

DRAFT Forest Landowners Guide to Preparing for and Recovering from Hurricanes in the Southeast U.S.

This is a draft of guidance being developed by the USDA SE Climate Hub to help forest landowners prepare for and recover from hurricane damage.

This section will focus on the following:

- Pre-hurricane planning for long-term preparedness when managing forests in the southeastern United States
- Establishment of forests in the southeastern United States for best hurricane resilience
- Short-term pre-hurricane forest planning
- Post-hurricane evaluation and recovery

I. Pre-Hurricane Planning – Long-term Preparedness

When planning for forest management in hurricane prone areas, landowners are encouraged to think about the biological and site factors that can make an area more resilient to hurricanes expected in both current and future hurricane seasons. Good timber inventories and thoughtful harvest scheduling can also protect your forest investment.

Initial Site Planning

- *The first thing to do is have a complete inventory of your forest.* Landowners often overlook this important land management task. A thorough forest inventory can provide information on tree species, number of trees, tree diameters and heights, and it can provide an estimate of the dollar value of your forest. A relatively current forest inventory (completed within the last 5 years) is necessary when estimating the value of the standing timber and losses for tax purposes. The results can also help you determine if your forest needs to be harvested or have other management activities completed outside of hurricane season that can improve forest health and resilience. Finally, forest inventories also provide documentation of forest condition prior to damage that can be caused by high winds or hurricanes.
- *Determine what soil types exist on your land.* Soil type determines which tree species are best suited to your forest site and can also give some insight into how trees might respond during hurricane events. Areas with shallow soils are more likely to have trees blow over or “tip-up” in

high winds than areas with deeper soils. Landowners can determine forest soil types on their property by using the United States Department of Agriculture, Natural Resource Conservation Service (USDA NRCS) Web Soil Survey which can be found at <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.

- *Select the best tree species to manage on your site.* Trees native to hurricane prone areas are naturally more resilient to potentially damaging agents caused by hurricanes such as high winds and flooding. For example, one southeast Mississippi study examined trees damaged by high winds caused by Hurricane Katrina (Johnsen et al. 2009). It was found that regardless of tree height or density, longleaf pine (*Pinus palustris*) had less mortality (7%) than slash pine (*Pinus elliottii*) (14%), or loblolly pine (*Pinus taeda*) (26%). The tree species you select should be the one that is best suited to your forest soils, location, and your management objectives (table 1).

Table 1. Characteristics of southern pine trees that naturally occur in hurricane prone areas of the southeastern United States

Pines	
Loblolly pine (<i>Pinus taeda</i>)	Grows very well on loamy soils that occur in drainages or lands suitable for agriculture. Sites with high fertility and moisture are best suited to loblolly pine management. This species is not competitive on eroded or low fertility sites. Small or young trees not fire tolerant.
Longleaf pine (<i>Pinus palustris</i>)	Grows across a broad range of sites from wet to dry but this species is more competitive than slash and loblolly pines on drier upland soils. Small/young trees are fire tolerant. The use of prescribed fire is necessary for successful longleaf pine management.
Sand pine (<i>Pinus clausa</i>)	Grows best on droughty sandy soils that rarely, if ever, are saturated with water.
Shortleaf pine (<i>Pinus echinata</i>)	More competitive than loblolly or slash pine on upland sites. Often found mixed with upland hardwoods and longleaf or loblolly pines east of the Mississippi River and in pure stands in western part of range. The use of prescribed fire is needed for successful management.
Slash pine (<i>Pinus elliottii</i> var. <i>elliottii</i>)	Grows on moist, sandy flatwoods (spodosols) and savannah sites. Native to coastal areas. Not fire tolerant at a young age.

- *Think about current road access on your property and where future roads should be built.* Consider upgrading current roads or constructing higher quality roads that are crowned and graveled for better access to your forest during wet weather. Work with an experienced road construction contractor to make sure that stream crossings meet state Best Management Practices and that culverts are properly sized to prevent “blowouts” during periods of high water flow. Slower moving storms can produce large amounts of rainfall in a very short period which can cause erosion, undermine roads, and wash away culverts. More information on constructing forest roads can be found in the USDA Forest Service Forest Road Construction and Maintenance handbook <https://www.nrs.fs.fed.us/fmg/nfmg/docs/mn/roads.pdf>.
- *Build relationships with timber buyers and loggers in your area.* If your lands are damaged during a storm event, most likely others in the area will be as well. This means that there will be many people making calls to have their timber salvaged following the storm. It is during these times of crisis that personal relationships help to get your calls answered and logging crews deployed to salvage your timber quickly. If timber harvest is delayed due to an oversupply of wood in a locally glutted market, downed trees begin to lose value due to rot or blue stain.
- *Establish your financial basis.* The Internal Revenue Service (IRS) defines basis as the amount of your investment in property for tax purposes. The basis should be established at the time the timber property is acquired. This occurs either through purchase, trade, inheritance, or gift. Further, it is important to understand that the way timber property is acquired has a major impact on the casualty loss deduction. Knowing your basis is necessary for tax considerations and is needed in the event you encounter a casualty loss which, is any event that is sudden, unusual, and unexpected such as major storm damage from hurricanes. The basis for your timber can be retroactively established if you do not know it. However, a professional forester will need to be hired to do so. Depending on how much timber you own, you will need to decide if the potential deduction in taxes or from casualty loss will be greater than the cost to hire a professional forester. ***Until the basis is established, the IRS will not recognize casualty loss.***

Site Establishment

When establishing a new forest plantation, the following steps should be followed:

- *Determine how many trees per acre you want to plant.* In general, trees native to hurricane prone areas naturally regenerate at higher densities. Although it will vary depending on tree species selected and landowner objectives, initial planting densities of 500 trees per acre or more are often recommended.
- *Place your order for tree seedlings early to get the best selection.* Tree planting often occurs between the months of December and March, so seedling orders should be placed the summer prior to when you plan to plant. When selecting a nursery from which to purchase seedlings, look for one located within the same region as your property. Similarly, select a local seed source when possible. For example, if your property is in southern Alabama, then seedlings

sourced from south Alabama, Mississippi, Georgia, or northern Florida could all be good choices to plant.

- *Prepare your site.* Site preparation is key to successful establishment and early survival of tree seedlings. Proper site preparation also allows for best root growth providing trees with a strong anchor in times of high winds. Herbicide treatments may be needed in areas with heavy grass or woody vegetative cover. Subsoiling techniques such as “scalping” and “ripping” may also be needed. Scalping provides a furrow in which to plant the seedling. Ripping also provides a furrow but goes deeper into the ground to fracture hardpans that can limit deep root growth. This is a good technique to use in clay soils or areas that have been in agriculture or grazing rotations in the past.
- *Work with a reputable tree planting contractor.* Secure a contractor during the summer months prior to when the planting should be completed. Always have a contract with your planting contractor to protect your planting investment. A contract is a legally enforceable agreement between you and the contractor, and it is best that forest landowners have a written contract for any land management activities completed on their property. A reforestation contract should outline the following:
 - Who will do the work and when,
 - Who will pay for the work,
 - Planting specifications,
 - Property location and acres to be planted,
 - How much will be paid, and
 - What will be done if the work is not completed to specifications.
- *Be on site during the planting process, to check planting quality.* Seedlings that are planted at the correct depth, and not j-rooted or drastically root pruned, have improved chances of survival and forming healthy root structures long term. Contact your planting contractor immediately if any concerns are noted.

Seasonal Considerations Outside of Hurricane Season

- *Plan thinning operations so they are outside of hurricane season dates.* This will give residual trees time to recover and become more wind-firm.
- *Monitor your forest for insects, disease, invasive species, or other forest health issues.* Monitoring seasonally allows you to inspect your forest for issues that may not be visible at certain times of the year, thus providing a better opportunity to identify and treat issues.

Monthly Considerations During Hurricane Season

- *Monitor weather activity across your state and region.* Pay attention to predictions and outlooks to better be informed of potential storms, their timing and strengths.

Annual Considerations

- *Maintain forest roads.* Check roads for any signs of erosion and fill in any holes or ruts with gravel or compacted fill. Check culverts and bridges to make sure they are sound and are sized to provide adequate drainage. “Daylight” roads by removing trees and vegetation that are within six to ten feet of the road edge. This allows for roads to dry more quickly after rain events. It also helps reduce the number of trees that might fall across forest roads during periods of high winds.
- *Conduct regular forest inventories.* This should be done after stand establishment, every four to five years after establishment, and again prior to timber harvests. Information provided by these inventories can help you optimize harvest schedules and prevent timber stands from becoming overcrowded. Tree growth often slows in stands that are overstocked and can make trees more susceptible to disease and damage caused by high winds from hurricanes.

II. Pre-hurricane Planning – Short-term Preparedness

If a hurricane is forecasted to make landfall in the next week or less in your area, the measures outlined below can be used to help you prepare.

When a Hurricane Is Forecast to Impact Your Area (1 to 7 days before)

- *Delay thinning operations.* If a thinning operation was planned during this time, it would be wise to delay the thinning until after the storm, especially for pine stands. Depending on the degree of stand closure, remaining crop trees immediately following a thinning are usually much less wind-firm until stems can adapt to the open conditions. In addition, stronger wind currents in more open stands are likely to cause more stem breakage.
- *Close and lock gates on forest roads.* To prevent damage to forest roads and personal property, gates should be closed and locked prior to hurricane events. This will prevent unauthorized individuals from traveling wet roads and causing rutting or other damage. It will also prevent unauthorized travel to areas that might be hazardous due to downed trees and limbs, flooding, or muddy/washed out road conditions.
- *Take pictures of your forest stands.* These will serve as a record of stand conditions prior to the storm.

- *Move any equipment to a secure location.*
- *If you are involved with a cost-share program, contact them to obtain information on what will be needed and required pre- and post-storm.*

III. Post-hurricane Recovery

The following measures should be taken by landowners in partnership with a consulting forester to assess and repair damage after a hurricane has passed.

Within a Week Following Hurricane Impacts

- *Obtain assistance from a professional forester and accountant.* The professional forester can assist in determining your options for the property going forward, determining the fair market value pre- and post-storm, and salvage considerations. An accountant can assist with determining what your loss limitation is for the event and assist with filing tax returns.
- *Obtain aerial imagery of storm damaged areas.* State agencies such as state forestry commissions usually conduct a survey flight to ascertain general areas of impact. Satellite imagery may also be available to view impacts with more precision.
- *Use care when driving on forest sites impacted by hurricanes.* Roads may be washed out and trees may be down. Do not travel forest roads if you are unsure of the condition. Check culverts and stream crossings prior to driving across them.
- *If it is safe to do so, walk or ride property boundaries and roads.* Walking or riding property boundaries and roads is necessary in-order to assess the damage to timber, roads, fences, gates, and stream crossings. This should be one of the initial steps when assessing post-storm damage because access will be needed for timber assessment and salvage operations.
- *If it is safe to do so, take pictures of any damaged areas to record impacts.*
- *Sketch distinct areas of blowdown on forest stand maps where feasible.* If possible, establish sample sites as needed to cover the range of damage categories and define reasonably distinct zones of damage.

Within a Month Following Hurricane Impacts

- Following the initial assessment of infrastructure and areas of timber damage, a thorough examination of the timber will be needed. Timber stands should be assessed by sampling plots within the stands in-order to estimate the amount and severity of damage. Depending on the strength of the storm, trees can vary in severity in-which they are damaged. Below are several categories for trees based on their severity of damage:
 - **Minor bending/leaning**
 - Trees in this category can naturally recover and are not a priority for immediate salvage (Figure 1).
 - **Uprooted**
 - Trees are less likely to have severe damage to wood and generally have a longer window (several months) of time for harvest (Figure 2). However, they are susceptible to insects and fungi that can degrade wood quality much sooner.
 - **Severely bent or snapped main stems and/or severe broken tops**
 - Trees typically have internal wood damage and are often only harvestable as pulpwood, mulch, or firewood (Figure 3). Harvest of these trees should occur as soon as possible.
 - **Broken tops with most of the crown still in place**
 - If these trees are reasonably straight and free from severe crown loss, they will likely survive and can be retained in the stand (Figure 4). However, these trees will still need to be closely monitored for signs of insects that target stressed and damaged trees.
 - **Major wounds**
 - Trees with major wounds (greater than 1 square foot) should be removed as they are prime targets for insects, which can potentially be catastrophic for remaining trees (Figure 5). Trees with minor wounds will often naturally recover, but the severity of the stand and post-storm stand recovery plans should be considered in-regards to harvesting.
- *Estimate the percentage of trees that are in each of the above classifications, so harvests can be prioritized.* Salvage harvest should be prioritized based on the type and severity of damage. Trees that can potentially bring higher value that need to be removed should be considered first. Depending on the severity of the damage, the entire stand or tract may not need to be harvested.
- *Work with state or private consulting foresters to conduct forest inventory assessments.* These will be used to determine salvageability of forest stands and follow-up management needs such as salvage thinning, full clear-cut and replant, pre-commercial thinning, etc., and should be based on the long-term goals and objectives and economic feasibility.

- *The IRS further requires that a reasonable effort be made to sell damaged timber that is not considered unmerchantable.* However, what is not merchantable or salvageable likely will meet the definition of a casualty loss. The first step is figuring out the amount of the loss. Tax law allows you to take a deduction in the amount of the lower of a (1) reduction in fair market value and (2) your adjusted basis for the property, which is the original basis plus or minus any investments or reductions such as timber sales.

- *Make sure to keep good records related to the timber casualty event.*
 - Show what the event was that caused timber loss
 - Documentation of when it occurred
 - Proof that the loss was directly related to the event
 - If you made any claims for reimbursement or salvage attempts

- *Management recommendations should be based on established damage categories.* For example:
 - 1) Lightly damaged stands may not need salvage if merchantable stands do not have enough timber for a commercial harvest or pre-merchantable stands are likely to recover over time.
 - 2) For moderately damaged stands, landowners may need to decide between a partial or complete harvest based on damage level and distribution. It may be difficult to accurately assess how well a stand may recover or estimate how much timber can be left for future growth and income. These can be complex decisions where the services of a professional forester would be most beneficial to the landowner.
 - 3) Severe or catastrophic damage will require a salvage operation to recoup any value that can be recovered from the stand. This likely would mean a complete harvest.

- *Trees that can be sold for veneer and sawtimber products should be harvested first.* After four to six weeks, a blue stain fungus will degrade the quality of these high-valued trees, and they will have to be sold for pulpwood. Trees being sold for pulpwood should be removed within eight to 12 months.

- *Understand that financial returns from salvage harvests will likely provide lower returns than normal harvest.* This is due to the decrease in timber value from individual tree damage and the impacts of storms on local timber markets. Selling timber following a major storm will bring lower prices from an abundant supply of timber entering the market. The costs associated with logging will also likely increase due to poor site conditions following a storm. A combination of decreased timber value and increased costs associated with harvest will lower financial returns.

- *When it is necessary to replant, choose species that are most resilient to future storm damage.* Longleaf pine with its deeper rooting characteristics, less taper, and higher specific gravity is less susceptible to storm damage.
- *Proper site preparation in storm-damaged areas is important.* Wildfires and invasive species are of concern due to increased fuel loads and site disturbance. Often a combination of prescribed burning and herbicide treatments may be needed to properly prepare the site for replanting.

This draft guidance was developed by subject matter experts from the Alabama Cooperative Extension System, Mississippi State University, University of Florida and the U.S. Forest Service

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