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# Apalachicola Regional Stewardship Alliance and Florida's Forest Stewardship Program

Present a Workshop:

## Longleaf Pine Forest Restoration & Management

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**June 2, 2015, 8:30 am – 3:30 pm Eastern Time**

St. Marks Wildlife Refuge, Visitor and Environmental Education Center  
1255 Lighthouse Road, St. Marks, FL 32355

Longleaf pine has many favorable characteristics for landowners with long-term, multiple-use land management objectives. Longleaf pine yields a large proportion of high value solid wood products, is adapted to fire and is resistant to many insects and diseases. Longleaf pine forests provide ideal habitat for a diverse array of plants and animals. The goal of the workshop is to educate private landowners about longleaf pine habitat management, restoration efforts and available technical and cost-share assistance.



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### Agenda:

- 8:30 am **Sign-in, meet & greet**
  - 9:00 **Welcome, Introduction**, Joe Reinman, US Fish and Wildlife Service
  - 9:15 **Why Longleaf Pine?**, Stan Rosenthal, UF/IFAS Leon County Extension
  - 9:45 **Prescribed Fire**, Daniel Stevens, Florida Forest Service
  - 10:15 **Break**
  - 10:30 **Groundcover Restoration**, Holly Ober, UF/IFAS North Florida Research and Education Center and Brian Pelc, The Nature Conservancy
  - 11:00 **Managing Wildlife in the Longleaf Forest and How to Get Cost-Share Assistance**, Arlo Kane, Florida Fish and Wildlife Conservation Commission
  - 11:30 **Conservation Easements**, Bill Cleckley, Northwest Florida Water Management District
  - 12:00 pm **Lunch**
  - 1:00 **Field tour**
  - 3:30 **Conclusion, evaluation and adjourn**
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Funding for this workshop is provided by the National Fish and Wildlife Foundation Longleaf Stewardship Fund, USDA Natural Resources Conservation Service, USDA Forest Service through the Florida Department of Agriculture and Consumer Services Florida Forest Service and the Florida Sustainable Forestry Initiative Implementation Committee.

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## Resource Contacts

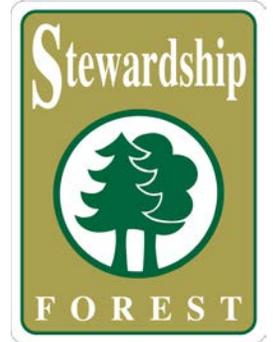
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<p><b>Chris Demers</b> Forest Stewardship Coordinator UF/IFAS School of Forest Resources and Conservation PO Box 110410 Gainesville, FL 32611 (352) 846-2375 <a href="mailto:cdemers@ufl.edu">cdemers@ufl.edu</a></p>	<p><b>Mike Mathis</b> Cooperative Forestry Assistance Regional Coordinator Florida Forest Service 2889 Forestry Drive Bonifay, FL 32425 (850) 547-7012 <a href="mailto:John.Mathis@freshfromflorida.com">John.Mathis@freshfromflorida.com</a></p>	<p><b>Stan Rosenthal</b> Extension Agent UF/IFAS Leon County Cooperative Extension Service 615 Paul Russell Rd Tallahassee, FL 32301 (850) 606-5202 <a href="mailto:stanr@ufl.edu">stanr@ufl.edu</a></p>
<p><b>Arlo Kane</b> Regional Landowner Assistance Coordinator Florida Fish and Wildlife Conservation Commission 3911 Highway 2321 Panama City, FL 32409 (850) 265-3676 <a href="mailto:arlo.kane@myfwc.com">arlo.kane@myfwc.com</a></p>	<p><b>Jeff Norville</b> Area Conservationist USDA Natural Resources Conservation Service 4155 Hollis Dr Marianna, FL 32448 (850) 482-2002 ext. 110 <a href="mailto:Jeff.Norville@fl.usda.gov">Jeff.Norville@fl.usda.gov</a></p>	<p><b>Steve Tullar</b> District Conservationist USDA Natural Resources Conservation Service 1244 N Jefferson St Monticello, FL 32344 (850) 997-2072 <a href="mailto:steve.tullar@fl.usda.gov">steve.tullar@fl.usda.gov</a></p>
<p><b>Ricky Lackey</b> Cooperative Biologist National Wild Turkey Federation 998 SW Yorktown Glen Lake City, FL 32025 (229) 378-0003 <a href="mailto:rlackey@nwtf.net">rlackey@nwtf.net</a></p>	<p><b>Holly Ober</b> Associate Professor UF/IFAS North Florida Research and Education Center 155 Research Road Quincy, FL 32351 (850) 875-7150 <a href="mailto:holly.ober@ufl.edu">holly.ober@ufl.edu</a></p>	<p><b>Daniel Stevens</b> Wakulla County Forester Florida Forest Service 3674 Bloxham Cutoff Rd Crawfordville, FL 32327 (850) 421-3101 <a href="mailto:Daniel.Stevens@FreshFromFlorida.com">Daniel.Stevens@FreshFromFlorida.com</a></p>

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

[http://www.sfrc.ufl.edu/forest\\_stewardship](http://www.sfrc.ufl.edu/forest_stewardship)

# Florida's Forest Stewardship Program

Forest Stewardship is active management of forests and related resources to keep these lands 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 forestlands 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 have 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 future public recognition as a certified "Forest Steward".
- Educational workshops, tours and a quarterly Stewardship newsletter developed and distributed by the University of Florida, IFAS Cooperative Extension Service.

## Getting into the Program

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 here:

**<http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/For-Landowners/Programs/Forest-Stewardship-Program>**



## 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.
- Access to seminars, field days, and workshops to help manage their Tree Farm even better.
- 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:

[http://www.floridaforest.org/tree\\_farm.php](http://www.floridaforest.org/tree_farm.php)



# 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

Panhandle Area

Roy.Lima@FreshFromFlorida.com

(850) 681-5942



### Robin Holland

Peninsula Area

Robin.Holland@FreshFromFlorida.com

(352) 732-1273



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

Roy Lima  
Panhandle Area  
(850) 681-5942



Robin Holland  
Peninsula Area  
(352) 732-1273

Roy.Lima@FreshFromFlorida.com

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# Got Invasives?

Invasive exotic plant problem? Use the Florida Invasives.org website to find financial and or technical assistance to manage or prevent an infestation.

FloridaInvasives.org is 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. It 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?

Public and private land managers have identified the high ecological and economic cost of invasive species as a statewide problem in Florida. The Florida Invasive Species Partnership (FISP) is a collaboration of federal, state and local agencies along with nongovernment organizations in Florida, formed to link efforts at preventing and controlling infestations of 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?

Each year, multiple agencies and organizations provide cost-share programs, grants and/or technical assistance to help landowners and land managers with various agriculture or natural resource management practices. Invasive exotic species management is an important practice covered within many of these programs.

FISP has created a searchable database, accessible at FloridaInvasives.org, that allows you to determine which agency or organization(s) might have an assistance program for your needs. Simply provide your county, target species and other pertinent information into the online tool, and you will retrieve a current list of available programs along with the most up-to-date contact information. 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. Log on at <http://FloridaInvasives.org> to find assistance with your invasive species problem.

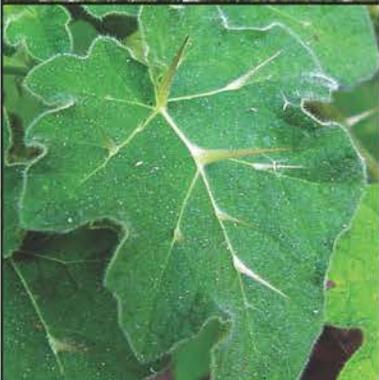
## Conclusion

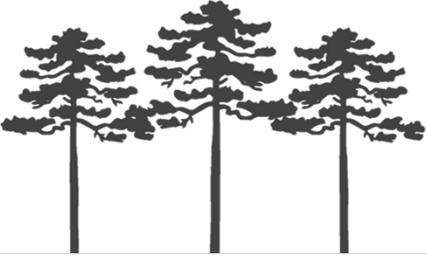
The Florida Invasive Species Partnership has created FloridaInvasives.org to help connect Florida's landowners and land managers with available technical and/or financial assistance programs to prevent or control invasive exotic species problems. These programs have been collected, evaluated and categorized in a single resource, making it easier to find the financial and/or technical assistance available to Florida landowners.

Go to FloridaInvasives.org to find out more.

Florida  
Invasive Species  
Partnership

Think Locally, Act Neighborly  
*Invasive exotic species know no boundaries!*





**Longleaf and Prescribed Fire**



Daniel Stevens

## A Brief History

- Before European settlement, Longleaf pine forests stretched from Virginia to Texas
- This unique ecosystem now occupies < 5% of its pre-settlement range



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## Overexploitation



- Longleaf was used primarily for ship building
- Provided lumber, pitch, tar, and turpentine



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## History of Fire

- Longleaf developed in an environment accustomed to fire
- Lightning was the primary cause of fire
- Native Americans also lit fires that would burn for days or weeks for hunting, protection, and ease of travel

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## Adaptation

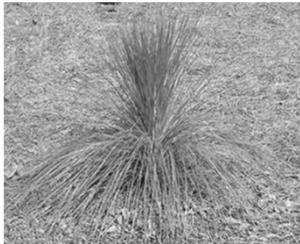
- Longleaf developed in an environment with frequent, low intensity fires
- As a result, it is very resistant to fire (pyrophytic)
- Adaptations include:
  - Fire resistant grass-stage seedling
  - Terminal bud protected by dense tuft of moist needles
  - Taproot growth in grass stage
  - Stem-elongation stage (also "rocket" or "bolting" stage) to quickly grow over ~5 ft when the tree is most susceptible to fire
  - Thick scaly bark protects cambium
  - Straight stems and self-pruning reduces chance of crown fire

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## Grass Stage

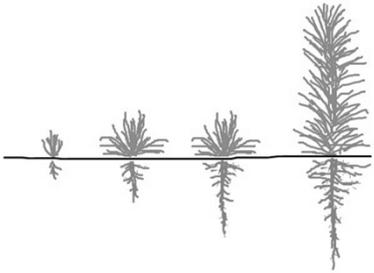


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## Taproot Development



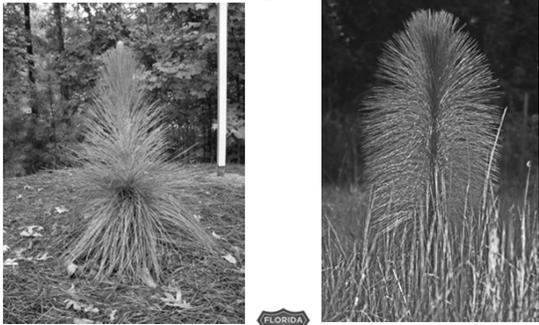
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## Dense Tuft of Moist Needles



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## Stem-Elongation Phase



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## Why Burn?

- Representative of natural circumstances
- Reduce amount of fuels in the forest, prevent wildfires
- Stimulating flowering and fruiting of native grasses and forbs, especially wiregrass, by:
  - Breaking down nutrients
  - Exposing seeds to sunlight and wildlife
  - Exposing mineral soil for seed germination
- Control species composition and competition
  - In this case, that means controlling hardwoods and other undesirable understory species
- Maintain open park-like conditions
- The most effective tool for maintaining the longleaf pine forest

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## Additional Benefits from Prescribed Burning Longleaf Pine Forest

- To maintain a healthy ecosystem for Endangered/Threatened Species – Pitcher Plants, Gopher Tortoises, Red Cockaded Woodpeckers, etc.
- To maintain a healthy ecosystem for game species – Deer, Quail, Turkey, etc.

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## Prescribed Fire Considerations

**Who is a Burn Manager? You are, we are!  
Any and all that contribute input,  
Landowner and Professionals...**

**Using Prescribed Burning in stands,  
development considerations?**

**Do I need to get a contractor?  
What are the trade-offs?**

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## Prescribed Burn Interval

- The shorter the cycle the better, determined by fuel build-up and forest recovery
- Longleaf pine sandhills generally 3 years, but sometimes longer, fuel accumulation is slow
- Longleaf pine flatwoods generally 2 years, but sometimes longer, fuel accumulation is faster
- If rotation is too long between burns hardwood encroachment is certain within the stand

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## When To Burn

**Dormant Season or Winter Burns, to:**

- Initiate prescribed fire within a forest, reduce fuels
- Also, top kill hardwoods
- From early December to the beginning of March

**Growing Season/Summer Burns, to:**

- Stimulate flowering and fruiting of grasses and forbs
- Also, good time to kill hardwoods
- From early April to August

**Seed Catch Burn**

- Clears leaf litter to allow longleaf pine seeds to reach soil
- From September to November
- Must be a cool burn to avoid damage to longleaf pine

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## When not the best time to Burn

- Less than one full growing season
- March/April while longleaf is candling
- The period after seedlings have emerged from grass-stage until they reach about 5 feet tall



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## Mature Longleaf Stand Considerations

Mature Longleaf Pine in fire suppressed systems accumulate litter in deep pyramidal heaps around the bases of the trees. These piles are composed of foliage, bark, cones, and shed limbs

Smoldering fires in these fuel beds can damage surface roots, creating entry points for root decaying fungi and other pathogens

Wetting or raking these piles may help avoid these problems

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## Litter beds around fire suppressed Longleaf can be a foot or more deep and smolder for days



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## Lookout Situations

- Are the firelines/firebreaks secure, will the fire escape?
- What direction will the smoke go? How much residual smoke will there be? Will the smoke impact Smoke Sensitive Areas, roads, schools, neighbors?
- Seasonality, time of year
- Prescribed burning during periods of drought could also kill pine trees
- Prescribed burning with low soil moisture, causes duff fires which will also kill the pine trees

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## **Pre-prescribed Burn Process**

### **Prescribed Burn Plan?**

**Gather information from local offices,  
i.e., County Forester or Forest Area  
Supervisor**

**Use the Internet to gather necessary  
information:  
[www.FreshFromFlorida.com](http://www.FreshFromFlorida.com)**

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## **Information Considerations**

### **Gathering information**

**Weather Predictions (Websites)**

**Burn Coordination (Helpers)**

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## **Obtaining a Burn Authorization**

**Before calling to obtain an authorization  
know your Section, Township, &  
Range.**

**Also helps to know a closest crossroads  
for dispatch to plot where burn will be  
conducted.**

**For Tallahassee District call (850)681-  
5951.**

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**The long term goal should be a Longleaf  
forest that looks something like this...**



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## Longleaf Pine Forest Groundcover Restoration

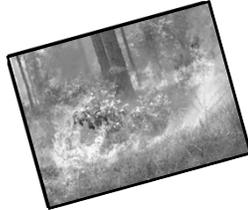


Brian Pelc, The Nature Conservancy  
& Holly Ober, UF

Referencing UF documents #16, 6269




## Why do we restore groundcover?






- For management
- For wildlife
- For biodiversity
- For sense of place

### 1. Identify the factors that caused the degradation of the site

- Previous land use like bedding or windrowing
- Fire suppression and canopy closure
- Invasive species





### 2. Define your goals and objectives in very specific terms

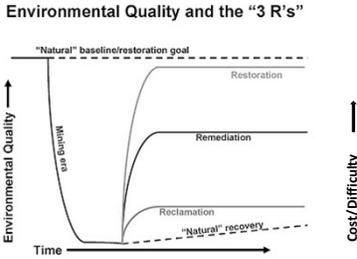
- “I want to have a nice place to walk”

↓ {Longleaf Forest Threshold} ↓

- “I want to encourage better fuels”
- “I want more wildlife”
- “I want to recreate historic conditions”

### 3. Carefully consider how realistic your goals and objectives are

#### Environmental Quality and the “3 R’s”



### Carefully consider your costs



Calculate not just initial costs, but also maintenance costs

- **Labor and time**
  - Assess the site to be restored
  - Assess the reference site
  - Mechanical treatments (roller-chopping, mowing, disking)
  - Herbicide application
  - Prescribed burning
  - Growing plants from seed?
  - Planting seeds or plugs
  - Monitoring

- **Equipment**
  - Purchase or rent all large equipment for roller-chopping, mowing, disking
  - Purchase herbicides, and purchase or borrow tanks, sprayers, ATVs
  - Arrange for safety equipment to be on hand for prescribed burns
  - Purchase plants and/or seeds of desired plants

#### 4. Identify the reference community for your site

- Agency contacts can help with this



Sandhill Site



Flatwoods Site

#### 5. Determine which restoration activities will be needed to reach the restoration goals you set for your site

- Agency contacts can help with this also
- Based on land history, available resources and desired future condition



Timber harvest and prescribed fire



Bare mineral soil moonscape

#### 6. Develop a detailed project schedule, but be prepared to change it



#### How we do it?

- Site Prep
  - Canopy mods (thinning, clear cut, replant)
  - Midstory mods (roller chop, gyrotrac, mow, chainsaw)
  - Understory mods (collect and sow native seed mix)



#### Seed mix collection

- Equipment: simple to complex
- Storage: depends on how soon it will be sown
- Cleaning: depends on how it will be sown
- Testing: can be helpful in estimating outcomes



#### Collection and Sowing Equipment

- Contractors are available for this work...but there's room for more!!



Seed collector : flail-vac by AgRenewal



Seed drill by Grasslander

### 7. Monitor

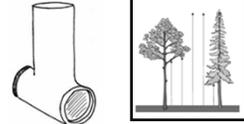
- Periodically characterize the groundcover at your site to tell if your efforts are paying off
- Simple approach: photo-monitoring



### 7. Monitor

- More complex approach: measure plants

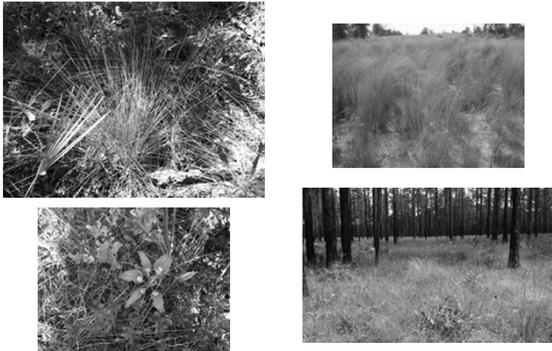
**Canopy Cover:** cheap method requires an empty paper towel cardboard tube. Estimate what % of view is obstructed by leaves & branches



**Ground Cover Structure:** make a 'cover board' or 'cover pole' with alternating black & white bands. Stand a standard distance away and record which zones are obstructed



### Pretty Pictures



# Northwest Florida Water Management District



Apalachicola Regional Stewardship Alliance and Florida's Forest Stewardship Program  
Longleaf Pine Forest Restoration & Management  
Workshop

## *Conservation Easements*

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT



## Conservation Easements (CE)

- **Less-Than-Fee (L-T-F) Acquisition**
  - Fee Simple: Acquire entire property
  - L-T-F: Acquire specific property rights
- **Acquiring a "Bundle" of Land Ownership Rights**
  - Envision your ownership rights as a "*bundle of sticks*" and you are selling some of your sticks.
- **Negotiation Takes Place Before Appraisal**
  - **First** – Property is appraised in fee simple (*Before Value*)
  - **Second** – Property is appraised with rights taken away (*After Value*)
  - **Difference** = Value of the conservation easement
- **Typical Rights Acquired:**
  - Development, Subdivision, Land Use Conversion, Reserve Wetland Forests, Roads, Quiet Enjoyment, Etc. – You have more rights than you realize and some are qualitative, i.e. usually cannot be valued in the marketplace!



## Conservation Easements (CE) cont.

### ➤ Development Rights

- Usually a property's most significant "value" right acquired.
- Example: Own 100 acres, allowable development density (zoning) is 1 dwelling per 10 acres. Under a CE, landowner sells that right, but can retain one impervious acre (43,560 sq. ft.) for a house and associated out buildings.

### ➤ Right to Subdivide or Break Up Property Into More Than One Parcel (Heirs, especially for larger tracts)

- Another significant "value" right acquired.
- No subdivision is **preferred** and one impervious acre per 40-acre parcel is **minimum** allowed.
- Example: Own 1,000 acres, have four children (250 acres each), three subdivisions allowed, i.e. split in half and split in half again = 3 subdivisions consisting of 4 parcels @ 250 acres each. A residence on each parcel is limited to one acre or less of impervious surface.

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## Conservation Easements (CE) cont.

### ➤ Land Use Conversion - Another significant "value" right acquired

- Limits "use" of property with minor exceptions for wildlife food plots, small gardens, etc.).
- Protecting wetlands and other water resources are especially important.
- Most CEs allow "traditional" low impact uses of property, especially silviculture (timber management and production) and improved pasture.
- No row crop agriculture, livestock feed lots, etc.

### ➤ Reserve Wetland Forests

- Additional water resource protection measure, especially along rivers and creeks with significant floodplain forests.
- Protects wetland forest habitat.
- Seller gets paid for wetland timber (may be a significant "value" component).

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NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT



## Conservation Easements cont.

- **CEs** - In the Form of a Deed Restriction (Exchanges).
- **CEs** - Can Be Very Creative, Especially When Restoring Longleaf/Wiregrass Habitat at a Landscape Scale.
- The Desire for Habitat Restoration/Prescribed Burning is Usually Landowner Driven.
- Three Examples From the Local Area.

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NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT




Gerrell Family Conservation Easement  
Basin: St. Marks  
Wakulla County, Florida

0 300 600 1,200 1,800 Feet

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## NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT



## Gerrell Conservation Easement

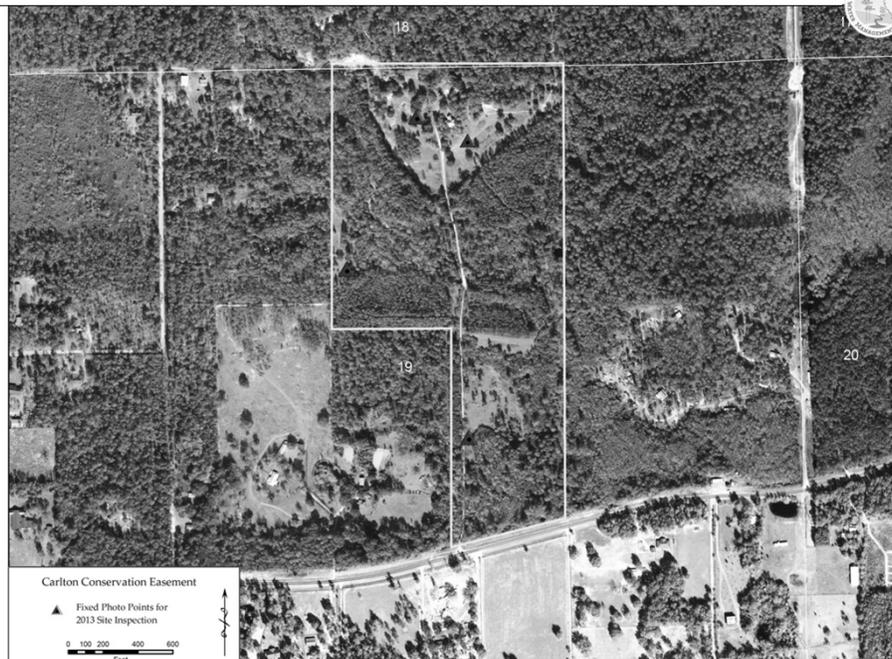
- CE on 149.11 acres of property.

In general the CE:

- **Protects** almost one-half mile of the St. Marks River shoreline and 30.46 acres of floodplain and isolated wetland forests.
- Landowner can **subdivide** the property twice into **three parcels** with one not less than 20 acres (an existing lot) and the two remaining parcels of approximate equal acreages (64.55 acres each).
- Residential Use (if subdivided) – Up to **three residential sites**, each no more than one-acre in size (impervious surface is limited to 43,560 sq. ft.), plus access to each residence.
- Wetland (Floodplain, etc.) forests **cannot be harvested** or converted to a different land use, i.e. reserved.
- Landowner can conduct **silvicultural activities** on 118.65 acres of natural pine uplands and pine plantations.
- Family Cemetery (historic) - Can be expanded from 0.55-acre up to one acre.
- Wildlife Food Plots – A maximum of **12 acres** in total, if subdivided,  $\leq 2$  acres for 20-acre lot and  $\leq 5$  acres for the two, 64.55-acre parcels.
- Landowner can hunt, lease the property for hunting, fish and recreate on property.

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## NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT



## NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT



## Carlton Conservation Easement

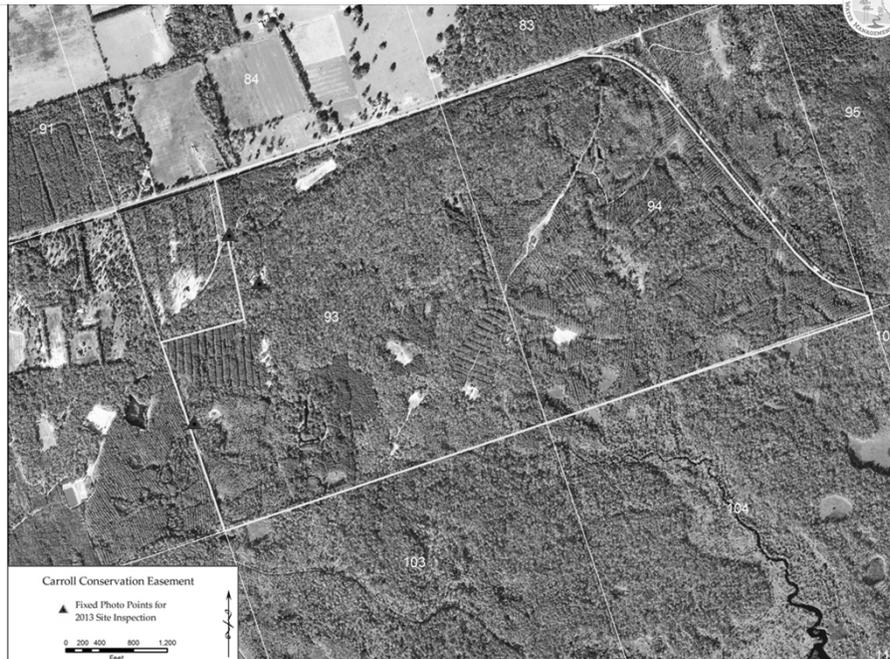
➤ CE on 62.4 acres of property.

In general the CE:

- **Protects** Leon Sinks (Fisher Sink), the Floridian Aquifer and the watershed of the Wakulla River.
- **Landowners cannot** subdivide their property.
- One residence (existing) allowed, with supporting buildings and amenities, not to exceed 30,000 square feet of impervious surface.
- Mixed bottomland hardwood (wetland) forest **cannot be harvested** or converted to a different land use, i.e. reserved.
- Landowners can conduct **silvicultural activities** on the upland portion of the property or convert to pasture, if silviculture is not desired.
- Wildlife Food Plots – Yes, but restricted to uplands.
- Landowners can hunt, fish and recreate on property
- Landowners can lease the property for hunting.

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## NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT





## Carroll/Avitable & Carroll/Langford Conservation Easements

- Two CEs on a total of 716.26 acres of property on consisting of three separate ownerships.

In general, the CEs:

- **Protect** the upper watershed of Spring Creek consisting of floodplain and other wetland forests.
- **History** – Originally, two separate CEs. Carrolls then bought the Carpenter CE and then sold a portion to Avitable and Langford, which continue to be encumbered by the original terms and conditions of the Carpenter and Carroll CEs.
- **Landowners** had the right to **subdivide** their property twice into **three parcels** with none < 40 acres.
  - ✓ Residential Use (if subdivided) – Up to **three residential sites**, each limited to **30,000 square feet** of imperious surface, plus access to each residence.
- Wetland and floodplain forests **cannot be harvested** or converted to a different land use, i.e. reserved.

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## Carroll/Avitable & Carroll/Langford Conservation Easements cont.

- **Silviculture** is allowed on the property's uplands and, if desired pine uplands can be converted to pasture for domestic livestock grazing.
- **Grazing** (in existing pine plantations) – Limited to animals kept for recreational rather than commercial purposes, but no commercial livestock production.
- Landowners (Carrolls) can conduct **silvicultural activities** on 174.27 acres of natural pine and pine plantation stands that occurred on their original 362.46 acres. The Carrolls then bought the adjoining Carpenter CE (a section) and gained additional pine acreage.
- Wildlife Food Plots – Yes, allowed on uplands.
- Landowners can have a hunt camp (existing), hunt, fish and recreate on property
- Landowners can lease the property for hunting.

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NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT 

### CE Benefits

- **Grantor** (Private Landowner)
  - Cash (Typically pay 40 to 60 percent of fee simple value)
  - Get paid for what you have already been doing with the property – Good Management!
  - Lower Income, Estate and Property Taxes (see your Certified Public Accountant)

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NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT 

### CE Benefits cont.

- **Grantee** (District, Agencies or Other Entities)
  - Protects water and other natural resources at a cost of 40-60 percent of fee simple value.
  - No public land management costs!
  - Property stays on the tax rolls, but usually at a lower rate.

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NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT 

### Future District CE Funding Outlook

- **Amendment No. 1 Funding** – Special Session?
- **Exchanges** – Evaluated on a “Case By Case” basis. District must realize a “net” water resource protection benefit before we will consider an exchange.
- **Donations** – Evaluated on a “Case By Case” basis. Income and Estate tax advantages (see your Certified Public Accountant)

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NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT 

### Thank You

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# Longleaf Pine Regeneration<sup>1</sup>

Chris Demers, Alan Long and Patrick Minogue<sup>2</sup>

Longleaf pine (*Pinus palustris*) has many favorable characteristics for landowners who have long-term, multiple-use resource management objectives. Of all the southern pine species, longleaf pine is the most insect-, disease-, and fire-resistant and has the greatest longevity. When burned regularly, longleaf pine forests develop a stable grass savannah ecosystem, providing ideal habitat for many plants and animals.

Longleaf pine is a pioneer species on a variety of sites but is intolerant of competition and flooding during its grass stage, when it appears like a clump of grass. Historically, fire and moisture have been the principal factors controlling longleaf distribution within its natural range. In the lower Coastal Plain longleaf grows on sandy, well-drained to excessively well-drained soils where loblolly or slash pine perform more poorly. Fire removes competing vegetation, exposing the bare soil necessary for successful seedling establishment. In the historic fire-dominated longleaf pine grass savannah ecosystem, relatively stable plant communities are characterized by an overstory of uneven-aged, widely spaced longleaf pines and fire-tolerant oaks such as bluejack oak (*Quercus incana*) and turkey oak (*Quercus laevis*) and a predominate ground cover of bunch

grasses such as wiregrass (*Aristida stricta*) and bluestems (*Andropogon* spp) which facilitate ignition and spread of periodic fires (Landers 1991). It is interesting to note that, despite this tree's performance on high, dry ground, its Latin name means "swamp pine." It does grow sparsely in wet areas as well.

## Artificial Regeneration

Options for artificial regeneration include planting of bareroot or containerized seedlings or direct seeding. Control of pine stocking (density) is best when seedlings are planted and container-grown seedlings generally provide the best survival rate. However, direct seeding may be a viable option for some situations, such as regenerating relatively small areas.

## Site Preparation

Longleaf pine is very intolerant of shade and is difficult to regenerate successfully without vegetation control. Vegetative competition around seedlings must be kept at a minimum until an adequate number of seedlings emerging from the grass stage are at least as tall as the competition. The type and degree of site preparation and the choice of

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The use of specific trade names in this publication does not constitute endorsement of these products in preference to others containing the same active ingredients. Mention of a proprietary product does not constitute a guarantee or warranty of the product by the authors or the publisher.

2. All chemicals should be used in accordance with directions on the manufacturer's label.

site preparation methods before planting longleaf seedlings will depend on the regeneration technique used, site conditions and your management goals.

At the very least, prepare the area for direct seeding by first performing a prescribed burn. Disking also enhances seeding by exposing mineral soil and reducing competing vegetation for a short period of time. More challenging site conditions require more extensive site preparation techniques to increase the likelihood of success.

The most common situations encountered include recently harvested forest sites and conversion of old fields and pasture land. On recently harvested forest sites, most residual hardwoods should be removed with heavy machinery such as a root rake or controlled using various herbicides (Table 1). Following herbicide treatment, broadcast site preparation burning is often done to improve hand or machine planting access. V-blade planters are used to improve machine planting access by pushing debris away from the planted row. On old fields and pastures ripping will help break hardpans (compacted soil layers) and scalping a narrow (1–2 ft) strip, about 2 to 3 inches deep, along the planted row will break up the sod and improve the effectiveness of the planting machine in setting the seedlings with good soil contact. Scalping and ripping are usually done following the contour on sloping land to avoid erosion problems. It is best to rip the soil during dry periods in the summer to obtain good soil fracture and well in advance of the planting season, so that eventually rain will settle the soil prior to planting in the late fall or winter. When planting into established grass sod, the most effective practice is to deaden the sod with glyphosate herbicide (Table 1) either by broadcast application or by treating a 5–6 ft wide band centered on the planted row *prior to planting*. Herbicide control of grasses is very important for successful longleaf establishment, and glyphosate is most effective when applied during periods of active growth. Disking established sod prior to planting is not recommended because it makes herbaceous vegetation control after planting very difficult.

The best results are obtained when vegetation is managed both before and after planting. During the first and sometimes the second growing season following planting, selective herbicides are used to control grasses and broadleaf weeds (herbaceous weed control). This practice significantly improves seedling survival, and accelerates seedling growth rates by reducing the period that seedlings remain in the grass stage by one or more years. In longleaf plantations in the sandy soils of the Coastal Plain, hexazinone and sulfometuron methyl are the most commonly used herbicides for herbaceous weed control in longleaf

pine plantations (Table 1). These herbicides may be applied directly over planted seedlings safely when care is taken to ensure the proper herbicide rate is applied and labeled method is followed. Pine tolerance to these herbicides is best when seedlings have initiated new root growth following transplanting. Many growers excavate a few trees to check for new roots, which are white in color, prior to herbicide application. Herbaceous weed control treatments are most effective when weeds just start to develop in the Spring, which is typically in late March through mid-April.

Once seedlings are established, a prescribed burning program is a natural and cost-effective means to manage hardwood vegetation and also shift the ground cover to grass savannah species which provide desirable habitat for many desired wildlife species (Platt *et al.* 1998, Noss 1989).

## Planting

Since longleaf pine seedlings do not become truly dormant, they require greater care in handling and planting than other southern pines. The success of longleaf pine planting depends on: (1) good soil moisture at and following planting (2) a well-prepared, competition-free site; (3) fresh, healthy, top quality planting stock; (4) extreme care in handling the stock from lifting to planting; (5) quality planting; and (6) managing competing vegetation through stand establishment. High quality seedlings can be grown as either bareroot or container stock, but container stock is somewhat more forgiving of less than optimum conditions.

The appropriate planting density will depend on your objectives. Low planting densities, 300 to 500 seedlings per acre or less, may be appropriate for longleaf ecosystem restoration and/or to provide wildlife habitat (such as that for bobwhite quail), whereas 750 seedlings per acre or more may be desirable to optimize timber production and pine straw raking.

Supplies of longleaf pine seedlings may not be sufficient to meet demands, so order your seedlings by early summer at the latest. For a list of longleaf nurseries, call your DOF County Forester ([http://www.fl-dof.com/field\\_operations/county\\_foresters/index.html](http://www.fl-dof.com/field_operations/county_foresters/index.html)) or the Longleaf Alliance, at 334-427-1029, and request a copy of the *Longleaf Nursery List*. This is also available on their website: <http://www.longleafalliance.org/>.

Choose a tree planting contractor that has experience with planting longleaf pine. Planting failures frequently result from improper seedling handling and planting. Hiring an experienced and reputable contractor may help to ensure

seedling survival and minimize the possibility of having to replant.

## BAREROOT SEEDLINGS

Longleaf pine seedlings at the nursery are stem-less and resemble a carrot with a clump of pine needles on top. Ideally, bareroot seedlings should have: (1) a root collar diameter (RCD) of 0.4 to 0.6 inch; (2) a stout, 6- to 8-inch or longer tap root; (3) at least 6 well-developed, 6- to 8-inch lateral roots with evidence of ectomycorrhizal development; (4) a winter bud with scales; (5) abundant, large, fascicled needles that are free of brown-spot disease; (6) been grown at a reputable nursery; (7) been undercut in the nursery bed well before lifting; and (8) a seed source from the same region as the planting site. Seedlings with a RCD of 0.3 inch or less generally have low survival rates.

Longleaf seedlings come out of the grass stage and initiate stem height growth when the seedlings have a RCD of about one inch. After planting, longleaf seedlings allocate their growth to develop a tap root prior to initiating stem height growth. As noted above, seedlings may initiate height growth at a younger age if competing vegetation is controlled. Once the seedlings emerge from the grass stage, height growth is comparable with loblolly or slash pine of the same age.

## CONTAINERIZED SEEDLINGS

There is increasing interest in using containerized longleaf pine seedlings (plugs) because they generally have greater survival than bareroot seedlings. Also, containerized seedlings can be planted throughout the year, whenever soil moisture is adequate *before and after planting*. Containerized seedlings have even been successfully planted during the hot summer months, when afternoon rains are common. They can be used to replant partial regeneration failures in the year they occur as well. Studies have shown that both fall-planted and late winter-planted containerized longleaf seedlings *often* have better survival and growth than winter-planted bareroot seedlings. Seedlings grown in large containers (large plugs) can enhance survival on adverse sites, but to ensure success sufficient site preparation and vegetation control measures must be taken.

The main drawback of containerized seedlings is cost. On average, the price per thousand is about twice as much for container-grown seedlings as the cost for bareroot seedlings. The larger the plug volume, the greater the cost to produce the plugs. Also, containerized seedlings are more bulky to handle during shipping and planting. However,

cost-share programs and increased survival make them a feasible option.

## NURSERY TO FIELD

Proper care and handling of seedlings from the nursery to the field includes several steps: (1) pick up seedlings from the nursery the day they are lifted; (2) protect roots from desiccation; (3) protect seedlings from wind and refrigerate them if possible during transportation to the planting site (place plugs loosely in large coolers or waxed boxes); (4) store seedlings in a cool, well-ventilated area for no more than three days before planting (or up to 3 weeks in refrigeration, 5 weeks with humidity control); and (5) do not expose seedlings to sunlight or heat. To optimize success, plant seedlings within three days of pickup from the nursery. Large planting jobs may require multiple trips to the nursery.

Longleaf seedlings are normally planted between November and the beginning of March when cool temperatures are prevalent and soils are normally moist. Planting during the early part of this time frame is best to give seedlings time to grow new roots before the dry weather of April and May. Containerized seedlings can be planted earlier whenever available soil moisture is adequate and rainfall occurs as noted above, but risks are diminished during the winter planting season. Avoid planting during periods of low soil moisture, dry weather, high temperature, low relative humidity, high winds or when soil is frozen.

Take enough seedlings to the field for one day of planting and keep them moist, but not submerged. When hand-planting bareroot seedlings, keep a little water or wet Tera-Sorb in the bottom of the planting bag. Make sure tree planters carry seedlings in the bag to prevent the roots from drying out.

For bareroot seedlings, machine planting is preferable to hand planting because the larger slit created by the machine provides for better root alignment. If hand-planting, bareroot seedlings should be planted with a shovel or large dibble. Containerized seedlings can be planted with a cylinder-type dibble or any of the flat-bladed implements used to plant bareroot stock.

For bareroot stock, position seedlings with taproots straight down and root collars at or slightly below the ground line (no more than 1 inch below), which allows the bud to be exposed once the soil has fully settled. Attention to detail during planting is critical -- a seedling planted too shallow will die quickly, and a seedling planted too deep will die slowly.

For containerized seedlings, position the plug so that the terminal bud is well above the soil surface. Tell planters to “leave the upper part of the plug exposed.” This insures the seedling is not planted too deep.

Don't plant directly in a subsoiled/ripped furrow because the seedlings may sink. Instead, offset 2–4 inches to the side of the ripped furrow.

On scalped sites, anticipate soil movement back into the scalped furrow and plant more shallowly, leaving approximately 1 ½ to 2 inches of the plug above the soil surface. Very shallow planting also works well on wetter sites.

## A WORD ABOUT COST-SHARE CONTRACTS

If you have a cost-share contract under the USDA's Conservation Reserve Program or Wildlife Habitat Incentives Program, the planting crew must know about it. If not, they may plant more than the maximum number of seedlings allowed in the terms of the contract, causing problems with your funding.

## POST-PLANTING CARE

Once seedlings are planted, the principal factors affecting seedling development are vegetative competition and brown-spot needle blight. Prescribed fire is the most common cultural treatment used to control both. If average brown-spot infection exceeds 20% of the cumulative foliage on sampled seedlings, a burn will be needed to control the disease unless it will result in excessive mortality. Seedlings in the early stages of height growth (coming out of the grass stage) are most susceptible to fire kill, especially when heavily infected by brown-spot.

## Direct Seeding

Due to increases in seed costs, this once cost-effective regeneration option is now potentially cost prohibitive, and it involves substantial risk. Failure can occur as a result of inadequate control of competing vegetation, low seeding rates, using seed not treated with bird or rodent repellent, seeding at the wrong time, or adverse weather conditions. Often, direct seeding results in stands with patchy stocking, with some areas not adequately stocked and some areas with too many trees. Low, poorly drained sites that are likely to be covered with standing water a week or more after seeding should be avoided. Likewise, deep upland sands that dry out rapidly after a rain are also unsuitable for direct seeding. Generally, sites that can be successfully planted can also be successfully seeded. As with planting, site preparation methods must control vegetative competition and expose at least 50% of the mineral soil. Seeds must

be in contact with the mineral soil for germination to take place. Seeds lodged in non-soil material will probably not become established.

In general, local seed sources are best. Seed or seedlings from North and South Carolina tend to grow poorly when planted on the Florida peninsula and vice versa. Most genetic improvement work with longleaf pine is concentrated on breeding for brown-spot disease resistance and accelerated initial height growth.

Purchase seeds from a reputable seed dealer. Longleaf seeds should be refrigerated at subfreezing temperatures until sowing. Sowing can take place in fall, when moisture is adequate and maximum daytime temperatures drop below 85 degrees. Seed can be sown at low cost by broadcast seeding at 3 pounds per acre, or spot seeding (dropping 3 to 5 seeds per spot). Row seeding, at 1 to 2 feet spacing between seeds, can be used when better control over spacing and density is desired. Large areas are best seeded by aircraft which use carefully calibrated equipment. After establishment (two to three years), clumps of seedlings can be thinned down to one tree.

## Natural Regeneration For Even-Aged Stands

Landowners who already have stands of longleaf pine can take advantage of a practical, inexpensive natural regeneration method known as the *shelterwood* system, a natural seeding method well-suited to the biological requirements of this species. The shelterwood method maximizes per-acre seed production and yields sufficient needle litter to fuel fires hot enough to inhibit hardwood regeneration and to prepare a seed bed. Regular prescribed burns should be scheduled throughout the rotation to maintain a low understory. Most of the mature stand is removed at the end of the rotation, but a portion is left standing as a seed source until regeneration is well established. Success with this method depends on: (1) a good seed year with adequate seed supply, (2) a receptive seedbed, (3) minimal vegetative competition and (4) ample soil moisture.

The shelterwood system requires 3 cuts that serve 3 basic purposes: (1) to prepare the stand for production of abundant seed, (2) to modify the environment in a way that promotes germination and survival, and (3) to build up the amount and size of advance regeneration to ensure a well-distributed stand following overstory removal.

## Preparatory Cut

The preparatory cut is 10 or more years before the planned harvest date of the stand and at least 5 years before the seed cut. This cut is essentially a thinning which reduces the basal area (BA) of the stand to a maximum of 60–70 square feet per acre of dominant and codominant pines. This cut promotes crown development and cone production. Most of the hardwoods not controlled by fire should also be cut at this time.

## Seed Cut

The seed cut is made 5 years prior to the planned harvest date and leaves no more than 30 square feet BA per acre of dominant trees at least 15 inches diameter at breast height (dbh), with well-developed crowns. Trees with evidence of past cone production are favored. Cone production peaks in the range of 30 to 40 square feet BA per acre, but the lower end of this range is preferred because logging-related seedling losses increase when more trees are removed in the final cut.

Monitor the cone crop by taking spring binocular counts of both flowers (next year's cone crop) and 1 year-old conelets (this year's cone crop) on selected sample trees in the regeneration area. These counts will give an estimate of the potential for the cone crop to regenerate the stand so that the seedbed can be prepared before the cones open. Generally, few seeds are produced by trees under 30 years old or under 10 inches dbh.

In order to achieve adequate natural regeneration, the available seed supply must feed various forms of wildlife with enough left over to establish a satisfactory stand. A minimum of 750 to 1,000 or more cones per acre is needed for successful regeneration. Longleaf cone crops are highly variable. Good seed crops occur every 5 to 10 years. Seedfall begins in late October and continues through November, but most seeds fall within a period of 2 to 3 weeks. About 70% of viable seeds fall within 65 feet of the parent tree. Under favorable weather conditions, seeds will germinate one or two weeks after dispersion. A prescribed burn 1 year before seedfall will remove accumulated litter and expose sufficient mineral soil for seedling establishment. A late-spring burn is most effective in controlling woody stems.

## Removal Cut

Once an acceptable stand of seedlings is established, the parent overstory can be removed. This cut can be delayed if necessary for management needs or market conditions. Seedlings can survive 8 or more years under the parent overstory with little or no effect on survival given exclusion of burning. However, logging damage becomes more serious once seedling height growth begins.

Naturally regenerated stands require the same attention as planted stands with respect to brown-spot disease and competing vegetation. Young stands should not be burned until at least 2 years after the removal cut to allow time for logging slash to decay and the seedlings to respond to release.

## Natural Regeneration for Uneven-Aged Stands

Uneven-aged stands are created using the selection system. In the selection system, trees representing a range in size are harvested at fixed intervals (called the cutting cycle, which ranges from 10 to 25 years). Regeneration (either natural or artificial) occurs in the harvested openings. This management approach allows periodic harvests, while maintaining a continuous forest cover. Smaller, lower quality trees are also removed to improve the overall quality of the stand. This method is covered in detail in this publication on opportunities for uneven-age management: <http://edis.ifas.ufl.edu/fr132>

## Conclusion

Longleaf pine has many desirable characteristics for landowners who have multiple-use forest management objectives. On appropriate sites, and with careful attention to detail during the regeneration phase, it is possible to enjoy the versatility of this species without compromising growth rates.

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Table 1. Common herbicide treatments for longleaf pine establishment on sandy, Coastal Plain sites. Read and follow all label directions.

<u>Common Name</u>	<u>Herbicide Rate</u>	<u>Trade Name</u>	<u>Amount Product</u>	<u>Comments</u>
A. Site preparation of recently harvested forest sites primarily to control hardwood and shrub vegetation				
Hexazinone	1.9 to 3 lb ai/A	Velpar L	2.5 to 4 lb/A	Hand "spotgun application" on grid pattern or to individual rootstocks, same sites as above
Imazapyr + Glyphosate	0.625 lb ae/A + 3lb ai/A	Chopper Gen2 Accord XRT II	40 oz + 2.2 qts	Tank mix, broadcast aerial or ground sprayer, clay soils, where maple, ti ti present
B. Site preparation in established pasture or grass sod				
Glyphosate	2 lb ai/A	Accord XRT II	1.5 qts	Foliar application, broadcast or apply to a band on tree rows prior to planting
C. Herbaceous weed control (grasses and broadleaf weeds) over-the-top of planted seedlings				
Hexazinone + Sulfometuron	6 oz ai/A 1.5 oz ai/A	Velpar L Oust XP	24 oz plus 2 oz	Tank mix, very broad spectrum
Hexazinone Sufometuron	7.6 oz ai/A 1.4 oz ai/A	Oustar	12 oz	Pre-package mix, very broad spectrum Use 10 oz product on sandy soil.

## Forest Groundcover Restoration<sup>1</sup>

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Holly K. Ober and Jennifer L. Trusty<sup>2</sup>

Restoration is the process of assisting the recovery of an area that has been degraded, damaged, or destroyed because of human activities. Groundcover restoration involves working to reestablish the herbaceous (nonwoody) species that occurred at a site before it was damaged. People may start groundcover restoration projects for a wide variety of motivations. Some common reasons are to enhance habitat for wildlife, to increase biodiversity, to restore ecosystem services (processes that take place in the natural world that provide benefits to humans), to increase natural beauty, or simply to take personal enjoyment in recreating the natural conditions that occurred historically.

Traditionally, restoration in forested areas focused on the trees, while groundcover received little attention. Recently, however, interest in restoring groundcover plants in the Southeast has increased as appreciation of their beauty and understanding of their importance to the health of ecosystems has grown. Due to the newness of the interest in this topic, no handbook yet exists to guide someone new to the field through the restoration process. Here we provide some suggestions for individuals interested in restoring groundcover.

### Planning a Restoration Project

Ultimately, the goal of most vegetation restoration projects is to recreate the community of species that were previously present at the site. The following seven steps will get you on a path towards success in a groundcover restoration project.

#### 1. Identify the factors that caused degradation of the site.

Before investing time and money in activities that could rebuild the groundcover at a site, determine what degraded the groundcover in the first place. Common problems include fire suppression, changes to the water table, or invasive species. Once you have pinpointed the causes of the damage, determine whether or not you can remove or at least mitigate the harmful conditions. If not, your restoration efforts are unlikely to succeed. For example, if fire suppression has changed the groundcover at the site and prescribed burning will never be possible there, simply reintroducing the missing species is unlikely to keep the site restored over time. In cases where factors that caused degradation can't be changed, restoration activities should not be started; effort should instead be shifted to a different location. In

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1. This document is WEC269, one of a series of the Wildlife Ecology and Conservation Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date November 2009. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.
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areas where the sources of degradation can be changed, restoration should begin only after these factors have been addressed. For example, in an area where bedding was used to change the water table to favor the growth of pine trees, many native groundcover plant species would not grow well due to the changes in water availability. Restorationists would need to remove the bedding and restore the hydrology (the water cycle) before attempting to reintroduce the native groundcover.

## **2. Define your goals and objectives in very specific terms.**

No single groundcover restoration plan would work at all sites. This is because restoration efforts must be tailored to address the unique problems that exist at each site. Before beginning to plan a timeline of activities for restoring groundcover, it is important to identify the target conditions you are aiming for. The goals of a restoration project should be broad statements of what you hope to achieve. For example, the restoration goal of your site may be to establish native groundcover species in an area that was converted to a pasture of nonnative grasses. Within this goal should be more specific objectives, which are more detailed statements describing the results you want to achieve. An example of an objective for restoring a pasture might include reducing the cover of non-native species to 10% within the next 5 years. By deciding in the beginning exactly what you are trying to achieve, you'll have a much clearer idea of when you've achieved it!

## **3. Carefully consider how realistic your goals and objectives are.**

Finances should be one of your most important considerations when planning for groundcover restoration. It's important to realize that the costs of the long-term maintenance may be more than the costs of the initial restoration activities. Many restoration efforts fail in the long run because not all expenses were included during planning.

Before starting any restoration activities, ensure reliable, continuing access to funding, labor, equipment, and seeds or transplants of the species you want to reintroduce. If any of these resources are

limited or uncertain, it is best to delay the start of the project.

The costs that should be budgeted for a groundcover restoration project are:

- Assessment of both the site to be restored and the reference sites (discussed below)
- Purchase or rental of mechanical equipment
- Mechanical preparation and maintenance of the site (disking, mowing, roller-chopping, etc.)
- Chemical preparation and maintenance of the site (spraying herbicides)
- Pyric preparation and maintenance of the site (prescribed burning)
- Purchasing or growing plants and/or seeds to reintroduce to the site
- Seeding and planting of desired groundcover
- Monitoring

If labor is limited, try contacting county agricultural extension agents, local plant societies, botanical gardens, high schools, and colleges. These organizations may have volunteers willing to donate their time and effort to assist with restoration.

## **4. Identify the reference community for your site.**

The goal of most restoration projects is to restore the ecosystem that existed at that site before it was damaged. Unfortunately, a description of the conditions at the site to be restored is often unavailable. When historical descriptions cannot be found and there is no intact habitat on your site to compare to, you can use off-site locations (known as "reference sites") as models. Carefully matched reference sites can help you define your restoration objectives by giving you a standard to imitate. Agency biologists or extension agents working in your area may be able to help you find a suitable reference site for your restoration project.

## **5. Determine which restoration activities will be needed to reach the restoration goals you set for your site.**

Conduct a "site assessment" at your reference sites and at the site you want to restore to inventory the characteristics of each site. This will allow you to compare the sites and develop a list of problems that need to be addressed to make your site more like the reference sites.

The specific activities that will be needed to restore the groundcover at your site can be determined using information in the references listed at the end of this document or by contacting specialists who have been restoring similar habitats in your region. Specific restoration activities you may want to consider are listed in Table 1.

Each of these techniques can be used alone or in combination with others.

#### **6. Develop a detailed project schedule, but be prepared to change it.**

Successful restoration requires planning for both the short and long term. Restoration is a long, complicated process that should involve planning, site assessment, selection of reference sites, careful consideration of potential restoration activities, and monitoring. A detailed timeline of what you will do each season of each year will help keep you on track.

However, it is also important to be willing to change your carefully laid plans. "Adaptive management" is an approach to restoration that involves monitoring the effects of your activities as you go so you can change tactics if your actions are not bringing about the results you want. This flexibility increases your chances of success in the long run. It allows you to learn from your mistakes and not repeat them again.

#### **7. Monitor.**

The best way to determine if your groundcover restoration project is successful is through periodic sampling of the groundcover. Measure such characteristics as percent cover (the amount of area covered by plants) and species richness (the number of species of plants present) and compare them to the same characteristics at your reference sites. This will help determine how effective your restoration efforts have been. Monitoring is the only way you can

identify which restoration activities are producing the results you want and which are not.

Keeping a photographic record is a good way to gauge your progress. Set up photostations so that you can take pictures at the same locations looking in the same directions at regular intervals over time. Making use of photostations is an efficient and simple method to observe changes in vegetation. Along with photographs, conduct regular plant sampling to determine which groundcover species are thriving, and how close you are to restoration success.

### **Important Considerations for Groundcover Establishment**

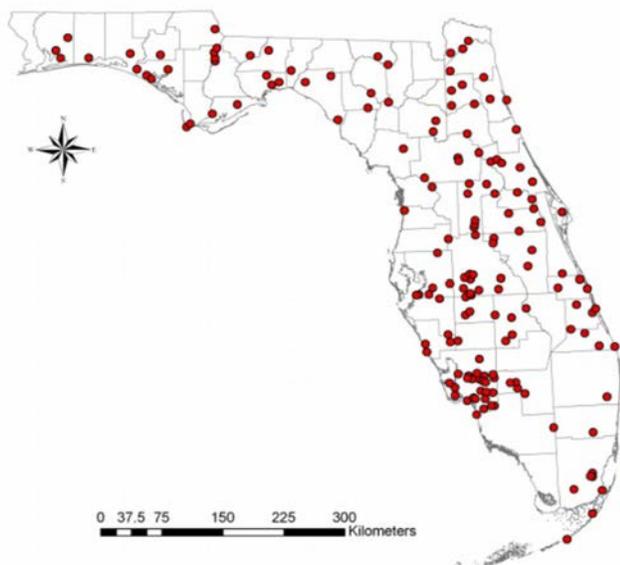
The number of decisions that must be made in a groundcover restoration project can be overwhelming. You need to decide which site conditions to change, select techniques to make these changes, determine if invasive species need to be controlled and if so which techniques would be best for this, decide whether to rely on nature to bring in desired species or to use direct seeding or outplanting of seedlings/tubelings, decide where and how to obtain seeds or seedlings/tubelings, determine what equipment you will need to do the planting, and decide whether prescribed burning would be appropriate, and if so, how often. Furthermore, the time of year that each of these activities takes place and the ordering of activities will affect your restoration success. There is a lot to consider!

Due to the newness of the interest in groundcover restoration, many of the restorationists who have conducted successful projects have not yet written descriptions of their successes. Much of the valuable information they have learned is impossible for others to access.

To help people interested in groundcover restoration to learn from one another, we have created a map of current groundcover restoration projects. Figure 1 shows the location of over 150 groundcover restoration sites throughout Florida. We recommend contacting individuals working on groundcover restoration in your area for additional assistance. For more information on who is conducting groundcover restoration, see the groundcover restoration manual at

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**Figure 1.** Map of restoration sites.

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**Table 1.** Activities that can help establish native groundcover

Restoration activities	What they will accomplish
Harvesting or thinning canopy trees	<ul style="list-style-type: none"><li>• increase sunlight at the ground level</li><li>• reduce competition between trees and groundcover</li></ul>
Mechanical treatment of shrubs (i.e., disking, roller-chopping, mowing)	<ul style="list-style-type: none"><li>• increase sunlight at the ground level</li><li>• reduce competition between shrubs and groundcover</li></ul>
Chemical treatment of invasive species (i.e., spraying herbicides)	<ul style="list-style-type: none"><li>• reduce competition between invasive and native groundcover</li></ul>
Pyric treatment (i.e., prescribed burning)	<ul style="list-style-type: none"><li>• promote desired groundcover</li></ul>
Outplanting or direct seeding	<ul style="list-style-type: none"><li>• reintroduce desired groundcover</li></ul>

## Benefits of Prescribed Burning<sup>1</sup>

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Alan J. Long<sup>2</sup>

### History of Fire in Florida

Fire has been a frequent visitor to Florida's forests for thousands of years. During spring and fall dry seasons, and even during periods of summer rain, fires ignited in grass, dry leaves, and brush at the base of lightning-struck trees. Native Americans also set fires to reduce vegetation, improve wildlife or grazing habitat, and create space for crops. Across much of historic Florida, these natural and human-caused fires maintained open park-like landscapes dominated by longleaf and other pines. Wildlife were nourished by the diversity of plants that thrived in these regular fire regimes. The short intervals between fires undoubtedly kept most fires far less intense than those of the 1998 fire season.

During much of the 20th century, intensified fire suppression and prevention activities decreased the frequency of wildfires and the area they covered. This brought about changes in forest ecosystems. Understory brush and hardwoods became more dense and both live and dead vegetation accumulated, increasing the risk of large and damaging wildfires.

In the last 40 to 50 years these changes in Florida's forests have prompted a return to using fire, under carefully controlled conditions, to accomplish many of the same benefits that were historically provided by natural fires. Today, approximately 1.5 to 2 million acres are prescribed burned each year for forest management, agriculture, grazing, and ecological restoration. At the same time, problems associated with smoke in populated areas and on highways have become more prominent. For the continued use of prescribed fire, landowners and the public alike must understand the value of fire for accomplishing various management goals as well as the constraints that limit its use.

### Reasons We Burn

Just as with natural and human-ignited fires in the past, prescribed burning today accomplishes many important ecological functions and landowner objectives.

#### *Reduction of Hazardous Fuels*

Prescribed burning removes accumulated fuels and therefore the risk of intense fires. Arson, human carelessness, and lightning will inevitably ignite fires

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in Florida. The rate of spread and damage caused by the resulting fires are directly related to fuel types and volumes. Fire intensity is much lower in grasses and small shrubs than in a 10-year-old growth of saw palmetto and wax myrtle. Fuel reduction would not have significantly decreased the number of fires in Florida in 1998, but would have reduced their severity. Prescribed burning must be repeated at regular intervals to maintain the protective effect of reduced vegetative fuels. In the long growing seasons of the Southeast, it takes only four to five years for fuels to return to hazardous levels.

### ***Altering Vegetative Communities***

Many public agencies and some private landowners conduct prescribed burns to restore or improve natural forest conditions. Longleaf pine forests are commonly burned, but so are ecosystems as diverse as sandhill scrub and wet sawgrass or pondcypress prairies. Fire intensities vary by plant community in temperature, from very low to extremely hot, and in frequency, from one to 40 years. In these natural forests, burning promotes seed germination, flowering, or resprouting of fire-adapted native plants and generally improves wildlife habitat.

Prescribed burning also changes the composition and density of existing vegetation. In forestry operations, fire at three- to five-year intervals reduces competing vegetation under forest stands over 10 years old. In pasture and range systems, fire is used at two- to three-year intervals to reduce encroachment of shrubs and invasive exotic weeds.

### ***Improving Wildlife and Livestock Habitat***

Regular burning of rangelands and understory plants improves forage quality and quantity for wildlife and livestock. New shrub, herb, and grass sprouts capture the quick flush of nutrients into the soil after a fire and are often more nutritious and palatable than older plants. Fires promote flower, seed, and fruit production, thus increasing available nuts and fruits for wildlife. Insects also increase rapidly after most fires. Burning different areas at different intervals and in different seasons produces a diversity of landscapes, animal food, and cover sources. Prescribed fire intervals of two to four years are generally used to promote this diversity.

### ***Controlling Pest Problems***

Prescribed burning has been used to control several different pest problems:

- needle disease on longleaf pine seedlings;
- bark beetles in infested trees that are cut and piled;
- root rot fungi;
- spittle bugs in pastures; and
- ticks and red bugs (chiggers).

### ***Improving Access***

By reducing dead fuels, harvest residues, and dense understory shrubs, prescribed fires can increase:

- openings for tree planting or natural regeneration;
- visibility within a stand for recreation or hunting;
- openings for wildlife feeding, travel, and display;
- access for hiking and other recreational activities.

### **Concerns about Prescribed Burning**

Although the benefits of prescribed burning are clear, there are also notable concerns. Two of the most important are the possibilities of fire spreading to adjacent properties and smoke intrusions in populated areas. Good management can reduce these concerns. Fires are generally not permitted by the Division of Forestry when hot, dry weather conditions or high fuel loads increase the likelihood that the fire could spread to other property. Similarly, fires should be ignited only when wind directions are predicted to carry smoke away from nearby smoke sensitive areas.

These restrictions may limit the opportunities to burn to just a few days each year. Given these limitations, many forest landowners do not have the staff or capability to burn all their land; they rely on

other management tools to reduce dense shrub and understory vegetation. Proper herbicide applications may require less frequent retreatment than would be necessary with fire. Mowers, choppers, chain saws, and grazing are also used to reduce dense brush and grasses, especially on small land ownerships. However, shrubs grow back quickly after these mechanical treatments.

Another concern with prescribed burning, especially in plantations grown for timber production, is the potential for mortality or growth loss in trees. Even with older longleaf pines, long-term studies have demonstrated that repeated fires will reduce stand volume. The reductions are the result of individual trees killed by fires as well as productivity and growth losses due to needle scorch.

Fire may also negatively affect individual animals. For example, slow moving animals may not be able to escape even low intensity fire fronts. Although ground nests may be lost in certain seasons, adult birds usually reneest and benefit from the abundance of insects that follow a fire. Small animals that find cover in burrows or under logs, plants, or stumps may be much easier prey for predators, who truly benefit from fires.

## **Conclusion**

Vegetation management in Florida is critical to retain desired native ecosystems, to reduce the threat of wildfire, and to meet other management objectives. Strategies for effective management may include fire, chemical, mechanical, or grazing technologies. Each method has benefits and problems associated with it. Carefully applied prescribed burning maintains or restores important ecosystem functions and structures, and is a cost effective method to fulfill a variety of landowner objectives. When burning conditions and risks are appropriate, it is usually the preferred strategy in forest management plans.

## Prescribed Burning Regulations in Florida<sup>1</sup>

Alan J. Long<sup>2</sup>

Prescribed burning is a precise tool for vegetation management that requires permits, proper training, care, caution and control. As defined in Florida Statutes (FS) Section 590.125, it is the controlled application of fire to vegetative fuels according to a written prescription and under specified environmental conditions. Appropriate precautionary measures must be followed to ensure that the fire accomplishes the specified land management objectives and is confined to the predetermined fire area.

When improperly managed, fire can kill or damage trees and small numbers of animals; it may also create smoke problems for people. Despite these potential problems, prescribed burning contributes significantly to wildland resource health and public safety. Properly managed, it:

- reduces the risk of wildfire by decreasing shrub and herbaceous vegetation and accumulated dead fuels,
- improves wildlife or grazing habitat,
- promotes successful forest regeneration,

- cycles nutrients for healthy ecosystems, and
- maintains fire-dependent species.



**Figure 1.** The controlled application of fire is an important tool for maintaining a healthy and safe forest. Photo by Bill Simpson, Florida Department of Agriculture and Consumer Services.

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Prescribed burning is not "setting fire to the woods" to let them burn as our ancestors may have done decades or centuries ago, although they often did so for some of the same reasons we do today. Rather it is the planned and deliberate use of controlled fire to achieve land management objectives (Figure 1).

An important difference between today and the past is the enormous increase in human population in Florida. Protecting people from physical harm, smoke-filled air, and poor water quality is the basis for the regulations and standards that now govern prescribed burning. This fact sheet briefly describes the origins of burning regulations and summarizes the current regulatory environment.

## History of State Fire Regulations

Regulations are basically in two formats: statutes derived from bills that pass the Florida Legislature and additional administrative rules written to clarify and implement the statutes. In both formats, the general objectives are to resolve state-wide concerns or opportunities or to provide state compliance with federal regulations such as the 1970 Clean Air Act and its revisions. Although fire-related regulations are mainly at the state level in Florida, additional rules have been imposed as local ordinances in both counties and cities.

Burning regulations in Florida are at least 70 years old. For example, the Forestry and Timber Laws of the State of Florida (Florida Forest Service Bulletin No. 10, March 1934) included the statement, "Whoever sets fire to or burns any wild forests, woods, lands or marshes, except between February 15 and March 31, of each year, or between the said dates without giving two days' previous notice to all persons living within one mile of the place intended to be fired, shall be punished by imprisonment not exceeding sixty days, or by fine not exceeding one hundred dollars." Other early laws banned burning at any time in Brevard, Indian River, and St. Lucie Counties (Laws of 1927), or allowed burning in Columbia County as long as it was on one's own property and was not allowed to spread elsewhere (Special Act of 1929).

For many years these rules focused on burning restrictions to prevent disastrous human-caused wildfires. The rules have been refined over the years and are currently summarized for landowners in the Florida Division of Forestry (DOF) pamphlet *Know the Law Before You Strike That Match in Florida*. These guidelines are available at all Division of Forestry and many county and municipal fire service offices.

The 1970 Federal Clean Air Act resulted in the establishment of specific air quality standards and the provision that each state would meet those standards through individual State Implementation Plans. A number of new burning regulations and rules in Florida in the last 40 years represent the state's response to the Clean Air Act, ensuring that smoke from prescribed burns will not affect compliance with air quality standards.

Similarly, in response to the 1972 Federal Clean Water Act, individual states are responsible for preventing the degradation of streams, rivers, and lakes. Protection of Florida waterways that are in or flow through forests is achieved by following guidelines described in the Silviculture Best Management Practices (BMPs). The BMPs were developed by representatives from many agencies and organizations and are monitored by the Florida DOF. Those that are relevant to prescribed burning are described later in this paper.

## Recent Legislation

As the use of prescribed burning expanded throughout the Southeast in the last 40 to 50 years, so did the incidence of smoke-related accidents on highways and smoke intrusions in urban and metropolitan areas. Along with these unfortunate, unplanned events came real or potential liability issues. By the late 1980s, prescribed burning was often curtailed because of the substantial risks of some type of litigation. In 1990, the Florida Legislature passed the Florida Prescribed Burning Act that provided the definition cited at the beginning of this fact sheet. This act defined important standards for prescribed burning and reduced the liability for burners who were properly certified and abided by the new and existing regulations.

Despite the increased use of prescribed burning, a long history of wildfire control and the lack of prescribed burning in many forested ecosystems have substantially increased the amount of living and dead fuels on many of the state's forest lands. Long before the 1998 fires, which were often intensified by these accumulated fuels, people around the state recognized the potential disasters that were developing on rural lands and in wildland/urban interface areas where residential development was mixed with dense forest and brush lands. The Hawkins Bill (1977) gave the DOF the authority to conduct prescribed burns on private property in interface or other wildland areas to reduce dangerous fuel levels.

Against this background of rules, regulations and experience, the 1998 fires clearly demonstrated the need to promote and protect prescribed burning across the state as well as to increase cooperation among diverse agencies involved in fire suppression and prevention. With those objectives, the 1999 Florida Legislature passed a bill that combined and revised all previous statutes related to prescribed burning and fire control. Accompanying rules in the Florida Administrative Code (FAC) were similarly updated and revised. Some of the most important changes focused on the following:

- increased attention to fuel reduction in interface and other wildland areas,
- increased public education about fire and prescribed burning,
- much greater liability protection for certified burners, and
- expanded burn permit conditions.

The statutes and code have been through additional minor revisions since 1999. The following summary includes all the important rules and regulations with which individual prescribed burners and landowners should be familiar. However, successful prescribed burning requires much more information and experience than just this understanding of regulations. You are **strongly encouraged** to fully understand fire behavior and prescribed burning methods before striking a match!

## Florida Statutes for Prescribed Burning

This summary does not intend to cover trash or other open burning in back yards. Refer to the DOF pamphlets *Know the Law Before You Strike That Match Florida*.

Whether or not prescribed burners have been certified (as defined below) by the Florida DOF, **all prescribed fires must** (according to FS 590.125) **fulfill the following:**

1. Be authorized by the local DOF office, or its designated agent before the fire is ignited. The permit must be in writing if the burn area is within an area of severe drought emergency (FS 590.081).
2. Have adequate fire breaks around the planned burn area, and sufficient personnel and firefighting equipment for controlling the fire must be on site.
3. Remain within the boundary of the authorized area.
4. Have someone present at the burn site until the fire is extinguished (which is defined as no spreading flame).
5. Have the specific consent of the landowner or his or her designee.

The DOF issues a burning authorization or permit once they determine that air quality and fire danger are favorable for safe burning. The DOF can cancel authorizations if those conditions change. Burning in a manner that violates any of these requirements is a second-degree misdemeanor.

Certified prescribed fires have additional requirements (FS 590.125.):

1. A written prescription must be prepared before a burning authorization is received from the DOF.
2. A certified prescribed burn manager must be on site with a copy of the written prescription from ignition of the burn to its completion.

A "certified prescribed burn manager" is an individual who satisfactorily completes the DOF certification program and possesses a valid certification number. The certification program includes either a correspondence course, classroom version of the correspondence course or one-week training course, direct experience managing or helping conduct at least three prescribed burns, and recertification every five years. Certification renewal requires a minimum eight hours of approved training or participation in approved Fire Council meetings and use of the certified burner's number on at least two burns or documented participation in five burns. See FAC 51-2.006 for additional rules about certification and prescribed burning (<https://www.firules.org/gateway/Chapter-home.asp?Chapter=51-2>).

A certified prescribed fire that meets all the requirements described in FS 590.125 is considered to be in the public interest and a right of the property owner. Under the 1999 legislation, "a property owner or his or her agent is neither liable for damage or injury caused by the fire or resulting smoke . . . for (certified) burns conducted in accordance with this subsection unless gross negligence is proven." The "gross negligence" condition provides substantially more protection to landowners and certified burners than under previous law. A certified burner who violates any of the requirements commits a second-degree misdemeanor.

## Administrative Rules for Prescribed Burning

To comply with the 1999 statute changes, the Florida Administrative Code was also revised. Important rules (see Chapter 5I-2, F.A.C.) for prescribed burning include the following:

1. Daytime burning authorizations are issued for 9:00 a.m. to one hour before sunset for noncertified burners and to one hour after sunset for certified burners.
2. Nighttime authorizations are issued for one hour before sunset to 9:00 a.m., under dispersion indices of 8 or higher and 6 or higher for noncertified and certified burners, respectively.

3. Certified burners must present their number at the time of their permit request, and they must have a copy of the prescription on site for inspection.
4. Minimum requirements for the prescription include stand, site, and fuel description; map of the area to be burned; personnel and equipment to be used; desired weather factors; desired fire behavior; ignition technique; time and date the prescription was prepared; authorization date and time period; an evaluation and approval of the anticipated impact of the proposed burn on smoke-sensitive areas; and signature and number of the certified burn manager. (Prescriptions are not required for fires managed by non-certified burners but are highly recommended for planning and control purposes).
5. Piles or windrows must be at least 100 feet from paved, public highways; they must be attended at all times; and wind direction must carry smoke from them away from public roads.
6. Open burning is not allowed:
  - when the fire or smoke may pose a threat to public health, safety, and property protection;
  - in smoke-sensitive areas between one hour before sunset and 9:00 a.m.;
  - when visibility on public roads would be reduced to less than 1,000 feet;
  - if it reduces visibility at a public airport;
  - during air quality or stagnation advisories.

## Local Ordinances

Local legislation (city or county) can be more restrictive than state and federal rules, but not in conflict with them. For example, you are required to obtain a permit from the Florida DOF to be legal for any prescribed fire or other open burning. However, you may also be required to obtain a permit from your local governing authority to be compliant with local ordinances. It is the responsibility of prescribed

burners to make themselves aware of any applicable local regulations regarding burning permits.

### **Silviculture Best Management Practices (BMPs)**

The 2000 BMPs are intended for implementation on all silviculture operations (which may include prescribed burning) whether or not the operations are subject to other regulatory standards or permits. The primary goal of the BMPs is to prevent erosion and sedimentation in Florida's waterways. Several BMPs relate specifically to prescribed burning and are described in more detail in the BMP manual (which is available at Division of Forestry offices or on the DOF websites; see Sources Below):

1. Site preparation burning in either primary or secondary Special Management Zones (SMZs) will only be conducted on slopes less than 18%.
2. Existing barriers and alternative fire line methods (such as harrowed, wet, or foam lines) will be used as much as possible to minimize plowed firelines.
3. Fireline construction will minimize impacts in sensitive areas, avoid SMZs and stream crossings, follow contours, and not connect isolated wetlands or serve as drainage systems.

### **Summary**

Prescribed burning is one important tool available to land owners and natural resource managers for maintaining healthy forests and range lands. Significant regulatory changes in the last decade have greatly enhanced the opportunities for responsible use of prescribed fire. Proper training, thorough prior planning, careful fire and smoke management, and practicing within the regulatory environment will assure wider use of prescribed fire and continued protection for land owners and managers.

### **Sources**

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## Controlling Hardwoods in Longleaf Pine Restoration<sup>1</sup>

Patrick J. Minogue, Kimberly Bohn, and Rick Williams<sup>2</sup>

Historically in the longleaf pine (*Pinus palustris*) ecosystem, periodic fires ignited by lightning during the growing season fostered a relatively stable community characterized by widely spaced, uneven-aged pines and an understory dominated by bunch grasses and a diversity of forbs (broad-leaved plants that often produce seed favored by wildlife) (Platt et al. 1988; Noss 1989) (Figure 1). Many game species such as deer, turkey, and quail; as well as some endangered species such as red-cockaded woodpecker; threatened species such as gopher tortoise; and species of special concern such as Shermans fox squirrel and Florida mouse; all prefer the habitat of a relatively open pine overstory, no midstory, and a grassland understory. The plant communities of the longleaf pine savannah contain few shrubs or hardwood trees because native bunch grasses such as wiregrass (*Aristida stricta*) and broomsedge (*Andropogon* spp.) facilitate the ignition and spread of surface burns during the growing season, limiting the development of all but the most fire-tolerant hardwood species such as bluejack oak (*Quercus incana*) and turkey oak (*Quercus laevis*) (Landers 1991). Like longleaf pine, these bunch grasses are resilient to fire, and fires during the growing season induce them to produce abundant and

viable seed, supporting wildlife and the proliferation of the ecosystem. With the exclusion of fire, these communities succeed to hardwood forests which are characterized by higher shading, greater litter accumulation, and less herbaceous ground cover. In the absence of management, shrubs and oak hardwoods will slowly encroach into the midstory, creating unfavorable conditions for groundcover and many wildlife species' wildlife habitat. Restoration of longleaf stands that have been unmanaged for long periods will require additional investments to restore the appropriate species composition and structure.

We have several tools available, used alone or in combination, to manage the hardwood component of longleaf stands including:

- tree felling
- machinery
- fire
- herbicides

**Tree Felling** – Cutting down individual trees is an option but this treatment alone will give rise to additional sprouting stems around the stump and

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**Figure 1.** Widely-spaced longleaf pines and an understory consisting of broomsedge and wiregrass facilitate periodic prescribed burning to maintain a relatively stable ecosystem. Credits: Pat Minogue, 2007

from the roots, typically resulting in more numerous stems of smaller diameter. This could potentially be used as an initial treatment by landowners with small properties, or on properties that have only a small hardwood component. However, long-term management will require follow-up treatments of either fire or herbicides to control the sprouts.

**Machinery** – Bulldozers can be used to clear large trees and underbrush, particularly in larger tracts where the desired groundcover is completely absent and re-planting and re-seeding will need to occur. However, this practice is expensive and consumptive of petroleum fuels, and additional problems include the potential for soil compaction, erosion, and re-sprouting of hardwoods.

**Fire** – Prescribed burning is a natural and cost-effective means to remove hardwoods from pine stands and promote desirable species in the understory. Burns in the late spring and summer are most effective in top-killing hardwoods (killing above ground portions). During warm seasons hotter burns are obtained and the heat of the fire will penetrate the bark of hardwood trees and shrubs fostering top-kill; however, the hardwood root system will survive and re-sprouting is expected. The bark of pine trees is thicker than hardwoods and thus they are better insulated, but even with a well executed prescribed burn pines can be injured.

Prescribed burning is an integral part of establishment and maintenance of the longleaf pine ecosystem. The first time a stand is burned it is best to do it in winter, under exacting conditions of wind, temperature, and humidity. Subsequent burns during the growing season may be done to control hardwoods. Prescribed fire regimes on a 2-3 year cycle are recommended. There are significant risks in prescribed burning regarding smoke and fire containment. It is best to work with trained and experienced burners and to prepare a burn plan in advance. Many southeastern states have “certified burner” programs through the State Forestry Commission or Division of Forestry. Additional information is available on the IFAS Web site <http://www.fireinflorida.com>.

## Silvicultural Herbicides

Selective herbicides may be used to remove hardwood trees and brush and to promote legumes and native grasses in the under-story (Minogue et al. 1991). Most techniques involve treating individual hardwood trees or brush with hand-held tools and back-pack sprayers. Broadcast applications are used to shift the species composition to desirable vegetation by using selective herbicides—ones that affect some plants more than others.

## Hack and Squirt Treatment

A hatchet and squirt bottle may be used to apply small amounts of herbicide directly into the vascular system of undesirable hardwoods. This approach is most appropriate where there are few scattered individuals with diameters greater than 3 inches. Many products are available for this use, but the most popular are Arsenal® Applicators Concentrate (imazapyr) and Garlon® 3A (triclopyr) which are mixed with water or used undiluted. A hatchet is used to cut through the bark in a downward fashion to create a cup in which to place a small amount of herbicide solution, one milliliter or about the amount a typical squirt bottle produces with one pull. Cuts are made around the stem to encircle the stem at a convenient height, and different approaches regarding the distance between cuts and solution concentration to use are described on the product labels. From experience, we know to use a sharp hatchet to ensure

a deep cut past the bark and well into the wood. Place only as much herbicide solution as will remain in the cut. Either imazapyr or triclopyr may be applied throughout the year with good results, except during the period of strong sap flow in the early spring. For imazapyr fall applications are optimum.

Imazapyr is the treatment of choice for most hack-and-squirt applications because of its effectiveness over a broad spectrum of tree and brush species and low use rate. However, imazapyr is soil active, meaning that it may be absorbed from the soil around treated stems by roots of desirable trees and other plants resulting in non-target injury. When applied at labeled use rates imazapyr will not be injurious to southern pines, which are tolerant to the herbicide.

For selective removal of some hardwood stems in mixed pine/hardwood stands, triclopyr is a better choice since it does not have soil activity. Selective removal by herbicide treatment within a species may result in injury to non-treated stems which share a common root system or grafts to treated stems.

### **Back-Pack Directed Foliar Sprays**

Where sapling size hardwoods less than head tall are to be controlled, backpack sprayers can be used to direct herbicide spray to the foliage of undesirable brush and sapling trees. Many herbicide products are available for this use, but combinations of Accord XRT® (glyphosate) and Arsenal® Applicators Concentrate or Chopper® (imazapyr) are most cost-effective across a wide range of brush species. A common mixture is 2% Accord XRT plus either 0.5% Arsenal or 1% Chopper in water. Add 1% methylated seed oil surfactant to improve control, particularly when treating oaks and other species with a thick cuticle (leaf covering). The oil improves penetration into the leaves and fosters good control. Apply this mixture to at least 2/3 of the crown with light coverage; there is no need to wet the foliage. Late summer to the beginning of fall coloration is the ideal timing. Refer to “directed foliar sprays” on the product labels for additional information.

### **Basal Stem Treatments**

Where undesirable hardwood crowns are too tall to reach with a backpack sprayer, or where very numerous sapling size stems are present, consider using a basal stem treatment with Garlon® 4 (triclopyr). There are several approaches described on the product label, but essentially a mixture of herbicide in oil is applied to the basal (lower) portion of the stem. It is best to treat the “root collar”, the base of the trunk where it goes into the soil up for about 12 inches. The approach is most effective on stems less than six inches in diameter, and is suggested for stems less than three inches. Diesel fuel, vegetable oil, or various mineral oils can be used as a carrier for the herbicides. The carrier type has little effect on hardwood crown-reduction during the dormant season. However, when the trees are growing, better results were provided by triclopyr mixed with vegetable oil (Williams and Yeiser 1995). The hack-and-squirt method discussed above is typically used for larger diameter stems. Basal stem treatments may be done anytime of year, including winter. Applications are made using a “straight-stream” sprayer such as the Gunjet® applicator.

### **Soil Spot Applications**

Velpar® L (hexazinone) may be applied directly to the soil surface to control susceptible species either by treating the soil at the base of individual stems, or when brush is dense, by making applications in a grid pattern (e.g., 3 X 3 ft spacing of spots). When labeled rates are applied, pines are tolerant to this herbicide. The amounts of product will depend on the hardwood species, stem diameter, and soil texture; see the product label for details. Undiluted product may be applied with a squirt bottle or by more durable equipment such as a MeterJet®. Optimum timing is from spring bud break to early summer. Rainfall is needed to foster root uptake. This material is particularly effective for controlling oaks.

## Broadcast Treatment

Several herbicides may be broadcast by ground or aerial equipment to selectively remove hardwood trees and brush in southern pine stands. The most common materials are Arsenal Applicators Concentrate (imazapyr) and various formulations of hexazinone (Velpar L, Velpar® ULW, and Pronone® 10 G). Imazapyr is applied in the late summer and early fall as a foliar spray and is effective on a wide range of hardwood species with some notable exceptions including winged elm and redbud. Imazapyr is tolerated by leguminous plants which may proliferate after broadcast applications (Minogue and Quicke 1999). Hexazinone products are applied from spring bud break to early summer and very effective in controlling oaks, particularly on the sandy soils characteristic of longleaf sites. In part due to the removal of the hardwood overstory and in part due to selectivity of the herbicide at low rates, hexazinone applications tend to promote native grasses such as broomsedge, wiregrass, and other graminoids, as well as forbs (Hurst and Warren 1986; Brockway et al. 1998; Hay-Smith and Tanner 1999). In comparing hexazinone broadcast to spot applications, Brockway concluded that spot applications provided better tolerance for native grasses, which were favored by the removal of a turkey oak overstory.

## Summary

Longleaf pine ecosystems require some management activity to maintain the favorable grassy understory. Left alone, the longleaf pine stand will develop a dense hardwood understory that will shade out desirable grasses, shrubs, and forbs. Lasting treatments must include either mechanical treatments where feasible, prescribed fire, herbicides or a combination of these options to keep undesirable hardwood under control.

**Table 1.** Herbicide treatment approaches for controlling hardwoods and shrubs in longleaf pine restoration and management of established stands

Undesirable Vegetation	Recommended Approach	Herbicide to Apply
Few scattered hardwoods, stem diameters greater than 3 inches	Hack and squirt (cut stem application)	Imazapyr Triclopyr
Shrubs, brush, sapling hardwoods less than head tall	Back-pack directed spray	Glyphosate plus Imazapyr
Numerous sapling hardwoods greater than head tall	Basal stem treatment	Triclopyr
Numerous or scattered oaks of various sizes, sandy soils	Soil spot application	Hexazinone
Large hardwoods, saplings, brush, and shrubs	Broadcast application	Hexazinone Imazapyr

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**For additional information see also:**

The University of Florida, Institute for Food and Agric. Sciences <http://edis.ifas.ufl.edu>

The Longleaf Alliance  
<http://www.longleafalliance.org>

PLEASE, READ AND FOLLOW ALL  
HERBICIDE LABEL DIRECTIONS

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Garlon® 3A, Garlon® 4, and Accord® XRT are registered trademarks of Dow AgroSciences.

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# Gopher Frogs, Burrows, and Fire: Interactions in the Longleaf Pine Ecosystem<sup>1</sup>

Elizabeth A. Roznik and Steve A. Johnson<sup>2</sup>

Florida is home to 28 species of native frogs and toads, which are found in a wide variety of habitats. The gopher frog (*Lithobates capito* [formerly *Rana capito*]; Fig. 1) is found in xeric (dry) habitats throughout the Southeastern Coastal Plain of the United States, particularly longleaf pine-wiregrass (*Pinus palustris*-*Aristida beyrichiana*) savannas. These large, plump frogs (2.5 – 3.5 in.) have wide heads and an obvious ridge down each side of the back, and their light-colored body is marked with dark brown or black blotches. Juvenile and adult gopher frogs spend most of their lives in upland terrestrial habitats, where they take shelter in burrows. Adults generally only return to wetlands in the late fall, winter, and early spring to breed and lay eggs; tadpoles develop in these wetlands, metamorphose, and disperse into terrestrial uplands. Gopher frogs can move long distances through terrestrial habitat and have been found more than a mile away from breeding ponds. In Florida, habitat loss and degradation have caused gopher frog populations to decline, and this frog is now listed by the state of Florida as a species of special concern.

Gopher frog populations face many challenges, and a major threat to the survival of this species is the disruption of natural fire cycles of the Southeastern Coastal Plain that historically maintained the habitat on which this species depends. Naturally occurring fires are now rare, and the aid of natural resource professionals who use prescribed fire to re-create the natural cycle is important for the survival of

gopher frogs and other species adapted to fire-dependent habitats. Understanding the relationships between fire, burrowing animals, and the animals that use burrows helps land stewards to manage habitat more appropriately for these species.



Figure 1. Adult gopher frog (*Lithobates capito*).  
Credits: Elizabeth A. Roznik, University of Florida, 2007

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## The Benefits of Burrows to Gopher Frogs

Gopher frogs rely on burrows and other underground refuges for shelter. Of the 350 or more species of animals that are known to take shelter in the burrows of gopher tortoises (*Gopherus polyphemus*; Fig. 2), the gopher frog is one of the most frequent burrow inhabitants. Gopher frogs also use the burrows of crayfish and small mammals, such as the southeastern pocket gopher, *Geomys pinetis* (for more information, read “Ecological Engineers: Pocket Gophers are one of Nature’s Architects” – <http://edis.ifas.ufl.edu/UW285>). Stump holes, spaces left by decaying roots of dead trees, are also important for shelter.

These underground refuges provide many important benefits to gopher frogs. All amphibians have semi-permeable skin that can dry out quickly—if they are unable to find shelter from adverse weather conditions or reabsorb moisture from rain or wetlands, they may die. Desiccation (drying) is a major threat to gopher frogs because they live in hot, dry areas. Gopher tortoise burrows maintain fairly constant temperatures and high humidity throughout the year. The more stable, hospitable environment of tortoise burrows and other underground refuges provides protection from dry conditions and extreme warm and cold temperatures. Burrows also provide shelter from the periodic fires that are essential for maintaining both the terrestrial and wetland habitats gopher frogs require.

In addition to sheltering gopher frogs from extreme weather conditions, burrows also protect them from many predators, such as snakes, raccoons, and owls. Many mammal and bird predators do not enter burrows; instead, they prey on gopher frogs when they leave the protection of the burrow. Snake predators typically forage for prey by “smelling” their surroundings and following the scent of their prey. Although some snakes seek shelter in burrows, a snake at the entrance of a burrow may not detect a frog that is deep inside, and will not often enter a burrow just to look for a meal. During the day, when gopher frogs are not active, burrows provide a safe place to rest. On warm nights, gopher frogs may leave the burrow to forage for prey, but they remain near the entrance of the burrow and quickly jump into the burrow if they feel threatened.

Although both juvenile and adult gopher frogs use burrows, these refuges are particularly important to juveniles. Small frogs lose moisture more quickly than adults and are also more susceptible to predation. The transition from aquatic to terrestrial habitat is a period of high mortality for juvenile gopher frogs, not only because of their vulnerability to

desiccation and predation, but also because they are unfamiliar with their new terrestrial habitat and the locations of burrows. We attached tiny radio transmitters to newly metamorphosed gopher frogs in the Ocala National Forest and tracked them into the terrestrial habitat to learn how they deal with these challenges during the transition from wetland to upland. We found that burrows are essential to the survival of these young frogs. Only 12.5% of newly metamorphosed gopher frogs survived their first month in terrestrial habitat, and the majority of the frogs that did not survive were preyed upon by snakes. However, juvenile gopher frogs that were able to locate a burrow within a few days of exiting the pond, and did not change locations, were more protected from snake predators and often were able to survive to the end of our study.

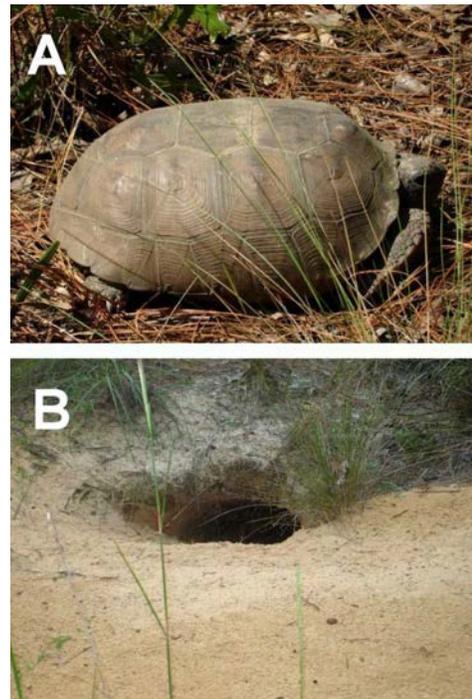


Figure 2. Gopher tortoises, *Gopherus polyphemus* (A) dig burrows (B) that can be up to 40 ft. long and 10 ft. deep. Credits: Elizabeth A. Roznik, University of Florida, 2006(A) & 2007(B)

## The Role of Fire in the Longleaf Pine Ecosystem

In the longleaf pine ecosystem, fire is the driving force that affects all other components of the ecosystem, both directly and indirectly. Longleaf pine-wiregrass savannas were historically maintained by fires naturally ignited by lightning or intentionally set by Native Americans. These fires occurred frequently (1–3 year intervals), preventing hardwood trees such as oaks (*Quercus* spp.) from becoming dominant, and thereby maintaining an open, sunny habitat dominated by pines and grasses (Fig. 3). When the intervals between fires are longer, or when fire is excluded altogether,

hardwoods begin to invade, filling the open gaps among the pines (Fig. 4). Soon, other fire-adapted plant species begin to decline as a result of increased shade. Over time, the habitat gradually transforms into a dense, shady, mixed pine-hardwood forest. Decades of fire suppression have contributed to the decline of the longleaf pine ecosystem throughout its range. The distribution of this ecosystem has been reduced by as much as 98%, and much of the longleaf pine-wiregrass habitat that remains is in poor condition. As a result of this habitat loss and degradation, many wildlife species associated with longleaf pine savannas have also declined, including the gopher frog and gopher tortoise.



Figure 3. Fire-maintained longleaf pine-wiregrass savanna.  
Credits: Elizabeth A. Roznik, University of Florida, 2007

## The Importance of Fire to Gopher Frogs

Fire also impacts the animals in the longleaf pine-wiregrass ecosystem. Fire influences forest characteristics, such as the openness of the canopy and thickness of the underbrush, which influence the distribution of burrowing animals. In turn, the distribution of burrowing mammals affects the availability of shelter sites that are critical for gopher frog survival. When longleaf pine savannas burn frequently, they are dominated by longleaf pines, grasses, and herbaceous (non-woody) plants. This forest structure provides high-quality habitat that can support large populations of burrowing animals like gopher tortoises and small mammals, resulting in higher density of burrows and therefore more potential refuges for gopher frogs. Because natural fires no longer occur at a scale and frequency sufficient for maintenance of longleaf pine savannas, land managers must use prescribed fire to mimic the natural fire regime.

Like the gopher tortoises and burrowing mammals associated with longleaf pine savannas, gopher frogs also prefer regularly burned habitat over habitat that has been fire

suppressed. By attaching radio-transmitters to juvenile and adult gopher frogs at ponds and tracking them into the terrestrial habitat, we found that both life stages chose fire-maintained habitat and avoided fire-suppressed areas with fewer potential shelter sites. Since survival of newly metamorphosed gopher frogs seems to depend on the ability of frogs to quickly locate burrows after exiting ponds (see “The Benefits of Burrows to Gopher Frogs” above), the ability of young frogs to identify and move into fire-maintained areas with higher densities of burrows should increase the probability that they will find a burrow and survive. Given the already low survival rate of juveniles, frequent fire is critical—higher juvenile survival means that more juveniles will mature and enter the breeding population as adults.

In addition to maintaining suitable terrestrial habitat for gopher frogs, fire also plays an important role in maintaining breeding ponds (Fig. 4). Gopher frogs breed in temporary and semi-permanent ponds, which periodically dry out during drought years. Historically, fires that occurred during such dry periods would enter dry ponds from the surrounding terrestrial habitat, eliminating peat and vegetation encroaching on the pond basin. These occasional fires maintained the structural characteristics of the pond basin and also kept the forest canopy open around the pond. Today, land managers are encouraged to burn through dry ponds when conducting prescribed burns in order to mimic the behavior of natural fires. When breeding ponds become shaded as a result of fire suppression, wetland vegetation that provides shelter and food for tadpoles is often reduced, and water quality may be reduced. As a result, growth and survival of gopher frog tadpoles may be reduced, contributing to declines in local gopher frog populations or even local extinctions.

## Other Gopher Frog Conservation and Management Concerns

In addition to the changes to their habitats as a result of fire suppression, gopher frogs face many other threats, both in terrestrial and aquatic habitats, and their conservation status is a concern in each state in which they occur. The greatest threat, aside from fire suppression, is habitat loss and alteration. Gopher frogs move long distances from breeding ponds and thus need large areas of habitat that are protected from urban development and conversion to other land uses, such as agriculture and tree farming, and actively managed with frequent prescribed fire. Factors that result in declines of gopher tortoises and burrowing mammals (e.g., disease) can also affect gopher frog populations by altering

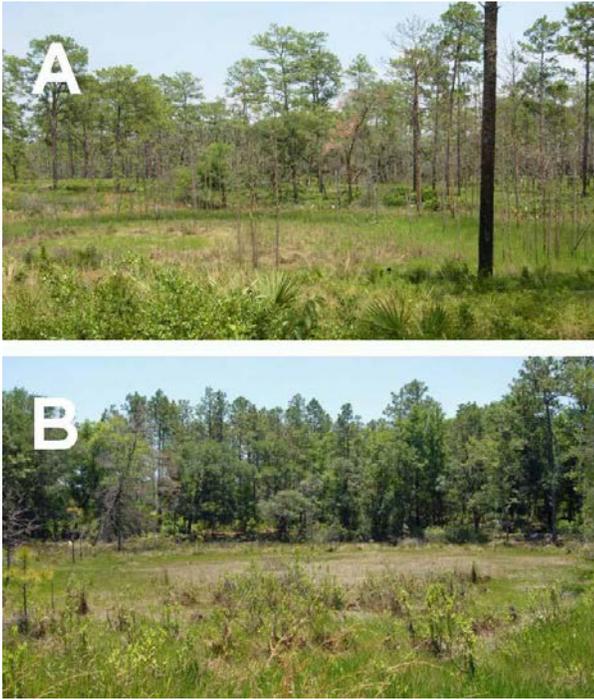


Figure 4. Gopher frog breeding ponds surrounded by habitat that has been regularly burned (A) and habitat where fire has been excluded (B). Note the difference in the widely spaced pine trees and sunny conditions in the fire-maintained habitat (A) and the dense hardwood trees and shady conditions in the fire-suppressed habitat (B). Credits: Elizabeth A. Roznik, University of Florida, 2007

the availability of critical shelter sites. In areas where trees are harvested, the practice of removing stumps can also reduce availability of shelter sites by eliminating stump holes. Recreational ATV traffic can result in mortality of gopher frogs, even on forest roads, and the destruction of their subterranean burrows. Recreational ATV traffic through wetlands also destroys vegetation critical for egg-laying and tadpole food and shelter, and can have serious, long-term impacts on breeding habitat. In addition, gopher frogs breed in ponds that are fish-free because they dry out periodically, so the introduction of fish (e.g., for sport fishing) that prey on gopher frog eggs and tadpoles can also harm gopher frog populations. In order to protect species such as the gopher frog, land stewards must carefully consider the potential impacts of all land use practices.

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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 if these clumps of bunch grasses. 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  
Conservation Commission

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## BOBWHITE QUAIL

to loaf during the mid-day heat. These protective thickets should be about 1500 ft<sup>2</sup> (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.



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For more information on Quail Management visit these sites:

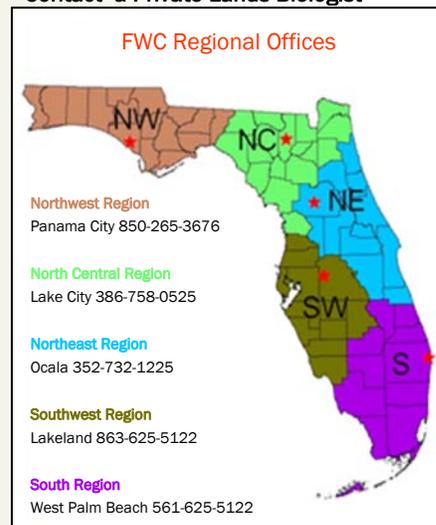
[www.myfwc.com](http://www.myfwc.com)

[www.naturalresources.msstate.edu/](http://www.naturalresources.msstate.edu/)

[www.extension.missouri.edu/publications](http://www.extension.missouri.edu/publications)

[www.quailforever.org](http://www.quailforever.org)

### Contact a Private Lands Biologist



## HABITAT MANAGEMENT

### COMMON FOODS

Grass seeds: panicums, paspalums, foxtails, dropseeds

Forbs: beans, peas, milk peas, cowpeas, clovers, ragweed, beggar ticks, dove weed, pigweed, spurges, 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.

# Conservation Easements: Options for Preserving Current Land Uses<sup>1</sup>

Chris Demers and Douglas R. Carter<sup>2</sup>

Conservation easements are cost-effective means for government agencies or non-government conservation organizations to protect land. Instead of purchasing land outright, these agreements allow organizations to purchase the development rights of a property, thereby protecting the target resources and saving money. Conservation easements may be a viable option for landowners wanting to prevent future residential and commercial development of their land, and those who want to reduce their heirs' inheritance tax liability. They often work best for landowners who have a strong connection to their land and want to ensure its protection for many generations. Landowners are encouraged to enter such agreements carefully because they require several rights to be conveyed to the easement grantee and the duration of these agreements is typically perpetual. This publication will describe conservation easements, what is involved in establishing one, some of the tax implications of such agreements, the government and non-government organizations that commonly participate in conservation easements, and important considerations for landowners before entering into such an agreement.

## What Is a Conservation Easement?

A conservation easement is a voluntary, legally binding agreement between a landowner and a government agency or non-government conservation organization. The

agreement keeps land in natural habitat, agricultural and/or open space uses. The agreement is customized to meet the landowner's and conservation entity's objectives and, in most cases, is perpetual.

In essence, the landowner sells or donates certain rights to use the land, which typically include the right to develop all or part of his/her land for non-agricultural or non-natural habitat, or non-open space uses to a conservation organization. Current uses, including residential and recreational uses, agriculture, forestry, and ranching, can continue under certain, legally-binding stipulations. The easement will protect qualities of the property such as wildlife habitat, open space, forest management, or aesthetics. Public access to the property is not a requirement to participate in a conservation easement, but the easement grantee will reserve the right to enter the property to monitor compliance with the agreement.

## How the Agreement Works

Generally, conservation easements are donations rewarded by certain tax benefits to the landowner. In Florida, perpetual conservation easements may be either donated or sold to an agency or other organization through *less-than-fee payments* to the landowner. If the easement is to be sold, the payment is negotiated between the landowner and conservation entity and may be as much as an amount

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equal to the difference between the fair market value of the land without the easement and fair market value of the land as encumbered by the easement.

For example, Joe and Jolene Landowner have property in Alachua County with planted pines, old pastures, and mixed hardwoods. The family is interested in growing and harvesting pines, hunting, bird watching, and some future forestry and wildlife habitat improvements on the property. They want the property protected from residential and commercial development, and they plan to pass the property on to their children with a decreased tax burden, so they decide to convey a conservation easement. Being close to a growing urban area, the land has a fair market value of \$3,500 per acre. The property appraiser determines that the overall current value of the property with a conservation easement is \$1,500 per acre since no major residential or commercial development can occur on the property at any time in the future. Therefore, the landowner could receive as much as \$2,000 per acre for the easement, and since the placing of the easement generally reduces the estate value of the property, the heirs' estate tax liability should also be reduced.

## Legal Stipulations

A conservation easement agreement will require the landowner to convey certain rights to the agency or organization that holds the easement and specifies uses prohibited on the property that will allow the easement to accomplish its intended conservation purposes. The grantor's (landowner's) reserved rights are also specified in the agreement. Examples of these stipulations, from a Florida Division of State Lands Deed of Conservation Easement, are outlined below.

## Rights Granted to the Grantee

Some or all of these rights may be conveyed to the grantee (the entity that receives the conservation easement):

1. the right to preserve and protect the conservation values of the property;
2. the right to enter the property at reasonable times in order to monitor compliance with the agreement;
3. the right to prevent any activity on or use of the property that is not consistent with the purpose or provisions of the easement and to require the restoration of areas or features of the property that may be damaged by inconsistent activity or use at the grantor's cost;

4. the right of first refusal to purchase the property in fee if the grantor proposes to sell the property to a third party other than a lineal descendant, and the right to purchase the property from the estate or trust of the grantor (void if easement is a charitable donation for no consideration);
5. the right to be indemnified by grantor for any and all liability, loss, damage, expense, judgment, or claim arising out of any negligence, willful action, or activity resulting from the grantor's use of the property or use of the property by the grantor's agents, guests, lessees, or invitees.

## Prohibited Uses

Activities on or use of the property not consistent with the purpose of the easement are prohibited under a conservation easement agreement. The following are some examples of prohibited activities specified in a conservation easement agreement:

1. no soil, trash, liquid or solid waste, hazardous materials, or pollutants defined by federal or Florida law shall be dumped or placed on the property;
2. activities or uses that will be detrimental to drainage, flood control, water conservation, erosion control, soil conservation, or fish and wildlife habitat conservation;
3. activities or uses detrimental to the structural integrity or physical appearance of any portions of the property having historical, archaeological or cultural significance;
4. planting of invasive exotic plants listed by the Florida Exotic Pest Plant Council, and the grantor shall control invasive exotic plants on the property;
5. commercial or industrial activity or ingress or egress across or upon the property in conjunction with any commercial or industrial activity, except as may be required for the exercise of the grantor's reserved rights;
6. new construction or placing of buildings, mobile homes, signs, billboards, or other structures on the property;
7. creation of new roads or jeep trails;
8. no more intense agricultural use of the property than currently exists on the property, if any, and no conversion of non-agricultural areas to agricultural use;
9. activities that adversely impact threatened or endangered species;

10. any subdivision of the land.

## Grantor's Reserved Rights

Some or all of these rights are reserved to the grantor and the grantor's representatives, heirs, successors, and assigns:

1. the right to observe, maintain, photograph, fish, hunt, introduce and stock native fish or wildlife on the property, to use the property for non-commercial hiking, camping, and horseback riding in compliance with federal, state, and local laws concerning such activities;
2. the right to conduct prescribed burning on the property provided that the grantor obtain and comply with the appropriate authorization from the regulatory agency having jurisdiction over this activity;
3. the right to harvest timber or other forest products in accordance with an approved forest management plan;
4. the right to mortgage the property;
5. the right to contest tax appraisals, assessments, taxes, and other charges on the property;
6. the right to use, maintain, repair, and reconstruct, but not relocate or enlarge, all existing structures, fences, roads, ponds, drainage ditches, and other facilities on the property.

## Tax Implications of Conservation Easements

Many factors influence the decision of landowners to consider encumbering development and other rights of property ownership through a conservation easement. Among those are economic and tax implications of either selling or donating conservation easements. Some tax benefits depend upon whether an easement is donated or sold, and some do not. Tax implications generally fall into one of 5 broad categories: income taxes (federal and state), estate taxes (federal and state), and property taxes. Since Florida has neither a state income tax nor a state inheritance tax, we will not explore their implications here as they vary widely from state to state and cannot be generalized.

In general, a landowner who sells a conservation easement to a qualifying organization will have to report proceeds from the sale as either ordinary or capital gains income for tax purposes. Landowners who choose to donate an easement may receive federal income tax and additional federal estate tax benefits. Tax benefits are only allowed for

“qualifying conservation contributions” as defined by the Internal Revenue Code (IRC) Section 170(h).

Donations can also only be made to qualifying conservation organizations. The Internal Revenue Service keeps a list of those organizations. They generally include federal and state natural resource management agencies such as one of the five Water Management Districts in Florida, and IRC Section 501(c)3 nonprofit, tax exempt land trusts. A more complete list of qualifying organizations for Florida residents can be found on the Land Trust Alliance website ([www.landtrustalliance.org](http://www.landtrustalliance.org)).

## Federal Income Tax Benefits

The enhanced easement tax incentive expired in December 2013. Gifts of all or part of a qualified conservation easement provide an annual charitable income tax deduction. Thirty percent of the donor's adjusted gross income can be claimed, with a 5-year carry forward. For example, the fair market value of a landowner's donated conservation easement is \$500,000, and the terms of the easement assure that the land will remain available for agriculture use. The landowner's adjusted gross income is \$80,000.00. The charitable deduction for the year of the transfer is \$24,000 (30% of \$80,000). This leaves \$476,000 (\$500,000 - \$24,000) to carry over for the next 5 years.

These income tax provisions are subject to change. For the latest information see the Land Trust Alliance website at <http://www.landtrustalliance.org/policy/taxincentives>.

## Property Tax Benefits

Florida House Bill 7157 went into effect in January 2010 under 196.26 and 193.501, Florida Statutes (F.S.). This law provides property tax exemption for real property dedicated in perpetuity for conservation purposes (form DR-418C) and a current use tax assessment of land used for conservation (form DR-482C). Section 196.26(2), F.S. states that: “Land that is dedicated in perpetuity for conservation purposes and that is used exclusively for conservation purposes is exempt from ad valorem taxation.” According to the statute, land that is “dedicated in perpetuity” is “land encumbered by an irrevocable, perpetual conservation easement.” More information about this provision is at the Florida Dept. of Environmental Protection website at: [http://www.dep.state.fl.us/lands/arc\\_conservation.htm](http://www.dep.state.fl.us/lands/arc_conservation.htm)

Land owners who meet the criteria for this property tax benefit should apply with the Florida Department of Revenue through their property tax appraiser's office. A complete online listing of property appraisers by county is

at <http://dor.myflorida.com/dor/property/appraisers.html>. Keep in mind that if your property is already receiving favorable tax treatment via an agricultural assessment (or other “current valuation”), a conservation assessment outside of that associated with a perpetual conservation easement may or may not further reduce the property tax. An agricultural assessment is an agricultural production-oriented classification. Land not already in an agricultural classification or some other tax-favorable classification may benefit from a conservation assessment depending upon the post-easement fair market value, the types of encumbrances specified in the conservation easement, future land use options, and other considerations.

## Federal Estate Tax Benefits

Federal estate taxes may be significantly reduced through either selling or donating a conservation easement. Additional tax benefits may accrue if the easement is donated. The most direct benefit results from reductions in fair market value and thus the value of the gross estate and the ultimate estate tax burden.

Additional tax benefits may result when easements qualify as a charitable contribution. Section 508 of the Taxpayer Relief Act of 1997, as amended by the IRS Reform Act of 1998 and the Economic Growth and Tax Reconciliation Act of 2001, allows the exclusion of up to 40% of property value encumbered by a conservation easement from the gross estate value. This is in addition to any reduction in taxable estate value resulting from the easement itself. The gross estate exclusion amount is currently limited to \$500,000. Also, the 40% exclusion is the maximum amount and is on a sliding scale. This amount is reduced if the value of the conservation easement is less than 30% of the unencumbered property value. The 40% rate is reduced by 2% for every 1% the value of the easement is less than 30% of the unencumbered property value.

All tax laws are subject to change. The Land Trust Alliance web site is a good place to keep up to date on the latest tax information associated with conservation easements: <http://www.landtrustalliance.org/>.

## Participating Organizations

What organizations will purchase a conservation easement? The major state agencies involved with conservation easements in Florida are the: Department of Environmental Protection (DEP) and Water Management Districts. These

agencies are particularly interested in buying easements, usually in large blocks, in order to protect watersheds.

Typically, conservation easements are donated to charitable nonprofit land trusts. However, occasionally these organizations may purchase easements for subsequent resale to a government agency, or as an effective leveraging tool to protect more land for less money because fee ownership, possession and many other rights remain with the landowner. A listing of some of these conservation organizations can be found on the Land Trust Alliance website (<http://www.landtrustalliance.org/>).

## Concluding Remarks

Since a conservation easement should be customized to meet specific objectives for you and the conservation entity, the agreement should contain some flexibility to allow for desired future uses. Try to anticipate future uses that you or your heirs may want to allow on the property that are consistent with the conservation objectives for the property. For example, John Landowner currently has no plans to harvest or plant pines on his land, but he or his heirs may want to allow those types of activities in the future and this activity is consistent with the conservation objectives for the property. A conservation easement is forever, so it is important to consider as many desired future uses as possible before finalizing the agreement.

It is also essential that the landowner carefully review the implications of the easement with legal and financial advisors before the final agreement. Also, bear in mind that your property will be subject to periodic visits (usually one scheduled visit per year) by the conservation organization to verify compliance with the agreement.

The following are some important questions to answer before entering a conservation easement agreement:

- What resources do you and the conservation entity want to protect on your property?
- What activities do you and the conservation entity want to prohibit on your land now and in the future?
- What activities do you want continued on your land?
- Are you willing to convey the rights as required in the agreement?
- What other activities, in addition to those taking place currently, might you or your heirs want to do in the future, which are compatible with your and the easement grantee’s conservation objectives?

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- Stockwell, P. 2001. Deed of Conservation Easement. Florida Division of State Lands. 11 p.

## More Resources and Links

Groundcover Restoration in Forests of the Southeastern United States, available at <http://sfrc.ufl.edu/CFEOR/index.html>

Groundcover Restoration Implementation Guidebook (FWC), <http://www.floridainvasives.org/central/GCRGuidebook.pdf>

Forest Plants of the Southeast and their Wildlife Uses, James H. Miller and Karl V. Miller, University of Georgia Press.

Field Guide to Common Legume species of the Longleaf Pine Ecosystem. H. Norden & K. Kirkman. Joseph W. Jones Ecological Research Center Ichauway, [www.jonesctr.org](http://www.jonesctr.org); call the center at (229) 734-4706

Florida Wildflowers Growers Cooperative, <http://www.floridawildflowers.com/>

Andrews Nursery, Florida Department of Agriculture & Consumer Services, <http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/For-Landowners/Programs/Bare-Root-Tree-Seedlings-For-Sale/Andrews-Nursery>

The Natives, Inc., <http://www.thenatives.net/>

Florida Association of Native Nurseries, <http://www.floridanativenurseries.org/>

Longleaf Alliance List of seed sources, <http://www.longleafalliance.org/resources/contractor%20list.pdf>

## UF/IFAS Forest Management and Stewardship Extension Publications on EDIS:

[http://edis.ifas.ufl.edu/TOPIC\\_Forest\\_Management\\_and\\_Stewardship](http://edis.ifas.ufl.edu/TOPIC_Forest_Management_and_Stewardship)

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- [Longleaf Pine Regeneration](#)
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- [Stewardship Ecosystem Services Study: Carbon Stores on Florida Forest Stewardship Program Lands](#)
- [Ten Tips for Encouraging the Use of Your Pine Plantations By Game Species](#)
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- [Thinning Southern Pines - A Key to Greater Returns](#)
- [Tips for Integrating Land and Wildlife Management: Deer in Forests](#)
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- [Using Soils to Guide Fertilizer Recommendations for Southern Pines](#)
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