

ANNUAL REPORT

2020 Longleaf Restoration Progress

A Joint Report from Enviva and The Longleaf Alliance



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Partnership Background

In 2020, Enviva and The Longleaf Alliance (TLA) announced a five-year partnership to protect and restore longleaf pine forests on private and public lands throughout Enviva's wood sourcing regions throughout Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Virginia. Through this partnership, Enviva and The Longleaf Alliance further support the goals of America's Longleaf Restoration Initiative, an extensive collaboration to increase acreage of longleaf pine forests to 8 million acres across the southeastern U.S.

The Longleaf Alliance acts as a guide for restoration, stewardship, and conservation of the longleaf pine ecosystem. Partnering with Enviva allows it to connect with landowners that are working to restore their lands to longleaf, provide management guidance, and promote tools that help facilitate the process of restoration. These actions contribute toward TLA achieving our goals of improving forest health and expanding longleaf acreage across the U.S. Southeast.

For Enviva, its partnership with TLA is a critical part of how it's implementing two provisions of Enviva's Responsible Sourcing Policy, which is its standing environmental pledge to ensure the company's wood is sourced according to strict environmental standards. The first provision is to "help restore critical, threatened, or declining forest types." Secondly, TLA is providing technical input related to our inclusion of longleaf-dominant forests as High Conservation Value forests (HCV) from which Enviva will only source if its sourcing will maintain or improve the longleaf forests.

The ultimate goal of this partnership between Enviva and the Longleaf Alliance is restoration of longleaf forests by biomass harvesting - which when made part of a long-term ecological management plan can improve high-conservation value forests while providing a sustainable supply of biomass feedstocks to displace fossil fuels.

Together, Enviva and The Longleaf Alliance work with stakeholders, landowners, land managers, and others to support longleaf restoration on public and private lands, as well as to monitor, track, and report on progress. This Annual Report is the first important milestone.



Longleaf restoration site

01

Using Biomass Sourcing to Restore Longleaf

When part of a long-term ecological restoration plan, biomass sourcing can support longleaf restoration in several ways.



02

At the stand level, longleaf pine restoration is moving longleaf forest stands toward desired stand conditions, defined in terms of the types of trees and other plants (ecological composition) and their physical arrangement (structure). As a type of fire-dependent pine forest, desired conditions for longleaf habitats are characterized by:

1. having an open canopy of mature longleaf trees,
2. minimal mid-story component, and
3. a diverse understory plant community.

America's Longleaf Restoration Initiative (ALRI) developed condition-class metrics that detail the desired conditions of the canopy, mid-story, and understory. Enviva's restoration-oriented sourcing helps move stands toward a desired future condition by establishing an appropriate density of canopy and midcanopy trees and shrubs. When stands reach a "maintenance condition class", prescribed fire and other management techniques can keep them in generally good condition.

According to the ALRI condition class metrics, restoration-oriented biomass sourcing can directly improve the canopy and/or mid-story component of stands. The appropriate restoration-oriented biomass sourcing operation depends on the initial condition of the stand, particularly its canopy or mid-story. In an established longleaf stand, restoration-

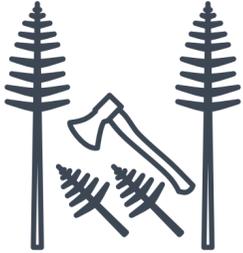
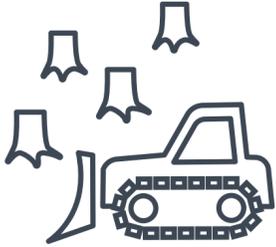
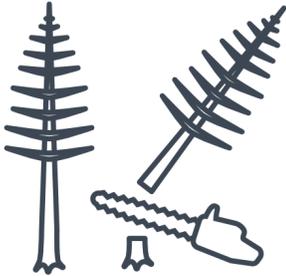
oriented biomass sourcing involves reducing the density of trees in the canopy or mid-story, particularly non-longleaf trees.

In a stand that has few longleaf in the canopy, restoration-oriented biomass sourcing can involve heavily thinning out the non-longleaf trees to leave a residual canopy dominated by longleaf trees. And in a stand that has no longleaf in the canopy, restoration-oriented biomass sourcing might involve clearcutting the non-longleaf stand so that the site can be prepared to plant longleaf seedlings.

Improving the canopy and mid-story, particularly by reducing density and letting more light reach the ground, can help improve the ground-story or understory plant community. Restoration-oriented biomass sourcing is an important step in the longer restoration process, which may take years, especially for the development of diverse ground-story plant community.

In 2020, The Longleaf Alliance developed a tract-level assessment chart, based on the ALRI condition class metrics, to assess whether and to what degree restoration-oriented biomass sourcing did indeed improve the canopy or mid-story of the longleaf stand. The chart [on page 8] summarizes the stand-level assessment results.

This table describes four scenarios, based on differing initial stand conditions, in which appropriate, restoration-oriented biomass sourcing improves longleaf stands. The scenarios are arranged from more common to less common.

	Restoration-oriented Biomass Harvesting Type	Initial Stand Condition	Benefits to Longleaf Restoration
	Mid-canopy or canopy thinning in a longleaf stand	Longleaf stand with too many trees (or an undesirable mix of tree species) in the midcanopy and/or canopy.	Appropriate thinning reduces shading of the groundcover plant community and/or facilitates reintroduction of prescribed fire, which further improves longleaf stands. Thinnings can also remove loblolly or other unwanted trees, improving stand composition by favoring longleaf or other more desirable trees for wildlife (i.e., oaks that produce acorns.)
	Clearcutting non-longleaf stand to prepare the site for longleaf planting	Non-longleaf stand, located on good longleaf soils/site, that the landowner/manager wants to restore to longleaf forest.	Without markets for the trees in the existing stands, which often include a high proportion of smaller-diameter and low-grade trees, longleaf restoration is restricted. In addition, the ability to chip and sell small-diameter trees and limbs to Enviva or other biomass producers reduces the amount and cost of site preparations, particularly to pile and burn slash, enabling land managers or landowners to increase the amount of restoration and plantings.
	Non-longleaf canopy thinning removes non-longleaf trees in the mid-canopy and/or canopy	Stand with a few longleaf trees that can be converted to a longleaf stand by thinning out the non-longleaf trees.	Increasing the amount of longleaf through silviculture, including heavy thinnings, is one of the 'game-changer' strategies to help accomplish ALRI's long-term longleaf restoration goals.
	Restoration-oriented salvage logging that removes as many damaged, dead trees as can be done safely and practically	Stand that has been severely impacted by natural disaster such as hurricane, tornado, wildfire, or insects.	Facilitates natural seeding and regeneration or potentially replanting of the stand.

02

Restoration-oriented biomass sourcing examples by type

Mid-canopy or Canopy Thinning in Longleaf Stand

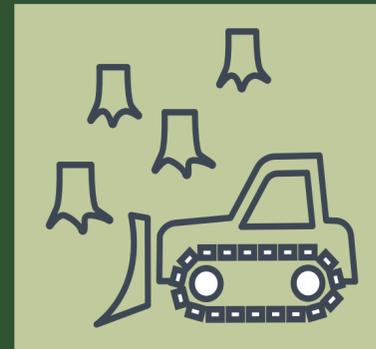


Pre-Harvest



Post-Harvest

Clearcut of Non-Longleaf Stand

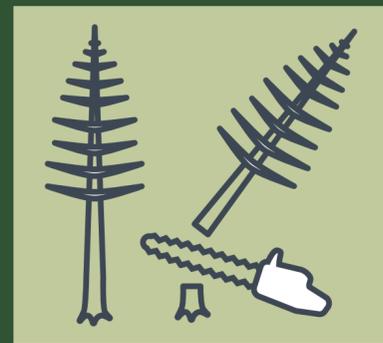


Pre-Harvest



Post-Harvest

Non-longleaf Canopy Thinning



Pre-Harvest



Post-Harvest

Salvage



Pre-Salvage



Post-Salvage

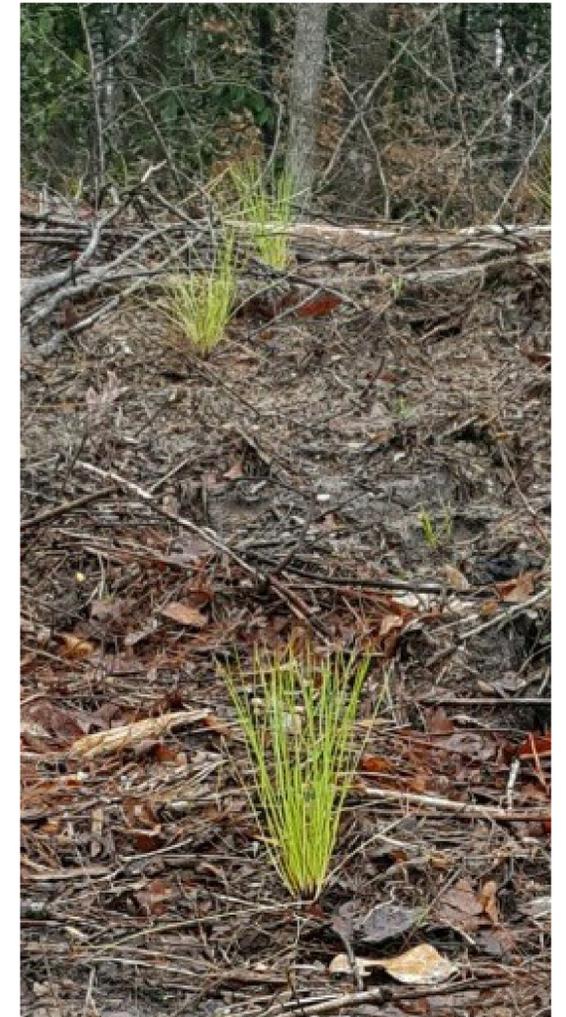


The red-cockaded woodpecker (RCW) is an iconic species that inhabits high quality, mature longleaf pine forests. This federally listed woodpecker lives in cavities that it creates in living pine trees. Installation of artificial cavities is an important tool used by Wildlife Biologists in the recovery of the species. Joel Casto is seen here installing a new cavity in a tree on the Chickasawhay Ranger District in Mississippi.

2020 Restoration Accomplishments

In 2020, Enviva set and met the following goals related to longleaf restoration.

Goal	Result
Establish partnership with The Longleaf Alliance (TLA)	Partnership established in January 2020 and announced in March 2020.
Release Enviva longleaf High Conservation Value (HCV) program and five-year restoration plan	Enviva released its five-year Enviva Forest Restoration Plan, based on technical input and strategic advice from TLA and others.
Certify 2,500 acres of longleaf pine forests	With the help of Milliken Forestry Company and other consultants, Enviva helped certify 6,603 acres with predominantly longleaf pine or that will have longleaf pine restored.
Get 5,000 acres on track for restoration sourcing	Enviva helped restore 3,371 acres (see Appendix 2.) In addition, Enviva has 2,700 acres certified and ready for restoration-oriented biomass sourcing or under contract with suppliers or landowners for restoration-oriented biomass sourcing.
Support planting of 135,000 longleaf seedlings on public and private land	With Enviva's funding, 198,000 longleaf seedlings were planted in MS and FL during the 2019/20 and 2020/21 planting seasons.
Install and/or repair 150+ red-cockaded woodpecker (RCW) nesting boxes to support longleaf habitat for an at-risk species	With Enviva's funding, 171 RCW nesting boxes were installed/repared on the Chickasawhay Ranger District of the DeSoto National Forest in MS.



Longleaf pine seedlings planted on the DeSoto National Forest in MS

03

Progress Report & 2021 Goals

Our 2020 progress report and 2021 plans are organized around the provisions in the Enviva and The Longleaf Alliance five-year plan that was initiated in 2020.

04

Longleaf Management & Restoration Guidance

Enviva-Longleaf Alliance Partnership Provisions	2020 Progress	2021 Goals
1. Providing strategic guidance on Enviva's Longleaf Restoration plan.	The Longleaf Alliance (TLA) provided extensive feedback on Enviva's draft Longleaf Pine restoration plan before it was released in March 2020. The two organizations developed joint 2021 goals.	Make modifications to plan as needed.
2. Providing information, data, and technical feedback to facilitate longleaf management and restoration efforts through the following activities:		
A. Enviva's stand-level longleaf management guidelines, to be implemented collaboratively with Milliken Forestry Company (MFC) in Tree Farm or Forest Stewardship Council (FSC) management plans as part of Enviva's high conservation value forest (HCV) policy and procedures.	MFC and TLA helped developed longleaf management guidelines early in 2020.	MFC, Enviva, and TLA staff to work collaboratively in development of longleaf management plans for enrolled tracts.
B. GIS mapping of longleaf stands that Enviva will use in the application of its HCV policy and procedures such that sourcing from mapped longleaf stands will maintain or improve their condition.	With TLA's assistance, we acquired longleaf GIS mapping in FL (Longleaf Element Occurrence or LEO).	TLA will assist Enviva with acquiring range-wide LLP LEO data. Provide additional assistance with GIS data as needed.
C. Develop, test, and refine longleaf pine HCV procedures, particularly the protection of longleaf-dominant stands through Enviva's requirement that Enviva it will only source from stands that have a longleaf dominant or co-dominant canopy if the management and biomass sourcing maintains or improves their stand condition, as determined by the ALRI condition classes.	TLA staff worked with Enviva staff to guide them through initial rapid assessments that were completed in the Cottondale, Florida Pilot Area.	Further refine procedures as needed.
D. Development of practical means to assess and analyze benefits and areas of improvement of restoration sourcing based on stand-level conditions, using rapid assessment metrics and tools used by other longleaf partners.	TLA used the ALRI condition class metrics to develop an assessment rubric or matrix by which TLA will determine if the management and Enviva's sourcing helped improve stand conditions [see Appendix 1]. TLA trained Enviva foresters on the use of the rapid assessment app. Enviva will train additional staff to do more rapid assessments next year. MFC started including the rapid assessment condition-class metrics in their management plans.	Enviva and TLA plan to conduct rapid assessments on at least 30 tracts in 2021, with Enviva, MFC, or other consultant conducting the pre-harvesting assessments and TLA conducting the after-harvest or after-planting assessments.

Progress Report & 2021 Goals

04

Training, Outreach, and Communications

Enviva-Longleaf Alliance Partnership Provisions	2020 Progress	2021 Goals
1. Print and distribute TLA outreach materials, co-branded with TLA and Enviva logos, for landowners, etc.	Landowner flyer developed.	Landowner flyer to be distributed to new TLA members, at workshops, and others as requested.
2. Training Enviva staff, particularly wood procurement and sustainability foresters .	In-person events were canceled in 2020 due to COVID restrictions.	Virtual Longleaf 101 Academy; other relevant Academies as they are scheduled.
3. Expanding landowner connections primarily through holding joint landowner workshops, which will focus on Enviva's sourcing regions.	<p>A series of online outreach events were presented for the Florida sourcing region. TLA staff worked jointly with Florida Forest Service and Enviva staff to develop and host these events in August and September 2020. These virtual events were focused on tools and resources that are available to landowners impacted by Hurricane Michael in the Florida panhandle. A total of 48 individuals attended the presentation that included information about longleaf restoration sourcing.</p> <p>An online outreach event was also hosted for the MS sourcing region in September 2020 and was aimed at consulting foresters and technical service providers. Presenters included representatives from Enviva, TLA and Wildlife MS. A total of 25 individuals attended this online presentation.</p>	Enviva and TLA staff to work collaboratively to hold landowner workshops and/or field visits in sourcing regions - particularly GA, NC, and MS areas.
4. The parties will collaborate on publicly describing progress toward accomplishing the shared goals outlined in this MOU through a variety of communication tools.	<p>Enviva authored the Heart Pine article which published in LLA's magazine, The Longleaf Leader.</p> <p>TLA has used several other communication tools to raise awareness about Enviva's Longleaf Restoration Plan among landowners, partners, and the general public.</p> <p>TLA staff worked with Enviva staff and US Forest Service (USFS) to craft and distribute a press release focused on the Lucedale, MS sourcing region. This was sent to MS partners and distributed through TLA, Enviva, and USFS media channels.</p> <p>TLA also worked with Enviva staff in December 2020 to draft an article focused on Enviva's hurricane salvage/restoration work at Cottdale to be included in the winter issue of National Woodlands, the quarterly magazine of the National Woodland Owners Association.</p>	Enviva and TLA staff will work collaboratively to draft communications products that explain the benefits and show positive results of restoration-oriented biomass sourcing in longleaf habitats.

Progress Report & 2021 Goals

04

Restoration Reporting

Enviva-Longleaf Alliance Partnership Provisions	2020 Progress	2021 Goals
1. Assessing and jointly reporting Enviva and The Longleaf Alliance's collaborative longleaf restoration progress. Specific restoration goals listed below:	Develop and distribute 2020 annual report.	Develop and distribute 2021 annual report.
A. Acres certified with predominantly longleaf:	NC: 984 acres FL: 1,219 acres MS: 4,400 acres TOTAL: 6,603 acres	3,000 acres
B. Acres improved/restored through appropriate biomass sourcing:	3,371 acres See tract-assessment chart included in Appendices	3,500 acres
C. Acres on track for restoration, i.e., that are certified and ready for restoration-oriented biomass harvest or that Enviva's committed to buy from a supplier or landowner:	2,758 acres	4,000 acres are on track for restoration-oriented management and biomass sourcing.
D. Total acres restored or on track to be restored:	6,129 acres	7,000 acres
E. Longleaf seedlings planted:	In the spring of 2020, 60K trees funded by Enviva were planted as part of a larger tree planting project on the DeSoto National Forest in MS. In the fall of 2020, 39K trees funded by Enviva were planted on two private properties in FL. In Feb 2021, 99K more seedlings funded by Enviva were planted on restoration sites at Torreya State Park. This will result in a combined total of 198,000 longleaf seedlings planted over both planting seasons.	Enviva will fund the purchasing of enough seedlings to plant about 200 acres of new longleaf forests on private land in FL.
F. Red cockaded woodpecker nesting box installation, replacement, or cleaning:	New Cavity Inserts: 56 Replacement Inserts: 54 Clean/repair existing cavities: 61 TOTAL 171	No RCW work is scheduled in 2021.

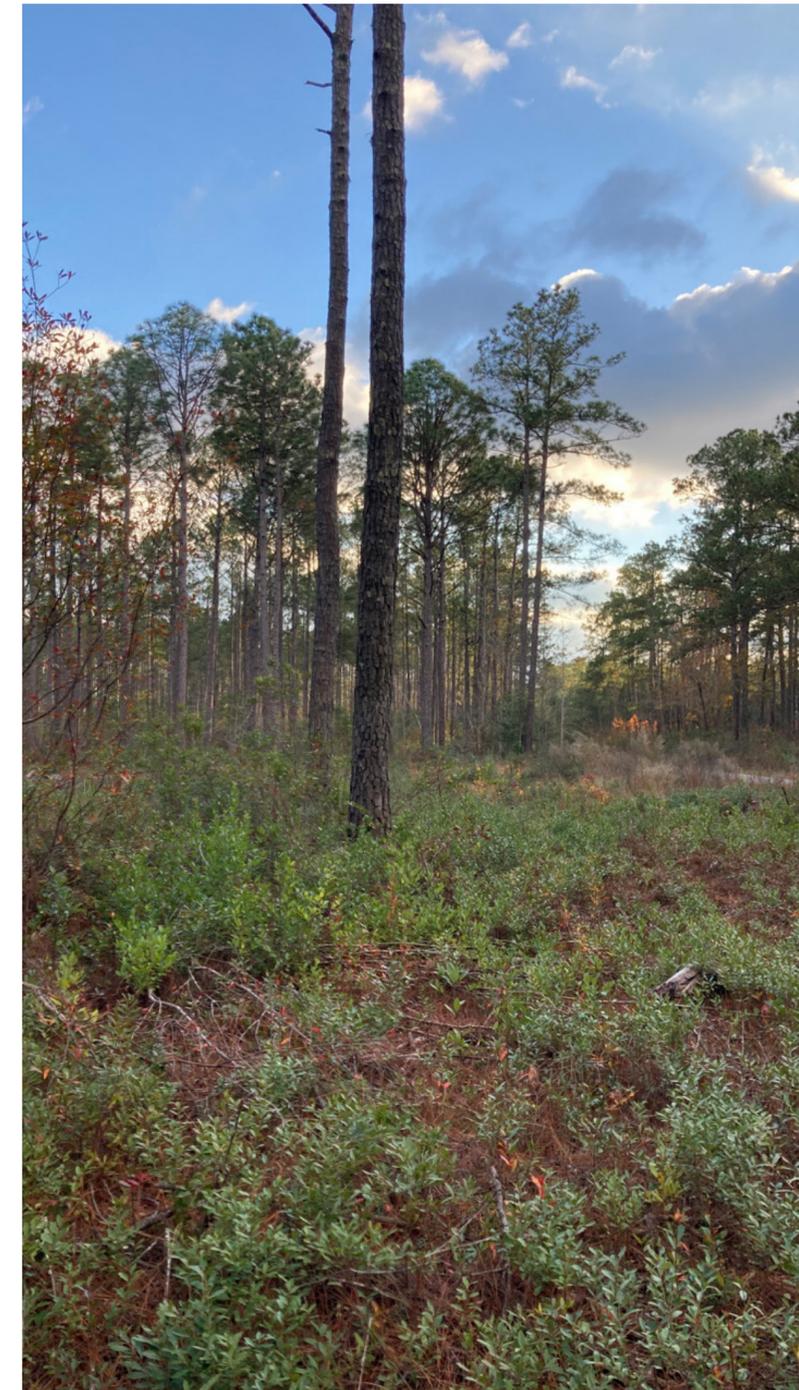
Looking Forward

2021 Joint Enviva and The Longleaf Alliance Longleaf Restoration Goals

The Longleaf Alliance will continue to work with Enviva to further develop and implement longleaf restoration sourcing on private and public lands in the southeastern US. The partnership is focused on the following objectives in 2021:

- Provide strategic guidance on Enviva's Longleaf Restoration Plan
- Provide information, data, and technical feedback to facilitate longleaf management and restoration efforts
- Provide training to Enviva staff, particularly wood procurement and sustainability foresters, and select suppliers
- Expand landowner connections
- Assess and jointly report on Enviva and The Longleaf Alliance's collaborative longleaf restoration progress
- Publicly communicate progress on shared restoration goals

05



A longleaf forest in NC from which Enviva sourced biomass as part of the ecological restoration of the stand

Appendices

01

Condition Class Metrics

02

Tract Assessment Chart

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Appendix 1

Condition Class Metrics

The condition class metrics included in this table will be used to assess tracts that are enrolled in longleaf restoration-oriented biomass sourcing. These metrics are based on America's Longleaf Restoration Initiative's condition class metrics¹ and Florida Natural Areas Inventory longleaf element occurrence data².

¹ <http://www.americaslongleaf.org/media/mjroakz/final-lpc-maintenance-condition-class-metrics-oct-2014-high-res.pdf>

² https://www.fnai.org/PDF/LPEGDB_v3_Summary_Report_Sep_2015.pdf

06

Attribute	Management Class		
	Restore (Poor)	Improve (Fair)	Maintain (Good to Excellent)
Canopy			
Longleaf pine canopy	Absent	Codominant to Occasional-Rare	Dominant
Older-mature characteristics	N/A	Not evident	Yes
Longleaf pine basal area	N/A	<10 or >70	10-70
Other pine basal area	>10	5-10	<5
Hardwood canopy basal area	>10	5-10	<5
Midstory			
Midstory cover	>55%	16-55%	≤15%
Tall shrub cover	>75%	30-75%	≤30%
Groundcover			
Short shrub cover	>75%	30-75%	≤30%
Pyrogenic grass cover	<1%	1-20%	>20%
Native herbaceous cover	<10%	10-40%	>40%
Non-native herbaceous cover and/or invasive plant cover	>10%	1-10%	<1%

Appendix 2

Tract Assessment Chart

North Carolina

* Mill Abbreviation Key:
 SAM - Sampson
 HAM - Hamlet

06

Mill*	Ownership Type	County	Acres	Pre-Harvest Condition Class	Restoration Treatment Type				Post-Harvest Condition Class
					Midcanopy or Canopy Thinning in Longleaf Stand	Clearcut Non-Longleaf Stand to plant with Longleaf	Heavy Non-LLP Canopy Thinning to convert to Longleaf dominant stand ('Game Changer' Strategy)	Salvage	
SAM	Federal	Jones	~212	Improve	Canopy thinned to allow more light to reach the ground and help develop more native herbaceous cover				Maintain
SAM	Private	Craven	28	Restore		Young loblolly stand clearcut in 2019 and then planted with longleaf pine			Restore
HAM	Private	Cumberland	5.3	Restore				Clearcut insect-damaged longleaf stand and replanted to longleaf in 2020	Restore
HAM	Private	Cumberland	10	Improve	Thinned canopy				Improve
HAM	Private	Cumberland	17	Improve	Thinned canopy and mid-canopy of natural longleaf stand				Maintain
HAM	Private	Moore	7.6	Restore			Game-Changer Thinning		Improve
HAM	Private	Moore	11	Improve	Canopy thinning				Maintain

Appendix 2

Tract Assessment Chart

South Carolina

* Mill Abbreviation Key:
GRE - Greenwood

Mill	Ownership Type	County	Acres	Pre-Harvest Condition Class	Restoration Treatment Type				Post-Harvest Condition Class
					Midcanopy or Canopy Thinning in Longleaf Stand	Clearcut Non-Longleaf Stand to plant with Longleaf	Heavy Non-LLP Canopy Thinning to convert to Longleaf dominant stand ('Game Changer' Strategy)	Salvage	
GRE	Federal	Richland	117	Improve	Canopy thinned				Maintain
GRE	Federal	Richland	77	Improve	Canopy thinned				Improve
GRE	Federal	Richland	144	Improve	Canopy thinned				Maintain
GRE	Federal	Richland	47	Improve	Canopy thinned				Maintain
GRE	Federal	Richland	99	Improve	Canopy thinned				Improve
GRE	Federal	Richland	50	Improve	Canopy thinned				Maintain

06

Appendix 2

Tract Assessment Chart

Georgia

* Mill Abbreviation Key:
 GRE - Greenwood
 COT - Cottondale

06

Mill	Ownership Type	County	Acres	Pre-Harvest Condition Class	Restoration Treatment Type				Post-Harvest Condition Class
					Midcanopy or Canopy Thinning in Longleaf Stand	Clearcut Non-Longleaf Stand to plant with Longleaf	Heavy Non-LLP Canopy Thinning to convert to Longleaf dominant stand ('Game Changer' Strategy)	Salvage	
GRE	Federal	Richmond	141	Improve			Co-dominant canopy thinned down to a combined basal area of 60 ft ² /acre		Maintain
GRE	Federal	Richmond	445	Improve		Clearcut small areas of loblolly where there was no LLP and will plant LLP	Most of tract had loblolly thinned out of canopy, leaving LLP		Improve
COT	State	Seminole	219	Restore				Removal of dead and damaged trees destroyed by Hurricane Michael	Restore

Appendix 2

Tract Assessment Chart

Florida

* Mill Abbreviation Key:
COT - Cottondale

06

Mill	Ownership Type	County	Acres	Pre-Harvest Condition Class	Restoration Treatment Type				Post-Harvest Condition Class
					Midcanopy or Canopy Thinning in Longleaf Stand	Clearcut Non-Longleaf Stand to plant with Longleaf	Heavy Non-LLP Canopy Thinning to convert to Longleaf dominant stand ('Game Changer' Strategy)	Salvage	
COT	State	Jackson	404	Restore				Removal of dead and damaged trees destroyed by Hurricane Michael	Restore
COT	State	Jackson	675	Restore				Removal of dead and damaged trees destroyed by Hurricane Michael	Restore
COT	State	Liberty	187	Restore		Sand pine clearcut to plant longleaf			Restore
COT	Private	Bay	235	Restore				Removal of dead and damaged trees destroyed by Hurricane Michael	Restore
COT	Private	Bay	141	Restore				Removal of dead and damaged trees destroyed by Hurricane Michael	Improve



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