

# HURRICANE HELENE

September 27-28, 2024

Timber Damage Assessment

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UNIVERSITY OF  
**GEORGIA**

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# TIMBER IMPACT ASSESSMENT

## Hurricane Helene: September 27-28, 2024

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### BACKGROUND

On September 27, 2024, Hurricane Helene impacted multiple southern states from Florida to North Carolina. Georgia was impacted by high winds and large amounts of rain throughout the eastern part of the state. Hurricane Helene entered Georgia as a category two near Valdosta and progressed northeast towards Augusta, becoming a tropical storm as it entered South Carolina, North Carolina, and Tennessee (Figure 1). During the event, Georgia experienced winds ranging from 35-100 miles per hour in the storm’s path (Figure 2) and rain totals ranging from four to 12 inches (Figure 3) impacted a large portion of forested, agricultural, and urban landscapes. Private forested land accounted for 88% of the impacted land ownership within the hurricane’s path, according to a forest damage report produced by the U.S. Forest Service.

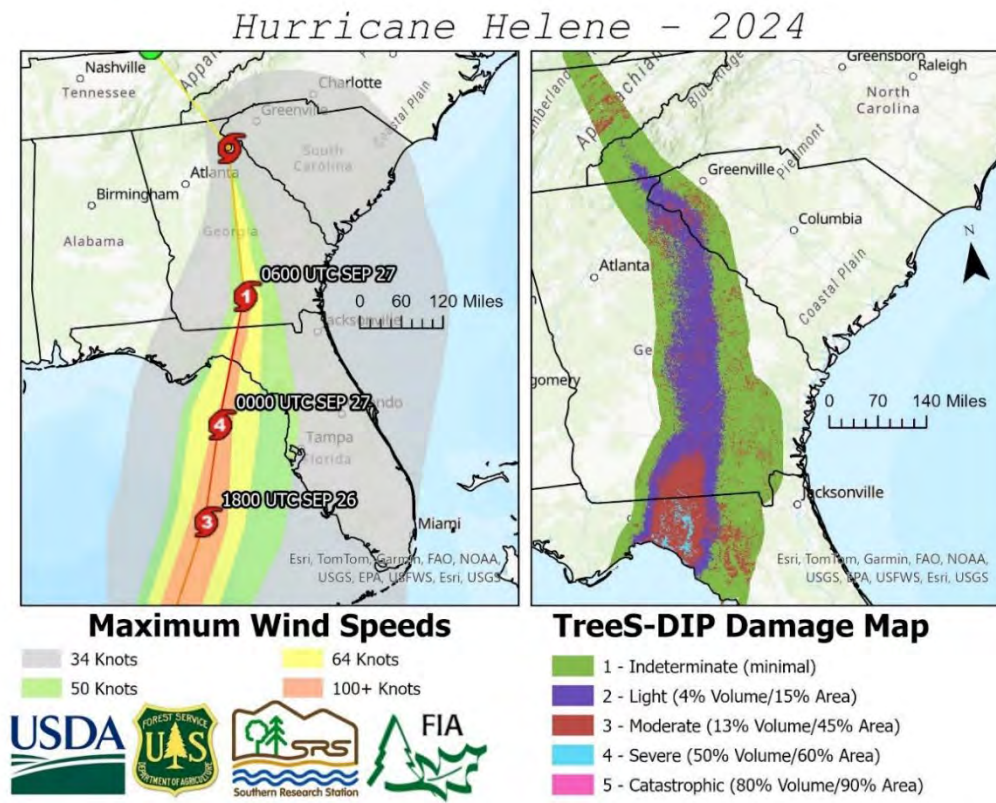


Figure 1: Hurricane Helene wind zone boundaries obtained from NOAA National Hurricane Center (NHC, left) and the TreeS-DIP forest damage map produced by the U.S. Forest Service Geospatial Technology and Applications Center (right, credit GTAC and Dr. Robert Chastain).

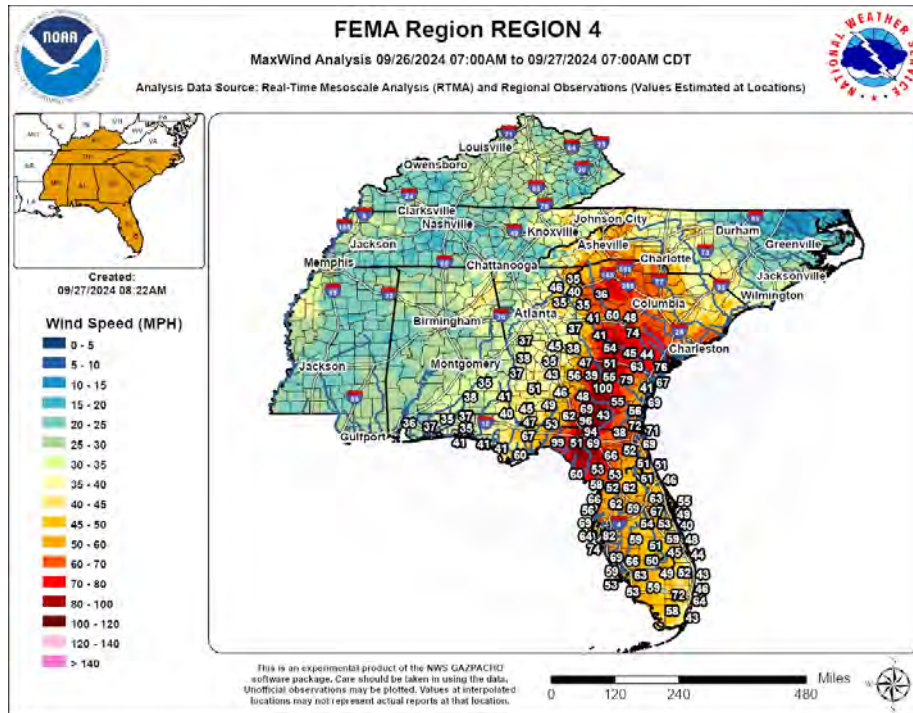


Figure 2: Hurricane Helene wind gust map with winds ranging from 35-100 mph in the hurricane's path.

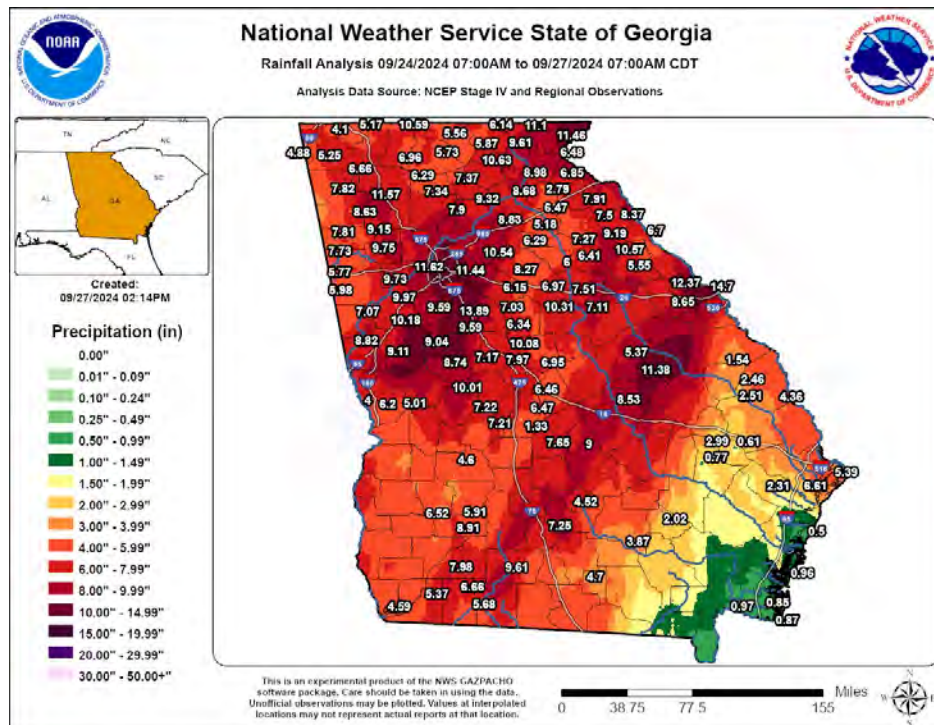


Figure 3: Hurricane Helene rainfall amounts ranging from 4-12 inches in the path of the hurricane.



## Emergency Declarations issued in the State of Georgia:

Governor Brian Kemp declared a state of emergency for all 159 counties in Georgia on Tuesday, September 24, 2024, in preparation for Hurricane Helene. On October 1, 2024, President Biden approved a major disaster declaration for Georgia. Ninety-one counties fall under the declaration: Appling, Atkinson, Bacon, Banks, Ben Hill, Berrien, Bleckley, Brantley, Brooks, Bryan, Bulloch, Burke, Butts, Camden, Candler, Charlton, Chatham, Clinch, Coffee, Colquitt, Columbia, Cook, Dawson, Decatur, Dodge, Dooly, Echols, Effingham, Elbert, Emanuel, Evans, Franklin, Fulton, Gilmer, Glascock, Glynn, Grady, Greene, Habersham, Hancock, Hart, Irwin, Jackson, Jasper, Jeff Davis, Jefferson, Jenkins, Johnson, Lamar, Lanier, Laurens, Liberty, Lincoln, Long, Lowndes, Lumpkin, Madison, McDuffie, McIntosh, Mitchell, Monroe, Montgomery, Newton, Oglethorpe, Pierce, Pike, Pulaski, Putnam, Rabun, Richmond, Screven, Stephens, Taliaferro, Tattnall, Telfair, Thomas, Tift, Toombs, Treutlen, Turner, Twiggs, Ware, Warren, Washington, Wayne, Wheeler, White, Wilcox, Wilkes, Wilkinson, and Worth Counties.

On October 21, 2024, the Federal Emergency Management Agency (FEMA) posted the Georgia Disaster Declaration emergency map. <https://www.fema.gov/disaster/4830/designated-areas>.

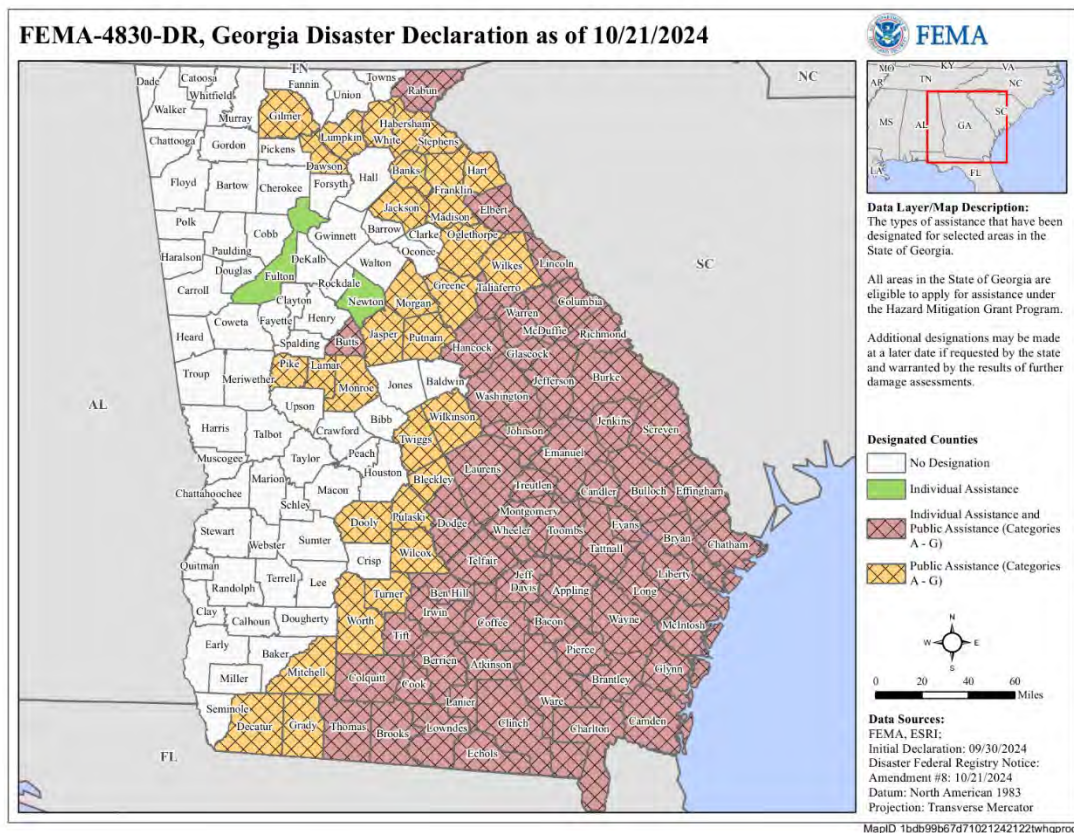


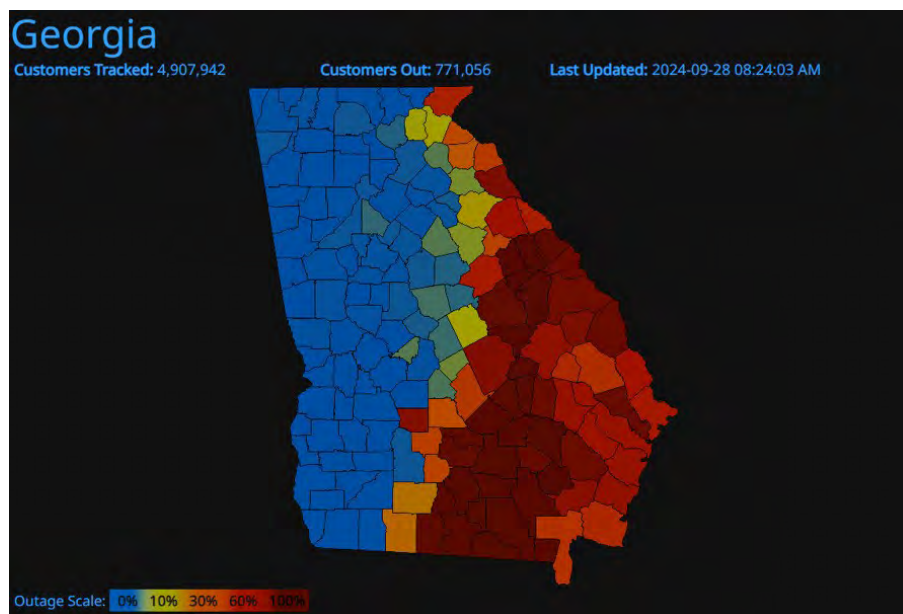
Figure 4: FEMA declaration map showing 91 counties declared and type of assistance designated for the counties.

## OBSERVATIONS AND METHODS

The goal of the Timber Impact Assessment survey is to determine the current overall damage to the forest in Georgia and to document widespread impacts to the region affected by hurricane conditions. This is not to say that damage was not or could not be found farther outside the declared state of emergency area, but the damage outside the disaster area was isolated and confined to localized impact.

The National Weather Service (NWS) provided continuous predictions and updates to identify areas of risk and potential impact. The US Forest Service utilized a computer program called TreeS-DIP (ForestGALES), which contains modeled tree damage prediction data once the storm has passed through. The NWS updates and TreeS-DIP information narrowed the survey areas for the Timber Impact Assessment. Initial reports revealed catastrophic, severe, moderate, and light damage in forested settings from Valdosta to Augusta. The urban interface suffered tremendous damage as well, which impacted local infrastructure from rights-of-way to buildings.

The Georgia Forestry Commission (GFC) engaged with Hurricane Helene storm clean-up and logistical support work on the morning of Friday, September 27, as soon as safely possible. A GFC Incident Management Team was established and stationed in Macon, Ga. to help manage logistical support and needs throughout the impacted area. GFC Strike team sawyers and bulldozer teams helped clear roads and improve infrastructure throughout the storm-damaged area from Valdosta to Augusta. Once a large portion of infrastructure was improved, foresters were able to move from logistical support of GFC's Incident Management Team to timber damage assessment.



*Figure 5: Power Outage Map (from poweroutage.us) Many counties in South Central GA had nearly 100% power outage the morning after Hurricane Helene swept through Georgia.*

A mobile data collection application, ESRI- Field Maps, was utilized by GFC foresters to gather over 2,800 visual field observation estimations from Valdosta to Augusta. One-square-mile grid squares were overlaid on Helene’s path, and GFC foresters reported their observations within the respective grid. Spots marked were assigned a damage intensity level and data was collected on species, product class, percent damage, and location. This tool was utilized to track damages throughout the area and help determine the scale of the storm’s damage. The TreeS-DIP (ForestGALES) program map was also overlaid on the collector application and compared to data collection points gathered in the field. Forest Inventory and Analysis data from the US Forest Service was also utilized and provided data on impacted forest type and timber volume estimates. Generally, the ground-checked spots aligned with TreeS-DIP damage categories, but data collected from foresters in the field showed more severe damage than TreeS-DIP estimated. For this reason, timber volumes within the TreeS-DIP moderate and severe categories were adjusted to correlate with forester plots.

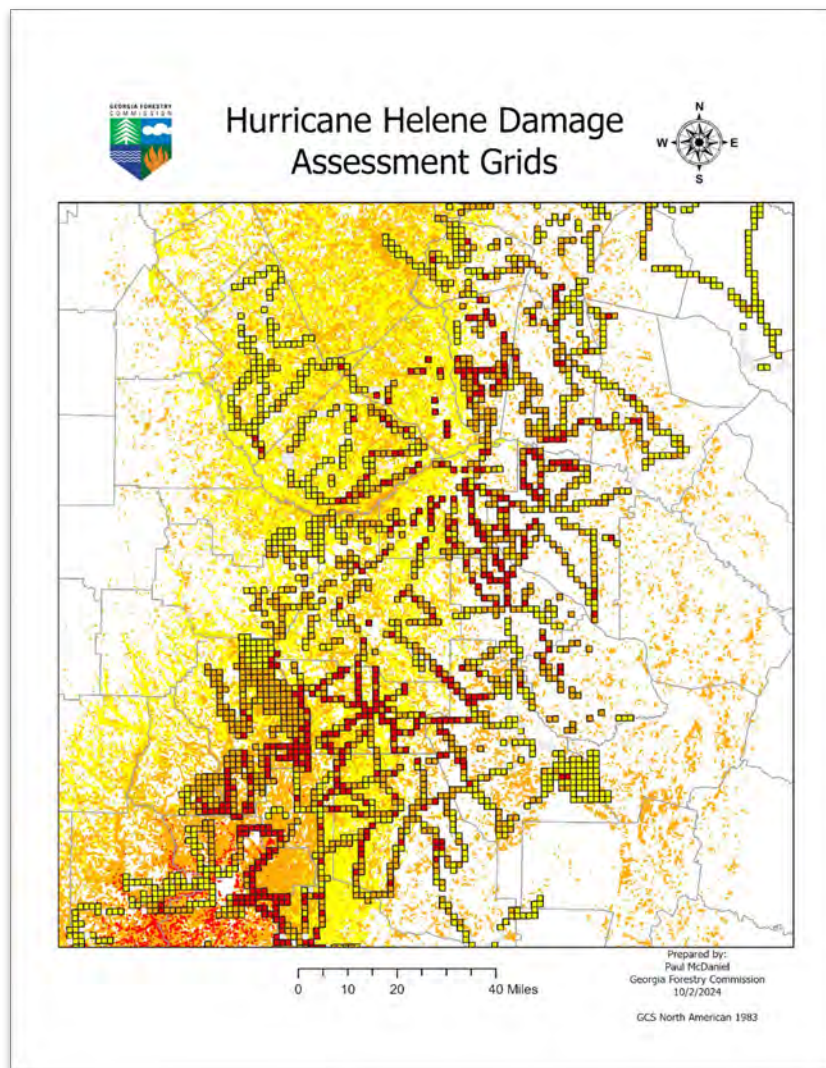


Figure 6: Snapshot of Hurricane Helene GFC Damage Assessment Grids. Red indicates severe/catastrophic damage, orange represents moderate damage, and yellow indicates light damage.



Foresters reported stand damage using three general damage categories. In addition to these reported categories, foresters were also able to add a specific, unique damage value to the assessed grid. The damage categories are listed below.

Damage levels:

Light damage – Less than 10% of timber damaged. Typically, branches and limbs broken from the tree, with minor damage to the overall stand and trees bent less than 45 degrees. No salvage operation will be necessary, and the stand should recover with no additional management requirements, though long-term yields will likely be impacted.

Moderate damage – Between 10-50% of stand is damaged. Branches, limbs, and tops broken from trees, and trees bent more than 45 degrees. A salvage operation should be considered for stands with more than 25% of stems broken to minimize losses and remove trees that likely will not survive.

Severe/Catastrophic damage – More than 50% of stems damaged, tops broken out across the stand, limbs stripped, and trees bent more than 45 degrees. A salvage operation must be considered, and a clear-cut may be the prudent management decision.



*Figure 7: Photo of forest impacts seen throughout the storm's path. Stands had trees uprooted and blown over, crowns bent over, leaning trees, and trees with snapped off trunks.*

Storm damage was detected in multiple timber types across the counties, and damage was seen in all classes of pine stands as well as in hardwood riparian areas. Timber damage throughout the hurricane's path is most severe in thinned chip-n-saw and sawtimber stands causing significant impacts to this timber resource. Moderate to light damage is commonly seen in pulpwood stands throughout the main path. Light damage was observed throughout the path of Hurricane Helene and can be found in most stands. In general, pine stands with higher densities typically fared better than thinned stands with lower densities. Hardwood riparian areas suffered severe damage respective to stand type, due to saturated soils and hardwood crowns that contained all their foliage which caught the heavy winds and either snapped trees or uprooted them. Pre-merchantable timber stands weathered the storm the best and typically only suffered light damage.



*Figure 8: Photos of forest impacts seen throughout the storm's path. Stands had trees uprooted and blown over, crowns bent over, leaning trees, and trees with snapped off trunks. Damaged timber stands can be found from Valdosta to Augusta.*

### **DAMAGE ESTIMATES**

The TreeS-DIP map showed that 8,931,000 acres of forestland was located in Hurricane Helene's path with 1,470,000 acres receiving the majority of timber damage from the storm. Of the 8,931,000 total acres traversed, Helene caused a total timber resource impact of \$1.28 Billion in Georgia. 26,025,313 tons of pine are valued at \$728,708,750 and 30,865,000 tons of hardwood are valued at \$555,570,000. Forest Inventory Analysis (FIA) data from the TreeS-DIP map class, along with collector application point data, were used to determine volumes and the percentage breakdown of pine and hardwood tonnage across the impacted area. The percentage breakdown was applied to the TimberMart-South Stumpage Price Report (*GA second quarter 2024*) to determine a stumpage price of \$28 per ton for pine (blended based on assessment of product classes of pulpwood, chip-n-saw, and sawtimber) and \$18 per ton for hardwood (blended based on assessment of product classes of pulpwood, pallet wood, and mixed sawtimber).



The Georgia Forestry Commission estimates that 8.9 million acres of Georgia’s forestland was located in Hurricane Helene’s path with a total timber resource impact of \$1.28 Billion.

Timber Damage Class	Pine Timber Value	Hardwood Timber Value	Total Timber Value
<b>Light</b> – Less than 10% of timber damaged per acre	\$71,522,500	\$34,602,188	\$106,124,688
<b>Moderate</b> – 10% to 50% of timber damaged per acre	\$440,314,787	\$349,048,434	\$789,363,221
<b>Catastrophic/Severe</b> – Greater than 50% of timber damaged per acre	\$216,871,463	\$171,919,378	\$388,790,841
<b>Total</b>	<b>\$728,708,750</b>	<b>\$555,570,000</b>	<b>\$1,284,278,750</b>

Figure 9: Timber Damage Classes with associated pine and hardwood timber values.

## RECOMMENDATIONS

Landowners are encouraged to utilize professional foresters and arborists to help with decisions about timber management or potentially hazardous trees around homes and urban environments. Seeking independent advice is a sound way to reduce hasty judgments and ensure all available options are considered.

### Assess stand(s) damage and categorize

- (1) Minimal damage – Scattered branches broken from trees, with little to no damage to the overall stand (in particular the tree stems) and a few trees bent less than 45 degrees from vertical. No salvage operation will be necessary, and the stand should recover with no additional immediate management requirements.
- (2) Light damage – An average of 10% damage (one tree of 10 damaged) with a range of 0-20% damage in stand. Only branches broken from trees, with minor damage to tree stems in the overall stand and trees bent less than 45 degrees from vertical. No salvage operation will be necessary, and the stand will recover with no additional immediate management requirements.
- (3) Moderate damage – An average of 25% damage (one tree of four damaged) with a range of 20% - 50% damage in the stand. Branches broken from the trees with visible damage to tree stems in the overall stand. Twenty to 50% of the stems in the overall stand are snapped, broken, have visible damage to tree stems, or these stands have trees that are noticeably uprooted with severe lean greater than 45 degrees from vertical. Moderate damage stands, in most cases, would require a salvage thinning to minimize losses and remove trees that will likely not survive. This salvage thinning may occur after the major clearcut salvage operations have been completed.
- (4) Severe damage – An average of 65% damage (two trees of three damaged) with a range of 50% - 80% damage in the stand. Fifty to 80% of the stems are broken, tops broken out across the stand, limbs stripped, and trees bent more than 45 degrees from vertical. A salvage operation must be considered and a clearcut in most cases will be the prudent management decision.
- (5) Catastrophic damage – An average of 90% damage (nine trees of 10 damaged) with a range of 80% - 100% damage in the stand. Eighty to 100% of the stems are broken out across the stand, tops broken out across the stand, limbs stripped, and trees bent over more than 45 degrees from vertical. A salvage operation is considered unlikely (a case-by-case evaluation is required by the landowner, forester, and logger) and the stand is considered a total loss.

**Damaged stands classified as catastrophic and severe do not have adequate trees per acre to maintain a viable stand.**



Managers and landowners are encouraged to salvage stands with 50% or more heavily damaged timber (trees snapped off, blown over, leaning greater 45 degrees, root damage, etc...). Stands with light to moderate damage need to be continuously monitored for insect and disease damage throughout the next year. The stress placed on these trees from the storm could attract pine bark beetles or increase the likelihood of disease as these trees recover. Wind and flooding damage may not become apparent until the following growing season. The areas with substantial damage may see issues with stem defects and sluggish growth rates.

Managers and landowners should evaluate stands with light to moderate damage for thinning or harvest in years following the storm. Less than one percent of pine trees greater than 40 feet tall with lean will straighten over the next one to two years, regardless of species, although many of the trees will often survive. Waiting to conduct a thinning or harvest in these stands will provide time for local markets and timber harvesters to recover.

Landowners can contact their local GFC forester to come visit and provide general advice for their property. GFC foresters can also provide contact lists for consultant foresters, timber buyers, contractors, etc., to help landowners accomplish work on their property.

Landowners facing a complete harvest to salvage their damaged timber due to the hurricane should consider reforesting the area. The Farm Service Agency (FSA) has a cost share program called the Emergency Forest Restoration Program (EFRP) that can assist with site preparation and planting costs. The program also provides cost share for debris management in stands to help landowners offset the cost of road clearing, pre-suppression firebreaks, and mitigation of heavy debris in the forest stand. Apply at your local FSA office. ([www.farmers.gov/working-with-us/service-center-locator](http://www.farmers.gov/working-with-us/service-center-locator)).

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These resources can help forest landowners learn more about options and considerations for situations in which trees have been damaged by severe weather:

**TIMBERLAND SEVERE WEATHER DAMAGE**

Assessing Hurricane and Tornado Storm Damaged Forests:

[https://bugwoodcloud.org/bugwood/productivity/pdfs/Outreach\\_Assessing\\_Storm\\_Damage\\_Sept2020.pdf](https://bugwoodcloud.org/bugwood/productivity/pdfs/Outreach_Assessing_Storm_Damage_Sept2020.pdf).

Leaning and Uprooted Pine Recovery After a Major Storm Event:

<https://bugwoodcloud.org/resource/files/30294.pdf>.

Bark and Woodboring Beetles in Wind-damaged Pine Stands in the Southern United States:

<https://bugwoodcloud.org/resource/files/19016.pdf>.

**TIMBER SALES**

Selling Your Timber:

<https://gatrees.org/wp-content/uploads/2020/01/SellingYourTimber.pdf>.

<https://gatrees.org/wp-content/uploads/2020/01/Selling-Storm-Damaged-Timber-Final.pdf>.

**TAXES**

How to Claim Timber Casualty Losses and Defer Taxes on Salvage Timber Sales:

<https://www.timbertax.org/publications/fs/taxtips/salvage-timber.pdf>

National Timber Tax website (Master Index has good list of subject areas):

<http://www.timbertax.org/>.