TNC - Chestnut Mountain Improved Forest Management Project

May 2019

The Nature Conservancy

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A.
PROJECT OVERVIEW

A1. PROJECT TITLE

TNC-Chestnut Mountain Improved Forest Management Project

A2. PROJECT TYPE

Improved Forest Management

A3. PROOF OF PROJECT ELIGIBILITY

Relevant eligibility requirements and demonstration that they are met by the project are elaborated below.

ACR Eligibility Requirement	Demonstration of compliance
Start date	The project start date June 5 2018, *after* November 1 1997. The methodology specifies that "The Start Date is when the Project Proponent began to apply the land management regime to increase carbon stocks and/or reduce emissions.", which is marked by the date that The Nature Conservancy (TNC) acquired and initiated management of the property.
Minimum project term	The project employs the ACR Standard v5.1 with requisite 40-year minimum project term (=commitment to project continuance, monitoring and verification). The minimum project term begins on the project start date of June 5 2018.
Crediting period	The project employs the ACR Standard v5.1 with requisite 20-year initial crediting period for IFM projects.
Real	The project will seek issuance of ex post credits, and not issuance of ex ante credits.
Direct emissions/Offset title/Land title	GHG emission reductions generated by the project activity are generated from forest carbon sources and sinks over which TNC has all management and ownership rights. TNC holds title to the project area (see Section G)
Additional	Additionality is demonstrated using the ACR Standard Three-Prong Additionality Test, demonstrating that the project activity is regulatory surplus, exceeds common practice, and faces either financial, technological or

ACR Eligibility Requirement	Demonstration of compliance
	institutional barriers to implementation. See Section C.
Permanent	Permanence is addressed by the project through ongoing assessment of risk using the ACR Risk Tool and contributions to the ACR buffer pool.
Net of leakage	Leakage is accounted for applying the methodology. See Section E3.
Independently validated and verified	The project will be submitted for independent validation and verification.
Community and environmental impacts	Net positive community and environmental impacts are demonstrated. See Section F.
Forest definition	All areas qualify as "forestland" per the methodology (Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands v1.3) definition of >10% stocking, or roughly around >8ft^2/acre basal area in trees >5" dbh.
Eligible landownership type	All landownership types, including private non-profits as in the case of this project, are eligible per the ACR Standard v5.1

As of the start date, there is currently no intent to seek registration of non-carbon environmental attributes from the project.

A4. LOCATION

The project property is located in the state of Tennessee, entirely in White County. A shapefile of the project area is archived in the project database ("Chestnut_MTN_StrataMap_Rev05092019.shp "), and illustrated in Figures A1a and A1b. Latitude, longitude: 35.864651, -85.324051.

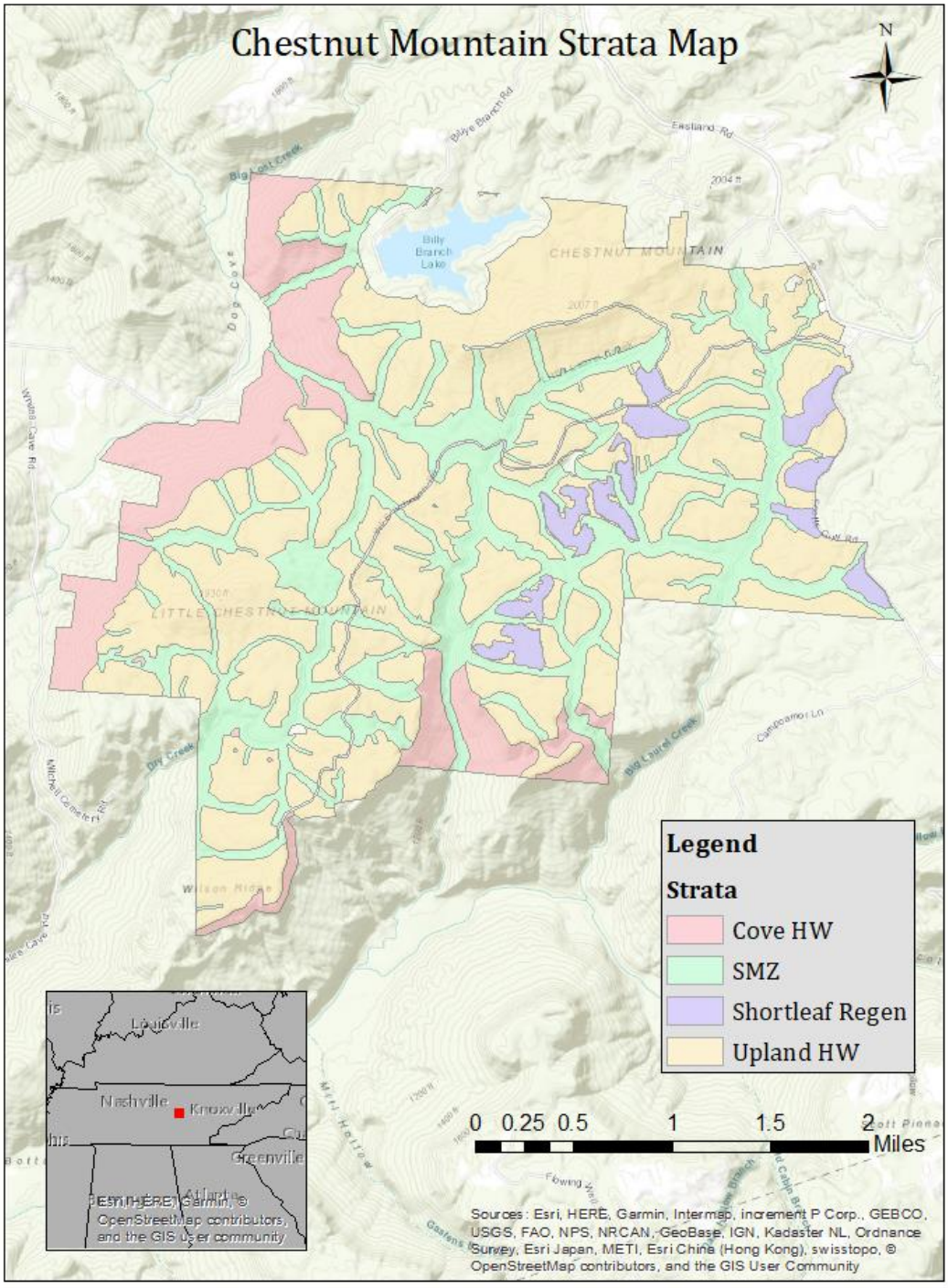

Figure A1a. TNC-Chestnut Mountain Improved Forest Management Project area.

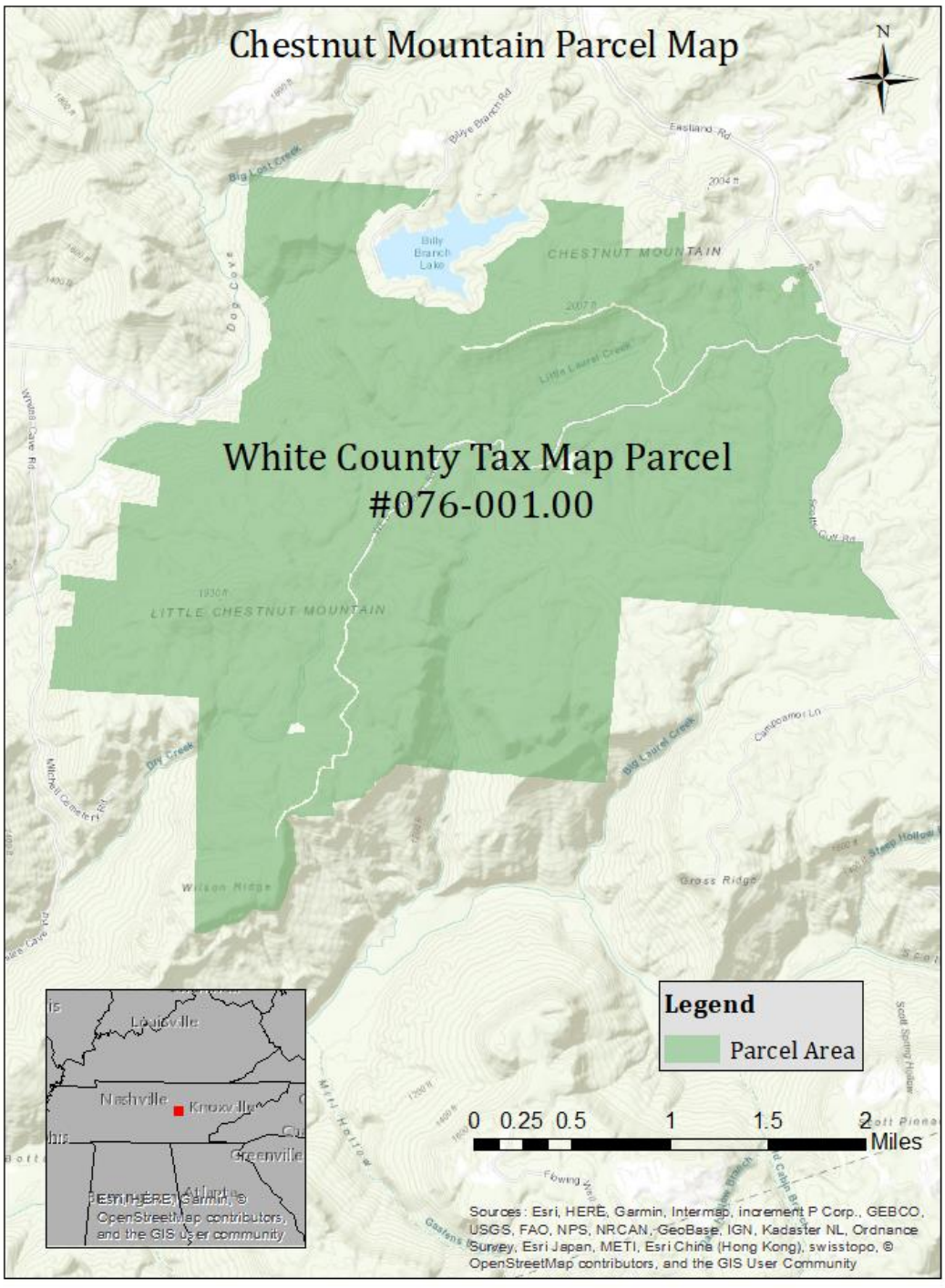

Figure A1b. TNC-Chestnut Mountain Improved Forest Management Project parcel map.

A5. BRIEF SUMMARY OF PROJECT

On June 5 2018, The Nature Conservancy (TNC) acquired the Chestnut Mountain property in White County, Tennessee, from the Bridgestone Americas, Inc. The project area is composed of 5,556 acres of cove and upland hardwood forest and sites undergoing restoration to shortleaf pine. The Chestnut Mountain forest contains many valuable ecological, educational, open space, cultural, and scenic resource conservation values. Chestnut Mountain also occupies a strategic position in the surrounding forested landscape, and its conservation serves to further consolidate a mosaic of protected areas in the Cumberland Plateau totaling 60,000 acres.

TNC envisions Chestnut Mountain as a vital platform to promote forest health and climate-smart forestry, and aims to advance three conservation priorities: tackle climate change, protect land and water, and connect people and nature through a direct reduction of harvesting.

A6. PROJECT ACTION

The project activity is improved forest management, with TNC's conservation-forestry practices representing an improvement in carbon storage over higher return, more aggressive management regimes, characterized by conversion of forest to loblolly pine plantations, typical of other ownerships in the region at the time of the project start date in 2018. The TNC-Chestnut Mountain Improved Forest Management Project will provide critical finance for the oversight and management of the property.

The start date of this project is when TNC received the donation of the Chestnut property from Bridgestone America's in June 2018. TNC will not be harvesting in 2019 and will likely begin some activities later in 2020. Our objectives will be different than Bridgestone's and will be identified as we plan to bring together experts for a BioBlitz and implement new technology such as a Motus Wildlife Tracking System tower in 2019 to learn more about the flora and fauna of the Mountain. We will hold a series of expert meetings to tour the Mountain's forests and plan for the best climate smart forestry and restoration practices, connecting Chestnut into a landscape view of planning for forest health. Thus, our objectives for forest management will be guided by new biological data and TNC harvest plans will be dictated by this information. We plan to harvest less annually than what was completed by Bridgestone in the past several years and in smaller patch sizes. We will continue to implement restoration activities on the shortleaf restoration sites that were kick-started by Bridgestone and if the new planning dictates increased acreage, we will assess the impacts to carbon versus the positive benefit to the species benefiting from the restoration activities.

Management activities are guided by a forest management plan and ongoing certification under the Forest Stewardship Council (FSC) as part of TNC's ongoing Working Woodlands Program[1].

A7. *EX ANTE* OFFSET PROJECTION

Estimates of GHG emission reductions and removal enhancements (before buffer contribution) for the first 20-year crediting period are provided in Table A1 below (derived in Section E).

Table A1. Estimates of annual emission reductions and cumulative emission reductions (before buffer contribution) for the first crediting period. Throughout the GHG Plan, the convention is employed that project year refers to the interval from June 5 of the corresponding year to June 4 of the following year.

Project Year	Annual net GHG emission reductions (t CO2)	Cumulative emission reductions earned (t CO2)
2018	98,595	98,595
2019	73,546	172,141
2020	76,672	248,813
2021	79,791	328,604
2022	66,732	395,336
2023	10,598	405,934
2024	10,598	416,532
2025	10,598	427,130
2026	10,598	437,728
2027	-	437,728
2028	-	437,728
2029	-	437,728

[1] https://www.nature.org/content/dam/tnc/nature/en/documents/TN%20Working%20Woodlands%20brochure%20-%20June%202018.pdf

2030	-	437,728
2031	101	437,829
2032	-	437,829
2033	-	437,829
2034	-	437,829
2035	-	437,829
2036	-	437,829
2037	2,068	439,897
First Crediting Period Total	439,897	439,897

A8. PARTIES

List full contact information, roles, and responsibilities for project proponent, other project participants, relevant regulator(s) and/or administrators of any GHG Program(s) in which the project is already enrolled, and the entities holding offset and land title (if applicable).

Project Proponent and landowner contact information:

The Nature Conservancy (TNC)

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Offset project consultant or project developer contact information:

TerraCarbon LLC

David Shoch

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B.
METHODOLOGY

B1. APPROVED METHODOLOGY

Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands version 1.3 (April 2018).

(hereafter referred to as the "methodology")

B2. METHODOLOGY JUSTIFICATION

The chosen methodology is appropriate for improved forest management on private lands in the U.S. Relevant applicability conditions and demonstration that they are met by the project are elaborated below.

Methodology applicability conditions, referencing modifications currently in process, and likely to be accepted by ACR.	**Demonstration of compliance**
Applicable only on non-federally owned forestland within the United States	The project area is privately-owned and located in the United States
The methodology applies to lands that can be legally harvested by entities owning or controlling timber rights on forestland	TNC owns and controls timber rights to the property.
Private or non-governmental organization ownerships subject to timber harvesting in the with-project scenario must be certified by FSC, SFI, or ATFS or become certified within one year of the project Start Date	The project area is FSC-certified.
All Tribal lands in the United States, except those lands that are managed or administered by the Bureau of Indian Affairs, are eligible under this methodology	Not applicable
If harvesting occurs in the with-project scenario on public non-federal ownerships, the property must: • be certified by FSC, SFI, or ATFS or become certified within one year of the project Start Date; or • have its forest management plan sanctioned by a unit of elected government officials within a state, or a state agency, or a federal agency; • and have its forest management plan updated at minimum every 10 years.	Not applicable
Use of non-native species is prohibited where adequately stocked native stands were converted for forestry or other land uses after 1997	The project area is composed entirely of native forest types and no non-native species will be planted.

Methodology applicability conditions, referencing modifications currently in process, and likely to be accepted by ACR.	Demonstration of compliance
Draining or flooding of wetlands is prohibited	The project activity does not involve any hydrological manipulation of wetlands.
Project proponent must demonstrate its ownership or control of timber rights at the project start date	The project area has been under TNC ownership as of the June 5 2018 start date and continues under TNC ownership.
The project must demonstrate an increase in on-site stocking levels above the baseline condition by the end of the Crediting Period	The project is expected to increase on-site stocking levels above the baseline condition by the end of the Crediting Period (consistent with FVS-SN projections produced in this report)

B3. PROJECT BOUNDARIES

The project area boundary is delineated in a shape file archived in the project database and illustrated above in Figure A1. All areas qualify as "forestland" per the methodology definition of >10% stocking (i.e. roughly around >8ft^2/acre basal area in trees >5" dbh), and not currently developed for non-forest uses. Non-forest land cover/use classes on the property were excluded (see below).

The project area (file "Chestnut_MTN_StrataMap_Rev05092019.shp ") was delineated as follows:

1. Used "Chestnut_MTN_stands_region.shp" to generate the stand map.
2. Added "Chestunut_MTN_Harvest_todate_region.shp" to map to view the 2015 harvest sites.
3. Used the Union Tool to combine the two above-mentioned layers to create "Chestnut_MTN_stands_region_U.shp"
4. Manually merged 12 fragment artifacts from the gaps and slivers (referenced above), with area less than 0.001 acres, between polygons to the nearest large polygon that were not removed by the Integrate tool.
5. Merged contiguous harvested polygons back together where divided by other strata to create Shortleaf Regen strata polygons.
6. Relabeled the stand number of the recently harvested stands to "1000".
7. Applied Explode Multi-part Feature Tool to the remnants of the original stands that were separated by the harvests to turn them into their own separate stands, though the stand numbers remained the same.
8. Recalculated the acreage of all new individual stands post-harvest using Calculate Geometry Tool.
9. Established 4 distinct strata for all stands using area description in the 'Notes' column of the shapefile attribute table[2] (Removed any non-forested area cover like the Bondecroft Dam, Billy Branch Lake, and some roads, etc. – listed them as N/A):

[2] Stand typing, and delineation of SMZs, was done by Panther Creek Forestry LLC, based on interpretation of aerials and on-site assessments

   a. SMZ
   b. Cove HW
   c. Shortleaf Regen
   d. Upland HW
10. Reassigned features to SMZ based on proximity to water features like perennial and intermittent streams by overlaying the map from the National Hydrography Dataset.
11. Dissolved all layers by strata to create a map of overall strata within the Chestnut MTN region, which can be found in "Chestnut_MTN_Stratum.shp".
12. Copied attribute table into Excel and calculated new total acreage for each strata.
13. Spatially joined the plot points from 2015 sampling and 2017 sampling to the "Chestnut_MTN_Stratum.shp" layer to find the strata that each plot is located in.

Subsequently, the project area boundary was revised to conform with the legal boundary recorded in the plat map. The Chestnut Mountain project area boundary was updated using a plat map of the property boundaries, digitized using a scanner and imported into ArcGIS 10.6 as a .png file. The plat map was georeferenced using the Georeference Toolbar in ArcGIS to stretch it to the NAD_1983_UTM_Zone_16N projection, using the original project area boundary shapefile (see "Chestnut_Mtn_Boundary_region.shp") to ground-truth the image. Five anchor points were placed on prominent corners of the project boundary distributed along the north, east, south, and west borders of the property to line up the two maps. Lining up the project area shapefile with the plat map revealed a few obvious discrepancies in the project area shapefile on the west boundary and one on the north boundary. After reviewing aerial imagery, it was clear that the discrepancy on the north edge of the map was due to a small area removed from the project area due to the existence of a structure. On the west side, the boundary was adjusted to match the plat map.

To adjust the boundary shape file, the lines were manually updated by stretching and editing the vertices to match the black boundaries lines of the plat map as closely as possible. Once the boundary shape file matched satisfactorily with the plat map, it was used as a template to update the project strata areas. All of the extraneous areas were removed by clipping the original strata map (see "Chestnut_MTN_StrataMap2.shp") to the new project area boundary. One corner was added to the strata map where it had originally been left out. Aerial imagery revealed that the added area includes a continuation of the Cove HW stratum. The area of each stratum was recalculated based on the new project boundary and documented in "Chestnut_MTN_StrataMap_Rev05092019.shp".

An inholding held by the Bondecroft Utility District and a 500' no cut zone around Billy Branch Lake was also delineated and excluded from the project boundary.

The first project crediting period is from June 5 2018 to June 4 2038. The project term extends through June 4 2058.

B4. IDENTIFICATION OF GHG SOURCES AND SINKS

The project includes the carbon pools and GHG sources detailed in Table B1.

Table B1. Carbon Pools and GHG Emissions Sources Included in the Project Boundary.

Carbon pools	Included / Excluded	Justification / Explanation of Choice
Above-ground biomass carbon	Included	Major carbon pool subjected to the project activity. The project employs a minimum dbh of 1".
Below-ground biomass carbon	Included	Major carbon pool subjected to the project activity. The project employs a minimum dbh of 1".
Standing Dead Wood	Included	Major carbon pool subjected to the project activity. The project employs a minimum dbh of 1".
Lying Dead Wood	Excluded	This pool is conservatively excluded. Lying dead wood is optional to include.
Harvested Wood Products	Included	Major carbon pool subjected to the project activity.
Litter/Forest Floor	Excluded	Changes in the litter pool are considered *de* *minimis* as a result of project implementation
Soil Organic Carbon	Excluded	Changes in the litter pool are considered *de* *minimis* as a result of project implementation
Emissions from Biomass Burning	Included	This pool is included. It is conservatively assumed to be zero in the baseline. No logging slash is burnt in either the baseline or with-project cases as part of management practices.
Market Leakage	Included	As more wood is harvested in the baseline than in the project scenario, market leakage is accounted for to reflect that wood supply elsewhere increases in response to project activity-attributable reductions, assuming demand is constant.

B5. BASELINE

The baseline scenario represents an aggressive harvest regime, targeted to maximize net present value at a 4% discount rate, typical of ca. 2018 practices in the project region on private lands under ownership by non-governmental organizations. Baseline practices involve clearcuts and conversion to

loblolly pine plantations and heavy thinnings. Derivation and justification for the baseline is detailed in Section E.

B6. PROJECT SCENARIO

The project activity is improved forest management, via acquisition of the property and implementation of TNC's conservation forestry practices summarized in Section A6.

B7. REDUCTIONS AND ENHANCED REMOVALS

The project activity produces net emission reductions by increasing stocking relative to the baseline, via improved forest management practices previously described in Section A6.

B8. PERMANENCE

Risks that may substantially affect the project's GHG emission reductions or removal enhancements include fire, forest pests (particularly southern pine beetle in the Shortleaf Regeneration stratum), climate change, and failure of project activity to avoid unsustainable forest resource extraction and land use change.

The project addresses permanence by application of the ACR Tool for Risk Analysis and Buffer Determination v1.0, to assess risk of reversal and withhold from issuance a commensurate percentage of ERTs, to be held in reserve in the ACR buffer pool. The initial risk analysis is detailed below, and will be updated at each verification.

The project has an initial risk rating of 18% based on application of the ACR Tool for Risk Analysis and Buffer Determination, detailed in the table below.

Applicable risk category	Risk value
A. Financial	4% (Default Value)
B. Project Management	4% (Default Value)
C. Social/Policy	2% (Default Value)
D. Conservation Easement Deduction	0% (No easement)
E. Fire	2% (project is located in low fire risk region[3])

[3] USFS Wildland Fire Assessment System https://www.wfas.net/index.php/fire-danger-rating-fire-potential--danger-32 Project area region typically categorized under low fire danger rating. Also classified as low by Dillon, G.K.; J. Menakis; and F. Fay. 2015. Wildland Fire Potential: A Tool for Assessing Wildfire Risk and Fuels Management Needs. (link is external) pp 60-76 In Keane, R. E.; Jolly, M.; Parsons, R.; and Riley, K. Proceedings of the large wildland fires conference; May 19-23, 2014; Missoula, MT. Proc. RMRS-P-73. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 345 p. No fires >1000ac have occurred in this region in the past 12 months, Southern Area Coordinator Center https://gacc.nifc.gov/sacc/

F. Diseases and Pests	4% Default Value[4]
G. Levee Failure and Water Table Changes	0% (<60% of the project area is a forested wetland)
H. Other Natural Disaster Events	2% Default Value
TOTAL	18%

The Minimum Buffer Percentage for the project is 18%, and the projected Buffer Contribution amount for the initial 20-year baseline period is 182,175 t CO2e (see "ACR_Calcs ChesMt rev3.xls".

[4] In the case of the Chestnut Mountain project, the most relevant and potentially damaging forest pest/disease would be southern pine beetle and/or emerald ash borer. 1-10% of the county is at high risk of loss due to pine beetle https://foresthealth.fs.usda.gov/nidrm/. Ash is a minimal component of overall forest carbon stock.

C.
ADDITIONALITY

C1. REGULATORY SURPLUS TEST

The project activity is not required by law. There are no state or federal regulatory restrictions on forest management that apply to the project area. Nevertheless, voluntary Tennessee Best Management Practices (BMPs[5]) restrictions around Streamside Management Zones (SMZs) are conservatively incorporated in both the baseline and with-project scenarios (see Section E), and thus compliance with BMPs is not included in accounting of ERTs.

C2. COMMON PRACTICE TEST

At the time of the project start date, ca. 2018, most forest managers in the project region were motivated to harvest as much timber as possible with little investment and eventually to sell the land, and few were committed to long-term forest management or conservation. In particular, TNC's focus on conservation objectives contrasts starkly with the more aggressive, predominately even-aged management regimes practiced by other forest ownerships in the region.

Common practice is reflected in average stocks in the project region, which have been assessed by the California Air Resources Board (ARB) from US Forest Service Forest Inventory and Analysis (FIA) data[6]. These values of average live carbon stocking, at the regional level and by forest type, reflect the outcomes of management regimes in practice across the landscape.

Weighted average common practice stocking per ARB of 96 t CO2/acre in live above and belowground biomass equivalent (Table C1, calculations in "ChestnutMtn CommonPracticeCalcs rev3.xls") is well below the projected stocking outcome in the with-project scenario, expected to average ~165 t CO2/acre over the first 20-years of the project term (Section E6). Thus, management in the with-project case can be characterized as producing outcomes not achieved by typical common practice.

Table C1. Comparison with (area-weighted average) 2015 ARB common practice values for Eastern Broadleaf Forest Cumberland Plateau and Central Interior Broadleaf Forest Eastern Low supersections.

stratum	acres	Equivalent* ARB common practice avg ABG t CO2/ac
Cove HW	764.0	95.33
Shortleaf Regen	233.7	56.55

[5] https://www.tn.gov/content/dam/tn/agriculture/documents/forestry/AgForBMPs.pdf
[6] https://www.arb.ca.gov/cc/capandtrade/protocols/usforest/usforestprojects_2015.htm

SMZ	1,447.7	97.32
Upland HW	3,110.8	97.97
	Area-weighted average	**95.69**

*converted from aboveground to above and belowground assuming 20% root:shoot ratio

C3. IMPLEMENTATION BARRIERS TEST

The project activity faces a financial barrier. Net present values were calculated referencing the baseline and project scenarios outlined in Sections E1 and E6 below, using a 4% discount rate over the 20-year crediting period from 2018 to 2037. Property taxes were ignored, as they are equal in the two scenarios.

The project activity, without carbon revenue, is expected to generate $ 3,922,265 NPV (in 2018 $$) in timber revenue, unambiguously lower than the return in the baseline NPV maximization scenario expected to yield NPV (in 2018 $$) of $ $ 12,124,823.

(documented in "NPV additionality ChesMt rev3.xlsx"). Thus, the project activity is clearly not the most profitable forest management use.

C4. PERFORMANCE STANDARD TEST

Not applicable.

D.
MONITORING PLAN

D1. MONITORED DATA AND PARAMETERS

Live tree stocks will be monitored via forest inventory conducted every 5 years or less, with field measurement and estimation procedures consistent with those outlined in Section E1 below.

The following parameters, specified in the Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands v1.3, will be monitored.

Note that QA/QC procedures for data and parameters related to baseline uncertainty (not monitored) are provided in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1", to ensure accurate and precise measurement data was collected in the inventory used to derive the project baseline. Subsequent growth and yield modeling using FVS-SN applied best practices, calibrating the model with location and site class data.

Data or Parameter Monitored	$C_{P,TREE,t}$
Unit of Measurement	metric tons CO_2
Description	Carbon stored in above and below ground live trees at the beginning of the year *t*
Data Source	Forest inventory.
Measurement Methodology	To be consistent with field measurement protocols specified in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1".
Data Uncertainty	To be calculated as the mean +/- 90% confidence interval
Monitoring Frequency	Every 5 years or less, or at request for ERT issuance
Reporting Procedure	
QA/QC Procedure	To be consistent with field measurement protocols specified in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1". The inventory will use a stratified systematic sample design and re-measure the same permanent plots established in 2015-2016, which targeted a precision level of +/- 10% of the mean live tree biomass with 90% confidence.
Notes	

Data or Parameter Monitored	$C_{P,DEAD,t}$
Unit of Measurement	metric tons CO_2
Description	Carbon stock stored in dead wood at the beginning of the year *t*

	Standing dead wood only (lying dead wood excluded from project accounting boundary).
Data Source	Forest inventory.
Measurement Methodology	To be consistent with field measurement protocols specified in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1".
Data Uncertainty	To be calculated as the mean +/- 90% confidence interval
Monitoring Frequency	Every 5 years or less, or at request for ERT issuance
Reporting Procedure	
QA/QC Procedure	To be consistent with field measurement protocols specified in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1". The inventory will use a stratified systematic sample design and re-measure the same permanent plots established in 2015-2016, which targeted a precision level of +/- 10% of the mean live tree biomass with 90% confidence.
Notes	

Data or Parameter Monitored	Project area
Unit of Measurement	Acres
Description	Area of IFM project
Data Source	Validated project GHG Plan
Measurement Methodology	Not re-measured – area remains fixed through crediting period. Determination of project area documented in Section B3 of the project GHG Plan.
Data Uncertainty	None
Monitoring Frequency	Not monitored.
Reporting Procedure	Reported in GHG Plan and all monitoring reports.

QA/QC Procedure	Project area boundary truthed with aerial imagery and on-site inspections with a GPS. Plat map and GIS datasets used were geo-registered referencing corner points, clear landmarks or other intersection points.
Notes	

Data or Parameter Monitored	Sample plot area
Unit of Measurement	Acres (variable, nested)
Description	Area (variable, nested) of forest inventory sample unit
Data Source	Standard Operating Procedures document "Final Carbon Cruise Specs Chestnut Mountain Dec 2015-Jan 2017".
Measurement Methodology	As per standard operating procedures detailed in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1", employing nested fixed-radius plots. Plot centers are permanently marked in the field.
Data Uncertainty	None
Monitoring Frequency	Sample plot area is not monitored. Sample plots are to be re-measured every 5 years or less.
Reporting Procedure	Reported in project monitoring reports.
QA/QC Procedure	As per detailed quality control procedures outlined in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1".
Notes	

Data or Parameter Monitored	Tree species
Unit of Measurement	Taxon (to species level)
Description	Species of tree measured in forest inventory sample unit

Data Source	Forest inventory
Measurement Methodology	As per standard operating procedures detailed in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017".
Data Uncertainty	None
Monitoring Frequency	Sample plots are to be re-measured every 5 years or less.
Reporting Procedure	Reported in project monitoring reports.
QA/QC Procedure	As per detailed quality control procedures outlined in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1". Inventory field crew members will be trained in or have familiarity with regional dendrology.
Notes	

Data or Parameter Monitored	$C_{P,HWP,t}$
Unit of Measurement	metric tons CO_2
Description	Carbon remaining stored in wood products 100 years after harvest for the project in year t.
Data Source	Monitored from recorded harvest volumes.
Measurement Methodology	During harvests, TNC receives scaled mill receipts for confirmation.
Data Uncertainty	
Monitoring Frequency	Annual data summed for the monitoring period, applied as average annual for the monitoring period
Reporting Procedure	
QA/QC Procedure	Harvest volumes will be scaled by a professional wood scaler and/or using calibrated scales.
Notes	

Data or Parameter Monitored	$BS_{P,t}$
Unit of Measurement	in metric tons CO_2
Description	Carbon stock in logging slash burned in the project in year *t*
Data Source	

Measurement Methodology	Burning of any kind is not performed as part of management practices. Surveillance of slash management on harvests is performed on FSC audits via visual census.
Data Uncertainty	
Monitoring Frequency	Annual
Reporting Procedure	
QA/QC Procedure	Monitoring and measurement of logging slash will be conducted by a professional forester.
Notes	

Data or Parameter Monitored	$C_{P,DEAD,t}$
Unit of Measurement	metric tons CO_2
Description	Carbon stored in dead wood at the beginning of the year *t*
Data Source	Forest inventory.
Measurement Methodology	To be consistent with field measurement protocols specified in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1".
Data Uncertainty	To be calculated as the mean +/- 90% confidence interval
Monitoring Frequency	Every 5 years or less, or at request for ERT issuance
Reporting Procedure	
QA/QC Procedure	To be consistent with field measurement protocols specified in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015- Jan 2017 rev1". The inventory will use a stratified systematic sample design and re-measure the same permanent plots established in 2015-2016, which targeted a precision level of +/- 10% of the mean live tree biomass with 90% confidence.
Notes	Limited to standing dead wood.

E.
QUANTIFICATION

E1. BASELINE

Baseline analysis began with a forest carbon inventory of the project area, conducted from December 2015 to March 2016 (Cove HW, SMZ and Upland HW strata), and in July 2018 (Shortleaf Regen stratum). The inventory employed a systematic, post-stratified sample design with nested fixed-radius plots; field measurement protocols are documented in "Final Carbon Cruise Specs Chestnut Mountain Dec 2015-Jan 2017". Minimum diameter at breast height (dbh) for live trees and standing dead wood was set at 1". Panther Creek Forestry, LLC established the systematic grid with a random start point using Landmark Solutions software.

Strata were delineated to represent broad forest/type structure and management regimes, developed from stand typing determined by a combination of aerial imagery evaluation and on-site verification during inventories by Panther Creek Forestry, LLC.

The final stratification is illustrated in Figure A1 and detailed in Table E1. Note that from the initial grid of 101 plots, 6 plots were removed to produce a final dataset of 94 plots: plots 3, 29, 48, 59 and 69 were located outside of the property area; plot 48 located in the middle of a lake (delineated and excluded from the project area). Plot 49 was excluded from the sample because it had been improperly relocated from its original position.

Table E1. Chestnut Mountain inventory design.

Strata	Acres	n	Measurement year
Cove HW	764.0	14	2015-2016
Shortleaf Regen	233.7	4	2018
SMZ	1,447.7	21	2015-2016
Upland HW	3,110.8	55	2015-2016
Total	5,556.2	94	

Inventory analysis and results

Total aboveground biomass carbon was estimated from inventory data applying species group-specific allometric equations sourced from Jenkins et al 2003[7].

For all trees, total aboveground biomass was adjusted to deduct any portion observed missing (referencing defect assessments for the top, middle and bottom thirds of the total aboveground

[7] Jenkins, J.C., Chojnacky, D.C., Heath, L.S. and R.A. Birdsey. 2003. National-scale biomass estimators for United States tree species. Forest Science 49:12-35

biomass of inventory trees). Deductions for defect were incorporated by multiplying total aboveground biomass by weighted average overall percent sound (1 – recorded percent defect) referencing the proportions of aboveground tree biomass represented in each of three assessed thirds (table below referenced from Climate Action Reserve 2012).

Allocations of total aboveground biomass in top, bottom and middle thirds:

Tree Portion	Percent of Tree Biomass
Top 1/3	10%
Middle 1/3	25%
Bottom 1/3	65%

Defect was not assessed in the field for snags in the inventory. Defect was assigned post-inventory to snags assuming the values below, based on field assessment of decay class (Table E2).

Table E2. Defect assumptions for trees not assessed in the field.

DECAY CLASS	Defect top (%)	Defect middle (%)	Defect bottom (%)
Allbranchesallbark	0	0	0
Fewlimbsnofines	50	0	0
fewstubssomebark	50	0	0
stubsbrokentop	100	0	0
nobranchesnobark	100	50	0

On a series of plots measured early on the in the inventory (plots 32, 33, 44, 55, 65, 74, 75, 76, 81 and 82; all in SMZ and UplandHW strata), neither defect nor decay class (on dead stems) were collected. On these tree records, defect and decay class were assigned post-inventory as the stratum average (from plot measurements where these attributes were assessed in the field) (Table E3); derived in "Chestnut Mtn Inventory DATA.xls" and including data from an additional 79 plots measured in the project area in Nov 2016-Jan 2017.

Table E3a. Average defect recorded on stems assessed in the field (from 2015-2016 and 2016-2017 data).

Stratum	Average defect top (%)	Average defect middle (%)	Average defect bottom (%)

SMZ	5.0	2.9	1.1
Upland HW	4.9	2.4	0.9

Table E3b. Average decay class recorded on snags assessed in the field (from 2015-2016 and 2016-2017 data).

Stratum	Average decay class of snags (average rounded to nearest integer)
SMZ	3
Upland HW	3

Root biomass was estimated from total aboveground biomass using component ratios from Jenkins et al 2003, to produce total live tree biomass. Total live tree biomass was multiplied by 0.5 to estimate carbon fraction, then multiplied by 3.664 to calculate CO2 equivalent.

Carbon in standing dead wood was estimated in the same way as for live trees, with deductions for decay class recorded in the field (Table E4). For all standing dead wood with methodology decay class 4, only stem wood (and defect recorded in bottom and middle portions) was included in carbon calculations.

Table E4. Decay class descriptions and deductions for standing dead wood.

DECAY CLASS	ACR IFM meth decay class	deduction	ACR IFM meth decay class description
Allbranchesallbark	1	0.97	Tree with branches and twigs that resembles a live tree (except for leaves)
Fewlimbsnofines	2	0.95	Tree with no twigs but with persistent small and large branches
fewstubssomebark	3	0.9	Tree with large branches only
stubsbrokentop	3	0.9	Tree with large branches only
nobranchesnobark	4	0.8	Bole only, no branches

For the Cove HW, SMZ and Upland HW strata, carbon stock estimates for the June 5 2018 project start date were modeled from the Dec 2015-Mar 2016 inventory data using the US Forest Service Forest Vegetation Simulator (FVS) Southern (SN) variant.

The FVS-SN model was calibrated to the project area entering the FVS location code 80812 (Clinch District, George Washington/Jefferson NF), Ecoregion code 223Eb (Eastern Karst Plain) and site index, determined using the NRCS Web Soil Survey database. We calculated the area-weighted average site index within each stratum with the Soil Data Viewer ArcGIS Add-in, as shown in Table E5, below and documented in "BridgestoneSiteIndex_10-11-18.xlsx". The site index was established based on a reference tree species for each stratum. Reference species were selected based on relative dominance (in terms of basal area) and representation in the NRCS dataset (i.e. site data available for more than 50% of the stratum area). For the Shortleaf Regen stratum, we selected shortleaf pine as the reference species because this is the anticipated dominant species in the stratum.

Table E5. Summary of Site Index for each stratum in the Chestnut Mountain project area using the NRCS Web Soil Survey. The "site index" is the average height, in feet, that dominant and codominant trees of a given species attain at age 50. The site index applies to fully stocked, even-aged, unmanaged stands (NRCS).

Stratum	Site Index (Area-weighted average based on NRCS Soil Data Viewer)	Reference Tree Species	% Area Available Soil Data
Cove Hardwood	66	Virginia Pine	56
Shortleaf Regeneration	63	Shortleaf Pine	100
Streamside Management Zone (SMZ)	68	White Oak	87
Upland Hardwood	68	White Oak	96

The FVS "NoTriple" command was entered to avoid excessive tree records and speed processing, and to track individual trees and permit cross-referencing to inventory dataset.

The grow-forward procedure for the Cove HW, SMZ and Upland HW strata is outlined below.

1. Dec 2015-Mar 2016 inventory data were entered into FVS-SN and grown for 5 years with no management.
2. For each live tree (ascribed a unique identifier), annual diameter growth was derived assuming linear growth during the 5-year projection interval (i.e. for dbh, annual growth calculated as dbh at end of 5-year interval *minus* dbh at beginning of 5-year interval, reported in the FVS Treelist output, *divided by* 5).
3. For each live tree, diameter data from the Dec 2015-Mar 2016 inventory were grown referencing the annual rates derived in step 2 above, adding 2.5 years annual growth (i.e. 2.5 growing seasons) to the Dec 2015-Mar 2016 measurement value.

4. Initial carbon stocks were recalculated using the grown data. No harvests or significant disturbances took place in these strata during the intervening period. Diameters of standing dead trees were assumed to be constant through the period.
5. The NPV and baseline scenarios were subsequently modeled entering the grown inventory data into FVS-SN.

Plots in the ShortleafRegen stratum (n=4) were measured in July 2018; this stratum had been subject to even-age harvests, and subsequent replanting of shortleaf pine, between the 2015-2016 inventory and project start date in June 2018.

Results for above- and belowground (live and dead) tree biomass are presented in Table E6; calculations are documented in "Chestnut Mtn inventory GROWN Jun2018 rev3.xls".

Table E6. Summary of inventory results.

	Cove HW	**ShortleafRegen**	**SMZ**	**Upland HW**
Mean ABGB tCO2/ac	181.2	15.6	175.4	187.3
n	14	4	21	55

Estimated total stock in live and dead trees at the project start date of June 5 2018 is 978,601.1

t CO2 (= 176.1 t CO2/ac * 5,556.2 acres).

NPV ANALYSIS

Discount rate assumption

We analyzed the Net Present Value (NPV) of projected cash flows for each baseline stratum for each year over a 100-year period to determine the baseline management scenario (that maximizes NPV). For purposes of our NPV analysis, we used a real discount rate of 4%, the rate for non-governmental organizations stated in the methodology.

Timber and revenue assumptions

To compute the net present value for each stratum, we first modeled harvestable timber from sawlogs and from pulp from the 2018 (grown and measured) inventory data for 100 years using FVS-SN, using the same specifications applied above, with the exception being that the FVS location code was entered as 80216 (Stearns District, Daniel Boone NF). The ShortleafRegen stratum was "planted" in 2018 in FVS-SN with shortleaf pine on a 10' * 10' uniform spacing (436 stems per acre), reflecting plantings completed prior to the project start date.

Model projections were made for the following management scenarios:

Stratum ("abbreviation")	**Harvest/management scenario**	**To determine:**
Cove hardwood ("CoveHW grow")	Allow existing stocks to grow 100 years	Year in which stratum would be first clearcut.
Cove hardwood ("CoveHW lob rot")	Clearcut, plant loblolly pine on an 8' * 10' uniform spacing (545 stems per acre), grow 100 years	Optimal rotation age
Shortleaf Regen ("ShortleafRegen grow")	Allow existing stocks to grow 100 years	Year in which stratum would be first clearcut.
Shortleaf Regen ("ShortleafRegen lob rot")	Clearcut, plant loblolly pine on an 8' * 10' uniform spacing (545 stems per acre), grow 100 years	Optimal rotation age
Upland hardwood ("UplandHW grow")	Allow existing stocks to grow 100 years	Year in which stratum would be first clearcut.
Upland hardwood ("UplandHW lob rot")	Clearcut, plant loblolly pine on an 8' * 10' uniform spacing (545 stems per acre), grow 100 years	Optimal rotation age
SMZ ("SMZ grow")	Allow existing stocks to grow 100 years	Year in which stratum would be first thinned to 50% residual "overstory canopy", compliant with Tennessee BMPs.
SMZ ("SMZ thin 2", "SMZ thin 3", "SMZ thin 4" and "SMZ thin 5")	Thin to 50% residual "overstory canopy", compliant with Tennessee BMPs. Thinning modeled as a thin throughout a diameter range with proportion of basal area cut set at 50%, regeneration via sprouting. Thinnings take place in: "SMZ thin 2": 2018 "SMZ thin 3": 2018 and 2023 "SMZ thin 4": 2018, 2023 and 2028 "SMZ thin 5": 2018, 2023, 2028 and 2033 Allow residual stocks to grow 100 years.	Years following prior thinnings in which repeat cuts would be justified.

Volume yields were output for 100-year projections from FVS-SN, with annual yields interpolated between 5-year cycle outputs.

Revenues

We then projected the revenues from sawlogs and pulp using the average stumpage price for pine and hardwood (whichever represented the majority of projected harvested volumes for that stratum). Stumpage prices were sourced from TimberMart South Tennessee Stumpage Prices Quarterly report for Q1 2018 (see accompanying document "TENNESSEE 1Q2018"):

timber type	**pulp $/green short ton**	**$/ft^3**
hardwood pulp	$ 8.60	$ 0.31
pine pulp	$ 5.20	$ 0.18
hardwood saw	$ 29.02	$ 1.04
pine saw	$ 18.58	$ 0.64

*conversions from green short tons to cubic feet assume 1 short ton hardwood = 0.787 cubic meters solid wood, and 1 short ton pine = 0.822 cubic meters solid wood, and 1 cubic meter = 35.315 cubic feet

Cost assumptions

Carrying costs consisted of property taxes, which were applied on a per acre basis, of $2.71/acre annually (= $19,673.29 2018 property taxes / 7,261 acres Chestnut Mountain property). We did not separately project costs related to cutting, hauling and delivery because they are implicitly accounted for in the stumpage prices. An extensive road network already exists in the project area, and no new road construction is necessary to facilitate harvests.

Establishment of loblolly pine on the Cove hardwood, Upland hardwood and Shortleaf Regen strata, post removal of hardwoods, incorporates the following costs, totaling $289.05/acre[8]:

Aerial applied herbicide - $90/acre

Bare root Loblolly seedlings - $.055 each - 545 trees/acre = $30.00/acre seedling cost

Planting labor - $.09/tree bare root

Backpack spray for site prep and/or release - $120/acre

Regeneration in the SMZ stratum post-thinning is solely via natural regeneration (sprouting).

NPV calculation and optimal harvest scheduling

[8] Personal communication, Emily Stefanick and Ben Myers, Panther Creek Forestry LLC, October 2018

For each stratum and harvest scenario, we calculated the NPV of cash flows at each year during the 100-year period using the 4% real discount rate and then selected the year that maximized the NPV of timber revenue as the optimal harvest year.

The results of our analysis are presented below (and in "NPV ChesMt rev2.xls") and support the basis for the management scenarios incorporated in the project baseline.

Stratum	harvest	abbreviation	FVS-SN projection source	max NPV revenues ($/acre)	year
CoveHW	First clearcut	CoveHW grow	ChesMt2018NPV_rev2, case CoveHW1	$2,649	2018
UplandHW	First clearcut	UplandHW grow	ChesMt2018NPV_rev2, case UplandHW4	$2,338	2018
SMZ	First thinning	SMZ grow	ChesMt2018NPV_rev2, case SMZ2	$1,135	2018
SMZ	Second thinning	SMZ thin 2	ChesMt2018NPV_rev2, case SMZ8	$549	2023
SMZ	Third thinning	SMZ thin 3	ChesMt2018NPV_rev2, case SMZ9	$265	2028
SMZ	Fourth thinning	SMZ thin 4	ChesMt2018NPV_rev2, case SMZ10	$126	2033
SMZ	Fifth thinning	SMZ thin 5	ChesMt2018NPV_rev2, case SMZ11	$57	2038
ShortleafRegen	First clearcut	ShortleafRegen grow	ChesMt2018NPV_rev2, case ShortleafRegen3	$176	2018
CoveHW	Optimal rotation	CoveHW lob rot	ChesMt2018NPV_rev2, case CoveHW5	$439	65 years (2083)
UplandHW	Optimal rotation	UplandHW lob rot	ChesMt2018NPV_rev2, case UplandHW7	$517	59 years (2077)
ShortleafRegen	Optimal rotation	ShortleafRegen lob rot	ChesMt2018NPV_rev2, case ShortleafRegen6	$465	60 years (2078)

Note that none of the post-clearcut scenarios justifies a repeat cut within the first 20-year crediting period. The management regimes derived from the above analysis and applied in the 20-year baseline scenario include (1) clearcuts (CoveHW, UplandHW and ShortleafRegen) and (2) repeated thinnings (SMZ).

For added conservatism in the baseline, the timetable of harvests was staggered over 6 years (2018-2023) in the CoveHW and UplandHW strata, and the first harvest in the SMZ stratum was delayed until 2023.

Legal and market constraints

There are no state or federal regulatory restrictions on forest management that apply to the project area. Nevertheless, voluntary Tennessee BMP restrictions around Streamside Management Zones were conservatively incorporated in the baseline scenario, as is common practice in Tennessee[9].

There is existing mill demand in the project region to realistically assimilate the largest annual volumes modeled in the baseline scenario. Maximum annual volume of harvested wood from the project area in the baseline is projected to total 3,963 thousand cubic feet (MCF) in 2018, including sawlogs and pulp wood. Using data from the Southern FIA Timber Output we determined that a total of 595,321 MCF, including sawlogs and pulp wood, were processed in 2015 by mills within a 60-mile radius of the project area[10]. Therefore, projected harvests in the baseline scenario do not exceed 0.7% of estimated annual mill capacity in the region surrounding the project area.

Principal mills in the project region were also identified in consultation with Panther Creek Forestry, LLC, and surveyed in October 2018 to assess average annual volumes purchased (Table E7) – annual demand of these three mills alone still far exceeds the highest annual volume production projected in the Chestnut Mountain baseline.

Table E7. Results from mill surveys conducted October 2018.

Mill	**Annual demand**	**Annual Demand (Converted to MCF)**	**Location**
Resolute Forest Products	1.6 million tons (pulpwood)	60,945	Calhoun, Tennessee
Savage Lumber	5 MMBF (saw timber)	417	Quebeck, Tennessee
Huber Engineered Wood	0.7 million tons (OSB)	138,936	Etowah, Tennessee
Total		*200,297*	

Baseline management scenarios *(in parenthesis, stand/stratum and case ID of model run in "ChesMt2018bsl2_rev2OUT.xls"*

[9] Personal communication, Ben Myers, Panther Creek Forestry LLC, August 2018

[10] https://public.tableau.com/views/SRSFIATPOProductFactsheets/AreaSelection?%3AshowVizHome=no

Stratum	Management regime
Cove hardwood 764.0 ac	Case CoveHW1: On 127.3 acres, clearcut in year 2018, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case CoveHW5: On 127.3 acres, clearcut in year 2019, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case CoveHW7: On 127.3 acres, clearcut in year 2020, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case CoveHW9: On 127.3 acres, clearcut in year 2021, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case CoveHW11: On 127.3 acres, clearcut in year 2022, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case CoveHW13: On 127.3 acres, clearcut in year 2023, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre).
Upland hardwood 3,110.8 ac	Case UplandHW3: On 518.5 acres, clearcut in year 2018, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case UplandHW6: On 518.5 acres, clearcut in year 2019, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case UplandHW8: On 518.5 acres, clearcut in year 2020, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case UplandHW10: On 518.5 acres, clearcut in year 2021, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case UplandHW12: On 518.5 acres, clearcut in year 2022, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre). Case UplandHW14: On 518.5 acres, clearcut in year 2023, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre).
Shortleaf Regen 233.7 ac	Case ShortleafRegen2: Clearcut in year 2018, replant with loblolly pine on an 8’ * 10’ uniform spacing (545 stems per acre).
SMZ 1,447.7 ac	Case SMZ4: Thin throughout diameter range with proportion of basal area cut set at 50%, regeneration via sprouting, in years 2018, 2023, 2028 and 2033.

Baseline projections

The scenarios above were projected in FVS-SN for the period 2018 to 2038. Projections were annualized using linear interpolation (FVS-SN produces projections in 5 year cycles); see "bsl2 live tree proj ChesMt_rev3.xls". Direct biomass carbon estimates for live trees were output via FVS FFE carbon reports, using Jenkins et al 2003 biomass predictions in metric tons of carbon per acre, matching the calculations applied to the forest inventory measurements.

To improve alignment of FVS FFE outputs with the forest inventory calculations, Jenkins et al 2003-derived FVS FEE live tree biomass projections (solely based on dbh) were adjusted for defect, by applying average percent defect (by stratum) derived from the 2018 inventory data (Table E8; "Chestnut Mtn inventory GROWN Jun2018 rev3"), assuming incidence of defect is constant through the projection period.

Table E8. Overall percent defect in live above- and belowground tree biomass, derived from 2018 inventory data.

	Cove HW	ShortleafRegen	SMZ	Upland HW
Average % defect ABGB live t CO2/ac	1.8%	20.5%	1.1%	0.4%

Standing dead wood was modeled using the Fire and Fuels Extension of FVS (FVS FFE) to produce detailed snag lists for each model cycle. Biomass carbon of each snag was estimated using model output cubic foot volumes of hard and soft components of dead wood, multiplied by dead wood density. Dead wood densities were sourced from the California Air Resources Board database "REF_SPECIES.xls", predominately sourced from the USFS Wood Handbook 2010, and incorporated deductions for decay classes corresponding to the hard and soft dead wood components output from the FVS FFE model, and summarized in the table below. Belowground biomass was estimated for hard classes of standing dead wood applying component ratios from Jenkins et al 2003. Standing dead biomass was converted to carbon applying a carbon fraction of 0.5, and carbon converted to carbon dioxide equivalent (CO2e) applying a conversion factor of 3.664. Detailed standing dead wood calculations are provided in "bsl2 snag proj ChesMt rev3.xls".

FVS FFE snag class	Deduction	Description/justification
soft	0.8	Per FVS FFE no branches remain, corresponds with methodology decay class 4
hard	0.97	Corresponds to methodology decay class 1; per FVS FFE: "Soft snags are more decayed and are assumed to have 80% of the wood density of hard snags"

FVS FFE = Rebain et al., 2012

Harvested wood products

Step 1:
Long-term storage in wood products was calculated from FVS projections of removals. Projected harvested volumes were broken out into the following categories: softwood sawlog, softwood pulp, hardwood pulp and hardwood sawlog. Pulp/saw breakdowns referenced merchantability standards in the FVS-SN variant (Keyser et al 2008[11]).

Volumes were converted to biomass by applying species-specific specific gravities referenced from the California Air Resources Board database "REF_SPECIES.xls". Biomass was converted to carbon applying a carbon fraction of 0.5, and then converting to CO2 equivalent by multiplying by 3.664. Harvest t CO2/acre (before delivery to mill) for each modeled group (i.e. baseline stratum) were summed for four categories: hardwood saw, hardwood pulp, softwood saw and softwood pulp.

Step 2:

Carbon transformed to wood products was estimated applying mill efficiency values referenced from the ARB 2015 forest protocol "Regional Mill Efficiency Data.xls" database[12], for the South Central region (which includes Tennessee), specified below:

Species group	**sawtimber**	**pulp**
softwood	0.629	0.57
hardwood	0.587	0.581

Steps 3 and 4:

Transformed carbon was summed across the hardwood/softwood/pulp/sawtimber categories and then distributed among a range of end wood product classes. Distributions of end wood product classes referenced ARB 2015 forest protocol values for the Eastern Broadleaf Forest Cumberland Plateau and Central Interior Broadleaf Forest Eastern Low supersections:

[11] Keyser, Chad E., comp. 2008 (revised May 8, 2012). Southern (SN) Variant Overview – Forest Vegetation Simulator. Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 70p.
[12] Sourced at: https://www.arb.ca.gov/cc/capandtrade/protocols/usforest/usforestprojects_2015.htm

Supersection	Softwood Lumber	Hardwood Lumber	Plywood	Oriented Strand Board	Non-structural Panels	Miscellan-eous	Paper
Eastern Broadleaf Forest Cumberland Plateau	9.8638%	65.0119%	0.1648%	0.0444%	3.6958%	14.5833%	6.6361%
Central Interior Broadleaf Forest Eastern Low	8.0288%	83.9360%	0.0994%	0.0000%	2.5717%	1.9297%	3.4343%
(approximate) area weighted average product class distributions	8.6%	77.9%	0.1%	0.0%	2.9%	6.0%	4.5%

Wood product amounts retained in storage for 100 years in in-use wood products and landfills were then calculated referencing end wood product class-specific 100-year average storage factors provided in the methodology[13].

Step 5:

Carbon in long-term storage was then summed across in-use wood products and landfills and across modeled groups/baseline strata to produce annual total t CO2 stored in in-use wood products and landfills over 100 years from wood harvested in a given year.

Detailed harvested wood product calculations are provided in “bsl2 hwp proj ChesMt rev3.xls”.

Emissions due to burning logging slash are conservatively assumed in the baseline to be zero. Thus, parameter BSBSL equals zero and the outcome of equation 4 of the methodology, parameter GHGBSL, equals zero.

Table E9. Projections of live tree, standing dead wood and harvested wood products carbon stocks in the project area in the baseline scenario for the first crediting period from 2018 to 2038. For the live tree and standing dead pools, stocks represent stocks at June 5 of the corresponding year. For

[13] Sourced from Smith JE, Heath LS, Skog KE, Birdsey RA (2006) Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. In: General Technical Report NE-343 (eds Usdafs), PP. 218. USDA Forest Service, Washington, DC, USA.

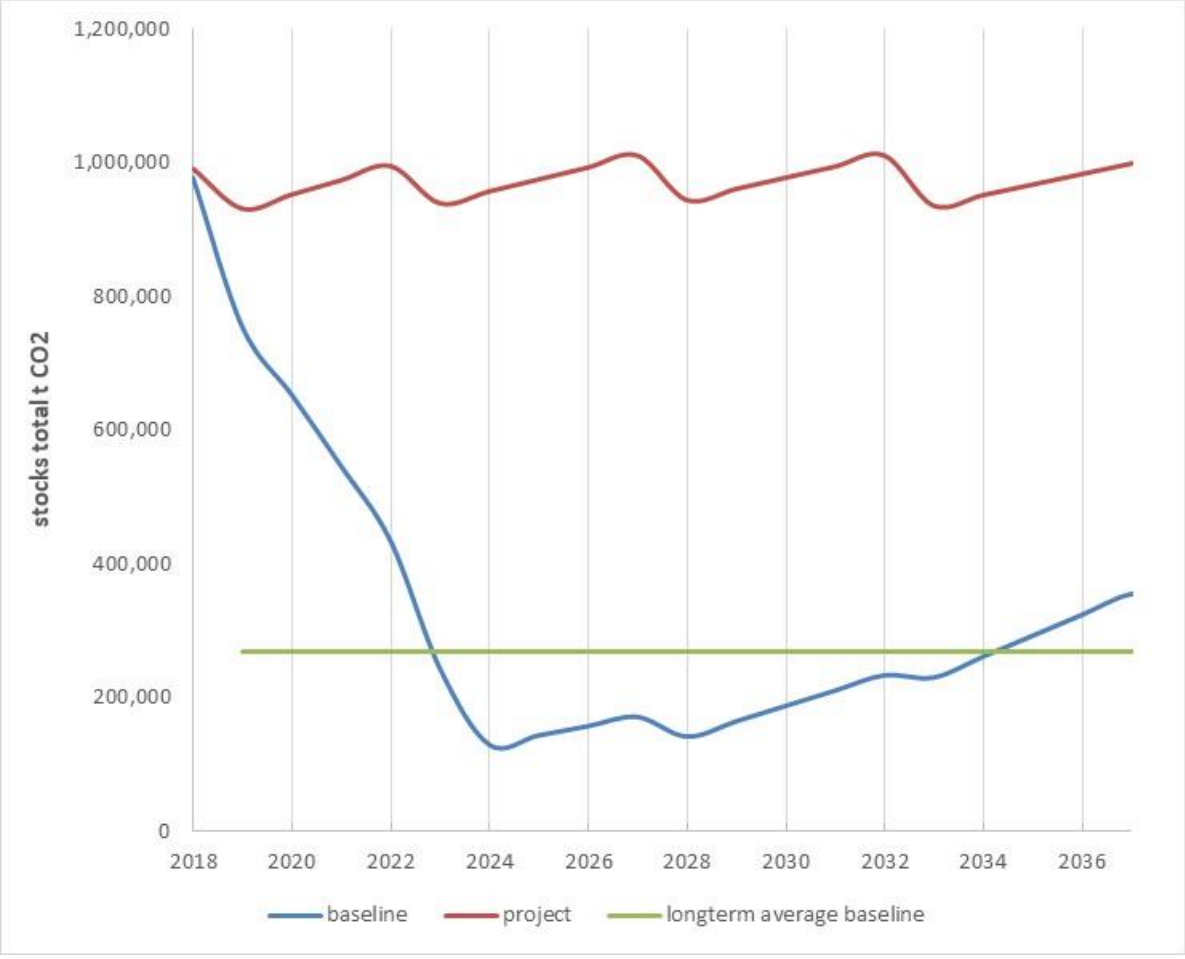
harvested wood products (HWP), stocks represent stocks harvested in the annual interval beginning June 5 of the corresponding project year.

Year	Live t CO2/acre	Standing dead t CO2/acre	total HWP t CO2
2018	169.9	6.3	35,672
2019	129.4	5.2	17,329
2020	110.8	4.2	17,758
2021	91.3	3.1	18,153
2022	70.9	2.0	18,576
2023	36.3	1.0	29,585
2024	14.6	0.8	
2025	16.0	0.6	
2026	17.3	0.4	
2027	18.7	0.3	
2028	12.2	0.1	6,229
2029	15.1	0.1	
2030	17.9	0.1	
2031	20.7	0.0	
2032	23.5	0.0	
2033	21.6	0.0	3,726
2034	25.9	0.0	
2035	30.2	0.0	
2036	34.5	0.0	
2037	38.8	0.0	
2038	37.3	0.0	

From the modeled stocks, we first calculated long-term average baseline stocking level for the first 20-year crediting period, 268,496.0 t CO2, and the change in baseline carbon stocks for each year.

T, project year 5 (June 5 2022 – June 4 2023), is the year that projected stocking levels in the baseline reach the long-term average, after which $\Delta CBSL,t$ becomes 0; i.e. the crediting baseline is equal to the modeled baseline until the modeled baseline reaches the long-term average, at which point baseline stocks are assumed to be constant (and subsequent change in stocks is equal to zero).

The figure below depicts the projected baseline stocks, average baseline stock for the first crediting period, and projected with-project stocks (see below for derivation of with-project stock projections).



E2. PROJECT SCENARIO

Ex ante projection of the project scenario is derived and documented in Section E6 below.

E3. LEAKAGE

Quantification of leakage is limited to market leakage, as no activity-shifting leakage is allowed by the methodology beyond *de minimis* levels.

Market leakage was determined by quantifying the merchantable carbon removed in both the baseline and with-project cases. Carbon in longterm storage in in-use wood products and landfills, calculated above, was used to assess relative amounts of "total wood products produced" in the two scenarios. Management openings envisioned in the project scenario are anticipated to produce insignificant commercial wood volumes, and for simplicity, the with-project scenario is modeled as no (insignificant) harvest, i.e. zero. The result, in application to the leakage assessment, is unambiguously conservative. The decrease in wood production relative to the baseline was then calculated and the applicable market leakage discount factor was determined.

Calculation of leakage factors for baseline:

Period	Total HWP stored for 100 yrs in the Baseline (tCO2e)	Total HWP stored for 100 yrs in the Project Scenario (tCO2e)	Decrease in Wood Products as Percentage of Baseline Stocks	Applicable Leakage Factor
2018-2037	147,027	55,720	62%	0.4

E4. UNCERTAINTY

Per the methodology, "The 90% statistical confidence interval (CI) of sampling can be no more than ±10% of the mean estimated amount of the combined carbon stock across all strata. If the Project Proponent cannot meet the targeted ±10% of the mean at 90% confidence, then the reportable amount shall be the lower bound of the 90% confidence interval."

Parameter $e_{BSL,TREE}$ (5.9%) is derived below from the 2018 inventory data (from which June 5 2018 stocks were estimated); standard error calculated using the estimator for a post-stratified sample (following Cochran 1977[14]).

Table E10. Live tree statistics from 2018 inventory

	Cove HW	ShortleafRegen	SMZ	Upland HW
mean tCO2/ac	179.9	14.7	172.9	177.6
variance	1664.0	238.1	4684.2	3295.4
stan dev	40.8	15.4	68.4	57.4
CV(%)	0.2	1.1	0.4	0.3
stan error	10.9	7.7	14.9	7.7
90% CI	19.3	18.2	25.8	13.0
n	14	4	21	55
ac	763.9886	233.7474	1447.723	3110.757
stan error	6.0			
mean	169.9			
90% CI	9.9563			
90% CI as % of mean	**5.861%**			

Parameter e_{BSL_DEAD} (28.5%) is derived below from the 2018 inventory data (from which June 5 2018 stocks were estimated); standard error calculated using the estimator for a post-stratified sample (following Cochran 1977[15]).

Table E11. Standing dead statistics from 2018 inventory

	Cove HW	ShortleafRegen	SMZ	Upland HW
mean tCO2/ac	1.3	0.9	2.5	9.6
variance	3.3	3.2	5.7	188.2
stan dev	1.8	1.8	2.4	13.7
CV(%)	1.4	2.0	1.0	1.4
stan error	0.5	0.9	0.5	1.8
90% CI	0.9	2.1	0.9	3.1
n	14	4	21	55
ac	763.9886	233.7474	1447.723	3110.757
stan error	1.1			
mean	6.267			
90% CI	1.7848			

[14] Cochran, W.G., 1977. Sampling Techniques: 3d Ed. New York: Wiley.

[15] Cochran, W.G., 1977. Sampling Techniques: 3d Ed. New York: Wiley.

90% CI as % of mean	**28.478%**			

Overall uncertainty in the baseline is calculated using equation 10 of the methodology,

UNC_{BSL} = √(($C_{BSL,TREE}$ * $e_{BSL,TREE}$)^2 + ($C_{BSL,DEAD}$ * $e_{BSL,DEAD}$)^2 + ($C_{BSL,HWP}$* $e_{BSL,TREE}$)^2 + (GHG_{BSL}* $e_{BSL,TREE}$)^2) /

($C_{BSL,TREE}$ + $C_{BSL,DEAD}$ + $C_{BSL,HWP}$ + GHG_{BSL})

where $C_{BSL,TREE}$ is the live tree carbon stock at the start date, $C_{BSL,DEAD}$ is the dead wood carbon stock at the start date and $C_{BSL,HWP}$ is the twenty-year average stock of carbon in long term storage in wood products. Emissions due to burning logging slash are conservatively assumed in the baseline to be zero, thus parameter GHG_{BSL} equals zero.

Overall uncertainty in the baseline is 5.9%.

Total project uncertainty, *UNC,t*, is calculated using equation 19 of the methodology, and for future monitoring events, where re-measurement of forest carbon stocks has taken place, will use separate baseline, $UNC_{BSL,t}$ (value 5.9%) and project, , $UNC_{P,t}$ (value to be determined), uncertainties.

E5. REDUCTIONS AND REMOVAL ENHANCEMENTS

Methodology calculations and estimates of net reductions and removals enhancements are detailed in the Table E12 below and in "ACR_Calcs ChestMt rev3.xls".

Table E12. Calculations for the first crediting period. All change values apply to the annual interval beginning June 5 of the corresponding year (i.e. project year 2018 accounts the change taking place between June 5 2018 and June 4 2019).

year (stocks at beginning)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
ACR Account Year Date		**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Baseline											
Live Tree CO2 Baseline	943,779.0	718,835.7	615,799.9	507,555.1	394,111.5	201,889.9	81,310.2	88,804.4	96,298.6	103,792.8	67,944.3
Standing dead CO2 Baseline	34,822.1	28,953.7	23,085.4	17,217.1	11,348.7	5,480.4	4,480.8	3,481.2	2,481.6	1,482.1	482.5
HWP Baseline		7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3
sum stocks	978,601.1	755,140.7	653,588.0	546,826.2	434,865.7	244,127.1	129,899.1	143,745.1	157,591.0	171,437.0	141,940.3
20yr Avg Baseline		268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0
Year T	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
deltaC baseline		-223,460.3	-101,552.7	-106,761.8	-111,960.5	-166,369.7	0.0	0.0	0.0	0.0	0.0
Project											
Live Tree CO2 Project	943,779.0	884,645.0	905,670.6	926,696.1	947,721.7	879,340.9	897,005.2	914,669.4	932,333.7	949,997.9	869,535.0
Standing dead CO2 Project	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1
Greenhouse gas emission from logging slash burning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HWP Project	11,778.6	0.0	0.0	0.0	0.0	13,231.6	0.0	0.0	0.0	0.0	14,644.0
sum stocks	990,379.6	931,245.6	952,271.2	973,296.7	994,322.3	939,173.1	956,837.4	974,501.7	992,165.9	1,009,830.2	944,011.2
deltaC project		-59,134.0	21,025.6	21,025.6	21,025.6	-55,149.2	17,664.3	17,664.3	17,664.3	17,664.3	-65,818.9
Total uncertainty		0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
ERTs at time t (before buffer contribution)		98,595.0	73,546.0	76,672.0	79,791.0	66,732.0	10,598.0	10,598.0	10,598.0	10,598.0	-39,491.0
Total ERTs (before buffer contribution)	0.0	98,595.0	172,141.0	248,813.0	328,604.0	395,336.0	405,934.0	416,532.0	427,130.0	437,728.0	437,728.0

year (stocks at beginning)	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
ACR Account Year Date	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**
Baseline										
Live Tree CO2 Baseline	83,640.1	99,336.0	115,031.8	130,727.6	120,173.0	144,062.0	167,951.0	191,840.1	215,729.1	207,226.4
Standing dead CO2 Baseline	386.0	289.5	193.0	96.5	0.0	0.0	0.0	0.0	0.0	0.0
HWP Baseline	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3	7,351.3
sum stocks	164,891.0	187,841.6	210,792.3	233,743.0	230,443.2	261,683.6	292,924.0	324,164.4	355,404.7	354,253.4
20yr Avg Baseline	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0	268,496.0
Year T	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
deltaC baseline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Project										
Live Tree CO2 Project	886,032.0	902,529.0	919,026.0	935,523.0	845,153.1	860,703.7	876,254.4	891,805.1	907,355.7	922,906.4
Standing dead CO2 Project	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1	34,822.1
Greenhouse gas emission from logging slash burning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HWP Project	0.0	0.0	0.0	0.0	16,065.9	0.0	0.0	0.0	0.0	0.0

sum stocks	960,508.2	977,005.2	993,502.2	1,009,999.2	935,695.2	951,245.9	966,796.5	982,347.2	997,897.8	1,013,448.5
deltaC project	16,497.0	16,497.0	16,497.0	16,497.0	-74,304.0	15,550.7	15,550.7	15,550.7	15,550.7	15,550.7
Total uncertainty	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
ERTs at time t (before buffer contribution)	0.0	0.0	0.0	101.0	0.0	0.0	0.0	0.0	0.0	2,068.0
Total ERTs (before buffer contribution)	437,728.0	437,728.0	437,728.0	437,829.0	437,829.0	437,829.0	437,829.0	437,829.0	437,829.0	439,897.0

E6. EX-ANTE ESTIMATION METHODS

Live tree carbon stocks in the with-project scenario were projected *ex ante* in FVS-SN for the period 2018 to 2038. Projections were annualized using linear interpolation; see "wp live tree proj ChesMt rev3.xls". Direct biomass carbon estimates for live trees were output via FVS FFE carbon reports, using Jenkins et al 2003 biomass predictions in metric tons of carbon per acre, again, matching the calculations applied to the forest inventory measurements, and applying defect as described above.

Note that the same stratification was applied to the with-project scenario as for the baseline scenario. In both cases, anticipated differences in forest dynamics and management are captured in the four forest cover classes delineated as strata (Cove Hardwood, Upland Hardwood, SMZs and Shortleaf Regeneration).

Management scenarios were developed consulting the Forest Management Plan for the Chestnut Mountain property, referencing sustainable harvest limits in the Cove hardwood and Upland hardwood strata of 20 acres/year and 70 acres/year, respectively. In FVS-SN, the Cove hardwood stratum was modeled with "clearcuts" (aggregations of patch cuts/group selections) totaling 100 acres every five years, and the Upland hardwood stratum was modeled with "clearcuts" totaling 350 acres every five years. The SMZ and Shortleaf Regen strata were left to grow for the first 20-year crediting period, with no significant harvests anticipated. The ShortleafRegen stratum was "planted" in 2018 in FVS-SN with shortleaf pine on a 10' * 10' uniform spacing (436 stems per acre).

Stocks of standing dead wood are assumed to be constant through the period.

Projections of the with-project scenario are summarized in Table E13 below.

Table E13. Projections of live tree, standing dead wood and harvested wood products carbon stocks in the project area in the with-project scenario for the first crediting period from 2018 to 2038. For the live tree and standing dead pools, stocks represent stocks at June 5 of the corresponding year. For harvested wood products (HWP), stocks represent stocks harvested in the annual interval beginning June 5 of the corresponding project year.

Year	Live t CO2/acre	Standing dead t CO2/acre	total HWP t CO2
2018	169.9	6.3	11778.56407
2019	159.2	6.3	
2020	163.0	6.3	
2021	166.8	6.3	

2022	170.6	6.3	
2023	158.3	6.3	13231.63017
2024	161.4	6.3	
2025	164.6	6.3	
2026	167.8	6.3	
2027	171.0	6.3	
2028	156.5	6.3	14643.9932
2029	159.5	6.3	
2030	162.4	6.3	
2031	165.4	6.3	
2032	168.4	6.3	
2033	152.1	6.3	16065.87333
2034	154.9	6.3	
2035	157.7	6.3	
2036	160.5	6.3	
2037	163.3	6.3	
2038	166.1	6.3	

No burning of any kind is expected to take place in the project area. Thus, parameter BS_P equals zero and the outcome of equation 13 of the methodology, parameter GHG_P, equals zero.

In ex ante calculations of net emission reductions, it is assumed that future inventories achieve overall precision less than +/-10% of the mean with 90% confidence, thus UNC_P is assumed to be equal to $UNC_{BSL.}$

F.
COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

The Nature Conservancy envisions Chestnut Mountain as a vital platform to promote forest health and climate-smart forestry. This project aims to advance three of the TNC's Shared Conservation Agenda Priorities: Tackle climate change, protect land and water, and connect people and nature through a direct reduction of harvesting.

The project will contribute to the protection of many valuable assets on the property including high diversity of forest and non-forest habitats and plant and wildlife species; habitats that sequester carbon and provide other ecosystem services; shortleaf pine restoration; cultural and historic features such as homestead grave sites; diversity of topographic features such as waterfalls, bluffs, and scenic overlooks; significant water features such as Firestone Lake, currently used as drinking water supply for the human communities of Bon De Croft, Franklin Pond, Dry Creek, Big Laurel Creek and Little Laurel Creek, and; popular and expansive view-sheds along the southern and western boundaries of the property that illustrate the landscape scale of decades of conservation land acquisition here.

The project area is in close proximity to many protected recreation areas including Bridgestone/Firestone Centennial Wilderness Wildlife Management Area, Virgin Falls Pocket Wilderness State Natural Area, Lost Creek State Natural Area, Fall Creek Falls State Park, and Bledsoe State Forest. The parcel is part of an important forested region with adjacent public forest land, providing a high level of connectivity, as surrounding forests are currently being managed in consideration of wildlife and ecological sensitivity. TNC will manage the property in coordination with the Tennessee Wildlife Resource Agency, managing the adjacent wildlife management area and wilderness, to achieve landscape-scale conservation objectives.

With regard to the public's recreational access to Chestnut Mountain, TNC, the State of Tennessee's Department of Environment and Conservation, and other stakeholders will engage in a recreation access planning process. Chestnut Mountain serves as a critical linkage between multiple State-owned recreation areas, and TNC feels that trail corridor connectors and new public access points on Chestnut Mountain are appropriate and in keeping with TNC's Connecting People & Nature Priority. TNC's vision of acceptable recreation uses includes low-impact, non-motorized activities such as hiking, access to scenic overlooks, and primitive campsites.

Historically, the land was owned by the Cherokee people, and Native American historical and cultural sites can be found throughout the property. Though these sites are not officially registered, there is evidence of artifacts from prehistoric cave dwellings along with rock piles, stonewalls, chimneys, root cellars, and Yucca plants associated with Native Americans and European settlers land use on this property. As these sites are identified, they will be buffered and protected in accordance with the Chestnut Mountain Forest Management Plan (FMP; "Chestnut Mountain FMP FINAL for FSC audit 12.6.17"); the management plan was FSC certified in 2015, and has been adopted by TNC upon taking title to Chestnut Mountain as of the project start date.

The 5 ACR Environmental and Community Impact Assessment Requirements are addressed below. Each ACR requirement is listed in italics.

1. *An overview of the Project Activity and geographic location.*

From the Real Estate Project Abstract:

"Chestnut Mountain contains resilient and highly connected forests that buffer the effects of a changing climate and contains many valuable ecological, educational, open space, cultural, and scenic resource conservation values. Chestnut Mountain is located within a contiguous, protected landscape of public recreation units exceeding 60,000 acres, including Bridgestone/Firestone Centennial Wilderness Wildlife Management Area, Virgin Falls Pocket Wilderness State Natural Area, Lost Creek State Natural Area, Fall Creek Falls State Park, and Bledsoe State Forest. TNC intends to own and manage the property as a Working Woodlands Program site; conservation activities may include a forest carbon project, sustainable forestry practices pursuant to Forest Stewardship Council certification, and public access, education, and outreach in concert with the State of Tennessee's Department of Environment and Conservation. TNC's ownership of Chestnut Mountain will be subject to permanent restrictive covenants placed upon the property by BAI prior to the donation. TNC will ultimately transfer some or all of Chestnut Mountain to the State of Tennessee."

From the Forest Management Plan:

"The 5789.6 acre property is located in central White County, west of Scotts Gulf Road, east of state Hwy. 111, south of US Hwy 70, and bordered on the south by Virgin Falls State Natural Area. The topography of the property is complex, with several steep bluffs along the escarpment, and steeply sloped mountainside at the south, approaching Laurel Creek, and at the northwest, approaching Dog Cove. Billy Branch Lake is located at the north end of the property, and contains an extensive earthen dam along the west side. An area of former strip mines lies along the northeast boundary of the property, and there are several small orphan mines at the base of the bluff. The property spans three watersheds – Caney Fork-Suggs Branch (HUC 051301080305), Caney Fork River-Clifty Creek (HUC 051301080303) and Lost Cove (HUC 051301080304)."

2. *Applicable laws, regulations, rules, and procedures and the associated oversight institutions.*

There are no state or federal laws that regulate forest management of the property. The FSC Audit ("TNC FSC FM reassess 18 (1)") demonstrates compliance, as shown below:

PRINCIPLE 1: Compliance with law and FSC Principles					
Criterion 1.1 Respect for national and local laws and administrative requirements					
Conformance	X	Nonconformance		NCR #(s)	
Finding *(strength/weakness)*	Group members were found to be in full conformance with this criterion.				
Criterion 1.2 Payment of legally prescribed fees, royalties, taxes and other charges					
Conformance	X	Nonconformance		NCR #(s)	
Finding *(strength/weakness)*	Group members were determined to be in full conformance with this criterion.				
Criterion 1.3 Respect for provisions of international agreements					
Conformance	X	Nonconformance		NCR #(s)	
Finding *(strength/weakness)*	Group members were found to be in full conformance with this criterion.				
Criterion 1.4 Conflicts between laws and regulations, and the FSC P&C					
Conformance	X	Nonconformance		NCR #(s)	
Finding	Group members were found to be in full conformance with this criterion.				

3. *A description of the process to identify community(ies) and other stakeholders affected by the project and, as applicable, the community consultation and communications plan.*

TNC staff visits the site once per week to meet with community members and monitor activities around the property. Further guidance can be sought from TNC and TWRA, along with public relations specialists. A list of stakeholders is kept on file, and stakeholders are notified in advance of forest management activities that may have a direct adverse effect on themselves or their property. Stakeholders will be notified by one or more of the following methods: Open letter to local newspaper at least 30 days in advance of a public meeting to discuss management activity that may affect the community; Written communication sent via USPS to adjoining landowners (stakeholders); and signage placed along the main road prior to beginning activities. TNC holds an annual community event to bring together stakeholders and give them an opportunity to voice concerns and ask questions. Community members can also reach out to TNC through their website and main phone number. FSC will monitor stakeholder engagement as a component of the annual audit.

4. *An assessment of the project's environmental risks and impacts, including factors such as climate change mitigation and adaptation, biodiversity, air quality, water quality, soil quality, and ozone quality, as well as the protection, conservation, or restoration of natural habitats such as forests, grasslands, and wetlands. The assessment shall: 1) identify each risk/impact; 2) categorize the risk/impact as positive, negative, or neutral and substantiate the risk category; 3) describe how any negative impacts will be avoided, reduced, mitigated, or compensated; 4) detail how risks and impacts will be monitored, and how often and by whom; and 5) describe how positive impacts contribute to sustainable development goals (optional).*

Risk/impact factor	**Risk category (positive, negative, neutral)**	**Measure(s) to avoid, reduce, mitigate, or compensate negative impacts**	**Monitoring approach**
Biodiversity	Neutral – There are no legally protected or managed areas on the property Positive - While no areas have been formally identified through Natural Heritage or the State Wildlife Action Plan, there are several areas on the [TNC] property that could contain rare species, primarily, bats in cave complexes and salamanders in vernal pools. According to the FSC audit: "The owners and managers of Chestnut Mountain are interested in creating a model for shortleaf pine restoration on the Cumberland Plateau".	N/A	From the Bridgestone FMP: "Identification of key ecological attributes (habitat maintenance, indicator species, etc.) in cooperation with shifting goals and management objectives for short and long-term desired results. KEAA monitoring requires a full inventory every 10 years to accurately assess and monitor forest conditions. This monitoring will also provide information on rare species and communities." TNC will also be conducting a Bio Blitz on the property.
Water Quality	Neutral - According to the FMP: While the entire property provides a source of drinking water, the most critical areas to protect include the lake and perennial and intermittent streams feeding the lake. The lake has significant buffer zones, measuring at least 200 feet (at the foot of the dam), but	N/A	"Water quality and BMP monitoring will be done at least monthly by Panther Creek Forestry staff during periods of active management, and adaptive management/feedback is monitored continually by the on-site property manager."

Risk/impact factor	Risk category (positive, negative, neutral)	Measure(s) to avoid, reduce, mitigate, or compensate negative impacts	Monitoring approach
	buffers average approximately 500 feet. There are 12.3 miles of perennial streams buffered by at least 200 foot no-harvest areas. 28.6 miles of intermittent streams buffered by at least 100 feet. (Note, the buffer widths will vary a great deal according to topography and natural features, and the desire to maintain connectivity.) While erosion is always a concern, the HCV buffers mentioned above and riparian buffers address those concerns. There are no areas on the [TNC] property that would be considered critical to prevent erosion, landslides, avalanches, etc.		
Soil Quality	Neutral – "While erosion is always a concern, the HCV buffers mentioned above and riparian buffers address those concerns. There are no areas on the [TNC] property that would be considered critical to prevent erosion, landslides, avalanches, etc."	N/A	
Natural Habitat	Positive - While rare species and communities have not been confirmed on the property, there is potential there for such species in and around cave openings (bats, etc.) and associated with	TNC will implement patch cuts with early successional habitat conservation in mind.	"In High Conservation Value Areas where a hands-off approach is appropriate, there will be a less intensive monitoring approach taken, along the following lines. Specific changes in species composition, structure, etc., will be captured in periodic

Risk/impact factor	Risk category (positive, negative, neutral)	Measure(s) to avoid, reduce, mitigate, or compensate negative impacts	Monitoring approach
	vernal pools in the spring (salamanders). Negative – There may a reduction in early successional habitat compared to baseline management.		inventories and regular ocular monitoring. Areas where concerns arise will be visited and checked, and any issues followed up on. HCV areas are also visited during periodic inventory procedures."
Cultural and Social Impact	Neutral – "The [TNC] property contains Indian rock houses that are not formally recognized or identified by any local or displaced tribe. They pre-date the Cherokees, but may have been utilized by the Cherokee. And this area is near a Cherokee settlement. [TNC] considers these areas to be of high conservation value and will protect these resources, and any others that are identified in the course of management." Neutral – According to the FMP: "The [TNC] property would not be considered fundamental to meeting basic needs of local communities, other than for water provision, which is covered above." Positive - With regard to the public's recreational access to Chestnut Mountain during TNC's ownership, TNC, the State of Tennessee's Department of Environment and Conservation, and other stakeholders (as TNC	N/A	"For the purposes of this assessment and more generally, Panther Creek (the consulting forestry firm) and TNC staff regularly consults with biologists from the TN Natural Heritage Program, and cultural experts from the TN State Historic Preservation Office."

Risk/impact factor	Risk category (positive, negative, neutral)	Measure(s) to avoid, reduce, mitigate, or compensate negative impacts	Monitoring approach
	sees fit) will engage in a recreation access planning process. Chestnut Mountain serves as a critical linkage between multiple State-owned recreation areas, and TNC feels that trail corridor connectors and new public access points on Chestnut Mountain are appropriate and in keeping with TNC's Connecting People & Nature Priority. TNC's vision of acceptable recreation uses includes low-impact, non-motorized activities such as hiking, access to scenic overlooks, and primitive campsites.		

5. *For community-based projects, an assessment of the project's community risks and impacts, including factors such as land and natural resource tenure, land use and access arrangements, natural resource access (e.g., water, fuelwood), food security, land conflicts, economic development and jobs, cultural heritage, and relocation. The assessment shall: 1) briefly describe the process to identify community risks/impacts; 2) identify each risk/impact; 3) categorize the risk/impact as positive, negative, or neutral, and substantiate the risk category; 4) provide detailed information regarding the community stakeholder consultation process (e.g., meeting minutes, attendees), including documentation of stakeholder comments and concerns and how those are addressed; 5) provide evidence of Free, Prior and Informed Consent for the Project Activity, as applicable; 6) provide evidence of no relocation or resettlement (voluntary or involuntary), as applicable; 7) describe how any negative project impacts will be avoided, reduced, mitigated, or compensated; 8) detail how risks/impacts will be monitored, and how often and by whom; 9) describe the mechanism for ongoing communications with the community and grievance mechanisms, as applicable; and 10) de-scribe how positive impacts contribute to sustainable development goals (optional).*

The project is a not a community-based project.

F2. STAKEHOLDER COMMENTS

The Forest Management Plan states that, “a list of stakeholders is kept on file, and stakeholders are notified in advance of forest management activities that may have direct adverse effect on themselves or their property”.

TNC staff visits the site once per week to meet with community members and monitor activities around the property. TNC is in communication with public land managers, community leadership, friends, groups, volunteer fire fighters, etc. Further guidance can be sought from TNC and TWRA, along with public relations specialists. A list of stakeholders is kept on file, and stakeholders are notified in advance of forest management activities that may have a direct adverse effect on themselves or their property. Stakeholders will be notified by one or more of the following methods: Open letter to local newspaper at least 30 days in advance of a public meeting to discuss management activity that may affect the community; Written communication sent via USPS to adjoining landowners (stakeholders); and signage placed along the main road prior to beginning activities. TNC holds an annual community event to bring together stakeholders and give them an opportunity to voice concerns and ask questions. Community members can also reach out to TNC through their website and main phone number. FSC will monitor stakeholder engagement as a component of the annual audit.

G.
OWNERSHIP AND TITLE

G1. PROOF OF TITLE

Land title for the project area is housed at the TNC office in Nashville, Tennessee and made available during project validation.

G2. CHAIN OF CUSTODY

Not Applicable – no offsets have been bought or sold previously, nor has the project entered into any forward option contracts.

G3. PRIOR APPLICATION

Not Applicable – the project proponent has not applied for GHG emission reduction credits through any other GHG emissions trading system or program.

H.
PROJECT TIMELINE

H1. START DATE

The project start date is June 5 2018, marked by the date that TNC acquired and initiated management of the property. Conformance with ACR Forest Carbon Project Standard Requirements is demonstrated in Section A3 above.

H2. PROJECT TIMELINE

Project timeline is elaborated in Table H1 below.

Table H1. Schedule of project activities

Project activity	Date	Source/Notes
Project start date and start of the crediting period	June 5 2018	Date of acquisition of the property by TNC
Forest inventory	Dec 2015 - July 2018	
Validation and registration of the project	Anticipated 2019	
First monitoring	June-December 2018	
First verification	Anticipated 2019	
Periodic monitoring and verification	2019-2058	Every 5 years or less, or at request for ERT issuance
End date of first project crediting period	June 4 2038	
Second crediting period	June 5 2038 – June 4 2058	Baseline re-evaluated in June 2038
End date of project term	June 4 2058	