



Sustainable Biomass Program (SBP)

Regional Risk Assessment for US Private Forest

SBP-RRA-US-PF-FOR v1.1

Endorsed RRA

Version v1.1

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In the case of inconsistency between translations, the official English language version shall always take precedence.

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Summary of changes

SBP-RRA-US-PF-FOR v1.0	SBP-RRA-US-PF-FOR v1.1	Comments
3.1.1: Low risk <i>Indicator 3.1.1 LULUCF emissions shall be accounted for through one of the following routes:</i> <i>Route A - Feedstock may be sourced from a country of origin which is party to the Paris Agreement, and which has submitted a Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) covering carbon emissions and removals from agriculture, forestry and land use which ensure the changes in carbon stock associated with biomass harvest are counted towards the country's commitment to reduce or limit greenhouse gas emissions, or</i> <i>Route B - Feedstock may be sourced from a country of origin which is party to the Paris Agreement and has national or sub-national laws in place (developed in accordance with Article 5 of the Paris Agreement and applicable in the area of harvest), to conserve and enhance carbon stocks and sinks, and provided there is evidence that reported LULUCF-sector emissions do not exceed removals, or</i> <i>Route C - Feedstock may be sourced from a Supply Base where an assessment demonstrates that both the carbon stock is stable, and the forests' capacity to act as a carbon sink is stable or increasing over the long term.</i>	3.1.1: Low risk - Until January 26, 2026, Route A Specified risk - From January 27, 2026, Route C <i>Indicator 3.1.1 LULUCF emissions shall be accounted for through one of the following routes:</i> <i>Route A - Feedstock may be sourced from a country of origin which is party to the Paris Agreement, and which has submitted a Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) covering carbon emissions and removals from agriculture, forestry and land use which ensure the changes in carbon stock associated with biomass harvest are counted towards the country's commitment to reduce or limit greenhouse gas emissions, or</i> <i>Route B - Feedstock may be sourced from a country of origin which is party to the Paris Agreement and has national or sub-national laws in place (developed in accordance with Article 5 of the Paris Agreement and applicable in the area of harvest), to conserve and enhance carbon stocks and sinks, and provided there is evidence that reported LULUCF-sector emissions do not exceed removals, or</i> <i>Route C - Feedstock may be sourced from a Supply Base where an assessment demonstrates that both the carbon stock is stable, and the forests' capacity to act as a carbon sink is stable or increasing over the long term.</i>	On January 20, 2025, the United States (US) President signed Executive Order 14162 directing the United States Ambassador to the United Nations to submit a formal written notification of the United States' withdrawal from the Paris Agreement. This formal notification was submitted to the United Nations by the US Ambassador on January 26, 2025. Article 28 of the Paris Agreement stipulates that "withdrawal shall take effect upon expiry of one year from the date of receipt by the Depositary of the notification of withdrawal" meaning as of January 27, 2026 the United States will no longer be a party to the Paris Agreement and from this date on, Routes A and B of Indicator 3.1.1 will cease to apply to US feedstock.
REDII Level A risk assessment	Removed	Replaced by the SBP-RED-US-NF-FOR_v1.2 REDIII Level A for US National FOR published as a standalone document.

Abbreviations

ACE	Army Corps of Engineers
AHEC	American Hardwood Export Council
ATFS	American Tree Farm System
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practices
CBA	Critical Biodiversity Area
CoC	Chain of Custody
CPI	Corruption of Perception Index provided by Transparency International
CWA	Clean Water Act
DDS	Due Diligence System
DOI	Department of Interior
EO	Element Occurrence
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
EUTR	European Union Timber Regulation
FIA	USDA Forest Service Forest Inventory Analysis
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FM	Forest management
FMU	Forest management unit
FSC	Forest Stewardship Council
FSC US NRA	Forest Stewardship Council US Controlled Wood National Risk Assessment
DOJ	US Department of Justice
G1	NatureServe Critically Imperilled
G2	NatureServe Imperilled
GIS	Geographical information system
GMO	Genetically modified organism
HCV	High conservation value
IFL	Intact Forest Landscapes
ILO	International Labour Organisation
IPM	Integrated pest management
LULUCF	Land use, land change and forestry
NGO	Nongovernmental organization
NFI	National Forest Inventory
NFS	USDA National Forest System
NIFRMA	1990 National Indian Forest Resources Management Act
NLCD	National Land Cover Database
NPS	USDI National Park Service
OHAS	Occupational health and safety
OSHA	Occupational Safety and Health Administration
PEFC	Programme for the Endorsement of Forest Certification
RED	Renewable Energy Directive
REIT	Real Estate Investment Trusts
RRA	Regional Risk Assessment



SBP	Sustainable Biomass Program
SE	Southeast
SFI	Sustainable Forestry Initiative
SWAP	State Wildlife Action Plan
TIMO	Timberland Investment Management Organizations
UNEP	United Nations Environment Programme
US	United States of America
USDA	United States Department of Agriculture
USFWS	United States Fish & Wildlife Service
USFS	USDA Forest Service
USIPA	US Industrial Pellet Association
WWF	World Wildlife Fund
WGI	Worldwide Governance Indicators

Foreword

Regional Risk Assessments (RRAs) are a key part of the Sustainable Biomass Programme (SBP) focus on identifying and managing risks associated with sustainably sourcing feedstocks for biomass production. With an RRA covering an entire geographic region and determining risks associated with sourcing feedstocks from that region, the need for individual Biomass Producers to conduct risk assessments is avoided, leading to an efficient and consistent risk assessment process. RRAs also ensure active engagement with a diverse range of stakeholders in the region.

1 Introduction

Statement of Scope

Political Geography

The RRA geographic scope is the biomass sourcing areas in the United States (US) encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia (Figure 1-1).

Some specific states in the geographic scope of the RRA, including notably Missouri and Ohio, are not generally considered part of the “South” or “Southern US” or “Southeast.” However, for the purposes of this assessment, these terms will be applied to the full geographic scope of the RRA.

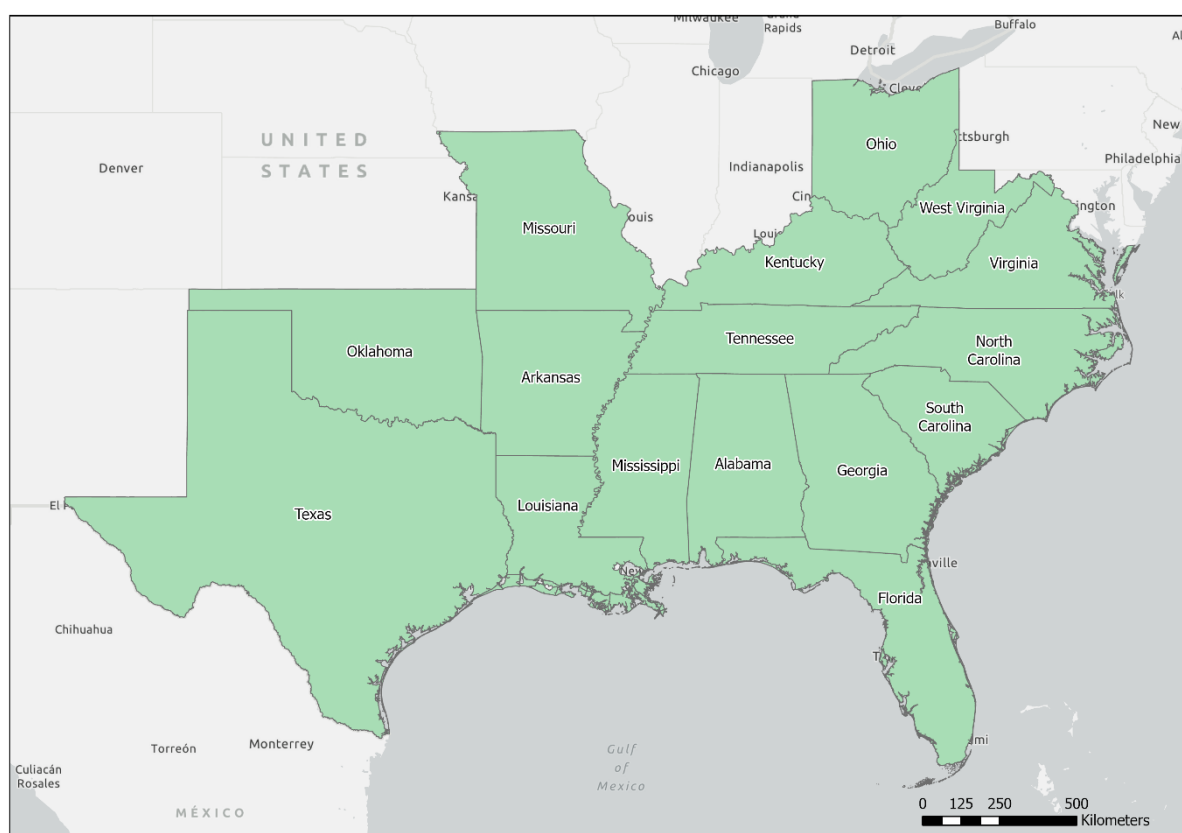


Figure 1-1: RRA geographic scope (Esri Living Atlas, US Census Bureau, "USA Census States", 2020).

Land Tenures and Feedstock Origin

In the US South, government landowners, including the Federal and State governments, contribute very small volumes to the forest product supply chain; it is estimated that less than 5% of industrial roundwood feedstock originates in government lands (ResourceWise, 2024). To corroborate this, pellet producer representatives were surveyed for estimates about their feedstock's source. Of the respondents, which represent a majority share of biomass producers active in the RRA, 98-99% of sourced feedstock originated in private forests and 1-2% originated in public forests, with most of that coming from US National Forests. Respondents reported no sourcing from Tribal or Indigenous communities for more than 5 years.

Given this, the focus of this RRA is privately owned forests of the sourcing region, including smallholders (or family forest owners) and medium and larger private landholdings, including industrial ownerships such as timberland investment



organizations (TIMOs) and ownerships such as real estate investment trusts (REITs). This management and/or ownership

focus recognizes that this is the land base that provides the vast majority of the biomass into the forest products sector, generally, and for biomass for energy use and pellet production, specifically. This ownership pattern supports active forest

management, which in turn provides a consistent supply of woody biomass.

Private ownerships in the US have a nuanced set of factors that affect their management, including a nexus of private property rights, cultural practices, and other unique characteristics that are distinct globally. These unique cultural and legal factors are specifically considered in the analysis.

However, while private lands are, rightly, the focus of this RRA, non-US National Forest public lands, which include non-US National Forest Federal lands, State lands, and local government lands, are also considered and appropriately addressed, and conclusions drawn from this RRA can be appropriately applied to non-US National Forest public lands. Additionally, this RRA is undertaken concurrently and in communication with the development of an RRA for the USDA National Forest System (NFS) by the US Endowment for Forests and Communities.

Feedstock Category

The primary focus of this risk assessment is forest-originating, wood fiber biomass including forest residues, forest thinnings, and low value stemwood originating in forest lands. The scope does not include Trees Outside of Forests (ToF).

2 Regional Background and Statement of Scope

2.1 Regional Background

Forest Ownership and Distribution in the US

Forest Area

In the US, forest lands cover more than 800 million acres or 324 million hectares (ha). In comparison, the European Union's forest lands cover 180 million ha (EU, 2019). The southeastern region of the US is heavily forested. The RRA's 16-State geography includes 533 million acres or 216 million ha of forest and timberland. By comparison, the forested area of the RRA is slightly larger than seven times the land area of Germany (Figure 2-1).

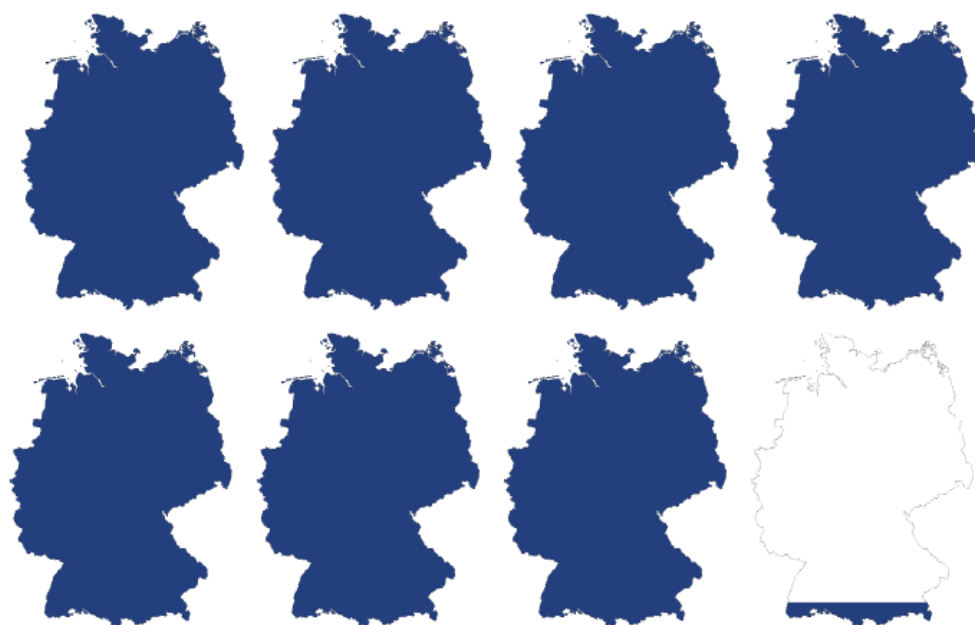


Figure 2-1. *Forested area with RRA region equivalence to Germany land area*

Indigenous Territory Acknowledgement

The geography of this RRA is positioned on the traditional territories of numerous Indigenous Peoples (Figure 2-2). These include the Accomack, Acolapissa, Adai, Adena Culture, Ais, Akokisa, Alabama, Alazapas, Annemessex, Apalachees, Appamattuck, Arrohatock, Atakapa Ishak Chawasha, Avoyel, Báxoje Mháyaⁿ (Ioway), Bayagoula, Bidai, Biloxi, Bodwéwadmí (Potawatomi), Caddo, Calicuas, Calusa, Cape Fear, Chahta Yakni (Choctaw), Chakchiuma, Chatot, Chawasha, Cheraw, Cheroenhaka (Nottoway), Cherokee (Oklahoma), Chesapeake, Cheyenne-Arapaho (Oklahoma), Chickahominy, Chickasaw (Oklahoma), Chicora, Chikashsha Iyaakni' (Chickasaw), Chincoteague, Chiricahua Apache, Chiso, Chitimacha, Choctaw (Oklahoma), Chowanoke, Coahuiltecan, Coharie, Congaree, Coree, Croatan, Cuttatawwomen, Doeg, Eastern Shawnee (Oklahoma), Eno, Erie, Esto'k Gna (Carrizo/Comecrudo), Gáuigú (Kiowa), Grigra, Guacata, Guale, Hatteras, hinono'eino' biito'owu' (Arapaho), Hitchiti, Ho-de-no-sau-nee-ga (Haudenosaunee), Hopewell Culture, Houma, Iowa (Oklahoma), Ishak (Atakapa), Isle de Jean Charles Biloxi-Chitimacha-Choctaw, Jeaga, Jicarilla Apache, Jiwere, Jíwere-Ñút'achi Mháyaⁿ (Otoe-Missouria [Oklahoma]), Jumanos, Karankawa, Kaskaskia, Kawwets'a, Kaw (Oklahoma), Kecoughtan, Keyauwee, Kickapoo

(Oklahoma), Kiikaapoi (Kickapoo), Kiowa-Comanche-Apache (Oklahoma), Kiskiack, Koasati (Coushatta), Koroa, Kusso, Lumbee, Manahoac, Mánu: Yí ʔsuwá (Catawba), Mascogo, Massawomeck, Matecumbe, Mattamuskeet, Mattaponi, Mayaimi, Mescalero Apache, Meškwahki·aša·hina (Fox), Miami (Oklahoma), Miccosukee, Mississauga, Modoc (Oklahoma), Monacan, Moneton, Monongahela Culture, Moratok, Moraughtacund, Mount Tabor Indian Community, Muscogee (Oklahoma), Mvskoke (Muscogee), Myaamia, Nacotchtank (Anacostan), Nandtaughtacund, Nansemond, Natchez, Natchitoches, Ndé Kónitsaqáí Gokiyaa (Lipan Apache), Neusiok, Niúachi, Nʌmʌnʌm Sookobitʌ (Comanche), Núu-agma-tʌvʌ-pʌ (Ute), Occaneechi, Occohannock, Očhéthi Šakówin, Ofo, O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw), Okchai, Okelousa, Onawmanient, Opelousas, Opiscopank, Osage (Oklahoma), Otoe-Missouria (Oklahoma), Ottawa (Oklahoma), oθaakiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox), Pamlico (Pomouik), Pamunkey, Pâri (Pawnee), Pascagoula, Paspahgeh, Pasquotank, Patawomeck, Pawnee (Oklahoma), Pee Dee, Pensacola, Peoria, Peoria (Oklahoma), Perquimans, Pescado, Piankatank, Piro, Piscataway, Pissaseck, Pocomoke-Assateague, Ponca (Oklahoma), Potawatomi-Shawnee (Oklahoma), Poteskeet, Powhatan, Quiyoughcohannock, Rappahannock, Rayados (Borrados), Roanoke, S'atsoyaha (Yuchi), Sac and Fox (Oklahoma), Saluda, Sana, Santee, Saponi, Secotan, Sekakawon, Seminole, Seminole (Oklahoma), Seminole Tribe of Florida (Big Cypress Reservation), Seminole Tribe of Florida (Brighton Reservation), Seminole Tribe of Florida (Hollywood Reservation), Seminole Tribe of Florida (Immokalee Reservation), Seminole Tribe of Florida (Tampa Reservation), Seneca-Cayuga (Oklahoma), Sewee, Shakori, Shawandasse Tula (Shawanwaki/Shawnee), Sissipahaw, Skaruhreh/Tuscarora (North Carolina), Sugaree, Sumas, Taensa, Taíno, Tampachoa (Mansos), Tawakoni, Tayoroniku (Tunica), Tepemacas, Tequesta, Tigua (Tiwa), Timucua, Tioux, Tocobaga, Tonkawa, Tonkawa (Oklahoma), Waccamaw (Woccon), Waco, Warraskoyack, Washa, Washtáge Moⁿzháⁿ (Kaw / Kansa), Wateree, Waxhaw, Werowocomoco, Westo, Weyanock, Wichita, Wichita-Caddo-Delaware (Oklahoma), Wicocomico, Winyah, WiYaPeMiAk (Weapemeoc-Yeopim), Wyandot, Wyandotte (Oklahoma), Yamasee, Yatasi, Yazoo, Yeopim, Yesan (Tutelo), Yoli (Concho), Youghtanund, CWJ.ᏍᏍᏍ Tsalaguwetiyi (Cherokee, East, ᎠᎵᎠᎵᎠ ᎡᏍᏍᏍ ᎠᎵᎠᎵ ᎠᎵᎠᎵ (Osage) (Native Land Digital, 2024).

This risk assessment was undertaken with respect to these communities and their connection to the land – past, present, and future.

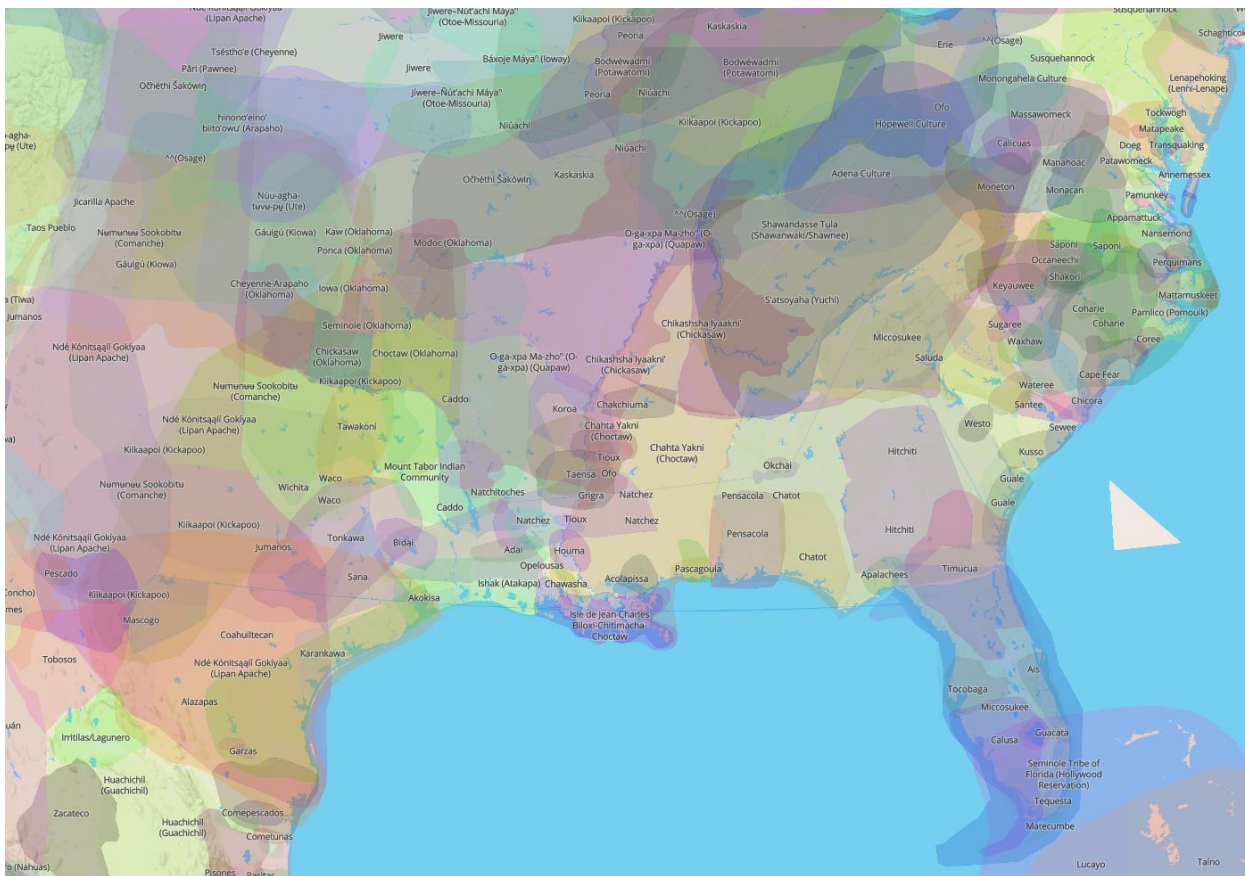


Figure 2-2. Traditional Indigenous Peoples' territories in the RRA geography (Native Land Digital, 2024).

Historical Perspective

The forests of the US Southeast, where the RRA is situated, have experienced tremendous change since the arrival of the first Europeans to Florida in 1513. Around the time of European settlement, US forest area exceeded one billion acres (Nelson, 2022). Before European arrival, Indigenous Peoples practiced controlled burns and other methods to manage forests (and grasslands) sustainably. The European invasion during the colonial era catalyzed the cutting of virgin forests across the Southeast region and the eradication of dominant ecosystems, as well as local Indigenous People populations, to accommodate new settlements and agriculture. This included the nearly complete elimination of the longleaf pine (*Pinus palustris*) ecosystem across the region.

Colonial settlers' general perspective was that the forests were an inexhaustible resource and a barrier to agricultural expansion (McNulty et al., 2013). As a result, 265 million acres of forest land lost was lost. Most of that loss occurred between 1850 and 1900. Amidst this change, growing concerns about a potential 'timber famine' sparked the conservation movement. The US Organic Act (1897) authorized the establishment of US National Forest Reserves to conserve forested areas to "furnish a continuous supply of timber for the use and necessities of the people of the United States." In 1905, the US established the US Forest Service to provide timber and quality water. The Forest Service's management scope was broadened later to primarily include water, forage, wildlife, wood, and recreation.

The US South has been a leading agricultural crop producing region throughout US history. The region was historically known as a major supplier of crops such as cotton, sugar, and tobacco. The agricultural and industrial economy of the US benefitted from the institution of chattel slavery which was established in North America in the 16th century under Spanish, British, French, and Dutch colonization. Slavery was ended throughout the United States after the US Civil War (1861–1865). In December 1865, the Thirteenth Amendment to the US Constitution was ratified, abolishing chattel slavery nationwide. From the 1850s to 1880s, federal efforts to expand the nation's borders included forced removal of Indigenous peoples to reservations. While the US South remained a major agricultural region throughout this era, there was abandonment of significant areas of farm and pasture lands across the region. Some abandoned land was planted in

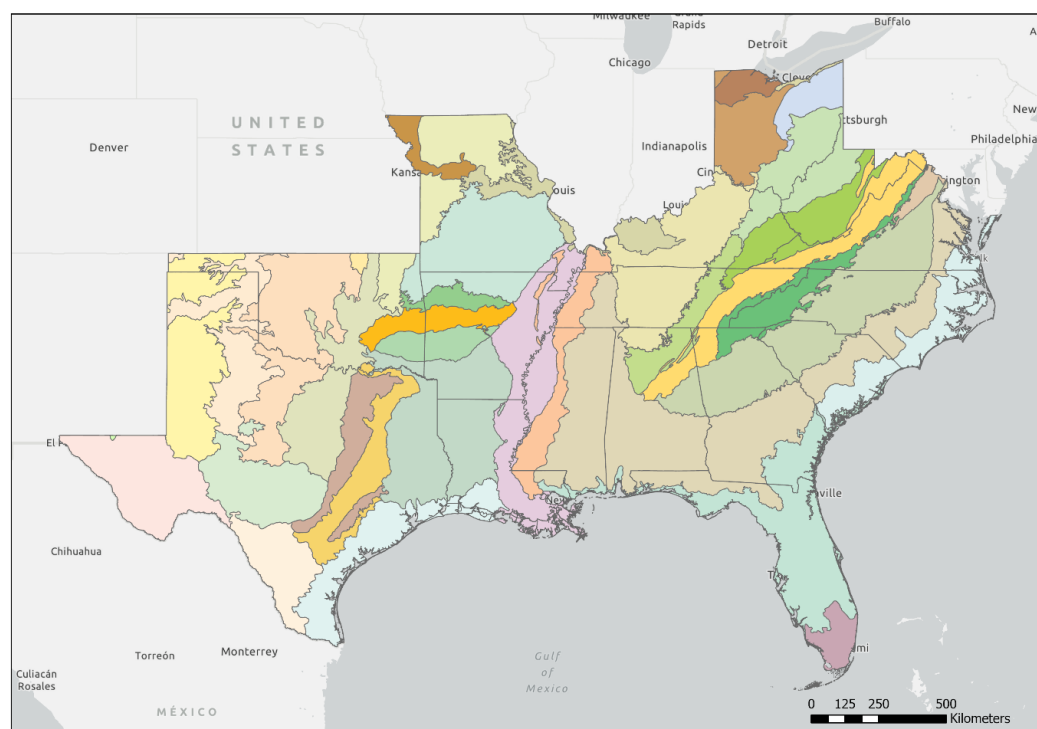
trees and some of this former agricultural land naturally regenerated (Wear et al., 2007). Changes to labor and land use continued as approximately 6 million people, mostly African Americans, moved out of the US South during The Great Migration (1910-1970). Farming also contracted following the economic impacts of the Great Depression (1930s). Following World War II, with the greater industrialization of agriculture and growth of global markets, through the early 1980s, significant amounts of forest land were, again, cleared in the region to support crop production. For example, the bottomland hardwoods of the Mississippi Delta were greatly reduced during this period.

Beginning in 1982, another era began in the US South as many agricultural lands were again converted to forest land, largely through plantation forestry, because of increases in market prices for wood and demand for pulp and paper products; this trend has continued through the present (McNulty et al., 2013). Federal and State incentive programs, technical assistance services, and tax law benefits contribute to private landowner participation in tree planting and forest expansion in the region. These factors, coupled with innovations in forest management and manufacturing, and the fact that more than 60% of all US wood harvests now originate in this area, led to the Southeast becoming known as the 'Woodbasket' of the US. The industry's expansion resulted in job growth and a regional economy connected to the forest sector. The region has experienced significant population growth, economic development, and infrastructure investment since the Civil Rights Era of the 1960s and especially over the past 50 years. These economic connections, in conjunction with the flow of other forest values including hunting, recreation, and natural beauty, have contributed to strong cultural values and identifies a connection to the forest within the region.

Ecological Extent

The geography of the RRA is very diverse, with 38 Level III ecoregions identified and mapped within the 16-state region (Figure 2-3). The area is generally situated in the Eastern Temperate Forest ecological region (Level I Ecoregion), except for (1) some western ecoregions in western portions of Texas, Oklahoma, and Missouri that include Level III ecoregions within the Great Plains and North American Deserts Ecoregions, and (2) the tropical Southern Florida Coastal Plain of south Florida, which is part of the Tropical Wet Forests ecoregion. Since the desert and Great Plains regions of parts of Texas/Oklahoma/Missouri and the tropical regions of Florida are not areas where substantial forest management is being practiced, the descriptions below focus on the ecoregions within Level 1 (i.e., Eastern Temperate Forests). The region is distinguished by its moderate to mildly humid climate, its relatively dense and diverse forest cover, and its high density of human inhabitants. A variety of geologic materials and landforms are present. Younger-age sedimentary coastal plains in

the south and east abut older, folded, and faulted sedimentary; metamorphic; and igneous rocks of the Appalachian Mountains that reach elevations over 2,000 meters (m). A mixed limestone-dolomite terrain of plains and hills dominates a portion of the region, with other sedimentary rock found on the plateau and plains at the western end. Surface waters are characterized by perennial and intermittent streams, some geographic areas with high densities of lakes, a diversity of wetland communities, and a rich array of maritime ecosystems.



Level III Ecoregions

10.2.4 Chihuahuan Desert	8.4.5 Ozark Highlands
13.1.1 Arizona/New Mexico Mountains	8.4.6 Boston Mountains
15.4.1 Southern Florida Coastal Plain	8.4.7 Arkansas Valley
8.1.1 Eastern Great Lakes and Hudson Lowlands	8.4.8 Ouachita Mountains
8.1.10 Erie Drift Plain	8.4.9 Southwestern Appalachians
8.2.2 Huron/Erie Lake Plains	8.5.1 Middle Atlantic Coastal Plain
8.2.4 Eastern Corn Belt Plains	8.5.2 Mississippi Alluvial Plain
8.3.1 Northern Piedmont	8.5.3 Southern Coastal Plain
8.3.2 Interior River Valleys and Hills	9.2.3 Western Corn Belt Plains
8.3.3 Interior Plateau	9.2.4 Central Irregular Plains
8.3.4 Piedmont	9.4.1 High Plains
8.3.5 Southeastern Plains	9.4.2 Central Great Plains
8.3.6 Mississippi Valley Loess Plains	9.4.3 Southwestern Tablelands
8.3.7 South Central Plains	9.4.4 Flint Hills
8.3.8 East Central Texas Plains	9.4.5 Cross Timbers
8.4.1 Ridge and Valley	9.4.6 Edwards Plateau
8.4.2 Central Appalachians	9.4.7 Texas Blackland Prairies
8.4.3 Western Allegheny Plateau	9.5.1 Western Gulf Coastal Plain
8.4.4 Blue Ridge	9.6.1 Southern Texas Plains/Interior Plains and Hills with Xerophytic Shrub and Oak Forest

Figure 2-3. RRA region's Level III ecoregions (Commission for Environmental Cooperation (CEC). 2021).

The climate is generally warm, humid, and temperate, although there is a latitudinal and elevational gradient from cool, continental temperatures to those that are subtropical. Summers are hot and humid, and winters are mild to cool. The average daily minimum temperature in winter is -12°C in the north and 4°C in the south. Average daily maximum summer temperatures are 27°C to 32°C . Precipitation amounts of 1,000 to 1,500 mm per year are relatively evenly distributed throughout the year, with most areas having either a summer or spring maximum (Commission for Environmental Cooperation, 1997).

Forest Conditions and Biodiversity

The forests of the Southeast are widely recognized for their high biodiversity and characterized by an array of forest conditions. There is a spectrum of forest types, each providing an assortment of unique habitats and species within. Similarly, the geography of the RRA is characterized by diversity in forest stand ages, which are evenly distributed age classes, supporting a diversity of not only product flows but also species habitats.

Figures 2-4 and 2-5 show the distribution of timberland acres in each age class category for both the private and non-National Forest public lands in the scope of the RRA. There is an even distribution of age classes within the RRA's geography, with the note that there is very little old growth reflecting the legacy of land use change following the settlement of colonial Europeans. Accordingly, the FSC US National Risk Assessment (FSC US NRA) concluded low risk for forest fiber flowing into supply chains from Old Growth (HCV 3) forests in the RRA region (Forest Stewardship Council, 2019). Figure 2-6 shows the forest types in the RRA's region. It is important to note the distinction between forest land and timberland.

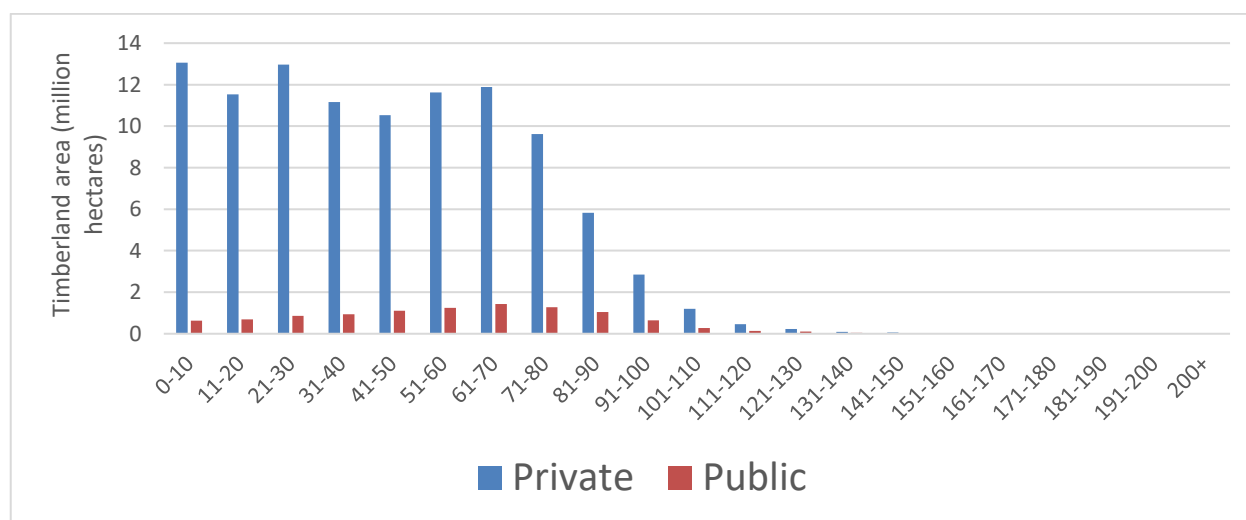


Figure 2-4. Distribution of timberland area on private and non-National Forest public lands by 10-year age class in the RRA region (USFS FIA, 2024).

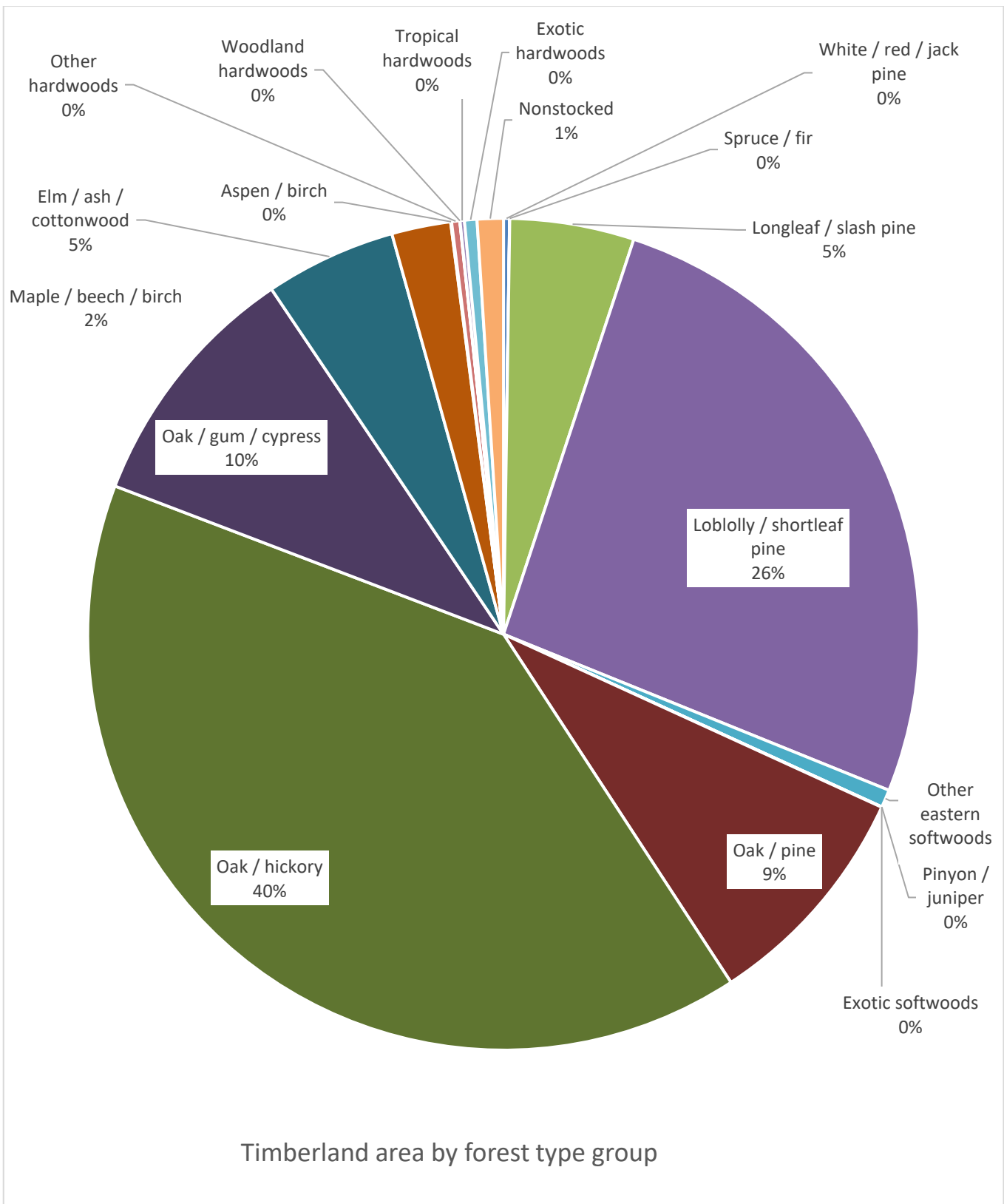


Figure 2-5. Distribution of timberland area by forest type group in the RRA region (USFS FIA, 2024).

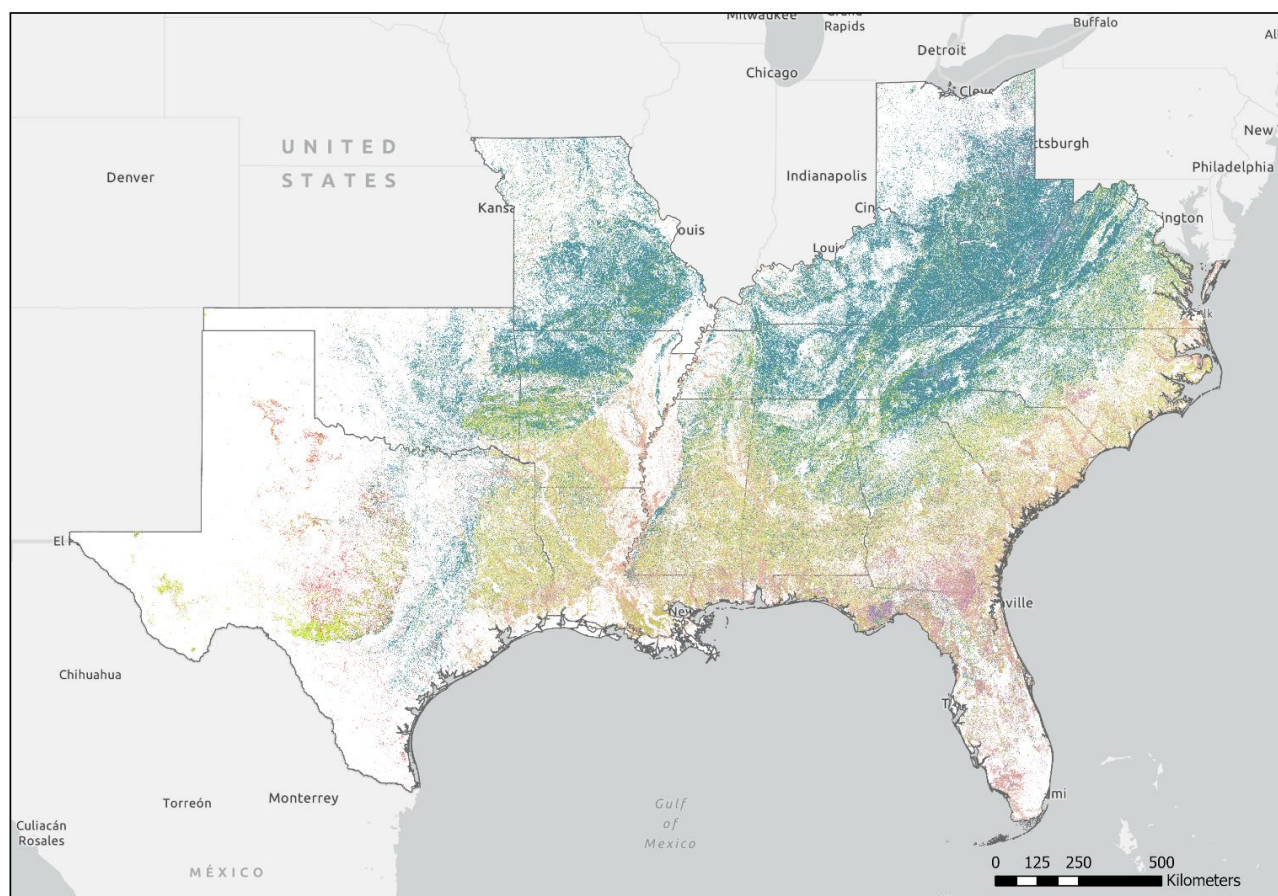


Figure 2-6. Forest types in the RRA region (USFS FIA, 2024).

The US Forest Service's Forest Inventory and Analysis (FIA) uses these terms to differentiate lands covered with forests. FIA defines forest land as land that has at least 10% canopy cover by live tally trees of any size or has had at least 10% canopy cover of live tally species in the past, based on the presence of stumps, snags, or other evidence. To qualify, the area must be at least 0.4 ha (1.0 acre) in size and 36.6 m (120.0 feet) wide. Forest land includes transition zones, such as areas between forest and non-forest lands that meet the minimal tree canopy cover and forest areas adjacent to urban and built-up lands. Tree-covered areas in agricultural production settings, such as fruit orchards, or tree-covered areas in urban settings, such as city parks, are not considered forest land. Timberlands are a subset of forest lands. FIA defines timberland as forest land that is producing or capable of producing 1.40 cubic m per ha (20 cubic feet per acre or more) per year of wood at culmination of mean annual increment (MAI). Timberland excludes reserved forest lands. There are 113.5 million ha (280.6 million acres) of forest land in the RRA region and 90.5 million ha (223.7 million acres) of timberland. Timberlands are the lands generally capable of producing forest products commercially and, thus, is the origin of nearly all biomass. In general, timberlands are used for analysis of the forested land base in this RRA, except in cases

where lower density or marginal forested lands are the focus of the indicator.

According to the World Wildlife Fund (WWF), temperate conifer forests that dominate this region can sustain the highest levels of biomass in any US terrestrial ecosystem, and the level of biodiversity is “virtually unparalleled” in North America (AFF, 2021). As a result, the region has long been recognized as a biodiversity hotspot. It supports habitats for a range of species that have been at risk, either because species are listed under the US Endangered Species Act (ESA) in NatureServe’s ranking system as imperiled or critically imperiled (Figure 2-7) or as threatened or endangered (which also designates their critical habitats) (Figure 2-8).

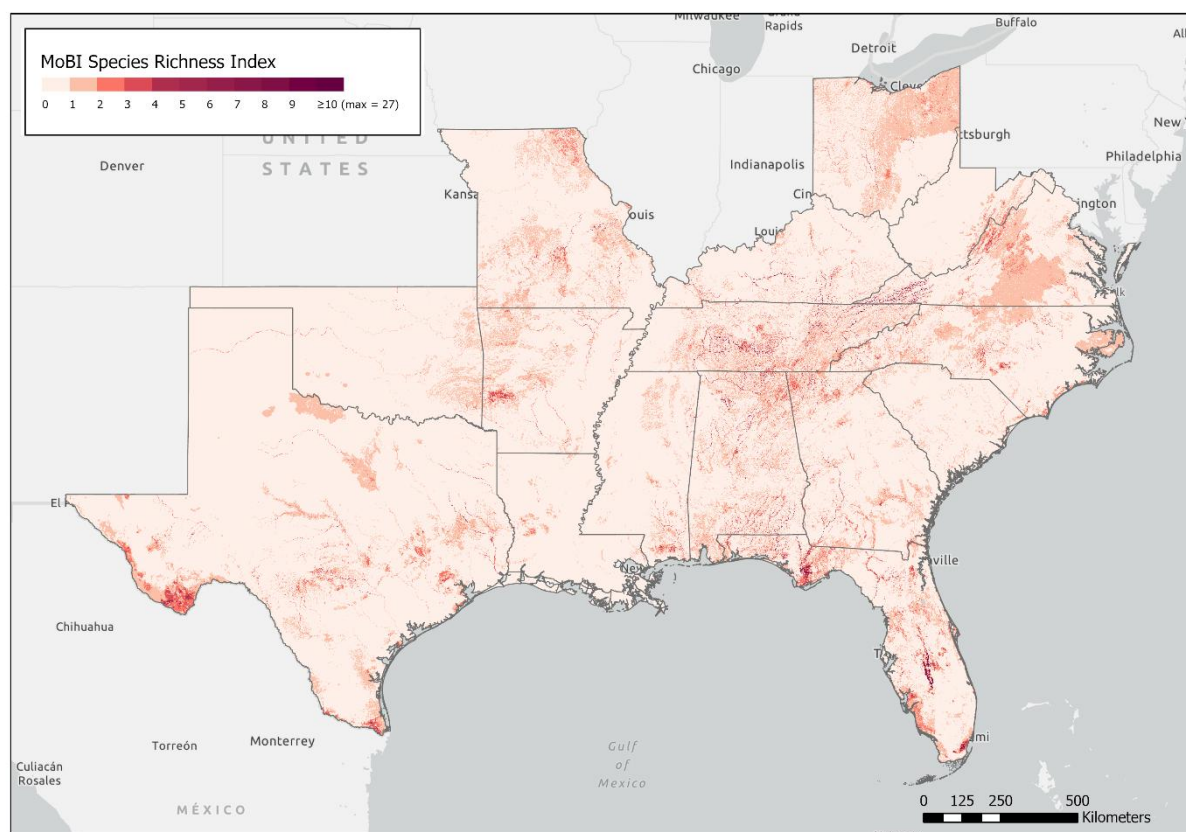


Figure 2-7: Map of Biodiversity Importance (MoBI) Species Richness Index (NatureServe, 2024).

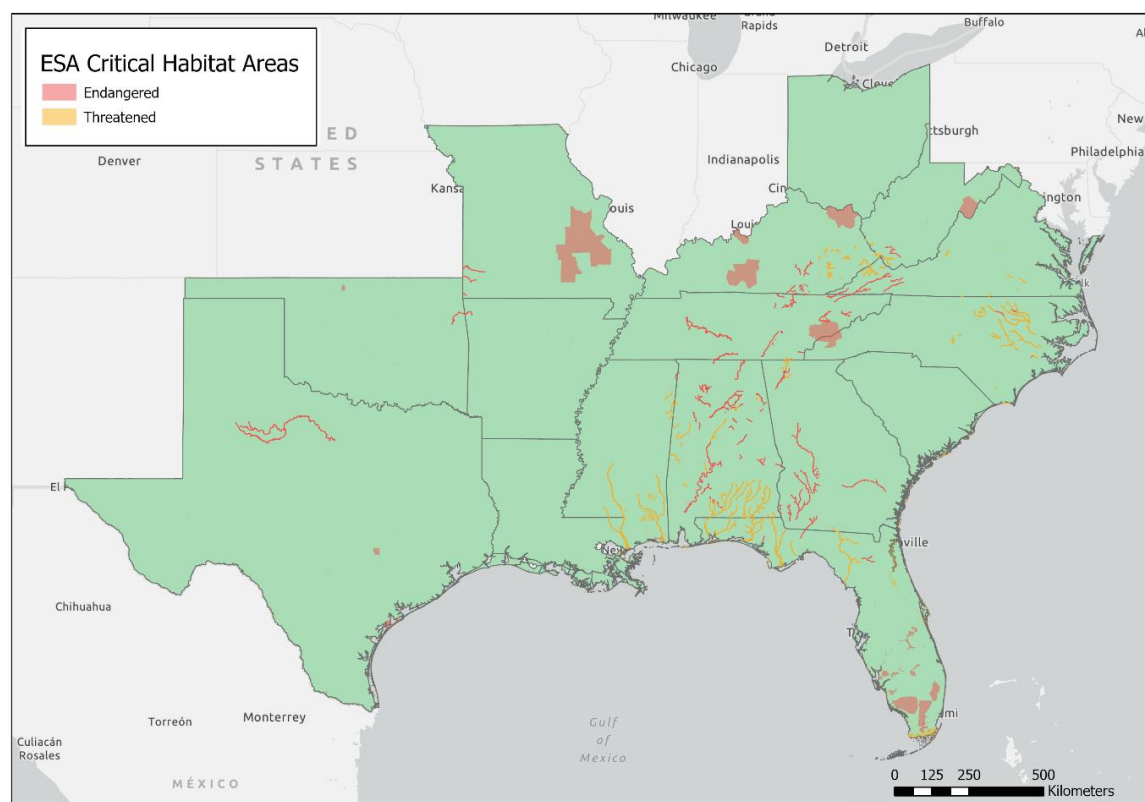


Figure 2-8: ESA Critical Habitat Areas (Esri Living Atlas, US Fish and Wildlife Service, "Critical Habitat for Threatened and Endangered Species", Polygon and Linear Features (Final), 2023).

Deforestation, Reforestation and Harvest Ratios

The overall rate of deforestation is quite low in the US, as a whole, and the US Southeast (the RRA's geography). However, incremental forest loss occurs within this region, as analyzed in indicator 2.2.1. While local level zoning laws may be in place, there are no Federal level laws that specifically address the conversion of forests on private land. However, there is broad consensus that forest harvesting is not a driver of forest loss, and neither is expansion of agriculture. Of note, conversions of natural and semi-natural forests do occur. Deforestation due to land use changes is driven by population growth and commercial or residential development.

Unlike in other countries, there are no explicit Federal or State laws dictating maximum annual allowable cut or clearcut size. However, prompt reforestation is routinely practiced because of alignment with both the production motivations of industrial private landowners and dominant noneconomic goals identified by family landowners (see Private Landowners, Their Values and Their Practices below). Additionally, prompt reforestation is also included in the forestry Best Management Practices (BMPs) for states in the region and is a requirement for forest certification (see section on BMPs below).

Overall, as analyzed in indicator 2.2.9, studies consistently find that, currently and historically, growth exceeds harvesting levels in the US Southeast region (ResourceWise, 2024).

Protected Areas

While the vast majority of the region is privately owned, it also includes many protected areas, which were designated to preserve areas of high biodiversity value. Figure 2-9, which shows areas in the US Geological Survey's Protected Area database's (PAD-US) national inventory of US terrestrial and marine protected areas. PAD-US's database includes areas dedicated to the preservation of biological diversity and other natural, recreational, and cultural uses, which are managed for these purposes through legal or other effective means. Lands in PAD-US are mainly open space/resource lands owned by US government agencies and nonprofits, but it also includes privately owned lands encumbered by conservation

easements that are open and suitable for public disclosure.

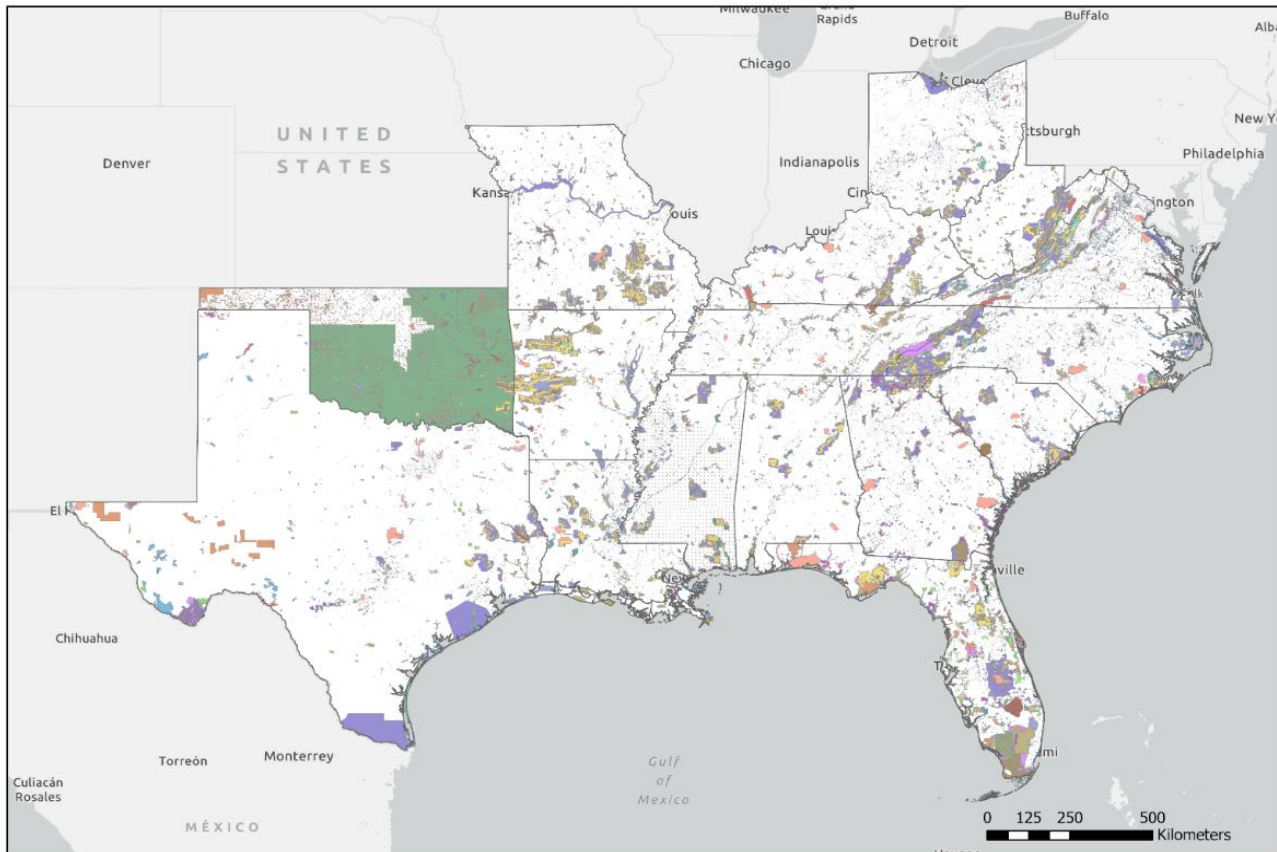




Figure 2-9: Lands in the US Geological Survey's Protected Area (PAD-US) national inventory of US terrestrial and marine protected areas (USGS, 2024).

Intact Forest Landscapes (IFL)

The FSC US NRA analyzed several datasets to evaluate the presence of Intact Forest Landscapes (IFLs). This analysis identified two land areas roughly aligning with the definition within the RRA's geography: the Okefenokee National Wildlife Refuge in southeastern Georgia and the greater Everglades ecosystem on the southern tip of Florida, which is protected inside and outside of Everglades National Park. Both areas are under Federal ownership and management specifically protects their ecosystems. The assessment conclusion is that these areas are effectively protected and there is a low risk that these HCV 2 areas are threatened by forest management activities.

Forest Ownership

The US is home to approximately 800 million acres, or 300 million ha, representing 7.5% of the world's forests. The country has a strong culture and recent history of sustainable forestry that supports healthy forests. US forests provide an array of benefits and values to a diversity of different communities.

There are three primary forest ownerships in the US: Federal, State or local government, and private (Figure 2-10). Unlike many countries, most American forests are privately owned.

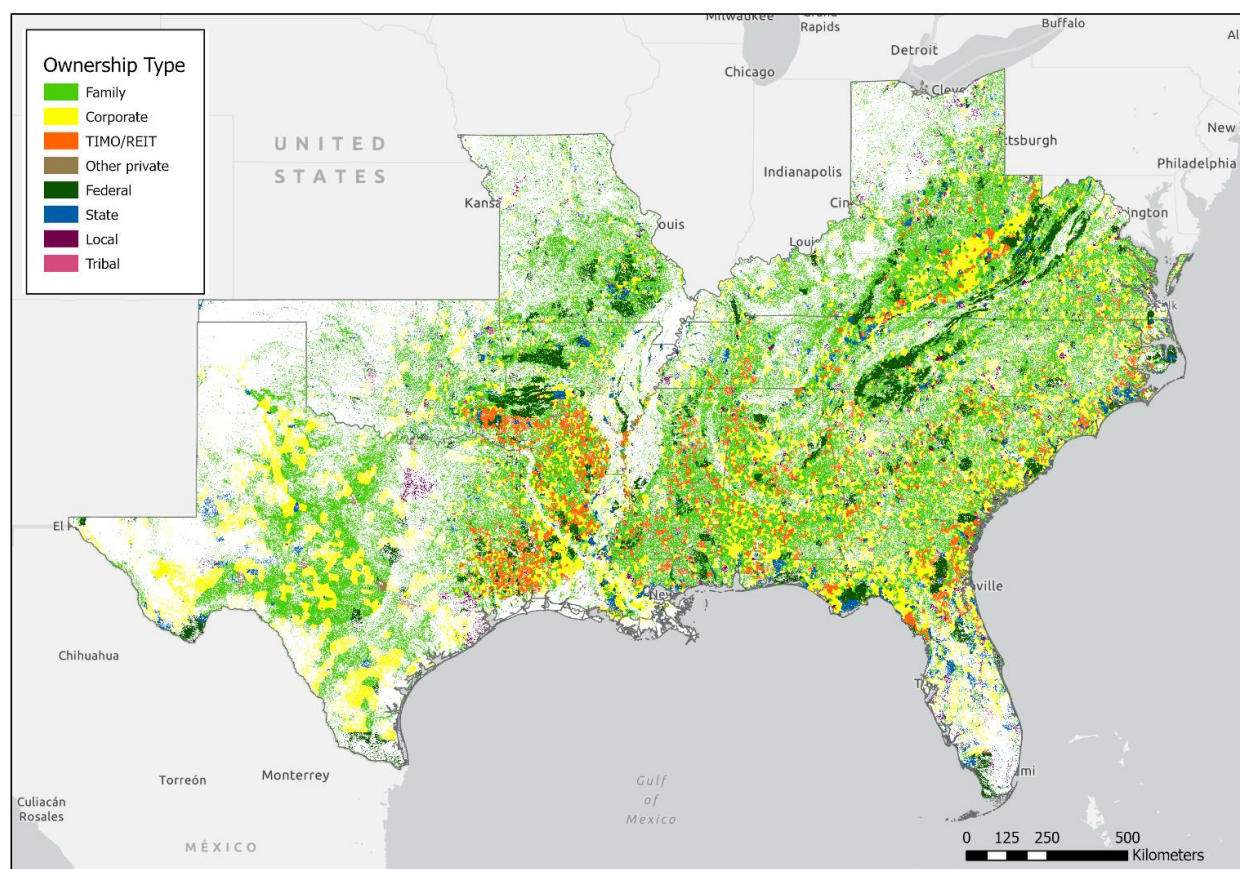


Figure 2-10. Forest ownership by location (Sass, Emma M., Butler, Brett J., Markowski-Lindsay, Marla A., Forest Service Research Data Archive, 2020).

In the RRA's region, 87% of forests are privately owned (Figure 2-11). The majority, 58% of the region's forests, approximately 122 million acres, are owned by families and individuals. Industrial, corporate private landowners own 28.6% of the forests. American Indian Tribes own a small portion of the RRA region's lands.

The remaining 13% of forests are generally comprised of government ownerships. US National Forests, administrated by the US Forest Service, represent 6.1% of these lands. Nearly 2% is owned and managed by other US agencies including the US National Park Service (NPS), which is responsible for the US National Parks and other land designations; the US Fish & Wildlife Service (USFWS), which is responsible for management of US National Wildlife Refuges and other land designations; the US Department of Defense (DOD) which manages military bases and other installations; the US Bureau of Land Management (BLM); and other federal agencies. State and local governments, such as counties and municipalities, own 4.6%.

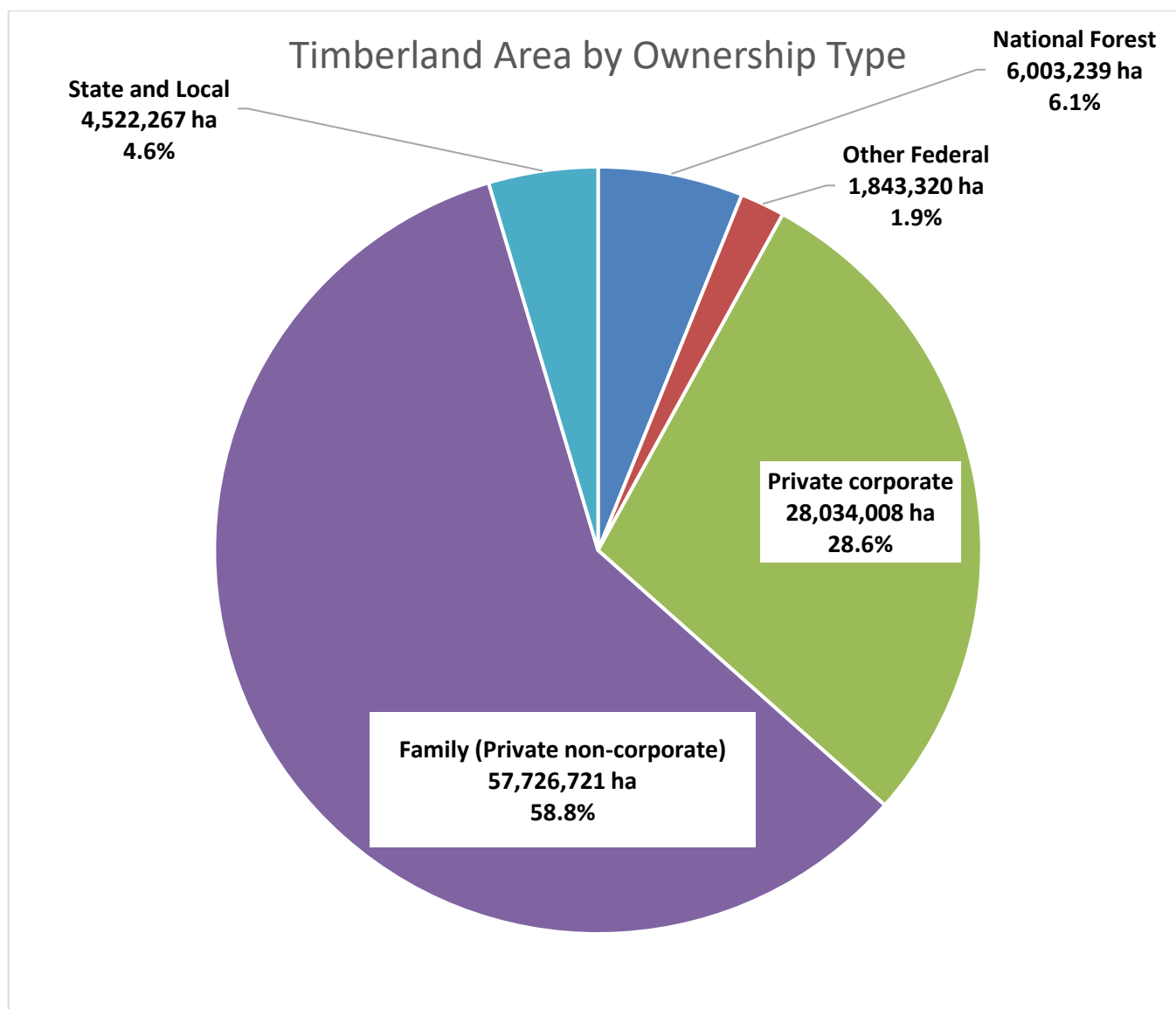


Figure 2-11 Distribution of timberland area by ownership types in the RRA region. (Oswalt et al., 2019).

Private Landowner Values and Practices

Private lands provide the vast majority forest biomass into the forest products supply chain. The Forest History Society (2024) estimated that 89% of the timber harvested in the US originates from private lands. This feedstock flows from millions of small tracts. The distribution of area and ownership vary across the RRA region, with the majority of ownerships smaller than 10 acres (4 ha) (Table 2-1, Figure 2-12).

Minimum Size of Forest Holdings (hectares)	Area (hectares, millions)	Number of Ownerships (thousands)	Number of Owners (thousands)
0.4 +	69.0 (1.96)	4,728 (869)	9,025 (1,794)
4.0 +	65.4 (2.11)	2,049 (214)	4,218 (624.6)
40.5 +	44.5 (2.47)	337.3 (32.2)	774.0 (115.7)
404.7 +	15.0 (1.82)	15.62 (2.50)	55.78 (18.44)

Table 2-1. Estimated hectares of family forest land, family forest ownerships, and numbers of family forest owners by minimum size of forest holdings, United States, 2018. Values in parentheses are standard errors (Butler et al., 2020).

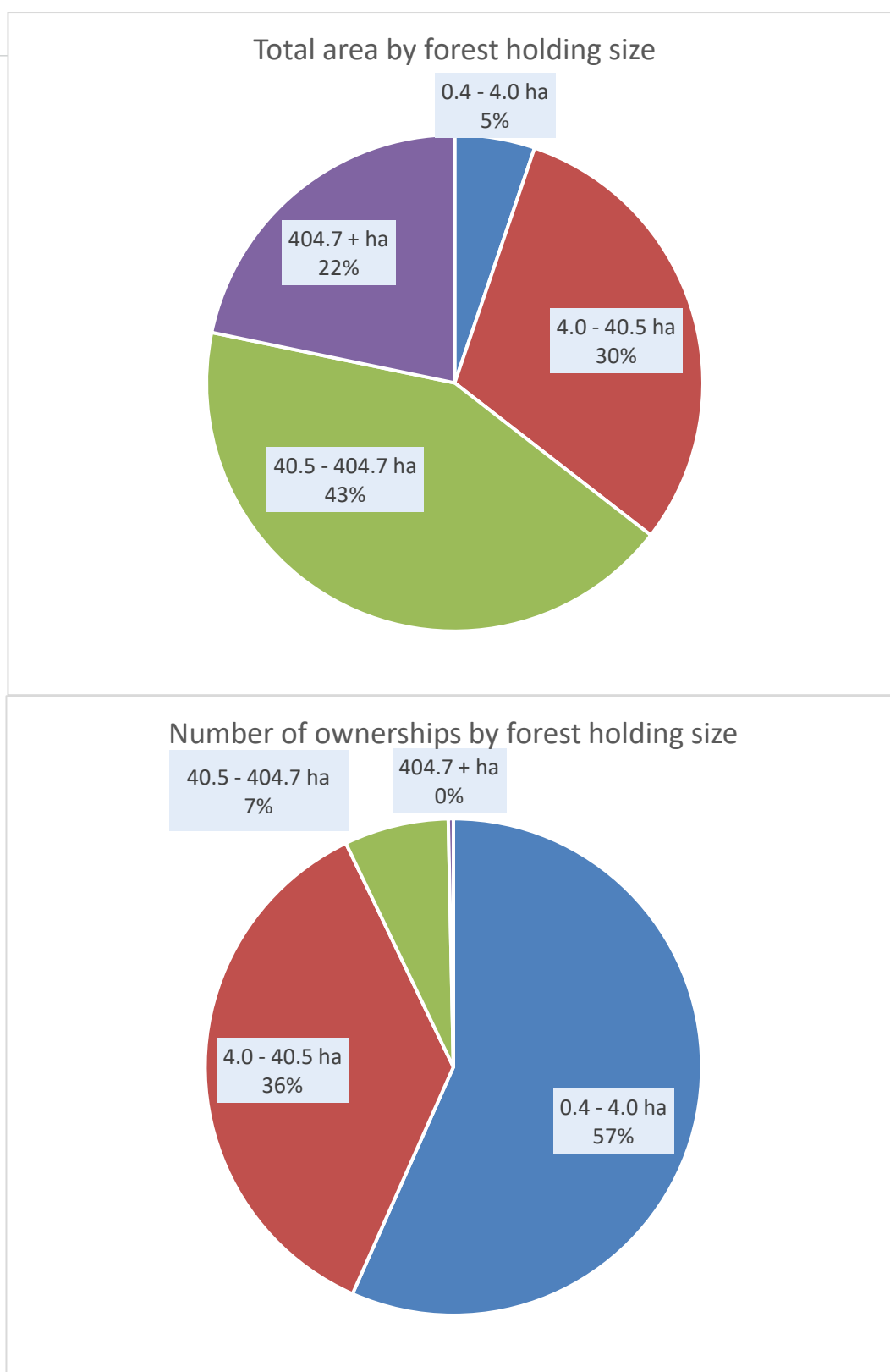


Figure 2-12. *Estimated percent of family forest land area and number of ownerships, based on 2018 data (Butler et al., 2020).*

Family forest landowners are vital to ensuring forests are productive and driven by a distinct set of values that influence their behaviors and forest management. According to the US Forest Service's National Woodland Owners Survey (NWOS), the highly respected and leading research on US family forest landowners, they own forest land for the following reasons: beauty or scenery (80% of all ownerships), wildlife habitat (70%), nature protection (70%), family legacy (70%), privacy (70%), and water protection (60%). Fewer than 15% of ownerships identify timber products as the reason for land ownership (Butler et al., 2018). Thus, in the US, small private landowners tend to be motivated by conservation (AFF, 2021).

Similarly, studies have demonstrated that private landowners derive socio-emotional benefits from the land, such as a sense of identity associated with the land, its history, and the value of passing it on to future generations (Tran et al., 2020). However, few family forest landowners have written management plans and there is no legal requirement to have one. For example, Butler et al. (2020) estimated that only 24% of the family forest land, owned by an estimated 11% of the family forest ownerships, have written forest management plans. Percentages for those who have received forest management advice are higher; an estimated 36% of the family forest land received some type of advice in the previous five years (Butler et al., 2020). Typically, engagement with professionals happens when these owners are considering harvesting their forests, which usually occurs every 25 and 40 years, depending on the species and harvest rotations, as well as personal and financial considerations. For this reason, government-, nonprofit-, and academic-based outreach and education programming for these landowners tends to be targeted around management activities. This is also why programs like third-party forest certification, which require an updated forest management plan, and the SFI Fiber Sourcing program, which engage landowners when they harvest their lands, are influential when they are implemented.

Industrial forest owners, those in the "private corporate" category, use academically trained professional staff to manage their lands according to multifaceted written forest management plans that include: (1) stand-specific objectives; (2) conservation and BMP applications for soils, wildlife habitat, water resources and other considerations; (3) growth and harvest modeling; (4) updated forest inventories; and if applicable (5) conformity with forest certification requirements. These forest owners, and family forest owners who own large tracts of land (e.g., 500 acres or more), often integrate these elements into robust large-scale systems that maintain data and information for implementing sustainable forest management across their landscape (Cook, 2024; NAFO, 2024). Additionally, research has shown that, in the US South, small landowners tend to be influenced by larger ownerships in their proximity. This system establishes baseline practices and provides the conditions for sustainable management across millions of acres of private working forests in the RRA region.

Forestry Best Management Practices (BMPs)

Forestry Best Management Practices (BMPs) are a central facet of forest management in the geography of the RRA. BMPs are based on the US Federal Water Pollution Control Act (1972), commonly referred to as the US Clean Water Act (CWA). The CWA is the essential Federal legislation addressing water protection in the US. The CWA is administered by the Environmental Protection Agency (EPA) and establishes the fundamental structure for regulating discharges of pollutants into the "waters of the United States" and regulating water quality standards for surface waters. The CWA includes requirements to address both point source pollution, pollution from identified outlets (e.g., a pipe from an industrial or municipal source), and non-point source pollution from sources that cannot be easily identified (e.g., runoff from roads). EPA has developed national water quality criteria recommendations for pollutants in surface waters; these are particularly relevant to forestry. Section 208 of the CWA defines timber harvesting and silvicultural operations as non-point source pollution.

Under CWA, the EPA requires US states to develop regulatory programs for forestry to meet water quality requirements. Section 319 provides US government funding to states for the development and management of non-point source pollution programs. As a part of each state's non-point source pollution programs, State environmental regulatory agencies delegate the authority and allocate funding to State forestry agencies to develop, implement, and monitor a non-point source pollution program for forestry activities (Florida Department of Agriculture and Consumer Services, 2024).

Every State in the geography of the RRA has developed forestry BMPs. Importantly, states can regulatorily halt forestry operations that create non-point source pollution that can damage water quality and/or associated water-based resources (See Annexes).

BMPs differ by state, reflecting their biophysical and hydrological features. However, most State BMPs include specific practices related to timber harvesting, streamside management zones (SMZ), stream crossings, forest road construction and maintenance, site preparation and reforestation, prescribed burning, pesticides and fertilizers, and waste disposal (AFF, 2021; NASF, 2019). For example, the Florida Silvicultural Best Management Practices specify minimum buffers between 11- and 60-m on both sides of perennial streams, depending on stream width.

The regulatory status of BMPs varies by state. BMPs may be non-regulatory, quasi-regulatory, or regulatory (Table 2-2). In regulatory States, BMPs are prescribed and required by law to be implemented. Typically, State law dictates that BMPs shall be used, and State regulations describe the required BMPs in detail. Some State BMP programs are identified as quasi-regulatory. In these States, State law establishes standards for water quality that silvicultural activities must meet but does not stipulate how the operator must meet those standards, offering multiple pathways for compliance. There are also instances (Virginia) where BMPs are not required at the state-level but allow local governments to require them. Lastly, some states implement their BMP program through information and educational efforts and rely on voluntary compliance (NASF, 2019). Regardless of their status, studies have found no significant difference between non-regulatory, quasi-regulatory, and regulatory BMP guidelines when compared by mean State BMP implementation rates (Cristan et. al, 2018).

Non-Regulatory States	Quasi-Regulatory States	Regulatory
Arkansas	Alabama	West Virginia
Louisiana	Florida	Kentucky
Missouri	Georgia	
Mississippi	North Carolina	
Oklahoma	Ohio	
South Carolina	Virginia	
Tennessee		
Texas		

Table 2-2. *Regulatory Status of State BMPs (NASF, 2019).*

Proper use of BMPs has been found to be widely effective in protecting water quality (NCASI, 2012). For example, Walbridge (1993) reported BMPs improved water quality 80-90% above prior practices, as well as reduced the deposition of sediment, nutrients, and organic matter. A comprehensive literature review, examining 81 research studies related to BMP effectiveness across the US indicated that BMPs protect water quality in a range of forestry activities, including timber harvesting, stream crossings, Streamside Management Zones (SMZs), forest road construction and maintenance, site preparation, and other operations when implemented correctly (Cristan et al., 2015). Thirty of the reviewed studies examined sites in the South located in the Piedmont and Coastal Plain physiographic regions, which are important biomass production regions within this RRA scope.

BMPs are standardized forestry practices in the US South. As the National Association of State Foresters (2019) reported in a study of US Forestry BMP programs, regardless of the approach that States take, BMPs and related programing are successful in controlling non-point source pollution from forestry activities and implementation rates are very high, ranging from 89-95%.

Research suggests that there are no significant differences in erosion rates between biomass and conventional harvesting sites and that proper implementation of BMPs at both conventional and biomass harvest sites underscores water quality protection efforts (Parajuli et. al, 2024).

Within the forestry community, the success and widespread use of BMPs is an area of intense focus and investment and is a point of pride. This largely stems from the expansion of BMP practices, along with logger training, as mandatory components of the SFI Fiber Sourcing certification program, which is widely used by biomass producers, as well as most of their suppliers (see Certification Section). While FSC and SFI certification also incorporate BMP compliance within their standards, Objective 2 of the 2022 SFI Fiber Sourcing Standard specifically requires written agreements that require all

suppliers to both use BMPs and utilize a verifiable monitoring system to verify BMP use within their own programs. The Objective also calls for promoting the standard use and effectiveness of BMP implementation across the forest sector within their States, broadly, beyond only SFI Fiber Sourcing certified operations. The Standard's Objective 7 requires the reporting of inconsistent practices, including BMP violations. State BMPs are a primary feature of SFI logger training programs (see Annexes). This training, which is also required by SFI Fiber Sourcing Objective 3, is generally coordinated by State forestry associations and highly attended. Documentation of training is made publicly available and verified in SFI audits. This makes loggers, who want and need to maintain their market access and professional reputation, highly motivated to take BMP training and correctly implement BMPs. This multifaceted government- and nonprofit based system reinforces the standardized application of BMPs and ongoing monitoring.

Governance and Legal Framework

The US operates under a federalist system, where power is shared between the Federal government and individual State governments. The US Constitution, the nation's supreme law, establishes this balance of power and outlines three branches of the Federal government:

- Executive: The President and their administration, responsible for administering laws
- Legislative: Congress, responsible for developing laws
- Judicial: The Federal court system, including the Supreme Court, responsible for interpreting and enforcing laws

Federal laws involve all three branches: Congress passes legislation, the President signs (or approves) legislation and issues executive orders, and Federal courts make judicial decisions. These laws provide an overarching framework for the entire US.

Each State also has its own government with legislative, executive, and judicial branches. State laws are passed by State legislatures, approved and executed by Governors, and interpreted by State courts. These laws apply only within that particular State and can vary from one State to another.

Global indices consistently evaluate and highly rank the US's performance related to rule of law, control of corruption, and related indicators. The World Bank maintains the Worldwide Governance Indicators (WGIs), also known as the Kaufmann-Kray Model, to provide rankings related to the (1) the process by which governments are selected, monitored, and replaced; (2) capacity of the government to effectively formulate and implement sound policies; and (3) respect of citizens and the government for the institutions that govern economic and social interactions among them. The US consistently performs very well on the important indices relative to legality, governance, and corruption. In the World Bank's (2022) most recent report, the US scored 86.79% for Government Effectiveness, 88.68% for Rule of Law, and 82.55% for Control of Corruption. Similarly, Transparency International's (2024) most recent rankings rank the US in the 87th percentile (24 out of 180 countries) in their Corruption Perceptions Index (CPI). These analyses demonstrate the high degree of confidence that laws cited within this RRA are strictly enforced.

Given the structure of the US Federal government system and the consistency of US and State law application and, because many of the laws most salient and important to this RRA's indicators are Federally based, Federal laws are the primary focus of the legal assessment within this RRA.

2.2 Statement of Scope and Sub-scopes

Within the context described in the Regional Background outlined above and the overview of the local biomass sector provided below, the scope of this RRA is forest-sourced biomass, including primary sourcing, as well as forest residuals originating in private lands, and other landownerships including non-National Forest public lands. Fiber originating outside private ownerships (Federal, State and local public or any other tenures) represent a de minimis volume into the biomass supply chain.

This scope aligns with practical implementation by US Biomass Producers, which report universal application of their risk assessments and due diligence systems, regardless of ownership type or certification status. Additionally, because public lands may be subject to additional regulations, conclusions developed for private lands may be appropriately and conservatively applied with no additional sustainability risk.

2.3 Overview of the Local Biomass Sector

Forest Harvesting Systems and Flow of Feedstocks

Since the 1950s, the South's forests have shown remarkable adaptability to fluctuating demand without experiencing declines in acres and inventory. Forest owners, who are mainly private individuals, families, corporations, and investors, have demonstrated their ability not only to use and maintain the forests but also to replenish and expand them (Forest2Market, 2017).

Forest harvesting tends to occur at two points in a forest cycle: Intermediate thinnings and final harvest. In an unplanted stand, intermediate thinning refers to the removal of smaller, unhealthy and/or unfavorable trees. In a planted stand, often, intermediate harvest refers to the removal of trees or rows of trees. In either case, the primary purpose of thinning is to reduce competition and promote the growth of the most vigorous, best formed trees and, in the case of unplanted stands, suppressed, less favorable, and/or least healthy trees, which also tend to have defects (e.g., curved stems). Thinning also provides other benefits by opening the canopy to allow sunlight to reach the herbaceous understory, which diversifies habitat for various plant and animal species. Additionally, these treatments also improve overall forest stand health by promoting the vitality of the remaining trees, providing resilience against insects, disease, and fires, as well as removing weaker, infected trees from the site. The results of intermediate thinning generally serve as the feedstock referred to as pulpwood; small diameter trees of low quality that are not suitable for the use in lumber, or other higher value products or applications. Pulpwood is a principal source of biomass feedstock.

Final harvests usually occur when a tree reaches a culmination of maximum annual growth rate and market value. At this point, trees in the stand are suitable for the highest market application as sawtimber. However, final harvest may also produce pulpwood.

Additionally, both at intermediate or final harvesting processes, limbs, tops, branches, and bark may also be amassed and used as biomass. This low value material may be chipped "in woods" and cost effectively transported, making it also a source of biomass.

The majority of harvested volume in the RRA's geographic footprint, including both thinnings and final harvests, is harvested using mechanized technologies (i.e., feller-bunchers, skidders, and loaders). Hand-felling and use of chainsaws is uncommon for commercial harvesting in the region. Categories of harvesting systems in the US include whole-tree, tree-length, and cut-to-length. In whole-tree systems, most common in the South, each tree is cut from the stump and the above-ground portion of the stem (i.e., bole, limbs, and top) is transported to a landing or roadside for further processing (Conrad, 2018). Many logging businesses in the region are highly productive, harvesting more than 70,000 tons per year or 350 tons per working day, and the most common harvesting system is mechanized full-tree systems using feller-bunchers, grapple skidders, and knuckleboom loaders (Diniz, 2017).

The US Southeast, generally overlapping with the RRA's geographic footprint, is the primary region for biomass production for many reasons, including a climate supporting diverse and fast-growing forests, and having a long history of forest management that supports ongoing capability of supplying wood fiber. Privately owned and highly productive, much of the region is working forest land. This distinct combination of factors sustains a diverse forest products industry with well-developed markets, extensive infrastructure, well-developed means of transportation and networks, and mechanisms that enable access to US and international markets.

Biomass Sector Profile

While the forest products sector is well established, biomass production is relatively new to the geography of the RRA. For example, Brandeis' (2019) research found that wood pellet mill feedstock in the US South represented less than 2% of the region's total roundwood output in 2015, and that the large majority of pellet feedstock was derived from residuals from 2015 to 2017. These findings were corroborated through review of Company Risk Assessments within the RRA's geography and interviews with representatives of biomass producers (Cheynet, 2024; Cook, 2024; Grant, 2024; Kincaid, 2024; Palmer, 2024), a principal and majority source of feedstock volume into biomass supply chains.

The use of sawmill residuals also provides an important market for low valued wood products and is viewed by many as a

means for the improvement of forest health, wildfire fuel reduction, and generation of economic incentives for small landowners to keep their land in forest land, well-managed and productive. Fiber sourced (indirectly) from primary solid wood manufacturing facilities are often in the form of residual chips, shavings, and sawdust. Research also demonstrates that forest lands and their inventories continue to grow as demand for wood fiber increases (Forest2Market, 2017). Currently, there is a surplus of lower-value wood in forest markets in the South.

Biomass producers, generally, do not own forest land and are therefore not directly responsible in harvesting or forest management activities. With changing markets, including the decline of the paper industry, the sourcing of feedstock as stumpage from landowners directly to producers is increasingly uncommon in the US South's forest product sector and is highly uncommon in biomass production because, high quality stemwood can be more profitably directed to lumber or packaging demands. Thus, many biomass producers are considered an indirect and secondary producer that can indirectly influence forest management but cannot control how forests are managed and how they are harvested. However, because of the demand for sawmill residuals, biomass producers influence harvesting and sourcing practices through their procurement policies, supply contracts, and periodic monitoring of suppliers.

In the US, forestry-related businesses support more than 1 million direct jobs and over \$55.4 billion in direct payroll (Forest2Market, 2019). The combination of direct, indirect, and induced impacts from forestry-related businesses (i.e., total employment and total payroll) is 2.9 million jobs and \$128.1 billion in payroll in the US (Forest2Market, 2019). About 45% of these jobs are in the US South. The GDP associated with forest product manufacturing industries totals nearly \$107.5 billion and represents 5.7% of total manufacturing GDP in the US (Forest2Market, 2019). As part of this sector, the wood energy export industry supports approximately 5,000 jobs throughout the supply chain and more than \$2 billion has been invested in the US Southeast over the last decade to support manufacturing jobs and infrastructure (USIPA, 2024).

Status of Forest Certification in RRA region

Forest management certification is an important aspect of US forestry. However, the extent of forest management certification is limited within the US and the geographic scope of the RRA, specifically. Of the almost 800 million acres of US forests, fewer than 10% are certified and, of those, the majority are industrial private forest lands certified in large part to the SFI standard, which is the only standard in the US that continues to grow over time (Figure 2-13). This forest certification, while an important consideration in feedstock sourcing, cannot be considered in evaluation for the majority of forests or feedstock received by biomass producers. This is particularly true for family landowners, of which only 1% are certified, generally to the American Tree Farm System (ATFS).

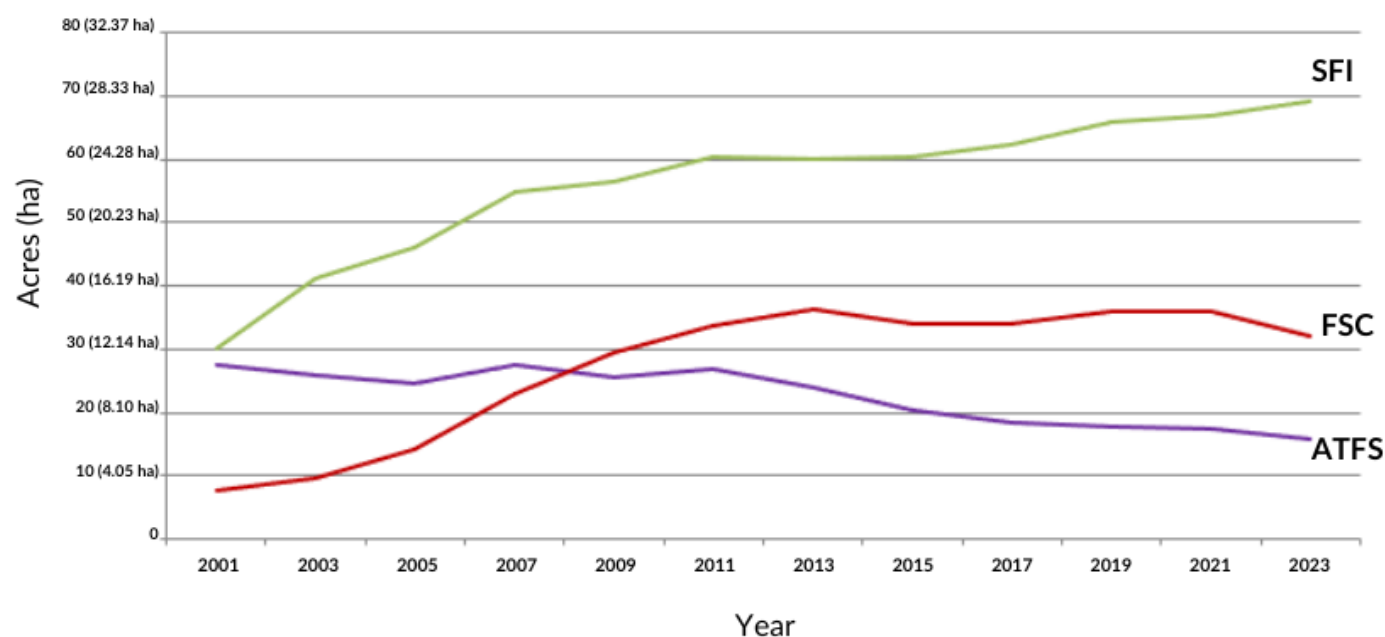


Figure 2-13: Certified Forest area in Millions of Acres by Forest Management Standard (SFI, 2024).

The Influence of Fiber Sourcing Certifications

Forest management certification is limited. However, wood/fiber sourcing standards do apply and widely influence feedstock sourcing. Specifically, SFI Fiber Sourcing certification is widely maintained by US biomass producers for their primary sourcing and is similarly maintained by a wide spectrum of their suppliers of residual materials (processing residues), especially the larger sized lumber companies (Metnick, 2024). Consultation with pellet producers confirms, with a high degree of confidence, that SFI Fiber Sourcing influences perhaps as much as 100% of their feedstock, inclusive of primary, secondary, and tertiary supplies (Cheynet, 2024; Cook, 2024; Grant, 2024; Kincaid, 2024; Palmer, 2024). Given this, while producers cannot account for biomass from every source, it can be assumed as noted throughout the RRA's analysis, that SFI Fiber Sourcing is greatly influencing forest sourcing practices for most feedstocks utilized by biomass producers.

The number of SFI mills by State (Figure 2-14) roughly corresponds to the number of mills in a geographic area generally and reflects the extent of the industry infrastructure in each State. Figure 2-15 illustrates the density of mills in the core production areas of the Deep South and Gulf Coasts and the extent of influence on the landscape.

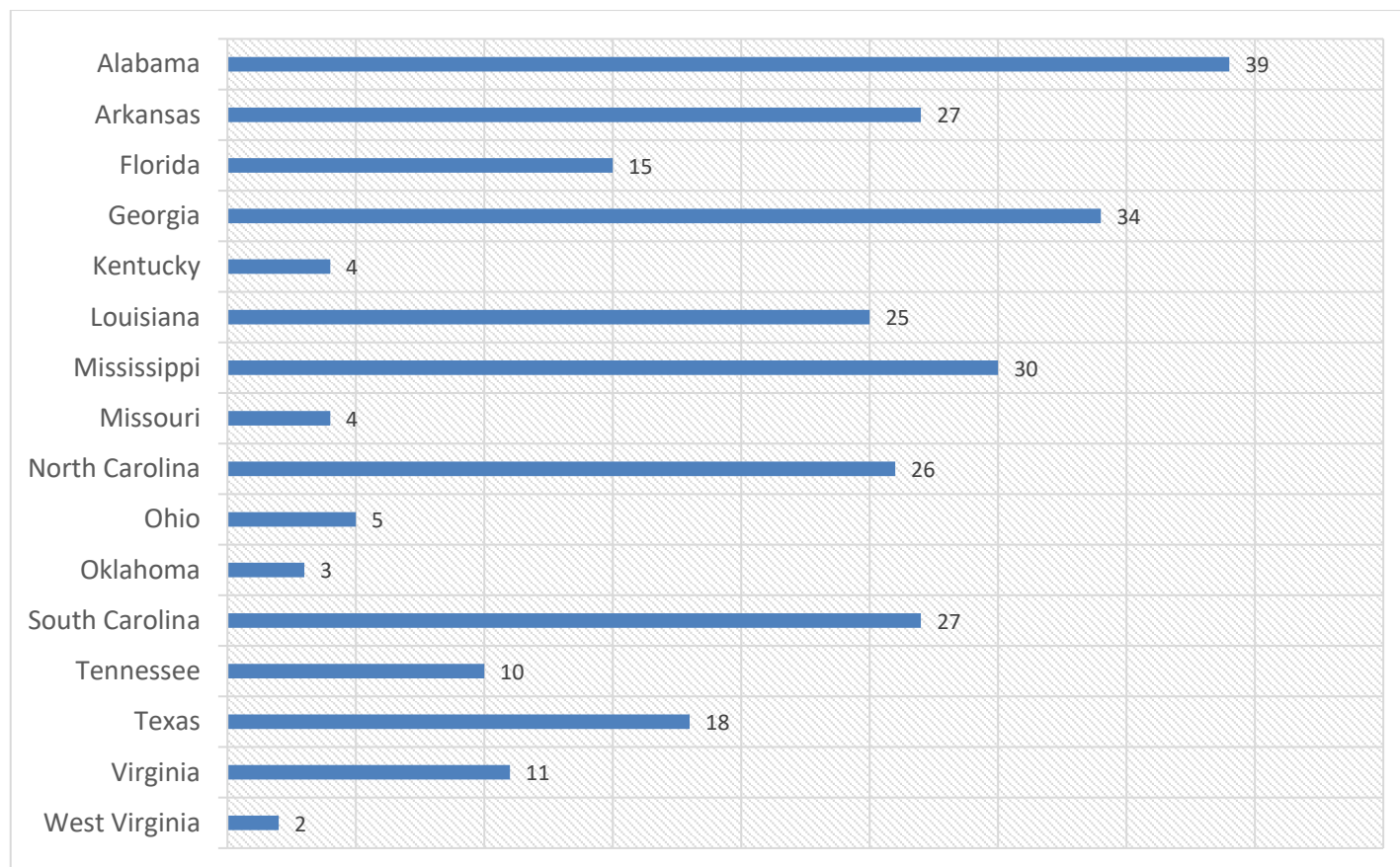


Figure 2-14: *SFI Fiber Sourcing Certified Mills Certified by State (SFI, 2024).*

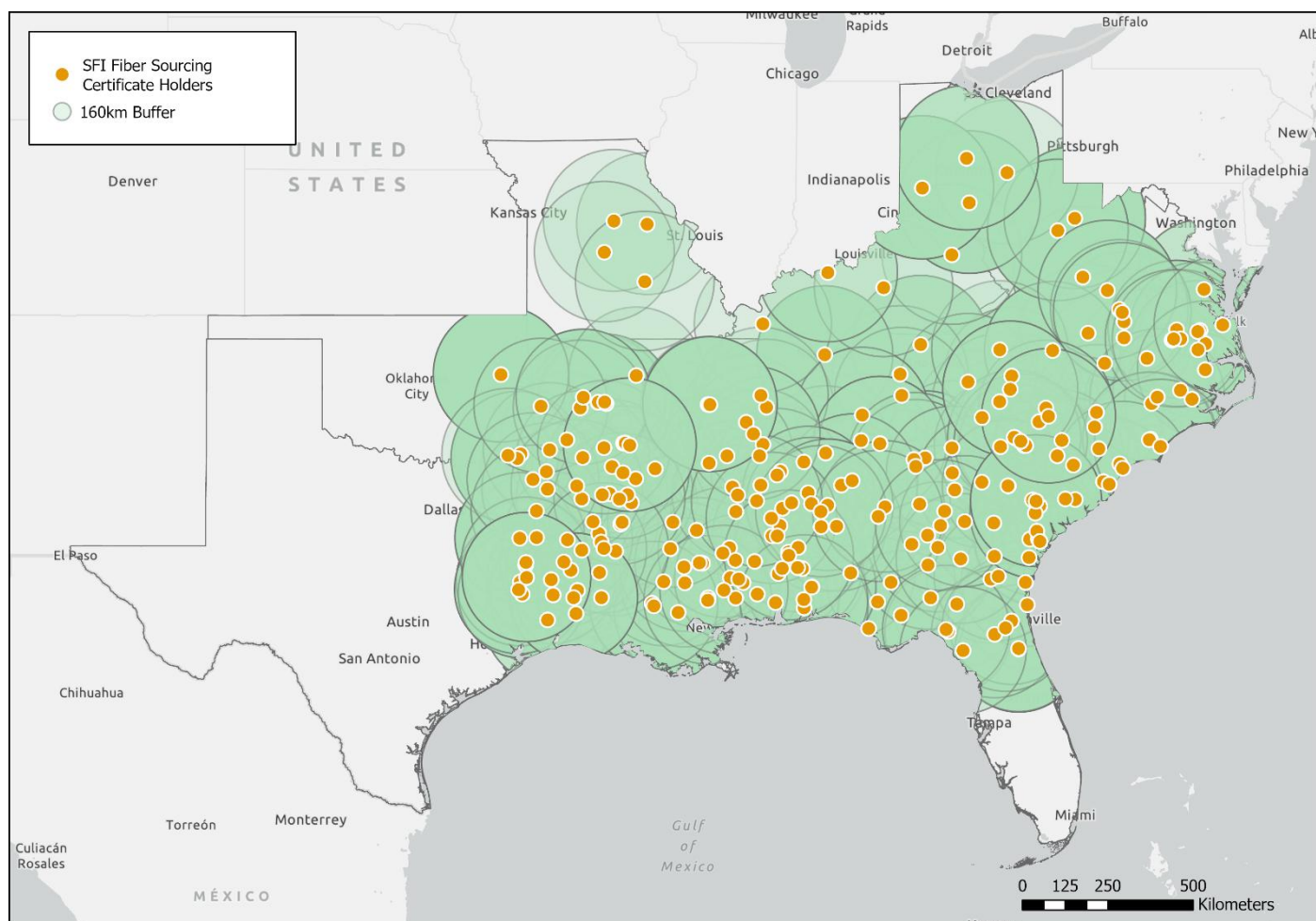


Figure 2-15: Geographic locations of SFI Fiber Sourcing Certified Mills (SFI, 2024) with 100-mile/160KM Theoretical Sourcing Radii.

Additionally, the SFI Fiber Sourcing program has been recognized as influencing standard forest sourcing and harvesting practices, beyond those that hold SFI Fiber Sourcing certificates to elevate the use of BMPs (Dwivedi et al., 2019). Additionally, because this fiber sourcing standard requires the use of trained loggers and broader promotion of logger training, education amongst those directly involved in harvesting operations, generally, is quite high.

SFI Fiber Sourcing includes a diverse set of requirements, including application of BMPs, logger training, safety, promotion of biodiversity conservation, and other community-rooted provisions. Additionally, the system requires a due diligence system (DDS), ensuring that information is gathered to assess and then avoid controversial feedstock sources including wood associated with forest land conversion, violations of human workers and Indigenous Peoples' rights, adverse impacts to biodiversity, GMO use, and other risks. SFI Fiber Sourcing is required for SFI Change of Custody (CoC) certified organizations sourcing feedstocks in the US and Canada and widely used as a standalone certification.

With more limited application, FSC Controlled Wood is also used primarily by larger organizations that have FSC Chain of Custody (CoC) systems for sourcing and mixing certified wood with uncertified wood. The FSC Controlled Wood system seeks to avoid what FSC has identified as five unacceptable sources, "wood associated with: illegality, GMOs, violations of human or workers' rights, land conversion, or where High Conservation Values (HCV) are threatened." FSC has established a national risk assessment (NRA) for the US, including this NRA geography, which provides a reference framework for risk assignments and mitigation in situations of specified risk. Specifically, the FSC NRA provides a widely accepted account of baseline conditions of risk in the US, without any certifications (including FSC Controlled Wood) or specific mitigating interventions. As such, the results of the FSC US NRA are widely included and considered in this RRA's analysis.

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3 Methodology

This RRA's development was undertaken in accordance with the SBP RRA Procedure (v1.2, May 2021) and SBP Standard 1: Feedstock Compliance (v2) (10/05/2023) and related guidance (10 May 2023).

An evaluation method was identified for each indicator. Recognizing the complexity of many sustainability elements addressed in the SBP requirements and the multiple variables that influence performance, where feasible, both original quantitative and qualitative analyses were utilized. For each indicator, at least two analytical methods were mobilized, including analysis of any applicable laws and qualitative analysis, to yield the most robust conclusions.

Data Selection

Recognizing the diversity of datasets used in the development of an RRA, the following criteria were developed to support data selection to be used in analysis for each indicator. Each data set was evaluated by these criteria. However, these criteria also recognize the tradeoffs necessary for the development of complex analyses and approaches for broad geographical areas and across diverse indicators. As such, some data sources essential to the RRA may not meet all these criteria but are the best available information and the most relevant, given cost constraints or resolution needs. Evaluation criteria were:

- Existing studies with precedence
- Relevance to the sustainability requirement
- Date of data collection or the latest update
- Credibility and independence of the source
- The scale of availability relative to requirements
- Coverage, relative to the region of interest
- Confidentiality limitations
- Licensing or permission or limitations to use
- Cost

3.1 Data collection

Data was identified, evaluated, and selected, using the criteria outlined above, relevant to each specific indicator. The Guidance for Standard 1 was also used to guide selection. To leverage existing precedence in the Southeast region, several key datasets, programs, and resources were mobilized in the development of this RRA.

Existing Company Risk Assessments

Notably, the publicly available Company Risk Assessments developed by biomass producers greatly reduced the need for an initial search and identification of information sources. While developed to SBP v1, these resources still offer substantial information for the development of the analysis of indicators that carry over to v2. The Company Risk Assessments provide a valuable baseline for assessing risk throughout the RRA's geography.

FSC US Controlled Wood National Risk Assessment (NRA)

The FSC US Controlled Wood National Risk Assessment (NRA) was finalized in 2019 and is widely used by the forest products sector, including biomass producers in the Southeast region. This includes collaboratively developed, widely accepted, and extensively used risk specifications for HCVs and control/mitigation measures. While the SBP requirements and the FSC Controlled Wood nexus do not fully align, the FSC US NRA nexus serves as a foundation and reference for information sources and mitigation approaches. Specifically, the FSC US NRA provides a widely accepted account of baseline conditions of risk in the US, without any certifications (including FSC Controlled Wood) or specific mitigating interventions. As such, the results of the FSC US NRA are widely included and considered in this RRA's analysis. Similarly, other forest certification programs, including and especially SFI Fiber Sourcing, may also be leveraged as key resources, reference points, and approaches.

American Forest Foundation SDE+ Risk Based Approach

In 2021, the American Forest Foundation (AFF) developed a risk-based approach (RBA) to meet the Dutch SDE+

requirements for Category 2 feedstocks originating in Georgia, Alabama, and Florida. This RBA addresses many similar elements to those in the SBP v2 requirements for small private lands specifically and is an excellent reference resource for analysis and risk ratings.

American Hardwood Export Council Risk Studies

In 2017, the American Hardwood Export Council (AHEC) updated their US Hardwoods: Assessment of Lawful Sourcing and Sustainability. This report remains a resource for risk assessments conducted in the US. Currently, AHEC is developing another assessment of 33 states relative to sourcing and legality.

US Forest Service Forest Inventory & Analysis

The US Forest Service's (USFS) Forest Inventory & Analysis (FIA) dataset is a principal source of data for the development of this RRA. Policymakers and land managers depend upon FIA data because no other data set offers the level of comprehensiveness, both geographically and historically.

The USFS continuously updates a comprehensive inventory and relevant analyses of current and prospective conditions of forests and rangelands of the US. The program collects data and reports on status and trends, locations, species, size, health of trees, total tree growth, mortality, removals by harvest by wood production and utilization rates by various products, and forest landownership. This information helps researchers, policymakers, landowners, and natural resource professionals better understand current forest conditions and identify and track significant changes. FIA is the only program that provides consistent and credible data for all forest lands (public and private). In administering the program, the USFS partners with State agencies and private contractors.

Sampling and data collection vary between states as some states choose to increase sample intensity by installing additional plots, and each field unit develops staffing plans at the local level. However, all field data collectors receive standardized training and must pass a certification test before collecting data. A minimum number of plots must be measured to achieve the area's required standard errors and volume estimates consistent with historical levels.

Inventory data is collected on a grid of permanent plots. The FIA program uses hexagons of equal area to establish monitoring plots systematically across the landscape and regularly spaced in time. Each hexagon contains 5,937.2 acres. Selecting one plot for each hexagon brings the sampling intensity close to the one field plot per 6,000 acres estimated to meet mandated national sampling precision. A variety of grids and methods are employed by FIA to locate field plots within the hexagon. Inventory crews use rigorous procedures to take measurements on each plot that include species, size, condition of trees, and evidence of harvesting, insects, diseases, fire, or other impacts.

The FIA program includes several levels of analysis: annual reports, periodic reports by state, periodic national reports, and issue-driven "special studies" using FIA data (which are generally funded externally by interested partners). Every five years, a complete State analytical report is produced. Each State report includes:

- Current status of the forest is based on the last five years of data,
- Trends in forest status and condition over the preceding 20 years, with emphasis on comparing the most recent data with data from the previous period,
- Timber product output data,
- Analysis and discussion of the probable forces causing the observed conditions, and
- Projections of the likely trends in key resource attributes over the next 20 years, under various scenarios.

FIA also prepares a National Summary report every five years, which includes the same elements described above but at regional and national scales.

FIA maintains a rigorous quality assurance program, including documentation of methods, training for data collectors, checks of data quality (including in-field for quality control during field operations), and peer review of analysis products. Quality assessments use statistical tools to verify that uncertainty associated with collected data is minimized and that the data are of sufficient quality to support programmatic decisions. Continuous improvement in the FIA program is assured by a variety of internal feedback procedures. FIA data serves as a baseline in the US for scientific investigations in various areas that involve or undertake research on forest ecosystems.

More detailed information on the Forest Inventory and Analysis program is available in USFS fact sheets (<https://research.fs.usda.gov/products/dataandtools/tools/forest-inventory-and-analysis-one-click-state-factsheets>). More information on the USFS Quality Assurance (QA) program is available at https://www.fs.usda.gov/nrs/pubs/gtr/gtr_nrs210.pdf.

3.2 Selection of indicators to be updated

This is the first RRA for US regions of biomass sourcing. All indicators were analyzed for the first time.

3.3 Risk classification

To inform the development of a draft for public consultation, stakeholders and experts were engaged in the listening period at the initiation of the RRA's development. Modes of stakeholder and expert input included an online listening session, an online survey, and expert interviews, by topical area.

In accordance with the RRA Procedure (v1.2, May 2021) and SBP Standard 1: Feedstock Compliance (v2) (10/05/2023) and related guidance (10 May 2023), the risk of noncomplying feedstock was evaluated for each indicator individually. An evaluation method was identified for each indicator. Recognizing the complexity of many sustainability elements addressed in the SBP requirements and multiple variables that influence performance, where feasible, both original quantitative and qualitative analyses were utilized. For each Indicator, at least two analytical methods were mobilized, including analysis of any applicable laws and qualitative analysis, to yield the most robust conclusions related to risk.

Risk ratings are expressed as "low risk" or "specified risk" based on the analyses conducted and indicators set out in Standard 1. For each of the indicators, a rationale for risk designation is provided, drawing on the analyses conducted.

Analyses were conducted by qualified professionals with relevant experience and expertise to ensure the RRA's credibility overall. Additionally, an internal peer review was conducted of all analysis and risk assignments. A listing of qualifications of the persons involved in performing the risk assessment (found in Appendix A) demonstrates they are qualified (through training and experience) to perform risk analyses tailored to the complexity of the processes and information being assessed and the country or region under assessment. The peer review by experts provided additional assurance as to the quality of the risk assessment.

For indicators for which risk is specified, mitigating measures are defined.

4 Stakeholder Consultation

Consultation with stakeholders and experts is a required and essential source of information for developing a robust and credible RRA. Stakeholder consultation undertaken with the development of this RRA conforms to the requirements set out in SBP Regional Risk Assessment Procedure (v1.2, May 2021). Recognizing this is the first RRA crafted for the specific context of biomass sourcing in the US, an additional stakeholder listening period was implemented at the initiation of development of this draft RRA, from July 2, 2024, through August 2, 2024. The purpose of this listening period was to ensure that any concerns or potentially important issues were identified early in the process and appropriately considered in the development of draft risk analysis and mitigation or control measures.

Stakeholder Identification

To identify potentially affected stakeholders, New March conducted an analysis of sectors, organizations, and individuals that have a sincere interest in biomass production and/or may be affected by the results of the RRA. Using this process and the stakeholder groups specified in the SBP Regional Risk Assessment Procedure (v1.2, May 2021), the following stakeholder groups were identified:

- Economic interests
- Social interests
- Environmental interests
- Certification bodies and certificate holders
- National and State forest agencies
- Experts in controlled wood, certification or relevant feedstock categories
- Forestry certification schemes
- Research institutions and universities
- Indigenous Peoples

Within these categories, additional categories were identified, including large and small/family landowners, nongovernmental organizations, local communities, forest workers and contractors, labour organizations, biomass producers, other forest product sector businesses, and others. Recognizing that some stakeholders may be best reached through their affiliations, key organizations (i.e., professional societies, associations, and membership groups) were identified as conduits to further distribute requests for input and feedback.

There are 57 Federally Recognized Tribes present in the geography of the RRA (Bureau of Indian Affairs, 2024). Representatives of each Tribe, along with the Bureau of Indian Affairs (BIA) offices for the affected regions, were identified for engagement in the consultation process. It is important to note that additional groups or individuals located outside of the RRA's geography may perceive the importance of forests and forest-related activities within the region. Information about the RRA's development was made available to the public through information posted online by the Working Body website. The stakeholder list is summarized in Annex 3.

Proactive Stakeholder Notification + Solicitation of Input

Drawing on the stakeholder groups identified in the process outlined above, contact lists of individuals or organizations representing stakeholder groups were developed. Stakeholders received an email notification that included the following elements (the information was also made publicly available at the [Working Body website](#)):

- A brief description of the SBP certification system, including direct reference of alignment with SBP Standard 1, v2 (10/05/2023).
- A brief description of the RRA purpose, scope of the risk assessment, objective of the stakeholder listening period, and a request for input.
- Start and end dates of the public stakeholder listening period.
- Contact details of New March, as the Working Body developing the RRA
- An estimated timeline for the completion of the proposed RRA.
- A statement that the RRA process is aligned with this SBP RRA Procedure (v1.2, May 2021)

Stakeholder Listening Period

A 30-day stakeholder listening period was conducted from July 2, 2024, through August 2, 2024, with the purpose of gathering input about focal issues, potential areas of perceived risk, and approaches to mitigation. To ensure greater access and multiple modes of engagement, during this listening period, input was solicited in writing via a web-based survey and through an open public forum webinar. Comments and input received during this consultation were considered in the development of the draft risk assessment and mitigation for areas of specified risk. Additionally, experts and stakeholders continued to be consulted through direct written and verbal contact on specific topics, as the RRA was developed, even after the close of the listening period.

Stakeholder Consultation Period

The 30-day Stakeholder Consultation Period was held from November 2, 2024 to December 3, 2024. Stakeholders were individually notified utilizing the identified list and notification process described above. During this time, an in-person listening session was held (November 3, 2024) and two online webinars were hosted. A total of 13 people participated in the in-person session, and 12 people registered for the online webinars. A total of nine stakeholder written comments were received through the online comment platform and four stakeholders requested confidentiality. Each stakeholder comment, whether provided in writing or verbally in a listening session, was considered in the refinement of the RRA. Elements of consideration included relevance of the comment to the scope of the RRA's development, consistency with the SBP requirements, definitions, and guidance; the interaction and alignment of different stakeholder perspectives and other factors. The written stakeholder comments that were made available for public review (as elected as nonconfidential by the commenter) and the specific response to each comment are in Annex 4.

Responses to all comments, whether of confidential or not, were provided back to individual commenters.

Sources

Bureau of Indian Affairs (BIA). 2024. Tribal Leadership Directory. <https://biamaps.geoplatform.gov/Tribal-Leaders-Directory/>

Public consultation by SBP

A 30-day public consultation was implemented by SBP beginning in November 2024 and ending in December 2024. The working body analysed all the information gathered during the consultation and documented it in the stakeholder consultation report. Modifications to the draft RRA report were completed as appropriate in response to relevant stakeholder feedback.

5 Conclusions

Based on the rigorous analysis carried out for each of the indicators presented in Annex 1, it can be concluded that private forests within the primary regions of biomass sourcing regions of the US (encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia) generally represent a low risk source of wood-based feedstock for biomass production.

Of the total of 42 SBP Standard 1 v2 indicators, 38 are found to be in a low-risk class and the remaining four to be in a specified risk class. Indicators of specified risk include: 2.1.3, 2.2.1, 2.2.2 and 3.1.1 as noted in Table 5.1 below.

Indicator	Conclusions
	Assigned Risk Class
1.1.1	Low risk
1.1.2	Low risk
1.1.3	Low risk
1.1.4	Low risk
1.1.5	Low risk
2.1.1	Low risk
2.1.2	Low risk
2.1.3	Specified risk
2.2.1	Specified risk (forests only)
2.2.2	Specified risk
2.2.3	Low risk
2.2.4	Low risk
2.2.5	Low risk
2.2.6	Low risk
2.2.7	Low risk
2.2.8	Low risk
2.2.9	Low risk
2.2.10	Low risk
2.2.11	Low risk
2.2.12	Low risk
3.1.1	Specified risk*
3.2.1	Low risk
3.2.2	Low risk
3.2.3	Low risk
3.3.1	Low risk
4.1.1	Low risk
4.1.2	Low risk
4.1.3	Low risk
4.1.4	Low risk
4.1.5	Low risk
4.1.6	Low risk
4.1.7	Low risk
4.1.8	Low risk
4.1.9	Low risk
4.1.10	Low risk
4.2.1	Low risk
4.2.2	Low risk
4.2.3	Low risk
4.2.4	Low risk
4.2.5	Low risk
4.2.6	Low risk
4.2.7	Low risk

Table 5-1. *Assigned risk conclusions by Indicator.*

* Low risk until January 26, 2026, Route A; Specified risk beginning on January 27, 2026, Route C

Annex 1: Detailed findings for Supply Base Evaluation

Principle 1 – Feedstock is legally sourced

Criterion 1.1 – Operators and operations are legal

1.1.1	Operations related to feedstock sourcing and biomass production shall comply with all existing applicable laws and regulations.
Findings	Scale of assessment This RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships or management groups such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages were thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. Legal frameworks are underpinned by an extensive nexus of overarching Federal laws providing a baseline for administrative and regulatory oversight in the US. Federal law in the US is created at the national level and consistently applied and enforced throughout the nation. The US Constitution is the supreme law of the US. Federal laws are expressed in statutes passed by the US Congress or as regulations issued by administrative Federal agencies, which have the same force and effect as legislation passed by Congress. Statutes are laws created by Congress and the President. Regulations are laws created by administrative agencies. Both are laws and there is no difference between them regarding their effect on the public. The only real difference is how they are created and amended or repealed. Federal court decisions also have the full effect of law. Federal regulations are documented in the US Code of Federal Regulations (CFR). The CFR is a codification (arrangement of) the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal government. States are a primary jurisdictional subdivision within the US, each with their own governments. Under the US federalism-based system, states share sovereignty with the US Federal government and have authority to regulate within their jurisdictions. The governance structures of states follow a framework which closely parallels the structure of the US Federal government. State laws are codified through processes like that of the Federal government. US citizens, residents, all people within the US, and corporations and other legal entities operating in the US are subject to both State and Federal laws. The US Constitution’s Supremacy Clause requires that when a State law directly conflicts with Federal law, the Federal law prevails (Congress.gov, 2024). Thus, there is clarity about applicable laws and an official record of all laws at the Federal and State level.

Annex 1: Detailed findings for Supply Base Evaluation

There are a wide array of Federal and State laws that address forest sourcing and biomass production. These apply to environmental protections, conservation of biodiversity, rights of workers, rights of Indigenous Peoples, payment of taxes, and other important dimensions of sustainable forest sourcing and biomass production. These issues, and laws relevant to them, are addressed specifically in other indicators analyzed in this RRA.

Regarding the legality of sourcing and sale of wood products specifically, the US Lacey Act, established in 1900 and most recently amended in 2008, addresses materials imported to the US and the labeling of foreign shipments of wood. The Lacey Act Amendments of 2008 specifically prohibits commercial transactions involving plant material (including wood products) that have been sourced in violation of foreign or US laws and either imported or transported across State lines (APHIS, 2024). The Act applies to possession of any plant taken, possessed, transported, or sold in violation of any State or foreign law, including laws addressing the (1) theft of plants; (2) taking of plants from a park, forest reserve, or other officially protected area; (3) taking of plants from an officially designated area; (4) taking of plants without, or contrary to, required authorization the payment of royalties, taxes, or stumpage fees; and (5) export or transshipment of plants. As such, the Lacey Act provides foundational Federal infrastructure for assuring the legality of forest products and related materials sourced in the US (or foreign countries).

States also maintain laws to address timber theft, and State agencies commonly have primary responsibility for investigation and enforcement of timber theft laws. Purchasers of forest products are commonly required to maintain written records of purchases, including information about the seller, location, and volume of wood purchased. Counties and Parishes (jurisdictional subsets of States) may also create local regulations requiring additional notification, planning, or permitting processes prior to harvest. State laws can require all purchasers of forest products to issue load tickets and receipts to haulers and material owners.

While timber theft is a potential threat, a study commissioned by American Hardwood Export Council (AHEC), updated in 2019, found that timber theft typically involved a small number of trees and was often linked to poorly marked property boundaries. The study indicated that theft or trespass incidents were relatively rare, accounting for less than 1% of total timber production in the region. The report found, “the preponderance of evidence compiled for this update strongly indicates that there is a very low or ‘negligible’ risk that US hardwood exports contain wood from illegal and unsustainable sources, based upon programs and requirements currently in place” (Seneca Creek Associates, 2019). While timber theft does occur, it represents a minor issue within the broader context of harvesting operations in the US and there are government agencies and enforcement bodies available to handle such violations. Generally, timber theft in the US, while sometimes highly impactful for the involved parties, involves a very small volume of timber relative to the total supply (AHEC, 2017). While timber theft detection is rare, according to experts consulted, findings at a national level can be reasonably applied to the US broadly (Kazee, 2022).

The Forest Stewardship Council US National Risk Assessment (FSC US NRA) included a comprehensive evaluation of risk for illegally harvested wood entering FSC controlled wood supply chains within the conterminous US. The FSC US NRA’s robust evaluation included multiple rounds of stakeholder engagement and expert consultation. This assessment included rigorous analysis and review of 21 indicators including legal authority and evaluation of mechanisms at the State level. The FSC US NRA determined Low Risk for all dimensions of illegality related to Controlled Wood Category 1: Illegally harvested wood. It also made a Low Risk determination for Indicators related to illegal harvest and trespass including associated issues such as harvesting permits, upholding laws addressing timber ownership, right to harvest, and rights to recourse when theft occurs. FSC US NRA conclusions are widely recognized as credible and have been universally adopted for use in evaluations of risk in the US forestry community.

Non-governmental programs contribute to a legal and institutional framework that places a high importance on sustainable forestry and helps to ensure the legality of US feedstocks. This is reflected in the \$478 million-dollar Federal funding from USDA for initiatives such as the Forest Legacy Program, Wood

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Innovations Grant, and Community Wildlife Defense Grants (NASF, 2024). This level of investment validates the US's commitment to forest markets, mitigating wildfire risks, and conservation.

As noted in the Introduction, certification to forest management schemes is limited in the US. However, certification to forest sourcing standards, including SFI Fiber Sourcing, is widely implemented by the forest sector for the primary sourcing in the privately owned forests which provide the majority of feedstock into supply chains, and which also make up residual material (secondary and tertiary) feedstocks (Metnick, 2024). These programs and SFI Fiber Sourcing specifically include requirements related to avoiding illegality in wood fiber sourcing (Section 1.4.(7) Legal Compliance, 1.5 Objective 4. Legal and Regulatory Compliance) as well as specific monitoring to identify and report inconsistent practices (SFI, 2022).

Enforcement and monitoring

There are a range of formal, legal mechanisms, along with cultural expectations and business practices, which drive performance related to the compliance with and enforcement of laws in the US. There are a range of enforcement mechanisms for applicable laws including through the application of monetary fines and penalties, as well as civil and criminal programs and pathways overseen by the US Department of Justice at the Federal level, as well as State judicial systems. Global indices consistently evaluate and highly rank the US's performance related to rule of law, control of corruption, and related indicators. The World Bank maintains Worldwide Governance Indicators (WGIs), also known as the Kaufmann-Kray Model, to provide rankings related to: (1) the process by which governments are selected, monitored and replaced; (2) the capacity of the government to effectively formulate and implement sound policies; and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them. The US consistently performs very well on the important indices relative to legality, governance, and corruption. In the most recent report (2022), the US scored 86.79% for Government Effectiveness, 88.68% for Rule of Law, and 82.55% for Control of Corruption (World Bank, 2022). Similarly, Transparency International's most recent rankings (2023) put the US in the 87th percentile (24 out of 180 countries) in their Corruption Perceptions Index (CPI) (Transparency International, 2024). On this basis, there is a high degree of confidence that any laws or regulations cited within this RRA are strictly enforced.

More specifically, the US has a robust system for enforcement and monitoring of the applicable laws for feedstock sourcing and biomass production. There are approximately 1,453 State government agencies involved in implementing policies and programs that influence the condition of non-Federal forests. Five hundred forty of these engage in regulating forestry practices on non-Federal forest (NASF, 2024).

The Lacey Act is multitiered in terms of requirements as well as the severity of penalties for violations, ranging up to five years in prison and fines of up to \$500,000 USD (USDA, 2024). The Act has a well-established history of successful enforcement, and the more than 100 years of case law tied to the Act is readily available (World Resources Institute, 2024).

State agencies play a primary role in enforcing state-specific regulations on private lands, including laws related to forest management and environmental protection. The following State authorities are responsible for forest-specific enforcement within the RRA geography: Alabama Forestry Commission, Arkansas Forestry Commission, Florida Division of Forestry, Georgia Forestry Commission, Kentucky Division of Forestry, Louisiana Department of Agriculture and Forestry – Office of Forestry, Mississippi Forestry Commission, Missouri Department of Conservation, North Carolina Division of Forest Resources, Ohio Department of Natural Resources – Forestry, Oklahoma Forestry Services, South Carolina Forestry Commission, Tennessee Division of Forestry, Texas Forest Service, Virginia Department of Forestry, and West Virginia Division of Forestry. State agencies have primary responsibility for enforcing State laws on private lands. This includes

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	forest management practices and environmental protection. Incidences of timber theft arrest, fines, prosecutions, or sentencing are not common in the sourcing region, but the existing occurrences are evidence of an effective enforcement system. Contract disputes involving timber sales, when they occur, are frequently resolved by the parties or can be litigated as a civil matter, through Federal or State courts. The outcome of Federal laws, State laws, and enforcement and monitoring mechanisms working together, is that operations comply with all existing applicable laws and regulations when sourcing feedstock from private and public lands. Risk conclusion and justification Given well-established laws pertaining to illegal harvesting and trade, the strong record of enforcement, conclusions of other, widely accepted analyses including the FSC US NRA, and direct feedback from stakeholders and experts, it is concluded that the risk class for Indicator 1.1.1. is low risk.
<i>Supply Base Verifiers</i>	• Worldwide Governance Indicators/Kaufmann-Kray model rankings for the US • Transparency International's Corruption Perceptions Index ranking • Court records of civil and criminal cases related to forestry violations • US Environmental Protection Agency records • US Fish and Wildlife Service records • State Environmental Agencies Documentation • US Department of Labor enforcement records • OSHA Compliance Records • Forest Stewardship Council US National Risk Assessment • Forest Stewardship Council Standards and Auditing processes • Sustainable Forestry Initiative Certification Records
<i>Evidence reviewed</i>	American Hardwood Export Council (AHEC). 2017. Assessment of Lawful Sourcing and Sustainability: US Hardwood Exports Key findings of the report.https://www.americanhardwood.org/en/environmental-profile/seneca-creek Congress.gov. 2024. Overview of Supremacy Clause. https://constitution.congress.gov/browse/essay/artVI-C2-1/ALDE_00013395/ Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous US of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Internal Revenue Service (IRS). 2022. IRS updates tax gap estimates, new data points the way toward enhancing taxpayer service, compliance efforts.

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https://www.irs.gov/newsroom/irs-updates-tax-gap-estimates-new-data-points-the-way-toward-enhancing-taxpayer-service-compliance-efforts Kazee, T. Director of Operations, Woodland Security Inc. August 2022. Personal Interview. Metnick, J. (Title: Senior Vice President, Customer Affairs) 2024. Personal Communication. National Association of State Foresters (NASF). 2024. Forest Action Plans. https://www.Stateforesters.org/forest-action-plans/#:~:text=Effectively%20prepare%20for%2C%20prevent%2C%20and,conserve%2C%20and%20enhance%20resource%20values National Association of State Foresters (NASF). 2024. USDA Forest Service Announces \$478 Million in Federal Funding for Forest Management. https://www.Stateforesters.org/newsroom/usda-forest-service-announces-478-million-in-Federal-funding-for-active-forest-management/ National Association of State Foresters (NASF). 2024. Timber Assurance. https://www.Stateforesters.org/timber-assurance/legality/governance-structure/ NEPCon. 2019. Timber Legality Risk Assessment United States Version 1.3. https://asfor.ro/wp-content/uploads/2020/01/NEPCon-TIMBER-USA-Risk-Assessment-EN-V1.3.pdf New March. 2024. RRA Input Survey. SurveyMonkey. North Carolina Department of Environmental Quality. 2024. Water Resources. https://www.deq.nc.gov/about/divisions/water-resources Seneca Creek Associates. 2019. Assessment of Lawful Sourcing and Sustainability: US Hardwood Exports, prepared for the American Hardwood Export Council. Southern Group of State Foresters. 2020. 2020 State Forest Action Plan Assessments, Southern Region. https://southernforests.org/wp-content/uploads/2024/04/Forest-AP-Summary-Final-2020.pdf Sustainable Forestry Initiative (SFI). 2022. SFI 2022 Fiber Sourcing Standard, Section 3. https://forests.org/wp-content/uploads/2022_SFI_StandardsandRules_section3.pdf Sustainable Forestry Initiative (SFI). 2024. SFI Forest Area Certificate Search. https://sfidatabase.org/search/search-forest-area Transparency International. Corruption Perception Index. 2023. https://www.transparency.org/en/cpi/2023 US Department of Agriculture (USDA). 2024. Violating the Lacey Act Declaration Requirement. Accessible: https://www.aphis.usda.gov/plant-imports/lacey-act/violation#:~:text=Any%20person%20who%20knowingly%20violates%20the%20declaration%20requirement%20or%20knowingly,forfeitures%20may%20also%20be%20imposed US Department of Labor (DoL). 2024. Data Enforcement. https://enforcedata.dol.gov/homePage.php US Department of Labor (DoL). 2024. Establishment Search. https://www.osha.gov/ords/imis/establishment.html US Environmental Protection Agency (EPA). 2023. Enforcement Data and Results. https://www.epa.gov/enforcement/enforcement-data-and-results US Fish & Wildlife Service (USFWS). 2024. Freedom of Information Act. https://www.fws.gov/program/fws-freedom-information-act-foia/foia-reading-room

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<i>Risk rating</i>	Low risk
1.1.2	Legal ownership of land and resource use rights shall be respected.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia, privately owned forests including smallholders (or family forest owners) and larger private landholdings, including industrial ownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages were thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. Private property rights are among the most beloved and fiercely protected American ethics, particularly within the US South, where the RRA is situated. Specifically, the Fifth Amendment to the US Constitution states that no person shall be deprived of property without due process of law (US Creator, 1789). This guarantees property owners the right to hold, control, use, and dispose of their land, and allow or exclude others from their land. From this basic tenet, flows an extensive and multitiered framework of laws and social practices that all reinforce respect for legal landownership and resource rights associated with it. To this end, the FSC US National Risk Assessment (FSC US NRA) established a determination of Low Risk for all legality indicators including respect for land tenure rights (FSC US, 2019). A study commissioned by the American Hardwood Export Council (AHEC) came to the same conclusion, finding low or negligible risk for illegality of sourcing, including violations of tenure rights (Seneca Creek, 2019). In the context of timber rights, land titles nearly universally include the right to harvest standing timber on private land. Land tenure and use rights are typically

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assigned and transferred through legal documents such as leases, contracts, easements, and deeds. These titles are recorded and maintained at States' county or parish level, which ensures public accessibility and transparency. Most jurisdictions allow electronic searches for land-related documents. An updated title search may be necessary to confirm there are no other deeds recorded against the property since the date of the deed in question. In rare instances where disagreements about landownership arise, the US and respective State legal systems provide means for resolution contributing to the low-risk assessment by FSC US NRA.

The US recognizes Native American Tribes as sovereign nations. The Federal government maintains a government-to-government relationship with the 574 Federally recognized Tribes including the 54 within the RRA's geography. The Federal government has signed more than 650 legally binding treaties that outline rights and responsibilities. Through these agreements, the Federal government is responsible for protecting Tribal treaty rights, lands, resources, and well-being of Tribal members. Federal agencies, such as the US Department of Interior's (DOI) Bureau of Indian Affairs (BIA), are required to consult with Tribes on decisions and activities that may affect Tribal interests, a requirement reinforced in 2022 by a Presidential Memorandum and Presidential Executive Order (EO 13175). The BIA is required to comply with Tribal laws governing Tribal forest lands, so long as they do not compromise the Federal government's trust responsibility to the Tribes. The US Indian Self-Determination Act allows Tribes to exercise autonomy over administering Federal programs designed for their benefit. The 1990 US National Indian Forest Resources Management Act (NIFRMA) requires Tribal forest lands to be managed in accordance with the US government's trust responsibility. These laws, practices, and policies are in place to respect the legal landownership and resource use rights of Tribal lands.

Lastly, there are common practices in commercial harvesting and transport of fiber that ensure timber volumes and appropriately tracked through the supply chain. The vetting of suppliers and establishment of supplier declarations is a standardized practice in the US South and, generally, in the US. General practices include the development of specific contracts for fiber purchase by commercial actors in the biomass supply chain. Contracts are linked to "trip tickets" for each load of fiber delivered and volumes can be tracked back to the forest of origin for roundwood. The chain of custody certification programs, along with fiber procurement systems, including FSC Controlled Wood and the prolific SFI Fiber Sourcing, reinforce and further normalize these practices (FSC, 2024; SFI, 2022).

Enforcement and monitoring

Property rights for private landowners are enforced by a network of local, state, and Federal institutions, as well as social norms. Titles are recorded and maintained at the county level which ensures public accessibility and transparency. As concluded in indicator 1.1.1, there is a robust system of institutions, business practices, and individual and special interest behaviors that provide assurance that all applicable law in US is followed and strictly enforced. These organizations and related activities provide avenues for dispute resolution and legal recourse, which ensures that any violations are addressed through legal channels.

For Tribal lands, the enforcement and monitoring of land resource use rights are supported specifically by Federal and State agencies, such as the BIA. The BIA is tasked with ensuring Tribal laws aligned with the Federal government's trust responsibility. The BIA is mandated to consult with Tribes when decisions affecting Tribal lands and resources occur. This process has further been strengthened by a Presidential Memorandum and Executive Order (EO 13175, 2022).

The NIFRMA requires annual reports on the status of Tribal lands to be submitted to Congress. This provides a structured approach to monitoring the management of these lands. The 650 treaties with Tribes each serve as a legally binding document outlining rights and responsibilities that the Federal agencies must uphold.

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	The described practices and enforcement measures, working together, provide sufficient assurance that legal landownership and resource use rights are respected when sourcing feedstocks from private and public lands. Forest certification chain of custody and procurement sourcing programs are annually audited, and audit reports are available. Risk conclusion and justification Given well-established laws pertaining to land use and resource rights, a strong track record of enforcement, the conclusions of other, widely accepted analyses including the FSC US NRA and the AHEC 2019 study, and direct feedback from stakeholders and experts, it is concluded that the risk class for Indicator 1.1.2. is low risk.
<i>Supply Base Verifiers</i>	• US Constitution • Worldwide Governance Indicators • Forest Stewardship Council US National Risk Assessment • Forest Stewardship Council Standards and Auditing processes • Seneca Creek Associates Risk Assessment • List of Federally Recognized Tribes • Executive Order • Memorandum on Uniform Standards for Tribal Consultation • Laws and Regulations regarding Tribes and Tribal Lands • Forest Stewardship Council US National Risk Assessment • Forest Stewardship Council Standards and Auditing processes • Sustainable Forestry Initiative Certification Records
<i>Evidence reviewed</i>	Bureau of Indian Affairs (BIA). 2024. Tribal Leadership Directory. https://biamaps.geoplatform.gov/Tribal-Leaders-Directory/ Congressional Research Services. 2024. The 574 Federally Recognized Indian Tribes in the United States https://crsreports.congress.gov/product/pdf/R/R47414 Exec. Order No. 13175, 65 Fed. Reg. 67249 (Nov. 9, 2000) Consultation and Coordination with Indian Tribal Governments. https://2009-2017.State.gov/documents/organization/136740.pdf Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Indian Self-Determination and Education Assistance Act of 1975. 25 U.S.C. §§ 5301 et seq. Washington, DC.

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<i>Risk rating</i>	Low risk
1.1.3	Feedstock shall be legally harvested, supplied and produced, including in compliance with CITES, EUTR, and other applicable legal trade requirements.
<i>Findings</i>	Scale of assessment The geographic scope of this RRA is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this indicator, stakeholders and experts were consulted, and qualitative analysis was conducted on relevant literature, including preexisting assessments evaluation of risks related to the legality of feedstock sourcing in the geography of this RRA. These preexisting resources, such as the Forest Stewardship Council US National Risk Assessment (FSC US NRA) and reports commissioned by the American Hardwood Export Council (AHEC) are widely accepted and have precedence in the forestry community in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The FSC US NRA determined there is low risk for illegally harvested wood, supporting the conclusion that feedstock is typically harvested, supplied, and produced in compliance with international trade regulations such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the European Union Timber Regulation (EUTR). The analysis included indicators related to land tenure and management rights (Indicator 1.1), Concession licenses

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	(1.2), Management and harvesting planning (1.3), Harvesting permits (1.4), Timber harvesting regulations (1.8), Protected sites and species (1.9), Environmental requirements (1.10), Classification of species, quantities, qualities (1.16), Trade and transport (1.17), Offshore trading and transfer pricing (1.18), Custom regulations (1.19), and CITES (1.20) (FSC, 2019). Similarly, a 2019 Seneca Creek study commissioned by AHEC found very low or negligible risk that hardwood exports from this region contain wood from illegal sources and specifically concluded low risk of noncompliance with a range of trade laws including EUTR, the Australia Illegal Logging Prohibition, Japan’s Goho program, and CITES (Seneca Creek, 2019). The US Forest Service and State forestry departments oversee sustainable forest management practices, while Track and Trace systems implemented by some companies provide additional transparency. Lastly, there are common practices in commercial harvesting and transport of fiber that ensure timber volumes and appropriately tracked through the supply chain. The vetting of suppliers and establishment of supplier declarations is a standardized practice in the US South and, generally, in the US. General practices include the development of specific contracts for fiber purchase by commercial actors in the biomass supply chain. Contracts are linked to “trip tickets” for each load of fiber delivered and volumes can be tracked back to the forest of origin for roundwood. The chain of custody certification programs, along with fiber procurement systems, including FSC Controlled Wood and the prolific SFI Fiber Sourcing, reinforce and further normalize these practices (FSC, 2024; SFI, 2022). Enforcement and monitoring As concluded in Indicator 1.1.1, there is a robust system of institutions, business practices, and individual special interest behaviors that provide assurances that any applicable US law is followed and strictly enforced. These institutions provide avenues for dispute resolution and legal recourse, which ensures that any violations are addressed through legal channels. The Lacey Act plays a central role in combating illegal trade of wildlife and plants, including timber. The Lacey Act has multitiered requirements as well as the severity of penalties for violations, ranging to five years in prison and fines up to \$500,000 USD (USDA, 2024). The Act has a well-established history of successful enforcement, and nearly 100 years of case law of the Act is readily available (World Resources Institute, 2024). Additionally, enforcement of CITES trade controls is administered in coordination by the US Customs and Border Protection (Customs), the Animal and Plant Health Inspection Service (APHIS), and the US Fish and Wildlife Service (USFWS). Violations of CITES, as expressed through violation of the Endangered Species Act (ESA), include criminal fines of up to \$50,000 USD and a year in prison, in addition to civil penalties of up to \$12,000 USD for each violation (USFWS, 2024). The outcome of Federal agencies, State forestry departments, and private landowners working together, ensures that feedstocks are legally harvested, supplied, and produced, in compliance with CITES, EUTR, and other applicable legal trade requirements from both private and public lands. Forest certification chain of custody and procurement sourcing programs are annually audited, and audit reports are available. Risk conclusion and justification Given well-established laws pertaining to legally harvested, supplied, and produced feedstock, a strong track record of enforcement, and conclusions of other, widely accepted analyses, along with direct feedback from stakeholders and experts, it is concluded that the risk class for Indicator 1.1.3. is low risk.
<i>Supply Base</i>	• Convention on International Trade in Endangered Species

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<i>Verifiers</i>	• Forest Stewardship Council US National Risk Assessment • Forest Stewardship Council Standards and Auditing processes • American Hardwood Export Council: Seneca Creek Study • State Best Management Practices • Federal Laws • State Forestry Laws
<i>Evidence reviewed</i>	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The CITES Appendices. https://cites.org/eng/app/index.php Enviva. 2021. Track & Trace- Sourcing Transparency. https://www.envivabiomass.com/sustainability/responsible-sourcing/track-trace/ Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Global Timber Tracing Network. 2022. Tracing the world's timber: the status of scientific verification technologies for species and origin identification. https://globaltimbertrackingnetwork.org/2022/08/11/tracing-the-worlds-timber-the-status-of-scientific-verification-technologies-for-species-and-origin-identification Groves, M., & Rutherford, C. 2023. CITES Timber-A Guide to CITES-listed Tree Species. https://cites.org/sites/default/files/timber_id_materials/files/CITES%20%20Timber%20-%20A%20guide%20to%20CITES-listed%20tree%20species%202023.pdf National Association of State Foresters (NASF). 2024. Timber Assurance. https://www.Stateforesters.org/timber-assurance/legality/governance-structure/ New March. 2024. RRA Input Survey. SurveyMonkey. Seneca Creek Associates. 2019. Assessment of Lawful Sourcing and Sustainability: US Hardwood Exports, prepared for the American Hardwood Export Council. State Forestry Laws. 2000. Defenders of Wildlife. https://defenders.org/sites/default/files/publications/State_forestry_laws.pdf The Lacey Act of 1900. 16 U.S.C. §§ 3371 et seq. Washington, DC. US Fish and Wildlife Service (FWS). 2024. Section 11. Penalties and Enforcement. Accessible: https://www.fws.gov/laws/endangered-species-act/section-11#:~:text=for%20each%20violation,-,Any%20person%20who%20knowingly%20violates%2C%20and%20any%20person%20engaged%20in,12%2C000%20for%20each%20such%20violation University of Tennessee, Knoxville. 2002. SP595 Timber Theft! How to avoid it and what to do if it happens, https://trace.tennessee.edu/cgi/viewcontent.cgi?article=1014&context=utk_agexfores

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<i>Risk rating</i>	Low risk
1.1.4	Payments for harvest rights and feedstock, including duties, relevant royalties and taxes related to timber harvesting shall be complete and up-to-date.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this indicator, stakeholders and experts were consulted, and qualitative analysis was conducted on relevant literature, alongside a review of existing literature and legal documentation related to the taxes and revenue of feedstock sourcing in the geography of this RRA. These preexisting resources, such as the Forest Stewardship Council US National Risk Assessment (FSC US NRA) and reports commissioned by the American Hardwood Export Council (AHEC), are widely accepted and have precedence in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The US has a hierarchy of Federal, State, and local laws concerning real and personal property, contracts, payment of fees and taxes, and protection of natural resources. These laws are implemented within biomass supply chains through training of loggers and foresters. Active enforcement of these laws exists within all levels of government. Federal taxation in the US is highly regulated through the US Internal Revenue Service (IRS) via the Internal Revenue code. Additionally, the Lacey Act includes a provision prohibiting the taking of plants without payment of royalties, taxes, or stumpage fees. There is no evidence of systematic avoidance of Federal taxes, and there are multitudes of instances of audits and investigations by the IRS to verify correct payment. State laws frequently require the use of trip tickets for timber transportation and mandate that receiving mills maintain detailed records of incoming loads. Scale tickets must contain specific information including the landowner or tract name, county where the harvest took place, logger's identity, and weight of the load. This documentation ensures proper accounting for tax purposes. Each State's Department of Revenue oversees the taxation of mills and timber transactions. There are variabilities in tax laws between States, but these laws typically follow a pattern of property, yield, and severance taxes. These taxes are collected either by local governments or State agencies for private lands. The structured tax system includes ad valorem property tax, flat property tax, yield tax, and severance tax, with States such as Alabama, Arkansas, Georgia, and Virginia applying different combinations of these taxes.

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The FSC US NRA made a low risk determination for indicators related to payment of taxes and fees in the US (FSC US, 2019). This includes indicators and assessments specifically for payment of royalties and harvesting fees (Indicator 1.5), value added taxes, and sales tax (Indicator 1.6), and income and profit taxes (Indicator 1.7), trade and transport (Indicator 1.17), and transfer pricing (Indicator 1.18). Similarly, a Seneca Creek study commissioned by AHEC noted that compliance with payment of taxes is high in the US and that data indicated that non-payment of tax liabilities in the US was an exceptional circumstance, contributing to a designation of low risk related to illegality in this respect (Seneca Creek, 2019). Enforcement and monitoring As concluded in Indicator 1.1.1, there is a robust system of institutions, business practices, and individual and special interest group behaviors that provide assurance that any applicable law in the US is followed and strictly enforced. These institutions provide avenues for dispute resolution and legal recourse, which ensures that any violations are addressed through legal channels. The US Lacey Act plays a central role in preventing commercial transactions that involve nonpayment of required taxes and royalties or other financial omissions. The Lacey Act has multitiered requirements as well as the severity of penalties for violations, ranging to five years in prison and fines of up to \$500,000 USD (USDA, 2024). The Act has a well-established history of successful enforcement, and nearly 100 years of case law of the Act is readily available (World Resources Institute, 2024). Local or State revenue agencies hold records for the land assessed, reported volumes of timber harvested, tax rates applied, and amount of taxes paid. The government offers timber tax incentives to stimulate forest investment and wood and fiber production. Third-party audits for forest certification, including the prolific SFI Fiber Sourcing procurement standard, require review of compliance with payment of all fees and taxes. Audit reports for the region confirm conformance with these requirements. Landowners in the US may be subject to a current use tax and a forest products severance tax upon harvesting timber. Manufacturers may be subject to a Forest Products Manufacturers Tax. Information regarding taxes for forest landowners is readily and publicly available for each State. The US Forest Service (USFS) and National Woodland Owners Association maintain a database for state timber and forest landowner taxes with detailed information for the latter (USDA Forest Service & National Woodland Owners Association, 2024). The IRS emphasizes the importance of keeping accurate and complete records of all forest-related income and expenses. Documentation is essential for proper tax reporting and in case of an audit. During an audit, the IRS may request documentation of timber sales, expenses, and other forest management activities. Forest management documents and plans may be reviewed by IRS auditors to verify the revenue and legitimacy of tax deductions. The IRS has collaborated with the USDA Forest Service and University Extension programs throughout the country to provide tax information outreach and an array of publications like the "Forest Landowners' Guide to the Federal Income Tax" to help landowners better understand and adhere to tax requirements (Boby, 2024; VanderSchaaf, 2024). The outcome of Federal agencies, State departments of revenue, and private landowners working together, is that comprehensive documentation and practices ensure that payments for harvest rights and feedstocks, including duties, relevant royalties, and taxes related to timber harvesting are complete and up to date when sourcing feedstocks from private and public lands. Risk conclusion and justification

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	Given well-established laws pertaining to payments for harvest rights and feedstock, strong track records of enforcement, and conclusions of other, widely accepted analyses, along with direct feedback from stakeholders and experts, it is concluded that the risk class for Indicator 1.1.4. is low risk .
<i>Supply Base Verifiers</i>	• FSC US NRA • Federal, State, and County Laws • Transparency International • World Bank Worldwide Governance Indicators • Seneca Creek • Forest certification audit reporting
<i>Evidence reviewed</i>	Boby, L. Director, Southern Regional Extension Forestry, University of Georgia. 2024. Personal communication, December 2024. Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra National Association of State Retirement Administrators. 2024. State and Local Revenue. https://www.nasra.org/revenue#:~:text=State%20and%20local%20governments%20collect,local%20governments%2C%20including%20school%20districts National Timber Tax Website. 2023. Quick Reference: Forest Property Taxation Systems in the United States. https://www.timbertax.org/Statetaxes/quickreference/ National Timber Tax Website. 2024. https://www.timbertax.org/ Penn State Extension. 2023. Federal Income Taxes: Four Essential "To Do's" for Forest Landowners https://extension.psu.edu/Federal-income-taxes-four-essential-to-dos-for-forest-landowners Sales Tax Institute. 2024. State Sales Tax Rates https://www.salestaxinstitute.com/resources/rates Seneca Creek Associates. 2019. Assessment of Lawful Sourcing and Sustainability: US Hardwood Exports, prepared for the American Hardwood Export Council. Transparency International. Corruption Perception Index. 2023. https://www.transparency.org/en/cpi/2023 US Department of Agriculture Forest Service Southern Region. 2005. Federal Income Tax on Timber A Key to Your Most Frequently Asked Questions. https://www.srs.fs.usda.gov/pubs/ja/ja_haney001_revised_2005.pdf US Department of Agriculture Forest Service. 2013. Forest Landowners' Guide to the Federal Income Tax. https://www.srs.fs.usda.gov/pubs/ah/ah_srs731.pdf VanderSchaaf, C, PhD. 2024. Southwest Regional Forestry Extension Specialist, Mississippi State University. 2024. Personal communication. World Bank. 2024. Worldwide Governance Indicators. https://www.worldbank.org/en/publication/worldwide-governance-indicators

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<i>Risk rating</i>	Low risk
1.1.5	There shall be adequate protection of the Supply Base from unauthorised and illegal activities, such as illegal logging, mining, and encroachment.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. As noted in Indicator 1.1.1, trespass and illegal harvesting is low risk due to the robust legal framework at the Federal and State level. The US Lacey Act specifically prohibits trade in timber and wood products that are taken, possessed, transported, or sold in violation of any law, treaty, or regulation. The amended Lacey Act strengthened US law of illegal sourcing of wood materials. Furthermore, a study assessed the status of timber theft and trespass in US wood exports and found that there is "less than a 1% risk of any illegal wood entering the US hardwood supply chain." The low risk is because of the clear and fully enforced property rights, respect for the rule of law, a strong civil society, and multi-generational family forest landownership (Seneca Creek Associates, 2019). The Forest Stewardship Council's (FSC) US Controlled Wood National Risk Assessment (NRA) made a Low Risk determination for all Indicators related to legality in the US (FSC US, 2019). In the US, private landowners generally have well-defined property rights. This includes subsurface mineral rights, though in some cases these may be separately owned. Well-defined property rights help prevent unauthorized mining activities on private lands. Each State has its own set of laws around forest management, land use, and timber harvesting. While these laws may vary, they collectively make up a legal framework that prevents activities like illegal logging, mining, and encroachment.

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	Enforcement and monitoring Both the US Lacey Act amendments and the European Union Timber Regulation (EUTR) have brought greater attention to, and monitoring of, supply chains. There are significant penalties for violations, such as large fines and imprisonment. An example of a State law addressing forest management, is Georgia’s Timber Security Law (HB 790). This law expands the Georgia Forestry Commission’s authority to investigate claims, issue warrants, and make arrests. If timber is harvested without permission, the landowner is automatically entitled to three times the fair market value of trees, three times the value of damaged trees, and the cost covered for reforestation. Each State has laws comparable to this example that act as a deterrent to crime and ensure restitution if damage occurs. Typically, mining activities require permits from State and/or Federal agencies. State agencies, such as the Departments of Natural Resources or Environmental Protection, often have jurisdiction over mining activities on private lands. South Carolina, for example, regulates surface mining through the South Carolina Mining Act and the South Carolina Department of Environmental Protection Agency. These State agencies have the authority to conduct inspections and enforce laws. States have systems in place for reporting suspected illegal activities on private lands, including unauthorized mining. The outcome of Federal and State laws, and enforcement agencies working together is that there are protections from unauthorized and illegal activities, such as illegal logging, mining, and encroachment, when sourcing feedstock from private and public lands. Risk conclusion and justification The evidence and legal structures referred to above support a conclusion that the risk class for Indicator 1.1.5. is low risk.
<i>Supply Base Verifiers</i>	• Worldwide Governance Indicators • Transparency International’s Corruption Perceptions Index ranking • Seneca Creek Associates Assessment • World Resources Institute • Federal Laws and State Laws – unauthorized activities • Best Management Practices • Forest certification standards and auditing processes
<i>Evidence reviewed</i>	Forest Stewardship Council (FSC). 2014. Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2014. FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2019. FSC-NRA-USA V1-0: FSC US Controlled Wood National Risk Assessment (US NRA). Access: https://us.fsc.org/en-

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	us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Forest Stewardship Council (FSC). 2023. US National Risk Assessment Implementation Resources. Access: https://us.fsc.org/en-us/certification/controlled-wood/us-nra-implementation-resources Forest Stewardship Council (FSC). 2024. Interpretations of the Normative Framework, Controlled Wood (9/09/2024). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2024. List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). Access: https://connect.fsc.org/document-centre Georgia Forestry Commission. Timber Security Law. Accessed July 8, 2024. https://gatrees.org/wp-content/uploads/2019/11/Timber-Security-Law-Factsheet.pdf#:~:text=If%20timber%20is%20harvested%20without,plus%20attorney%20and%20litigation%20fees New March. 2024. RRA Input Survey. SurveyMonkey. Pilon, R. 2017. 16. Property Rights and the Constitution. https://www.cato.org/cato-handbook-policy-makers/cato-handbook-policy-makers-8th-edition-2017/property-rights-constitution Seneca Creek Associates. 2019. Assessment of Lawful Sourcing and Sustainability: US Hardwood Exports, prepared for the American Hardwood Export Council. South Carolina Department of Health and Environmental Control. 2019. Mining and Reclamation. https://scdhec.gov/environment/land-management/mining-reclamation Sustainable Forestry Initiative. 2022. SFI 2022 Standards and Rules. Access: https://forests.org/new-sfi-2022-standards-updates/ University of Tennessee, Knoxville. 2002. SP595 Timber Theft! How to avoid it and what to do if it happens, https://trace.tennessee.edu/cgi/viewcontent.cgi?article=1014&context=utk_agexfores Transparency International. Corruption Perception Index. 2022. https://www.transparency.org/en/cpi/2022 United States Agency for International Development (USAID). Illegal Logging and Deforestation. https://www.usaid.gov/biodiversity/illegal-logging-and-deforestation World Bank. 2024. Worldwide Governance Indicators. https://www.worldbank.org/en/publication/worldwide-governance-indicators World Resources Institute. 2013. Lumber Liquidators Raid Shows Companies Need to Heed US Lacey Act. https://www.wri.org/insights/lumber-liquidators-raid-shows-companies-need-heed-us-lacey-act World Resources Institute. 2022. How Tracking Timber Helps Prevent Illegal Logging and Deforestation. https://www.wri.org/insights/how-tracking-timber-helps-prevent-illegal-logging-and-deforestation
<i>Risk rating</i>	Low risk

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Principle 2 - Feedstock sourcing does not harm the environment

Criterion 2.1 - Biodiversity is maintained or enhanced.

2.1.1	Key species, habitats, ecosystems, and areas of high conservation value (HCV) pertaining to biodiversity in the Supply Base shall be identified.
Findings	Scale of assessment Analysis was conducted for the RRA’s full geographic scope and for all non-National Forest tenures with a focus on private forest lands, which provide the vast majority of feedstocks furnished into biomass supply chains. Identification of key species, habitats, ecosystems and high conservation values (HCVs) was conducted at various scales, based on the availability of specific biodiversity datasets including standardized 6,219 km² hexagons provided by NatureServe Explorer Pro (NatureServe, 2024), and 30-meter (most species) and 330-meter (wide ranging species) resolution for richness of imperilled species provided by the MoBI data layer collection (NatureServe Network, 2024). Additionally, other key sources including the Forest Stewardship Council’s US National Risk Assessment (FSC US NRA) utilize a range of functional assessment scales, including national, county and parish, ecosystem, and others. Analysis To evaluate this Indicator, original quantitative and qualitative analysis was conducted, along with analysis of relevant literature, including preexisting assessments evaluating risks and impacts to biodiversity associated with forest sourcing in the geography of interest. These preexisting resources are widely accepted and have precedence in the forestry community in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. For this indicator specifically, mitigation options and approaches were a focus of stakeholder feedback. Analysis generated three primary pathways for identification and analysis of key species, habitats, ecosystems and HCVs pertaining to biodiversity: the US Endangered Species Act (ESA), the NatureServe Global Ranking System, and the FSC US NRA. The overarching Federal legislation identifying and protecting biodiversity in the US is the ESA. The law was enacted in 1973 to provide a legal framework for the protection and conservation of threatened and endangered faunal and floral species and their habitats. The primary components of the ESA are the formal “listing” of species in need of protection, establishment of critical habitat areas, and development of conservation plans aimed to preventing the extinction of species and conserving of the ecosystems upon which the species depend. Under the ESA, an endangered species is defined as “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range,” while a threatened species is defined as “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” When the US Fish and Wildlife Service (FWS) applies the designation of threatened or endangered, the species is considered “listed.” There is a set of extensive evaluation criteria and related processes for listing a species as threatened or endangered, these are described in detail in Indicator 2.1.2. When

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one or more factors identified by the FWS imperils the survival of a species, the agency takes action to **list the species** as endangered or threatened to ensure the appropriate protective measures apply (see enforcement under Indicator 2.1.3). Using the same criteria, the FWS also assesses species already listed to determine whether they should be reclassified from threatened to endangered (escalation) or whether threats have been reduced or eliminated to the point the species should be reclassified from endangered to threatened or removed from the list (i.e., de-escalation or delisted) (FWS, 2024).

The FWS spatially designates *critical habitat* areas for each listed species. The ESA requires the designation of critical habitat for listed species. When identifying critical habitat, FWS first evaluates areas currently occupied by the species and considers what physical and biological features a species needs for life processes and successful reproduction. These features include: (1) space for individual and overall population growth, and for normal behavior; (2) cover or shelter; (3) food, water, air, light, minerals, or other nutritional or physiological requirements; (4) sites for breeding and rearing offspring, germination, or seed dispersal; and (5) habitats that are protected from disturbances or are representative of the historical, geographical, and ecological distributions of the species. Unoccupied areas are designated as critical habitat when there are too few known occupied areas to ensure long-term conservation of the species. For an unoccupied area to be designated as critical habitat, the agency must determine that there is a reasonable certainty that the area will contribute to the species conservation and that the area contains one or more of the physical or biological features essential to the species conservation. In some cases, an area may be excluded from critical habitat designation based on economic, national security, or other relevant impacts. In these rare cases, the FWS may determine that the benefits of excluding it outweigh the benefits of including it (USFWS, 2024). For ESA listed species, critical habitat areas and species ranges are provided in spatial data layers ranging in resolutions. In summary, under ESA, species and their habitats are identified through a robust and multifaceted process.

In addition to species identified and protected under ESA (see citations for link to current list of ESA-listed species), many experts and programs, including the Sustainable Forestry Initiative (SFI) certification in the US, also utilize the global ranking system provided by NatureServe to identify key species (Evans et al., 2016, Laband and Nieswiadomy, 2008, Possingham et al., 2022, SFI, 2022). The NatureServe ranking system differs from the US Federal process of listing species and is considered by some experts, including members of this RRA development team, more complete in assessing plant and insect species that may be excluded or de-emphasized within the ESA listing processes (Hamilton, 2024). This system was established in the 1980s by The Nature Conservancy’s (TNC) scientists as a means for categorizing the relative imperilment of species of plants, animals, and natural ecological communities, on the global, national or subnational levels to prioritize conservation action. Started by TNC but now led by NatureServe, the ranking system is a globally standardized, repeatable, peer-reviewed system that factors in rarity, trends, and threats data on species and ecosystems to determine imperilment on a scale of 1 to 5 (NatureServe, 2009). NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (Faber-Langenhoven, 2012) sets out the methodology for conservation status assignment of species and ecosystems within the NatureServe system. A rank of G1 means that a species is considered critically imperiled because it is at very high risk of extinction due to extreme rarity (often five or fewer populations), very steep declines, or other factors. A rank of G1 or G2 means the species is considered either critically imperiled or imperiled because it is at a high risk of extinction due to a very restricted range, few populations (often 20 or fewer), steep declines, or other factors (Faber-Langendoen, 2012).

When a G1 and G2 species is identified by professional zoologists, botanists, or ecologists on the ground, primarily through natural heritage or biological conservation programs implemented by the State governments, that known location is spatially documented as an “element occurrence” (EO). The explicit EO location is generally not made publicly available by State authorities or NatureServe to ensure that sensitive species are not subject to overcollection or other potential threats that could occur if their precise locations were disclosed. For these reasons, species location data is provided at precisions determined to be

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appropriate for each species in consultation with NatureServe Network Programs. With limited exception, NatureServe Explorer Pro freely provides data in 343 mile² (888.37 km²) hexagons. However, more granular level data are available if data security agreements are signed and fees to cover costs of access are paid (NatureServe, 2024).

Since EO data is limited only to known, documented sightings (element occurrences), as with the designation of critical habitat under ESA, conservation experts develop models that predict the highest quality habitat for NatureServe ranked imperiled species. To accomplish this, NatureServe developed a peer-reviewed modeled product called the Map of Biodiversity Importance (MoBI), which addresses the vast majority of imperiled vertebrate and plant species in the US as well as pollinators and most aquatic invertebrates. The combined map highlights where conservation efforts can help prevent extinctions and promote the advance conservation of imperiled species. First released in 2020, the MoBI tool is under continued iteration as species-specific models are refined. As such, it is in an ongoing stage of development and in some cases, access may be limited. Used in conjunction with specific element occurrence data generated from NatureServe Explorer Pro, MoBI provides conservative, and well-defined models of where species are likely to occur regardless of past scientific survey intensity. MoBI provides 30-meter (most species) and 330-meter (wide ranging species) resolution for richness of imperiled species (NatureServe Network, 2024) and, in the future, there will be options for accessing individual species models at a coarser scale (pending finalizing agreements with State heritage programs on data access). Experts consulted, and members of the RRA development team, agree that NatureServe datasets, including EO and MoBI, provide the most accessible and comprehensive assessment of species imperilment and their habitats in the US (Evans 2016).

Recognizing the precedence of the FSC US NRA, this assessment was also reviewed primarily for the identification of ecosystems and HCVs, as defined by the Sustainable Biomass Partnership (SBP). Forest Stewardship Council (FSC) International mobilizes the HCV approach, as described in the HCV Resource Network’s (HCV RN) Common Guidance, which was, in turn, mobilized in the development of the FSC US NRA. Thus, biodiversity related HCVs: HCV 1 (species diversity), HCV 2 (landscape level ecosystems, ecosystem mosaics and intact forest landscapes), HCV 3 (ecosystems and habitats), and HCV4 (ecosystem services), as identified by Guidance for SBP Standard 1 (May 2023) have all been fully identified and evaluated within the existing FSC US NRA. Additionally, SBP’s definition for *ecosystems* aligns with the definition included in the HCV approach and, as such, ecosystems have also been identified and evaluated by the FSC US NRA. Thus, all ecosystems and HCVs are effectively identified, along with detailed analysis of the threats and impacts and spatially explicit risk designations. Control measures are also identified for each specified risk within the FSC US NRA and Controlled Wood nexus (FSC, 2019, FSC 2023).

In summary, through the ESA-listed species and critical habitats, NatureServe’s EO and modelled G1-G2 MoBI data, and the FSC US NRA, there is high confidence that all key species, habitats, ecosystems, and areas of HCV pertaining to biodiversity are identified within the area of analysis.

Enforcement and monitoring

The FSC US NRA, the ESA, and NatureServe Conservation Status Ranking System each has an appropriate and sufficient means for monitoring and enforcing the process for identifying key species, habitats, ecosystems and HCVs, which includes the process of analysis of threats and impacts.

FSC maintains a robust, complex and multifaceted normative framework for the development and maintenance of Controlled Wood National Risk Assessments. This framework includes but is not limited to the Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002V2-0 EN), FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002), Interpretations of the Normative Framework, Controlled Wood (9/09/2024), and List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). All of these guiding mechanisms are subject to FSC’s triumvirate

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governance system and related processes for the development of procedures, directives, interpretations, derogations, and other forms of FSC’s normative framework. Additionally, the FSC US NRA specifically describes the approach for maintenance of the NRA (FSC, 2019).

As noted in Indicator 2.1.1, the listing of species under ESA follows extensive, species-specific habitat range mapping and stakeholder consultations, requiring the involvement of local communities and Indigenous People specified and supportive in the law. This process is implemented by the FWS, an agency of the US Department of the Interior (DOI), under the supervision of the Secretary of Interior. The US Congress, comprised of the Senate and House of Representatives, appropriates Federal funds for the operation of activities under ESA and reviews its performance through various Congressional mechanisms, including special review by other divisions of government to evaluate effectiveness (Congressional Research Service, 2021). Additionally, the US judicial system may also be mobilized by stakeholders to challenge the implementation of ESA by the FWS and DOI. Indeed, there is an extensive history of the use of litigation related specifically to decisions to list or delist species or areas designated as critical habitats. The US Department of Justice (DOJ) maintains specific areas of practice related to Endangered and Threatened Species Listing and Recovery, a formal program area, to ensure appropriate judicial oversight of ESA (Department of Justice, 2024). As noted in analysis provided under Principle 1, there is a high degree of governance and rule of law that provides assurance of the appropriate implementation and enforcement of the ESA overall and as it relates to the identification of species and habitats, relevant to this Indicator.

NatureServe and the NatureServe network (comprised of individual State programs throughout the US) have a long and well-documented history of identifying imperilled species using defensible and scientifically rigorous and repeatable standards. These organizations are made up of more than 1,000 conservation professionals with a wide array of expertise, including ecologists, zoologists, botanists, data specialists, and others with expertise in acquiring, managing, and sharing knowledge, assessing status, risk and condition, planning, and measuring results. In addition, network staff identify and work closely with outside experts within academia, government, and the for-profit sector to peer review the process of species ranking and appropriately apply the methodology. Consequently, the global ranking system and the data behind it are seen as a principal source of information on rarity of species and ecosystems in the US and Canada (Comer and Reid, 2013, Master et al., 2000). The global ranking process uses known and verified species locations (element occurrences) in combination with highly vetted data on threats and trends to determine the global rank and revisit it as new information (e.g., new populations are discovered, new threats emerge, species occurrence disappear). This ranking process has been developed to ensure it is unbiased, quantitative, and repeatable and is documented and available using NatureServe’s online rank calculator tool (see citations).

The outcome of the ESA, NatureServe’s Global Ranking System (including data from Explorer Pro and the MoBI tool), and the FSC US NRA working together is that key species, habitats, ecosystems, and areas of HCV shall be identified when sourcing feedstock from private and public lands.

Risk conclusion and justification

The ESA provides a Federal framework for the identification and protection of key species and habitats in the US, listed threatened and endangered species, along with the mapping of their critical habitats, is made publicly available. Additionally, NatureServe’s ranking system and the modelling of G1-G2 species occurrences and habitats mobilizes other methodologies to identify additional key species, habitats, and ecosystems. Last, the FSC US NRA is a resource with precedence in the US that identifies and provides mapping for additional key species and HCVs. Via these three pathways, there is high confidence that all key species, habitats, ecosystems, and HCV areas pertaining to biodiversity are identified within the RRA’s geography. Therefore, it is concluded that the risk class for Indicator 2.1.1. is **low risk**.

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<i>Supply Base Verifiers</i>	• FSC US NRA • FSC areas of specified risk • ESA listings • ESA critical habitats • NatureServe Explorer Pro • NatureServe MoBi ESA critical habitats
<i>Evidence reviewed</i>	Congressional Research Service. 2021. The Endangered Species Act: Overview and Implementation (Updated March 4, 2021), CRS Report Prepared for Members and Committees of Congress. Access: https://crsreports.congress.gov/ (ref: R46677). Evans, D.M., Che-Castaldo, J.P., Crouse, D., Davis, F.W., Epanchin-Niell, R., Flather, C.H., et al. 2016. Species recovery in the united states: Increasing the effectiveness of the endangered species act. <i>Issues in Ecology</i>, 2016(20). Access: https://escholarship.org/uc/item/8k61j403 Faber-Langendoen, D., Nichols, J., Master, L., Snow, K., Tomaino, A., Bittman, R., Hammerson, G., Heidel, B., Ramsay, L., Teucher, A., and Young, B. 2012. NatureServe Conservation Status Assessments: Methodology for Assigning Ranks. NatureServe, Arlington, VA. Faber-langendoen, D., Baldwin, K., Peet, R.K., Medinger, D., Muldavin, E., Keller-Wolf, T., and Josse, C. 2017. The EcoVeg approach in the Americas: US, Canadian, and International Vegetation Classifications. <i>Phytocoenologia</i>. Published online December 2017. Forest Stewardship Council (FSC). 2014. Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2014. FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2019. FSC-NRA-USA V1-0: FSC US Controlled Wood National Risk Assessment (US NRA). Access: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Forest Stewardship Council (FSC). 2023. US National Risk Assessment Implementation Resources. Access: https://us.fsc.org/en-us/certification/controlled-wood/us-nra-implementation-resources Forest Stewardship Council (FSC). 2024. Interpretations of the Normative Framework, Controlled Wood (9/09/2024). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2024. List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). Access: https://connect.fsc.org/document-centre Hamilton, H., Smyth, R.L., Young, B.E., Howard, T.G., Tracey, C., Breyer, S., Cameron, D.R., et al. 2022. "Increasing Taxonomic Diversity and Spatial Resolution Clarifies Opportunities for Protecting US Imperiled Species." <i>Ecological Applications</i> 32(3): e2534. https://doi.org/10.1002/eap.2534 Hamilton, H., PhD. 2024. Chief Scientist. Sustainable Forestry Initiative. Personal Correspondence, September 2024. Laband, D.N. and Nieswiadomy, M. (2006). Factors affecting species' risk of extinction: an empirical analysis of ESA and NatureServe listings. <i>Contemporary</i>

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<i>Risk rating</i>	Low risk
2.1.2	Threats to and impacts on the identified key species, habitats, ecosystems, and areas of high conservation value (HCV) pertaining to

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	biodiversity in the Supply Base shall be identified and evaluated.
<i>Findings</i>	Scale of assessment This analysis was conducted for the RRA’s full geographic scope and for all non-National Forest tenures with a focus on private forest lands, which provide the vast majority of feedstock furnished into biomass supply chains. Identification of key species, habitats, ecosystems, and high conservation value (HCVs) was conducted at various scales, based on the availability of specific biodiversity datasets including standardized 6,219 km² hexagons provided by NatureServe Explorer Pro (NatureServe, 2024), 30-meter (most species) and 330-meter (wide ranging species) resolution for richness of imperilled species provided by the MoBI data layer collection (NatureServe Network, 2024). Additionally, other key sources including the Forest Stewardship Council US National Risk Assessment (FSC US NRA) utilize a range of functional assessment scales, including national, county, ecosystem and others. Analysis To evaluate this Indicator, qualitative analysis was conducted, along with analysis of relevant literature, including preexisting assessments evaluating risks and impacts to biodiversity associated with forest sourcing in the geography of interest. These preexisting resources are widely accepted and have precedence in the forestry community in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. As noted in Indicator 2.1.1, under the US Endangered Species Act (ESA) when evaluating a species for designation as endangered or threatened, US Fish and Wildlife Service (FWS) considers the following five factors: (1) damage to, or destruction of, a species’ habitat; (2) overutilization of the species for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing protection; and (5) other natural or humanmade factors that affect the continued existence of the species. When one or more of these factors imperils the survival of a species, the FWS moves to legally list the species to ensure the appropriate protective measures apply (see enforcement for Indicator 2.1.3 below). Through these processes, impacts and threats to both key species and their habitats are rigorously evaluated in a manner consistently with the SBP requirement and related guidance. A summary of these analyses is conducted for each species and is available through the FWS website along with links to formal legal documents associated with their listing, which include more detailed analysis. For example, large-fruited sand-verbena (<i>Abronia macrocarpa</i>) is an endemic plant found in Leon, Robertson, and Freestone counties, in the post oak savanna region of eastern Texas. The nine documented wild populations are known only to be on private lands and occur no more than 80 km (50 miles) apart. The USFWS notes that stressors to this species include competition from introduced invasive grasses and the conversion of open grassland to dense woodland, habitat conversion, clearing for petroleum exploration and residential development, off-road vehicle use, and potential grazing and herbivory (USFWS, 2024). For key species and ecosystems not identified through the listing process under ESA, the NatureServe ranking system includes evaluation of data related to threats and impacts on species to contribute to imperilment. <i>NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk</i> sets out the methodology for conservation status assessment of species within the NatureServe system. This specifically includes a calculation of overall

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threat impact to indicate the degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in an area of interest (e.g., global, nation, or subnation). These include direct threats which are primarily from human activities but also may be natural phenomena, like the effects of fires, hurricanes, or flooding which may impact habitats. Threats may also be indirect, but human caused, such as the introduction of invasive species or changes to hydrology downstream from upstream dams, pollution, or development. For purposes of status assessment, threat impact is calculated in the NatureServe system considering only present and future threats (NatureServe, 2012). For example, the Georgia Rockcress (*Arabis georgiana*) is a rare, endemic plant that occurs in eight counties in Alabama and seven counties in Georgia. The analysis associated with its assignment as G1 (critically imperilled in the NatureServe system) includes discussion of the species as threatened by habitat degradation and habitat loss from river alteration, road building, timbering, and grazing. Disturbances from these activities have created conditions favourable to invasive exotics such as Japanese honeysuckle (*Lonicera japonica*), which will likely outcompete the species in all but the rockiest, most soilless situations (NatureServe, 2024).

The Forest Stewardship Council’s US National Risk Assessment (FSC US NRA) was reviewed to evaluate whether it effectively identified threats and impacts on identified key species, habitats, ecosystems, and areas of HCV pertaining to biodiversity. Indeed, the core function of the FSC US NRA is the evaluation of the risk of sourcing wood from forests in which high conservation values are threatened by management activities. The analysis includes extensive evaluation of each identified HCV and the threats and impacts to them. While the focus is on the impact of forest management activities, it also specifies other driving threats to specific HCVs. For example, analysis of the Central Texas Critical Biodiversity Area (CBA), which falls within this RRA’s geography and for which low risk is identified, includes threats associated with urban and agricultural development. For the Central Appalachians CBA, in addition to forest management, identified threats include climate change, air and water pollution from mining, new highways and utility rights-of-way, off road vehicle recreation, and overpopulation of deer (FSC, 2019). As such, the FSC US NRA clearly identifies and evaluates threats to identified key species, habitats, ecosystems, and areas of HCV pertaining to biodiversity.

In summary, identification and analysis of threats and impacts to key species, habitats, ecosystems, and HCVs pertaining to biodiversity are part of the identification processes undertaken via the ESA, NatureServe’s ranking and mapping system, and the FSC US NRA.

Enforcement and monitoring

The ESA, NatureServe’s Conservation Status Ranking System, and the FSC US NRA each has an appropriate and sufficient means for monitoring and enforcing the process for identifying key species, habitats, ecosystems, and HCVs, which includes the process of analysis of threats and impacts.

As noted in Indicator 2.1.1, the listing of species under ESA follows extensive, species-specific habitat range mapping and stakeholder consultations, requiring the involvement of local communities and Indigenous People that is specified in the law and supportive legislation. This process is implemented by the FWS, an agency of the Department of the Interior (DOI), under the supervision of the Secretary of Interior. The US government appropriates federal funds for the operation of activities under ESA and reviews its performance through various Congressional mechanisms, including special review by other divisions of government to evaluate effectiveness (Congressional Research Service, 2021). Additionally, the US judicial system may also be mobilized by stakeholders to challenge the implementation of ESA by the FWS and DOI. Indeed, there is an extensive history of the use of litigation related specifically to decisions to list or delist species or related to the designation of critical habitats. The US Department of Justice maintains specific areas of practice related to Endangered and Threatened Species Listing and Recovery, a formal program area, to ensure appropriate judicial oversight of ESA (Department of Justice, 2024). As noted in analysis provided under Principle 1, there is a high degree of governance and rule of law that provides assurance of the appropriate implementation and

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	enforcement of the ESA overall and as it relates to the identification of species and the habitats, relevant to this indicator. NatureServe and NatureServe network (comprised of individual State programs throughout the US) have a long and well-documented history of developing and maintaining high-quality, scientifically rigorous, defensible, and reproducible status assessments for species in the US and Canada. These organizations are made up of more than 1,000 conservation professionals with a wide array of expertise, including ecologists, zoologists, botanists, data specialists, and others with expertise in acquiring, managing and sharing knowledge, assessing status, risk and condition, planning, and measuring results. In addition, network staff identify and work with outside experts within academia, government, and the for-profit sector who have worked closely together to peer review the process of species ranking and appropriately apply the methodology. Consequently, the global ranking system and data behind it are considered the principal source of information on rarity of species in US (Comer and Reid 2013, Master et al., 2000). The global ranking process uses known and verified species locations in combination with highly vetted data on threats and trends to determine the global rank and revisit it as new information is developed (e.g., new populations are discovered, new threats emerge, species occurrence disappear). The Forest Stewardship Council (FSC) maintains a robust, complex, and multifaceted normative framework for the development and maintenance of Controlled Wood National Risk Assessments. This framework includes, but is not limited to, the Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002V2-0 EN), FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002), Interpretations of the Normative Framework, Controlled Wood (9/09/2024), and the List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). All these guiding mechanisms are subject to FSC's triumvirate governance system and related processes for the development of procedures, directives, interpretations, derogations, and other forms of FSC's normative framework. Additionally, the FSC US NRA specifically describes the approach for maintenance of the NRA (FSC, 2019). The outcome of ESA, NatureServe's Global Ranking System, and the FSC US NRA working together is that threats to and impacts on identified key species, habitats, ecosystems, and areas of HCV are thoroughly identified and evaluated given the best information when sourcing feedstock from private and public lands. Risk conclusion and justification In summary, identification and analysis of threats and impacts to key species, habitats, ecosystems, and HCVs pertaining to biodiversity is part of the identification processes undertaken via the ESA, NatureServe's global ranking system for species and ecosystems, and the FSC US NRA. These approaches are subject to legal and/or organizational oversight, which ensures appropriate monitoring and enforcement of specified processes for threat and impact analysis and identification. Therefore, it is concluded that the risk class for Indicator 2.1.2. is low risk.
Supply Base Verifiers	• FSC US NRA • FSC areas of specified risk • ESA listings • ESA critical habitats • NatureServe Explorer Pro

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	• NatureServe MoBi
<i>Evidence reviewed</i>	Comer, P., and Reid, N. 2013. "Using NatureServe Data for Conservation: Evaluating the G-Rank System and Its Application." <i>Conservation Biology</i>, 27(1), 48-57. Faber-Langendoen, D., Nichols, J., Master, L., Snow, K., Tomaino, A., Bittman, R., Hammerson, G., Heidel, B., Ramsay, L., Teucher, A., and Young, B. 2012. NatureServe Conservation Status Assessments: Methodology for Assigning Ranks. NatureServe, Arlington, VA. Faber-langendoen, D., Baldwin, K., Peet, R.K., Medinger, D., Muldavin, E., Keller-Wolf, T., and Josse, C. 2017. The EcoVeg approach in the Americas: US, Canadian, and International Vegetation Classifications. Phytocoenologia. Published online December 2017. Federal Geographic Data Committee (FGDC). 2008. National Vegetation Classification Standard, Version 2. Federal Geographic Data Committee – Vegetation Subcommittee. FGDC-STD-005-2008 (Version 2). http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation/NVCS_V2_FINAL_2008-02.pdf Forest Stewardship Council (FSC). 2014. Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2014. FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2019. FSC-NRA-USA V1-0: FSC US Controlled Wood National Risk Assessment (US NRA). Access: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Forest Stewardship Council (FSC). 2023. US National Risk Assessment Implementation Resources. Access: https://us.fsc.org/en-us/certification/controlled-wood/us-nra-implementation-resources Forest Stewardship Council (FSC). 2024. Interpretations of the Normative Framework, Controlled Wood (9/09/2024). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2024. List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). Access: https://connect.fsc.org/document-centre Hamilton, H., Smyth, R.L., Young, B.E., Howard, T.G., Tracey, C., Breyer, S., Cameron, D.R., et al., 2022. "Increasing Taxonomic Diversity and Spatial Resolution Clarifies Opportunities for Protecting US Imperiled Species." <i>Ecological Applications</i> 32(3): e2534. https://doi.org/10.1002/eap.2534 Master, L. L., Flather, C. H., & Smith, R. M. (2000). "Rarity, Endangerment, and the Role of the Global Rank in Conservation Planning." <i>Ecological Applications</i>, 10(2), 709-722. NatureServe. 2012. <i>NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk</i>. Access: https://help.natureserve.org/biotics/content/Methodology/natureserveconservationstatusfactors_apr12.pdf NatureServe. 2024. <i>Arabis georgiana</i>, <i>Georgia Rockcress</i>. Access: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.154760/Arabis_georgiana

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	New March. 2024a. RRA Input Survey Results. SurveyMonkey. New March. August 1, 2024b. RRA Listening Session Live Poll Results. US Fish & Wildlife Service (FWS). 2024. Critical Habitat Polygon Features Final, ArcGIS Feature Service, Environmental Conservation Online System, Retrieved from https://services.arcgis.com/QVENGdaPbd4LUkLV/ArcGIS/rest/services/USFWS_Critical_Habitat/FeatureServer US Fish & Wildlife Service (FWS). 2024. Complete Current Range, Shapefile Feature Class, Environmental Conservation Online System, Retrieved from https://ecos.fws.gov/docs/species/shapefiles/usfws_complete_species_current_range.zip
<i>Risk rating</i>	Low risk
2.1.3	Key species, habitats, ecosystems, and areas of high conservation value (HCV) pertaining to biodiversity in the Supply Base shall be maintained or enhanced.
<i>Findings</i>	Scale of assessment The geographic RRA scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, and State and local government lands are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted along with analysis of relevant literature, including preexisting assessments evaluating risks and impacts to biodiversity associated with forest sourcing in the geography of interest. These preexisting resources are widely accepted and have precedence in the forestry community in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. As noted in Indicators 2.1.1 and 2.1.2, analysis yielded three primary pathways for the identification and analysis of threats and impacts to key species, habitats, ecosystems, and high conservation value (HCVs) pertaining to biodiversity: the US Endangered Species Act (ESA), NatureServe's Global Ranking System, and the Forest Stewardship Council US National Risk Assessment (FSC US NRA).

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Under the first pathway of the ESA, when the US Fish and Wildlife Service (FWS) formally lists a species as threatened or endangered, it prohibits the “take” of the listed species and its related habitats. Under ESA, the term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (USFWS, 2020). As such, listed species and their habitats are under the full protection of the law (USFWS, 2024). Although ESA provides protection for critical habitat for listed fish and wildlife species on both public and private lands, that protection does not extend to plant species on private lands, unless such lands are certified.

In association with the ESA, the Federal government requires States to have a State Wildlife Action Plan (SWAP) to receive funding for grants through the FWS. SWAPs have been developed for every State in the US and are updated approximately every 10 years. State level plans are required to identify at-risk wildlife and key habitats and communities. SWAPs include state-wide species lists. They are collaboratively drafted by many partners and stakeholders and use the best available data to provide a comprehensive, adaptable assessment of conservation needs and a plan to address them. Although SWAPs are not specifically regulatory, they may be accompanied by State level species protections. Additionally, they serve as a baseline resource that stakeholders across a State use for conservation as a framework to coordinate local conservation efforts with region-wide initiatives, and as an overarching strategy that aligns the efforts of multiple State agencies.

Additionally, State Best Management Practices (BMPs) identify practices that can further protect and enhance wildlife habitat. For instance, the Florida BMP manual highlights “These practices are designed as the minimum standards necessary for protecting and maintaining the State’s water quality as well as certain wildlife habitat values, during forestry activities. As such, they represent a balance between overall natural resource protection and forest resource use.” Georgia’s BMP manual states, “Forest management practices such as timber harvesting, site preparation, tree regeneration, and within-stand treatments may be conducted in ways that enhance fish and wildlife habitat, aesthetics, and recreational opportunities, while accommodating sensitive sites and endangered species.” The South Carolina BMP manual succinctly states, “All forestry practices must comply with the Endangered Species Act.” BMP training is a part of each State’s professional logger training program (AFF, 2021). See the introduction for an overview and discussion of BMPs programs.

Previous analysis, including the American Forest Foundation’s (AFF) Risk Based Approach (RBA) and preexisting Company Risk Assessments for biomass producers in the geographic scope of the RRA, require that biomass producers train their staff to identify ESA-listed species and their habitats within their sourcing areas and assess the risks associated with each of them. This was further corroborated in interviews with a range of biomass producers (Cheynet, 2024, Cook, 2024, Grant, 2024, Kincaid, 2024, Palmer, 2024).

Under the second and third pathways, NatureServe’s framework and the FSC US NRA, key species, habitats, ecosystems, and HCVs are not guaranteed protections under Federal or State law. In the case of NatureServe-identified G1 and G2 species and ecosystems, Sustainable Forestry Initiative (SFI) Fiber Sourcing certification requires that analysis be conducted of a certified organization’s supply basin and that a summary of that analysis be provided to their suppliers. Additionally, in cases of stumpage purchases, certified organizations are required to incorporate the results of the assessment to promote conservation, specifically of G1-G2 species (SFI, 2022). The analysis and distribution of the G1 and G2 summary is reviewed by third-party auditors for certified organizations, along with samples of on-the-ground application for stumpage purchases.

Similarly, in the case of HCVs and species associated with specified risks identified by the FSC US NRA, Forest Stewardship Council’s (FSC) Controlled Wood certified holders are required to have in place control measures, as identified by guidance provided by the FSC US NRA. The implementation of this guidance is evaluated by third-party auditing bodies. Thus, while organizations with valid FSC Controlled Wood and SFI Fiber Sourcing would implement measures

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supporting the maintenance or enhancement of key species, habitats, ecosystems, and areas of HCV pertaining to biodiversity, there is no legal protection under these systems.

Enforcement and monitoring

As noted in Indicators 2.1.2 and 2.13, threatened and endangered species are listed by the ESA and are present within the RRA’s geographic scope. These species and their critical habitat areas have been rigorously identified and analyzed. Landowners and forest managers are legally required to protect listed animal species and their habitats. Although Federally listed plant species are protected on Federal lands, the ESA does not legally require protection of listed plant species on private lands.

The legal protections in place under the ESA are strictly enforced. Violations of ESA are punishable by civil penalties of up to \$25,000 for each violation and criminal penalties of up to \$50,000 and one-year imprisonment upon conviction of violations of the Act. Since ESA prohibits take of these species, including the harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collection, or other such attempts, the ESA and its accompanying enforcement ensure the protection of listed species under Federal law. According to Title 18 of the Criminal Provisions of the US Criminal Code, violations of the ESA are punishable with criminal misdemeanor penalties of up to one year imprisonment and fines pursuant to a maximum of \$50,000 (EPA, 2024).

In terms of effectiveness, ESA is regarded as “one of the strongest laws of any nation for preventing species extinction” and has been successful in preventing the extinction of 99% of the species that have been listed since its enactment in 1973. As of 2019, only two species are known to have become extinct in the Southeast region since the passage of the ESA, and neither of those species, the dusky seaside sparrow (*Ammospiza maritima nigrescens*) and the green blossom pearly mussel (*Epioblasma torulosa gubernaculum*), was forest-dependent or was likely to have been impacted by forest management activities (Greenwald et al., 2019).

In addition to Federal law, within the RRA geography, States may have laws protecting species at risk including those identified in their SWAPs as Species of Greatest Conservation Need (SGCN). SWAPs also outline comprehensive monitoring programs and State agencies, alongside the FWS, conduct ongoing monitoring of species populations and habitat. Penalties for violations of State related species laws vary. For example, a misdemeanor in Georgia is punishable by up to 12 months in jail and a maximum fine of \$1,000, a misdemeanor in South Carolina is punishable by up to one-year imprisonment and a \$1,000 fine or both, and a third-degree felony in Florida punishable by up to five years in prison and a fine of up to \$5,000 (AFF, 2021). However, SWAPs in and of themselves do not provide protection for species listed as SGCN in the plans, and there are no laws within Southeast states that specifically address these SGCNs.

Beyond those identified by ESA, NatureServe’s framework, and the FSC US NRA, analysis, key species, habitats, ecosystems, and HCVs are *not* guaranteed protections under Federal or State law.

Risk conclusion and justification

This analysis indicates the ESA is a highly efficient system for the maintenance and enhancement of Federally listed threatened and endangered animal species. However, there is **specified risk** for the following due to lack of regulatory safeguards and/or resources/incentives for maintenance and enhancement of the following:

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- Nature Serve Network identified G1-G2 animal species not on the ESA threatened or endangered list, G1-G2 plant species (Figure 2.1.3.-1), and
- FSC US NRA identified species, ecosystems, and HCVs (Figure 2.1.3.-2).

Mitigation

In the context of a privately owned landscape governed by private property rights, biomass producers are limited in their abilities to directly control management actions and decision making.

There is longstanding evidence supporting supplier engagement and logger training as strategies to influence practices during harvest operations. Studies have found that logger training, for instance, results in enhanced knowledge and awareness around specific issues (Barnett et. al, 2012 Helmkamp et. al, 2004) and even a single introductory course in forest ecology and silviculture can help loggers make more-informed management decisions (Keefer et. al, 2002). Additionally, field guilds reinforce and serve as references for practitioners (Helmkamp et. al, 2004). These approaches can be evaluated through sampling of harvest sites, review of generated materials and interviews.

Studies suggest that outreach and education opportunities may be more influential on landowner behaviours than other forms of programming, such as the development of forest management plans. However, landowner programs, such as the US Forest Service's Forest Stewardship Program, which is among the largest and most significant programs, reach a small fraction of landowners. (Butler et. al. 2014). However, research finds that targeting the right audience, including landowners who plan to harvest, is more likely to result in their taking action to participate in programs (Ma et. al, 2012). As such, the procurement apparatus may provide a beneficial pathway for the distribution of outreach and education tools. Moreover, outreach and education, as well as conservation initiatives, seem likely to provide additional impact. As a result, these mitigation options will continue to be encouraged.

For Nature Serve Network identified G1-G2 animal species not on the ESA threatened or endangered list, G1-G2 plant species (Figure 2.1.3.-1):

Control measures including the following, which may be implemented in concert with SFI Fiber Sourcing certification:

- o Assessment of G1 and G2 plant and animal species and ecosystems by forest type within a biomass producer's supply basin, including primary and processing residue feedstocks:
 - Results of the assessment shall be integrated into a summary of management recommendations to support maintenance or enhancement of identified G1 and G2 species and ecosystems associated with forest types within the supply basin.
 - Results of the summary, including forest type-based management recommendations, shall be integrated into logger training curricula for company level or coordinated delivery to loggers within the supply region.
 - Requirement that suppliers enter binding written agreements that specify logger training inclusive of forest type-based management recommendations to maintain or enhance G1 and G2 species. This applies to both primary and processing residue suppliers.

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- For direct sourcing, coordinate with landowners, foresters, and trained loggers to promote forest-type based management recommendations to support maintenance or enhancement of identified G1 and G2 species and ecosystems, specifically in conjunction with NatureServe's MoBi modelled habitat data layer or NatureServe Pro.

For FSC US NRA identified species, ecosystems, and HCVs (Figure 2.1.3.-2):

Control measures including the following, which may be implemented in concert with FSC Controlled Wood programs under the FSC US NRA (2019) nexus:

- Assessment of FSC-specified HCVs and areas of specified risk within a biomass producer's supply basin, including primary and processing residue feedstocks:
 - Results of the assessment shall be integrated into a summary of management recommendations to support maintenance or enhancement of HCVs associated with forest types within the supply basin.
 - Results of the summary, including forest type-based management recommendations to support maintenance or enhancement of HCVs, shall be integrated into logger training curricula for company level or coordinated delivery to loggers within the supply region.
 - Requirement that suppliers enter binding written agreements that specify logger training inclusive of forest type-based management recommendations to maintain or enhance HCVs. This applies to both primary and processing residue suppliers.
 - For direct sourcing, coordinate with landowners, foresters, and trained loggers to promote forest-type based management recommendations to support maintenance or enhancement of identified HCVs.

Additional mitigation measures may be implemented in conjunction with the mitigation specified above. These measures may include and may be complimented with FSC Controlled Wood programs under the FSC US NRA (2019) nexus:

- Outreach and Education: Using materials as specified in individual mitigation options, communicate to audiences (also as specified) the conservation values of the HCVs, threats from incompatible forest management (as described in the FSC US NRA), and opportunities for conservation through management that enhances HCVs and reduces or eliminates these threats. The desired outcome of these communications is engaging landowners, foresters, consultants, and loggers in HCV conservation within the specified risk area and the organization's supply area.
- Procurement Policy (for organizations that purchase directly from the source forest): Develop/adapt a procurement policy that reflects the communications themes specified in individual mitigation options and clearly states the requirement that the landowner/forester/logger at the source forest will not supply materials from forests where the HCV is threatened as a result of the forest management activities that produced the forest materials.
- Conservation Initiatives: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are supporting or promoting programs or projects to develop new or augment existing programs within the specified risk area and the organization's supply area that will result in: a) increased and improved implementation of

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	forest management practices for conservation of HCVs, and/or b) increased access to incentive programs for landowners who conserve an HCV. ▪ Implement Management Activities: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are facilitating active, on the ground implementation of management activities (also as specified) to restore, maintain, or enhance an HCV, with a goal of long-term conservation within the specified risk area and the organization's supply area. ▪ Landowner Incentives: Engage with and/or provide monetary or in kind resources to: 1) conservation organizations or similar entities (as specified in individual mitigation options) supporting or promoting programs or projects to develop new or augment existing incentive programs for landowners who restore, maintain, or enhance existing examples of HCVs within the specified risk area and organization's supply area, or 2) organizations (also as specified) that work to connect landowners with incentives provided by other entities within the same area. ▪ Direct Influence: (a) Engage with a conservation organization or similar entities, or collaborate with FSC US NRA, to identify landscapes of particular concern related to the risk of receiving non-certified supplies from areas where the HCV is threatened by forest management activities, and then communicate this information to suppliers, along with: 1) recommended BMPs that will conserve an HCV, 2) contact information for organizations that may be interested in working with the landowner on conserving an HCV in question, and 3) a requirement that the landowner/forester/consultant/logger at the source forest either will not provide materials from the landscapes identified, or will document that the forest management practices implemented in the source forest did not threaten the HCV. (b) Document acceptable implementation of BMPs that conserve the HCV for harvests that produce non-certified materials that will be controlled by the Organization. (c) Include BMPs that will conserve the HCV in harvest plans and/or in contracts made with loggers for harvests that produce non-certified materials that will be controlled by the organization and require in those harvest plans and/or

contracts that the Best Management Practices are implemented.

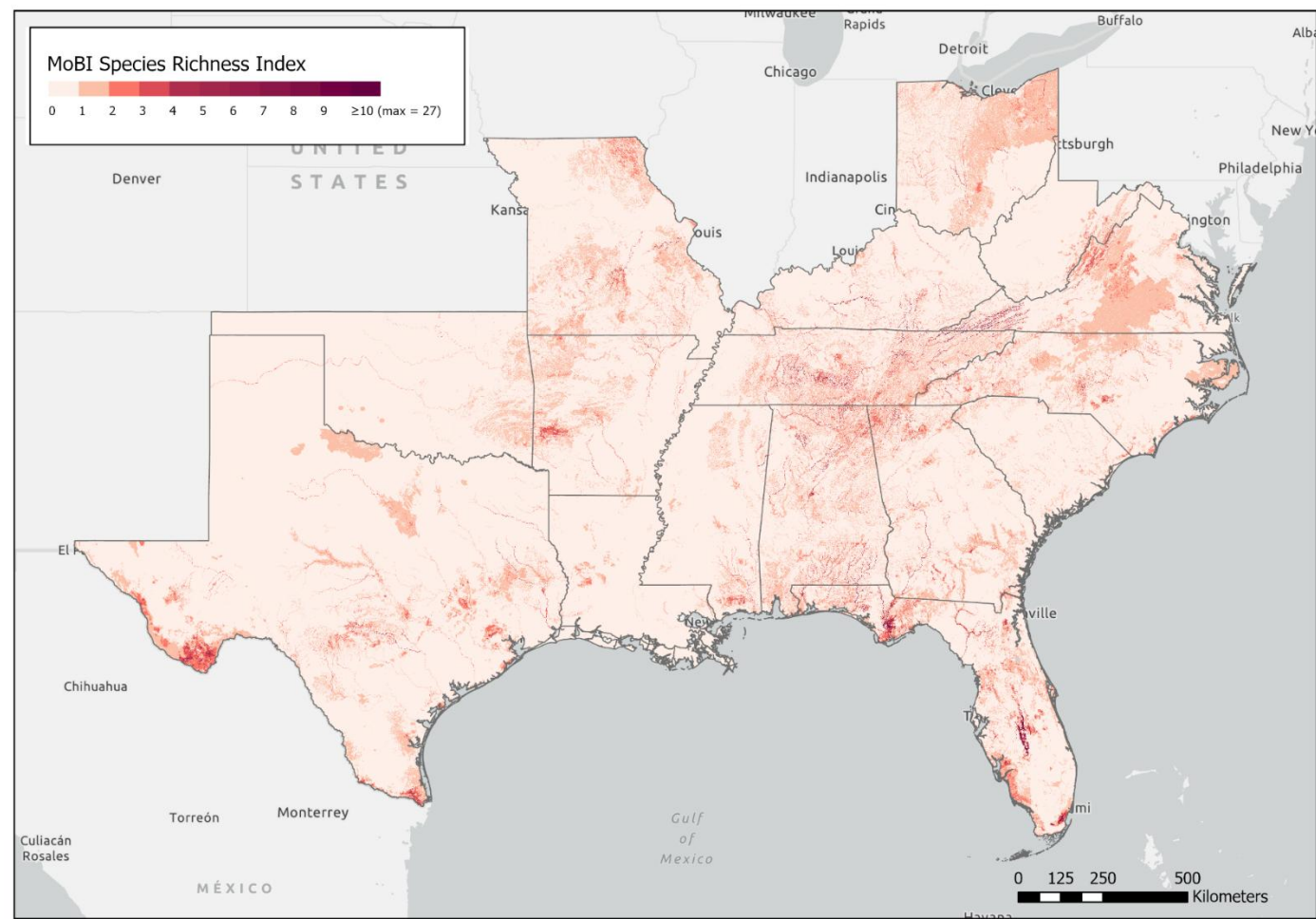


Figure 2.1.3.-1: Areas of specified risk as identified by the element occurrence or modelled habitat of G1 and G2 species (NatureServe, 2024).

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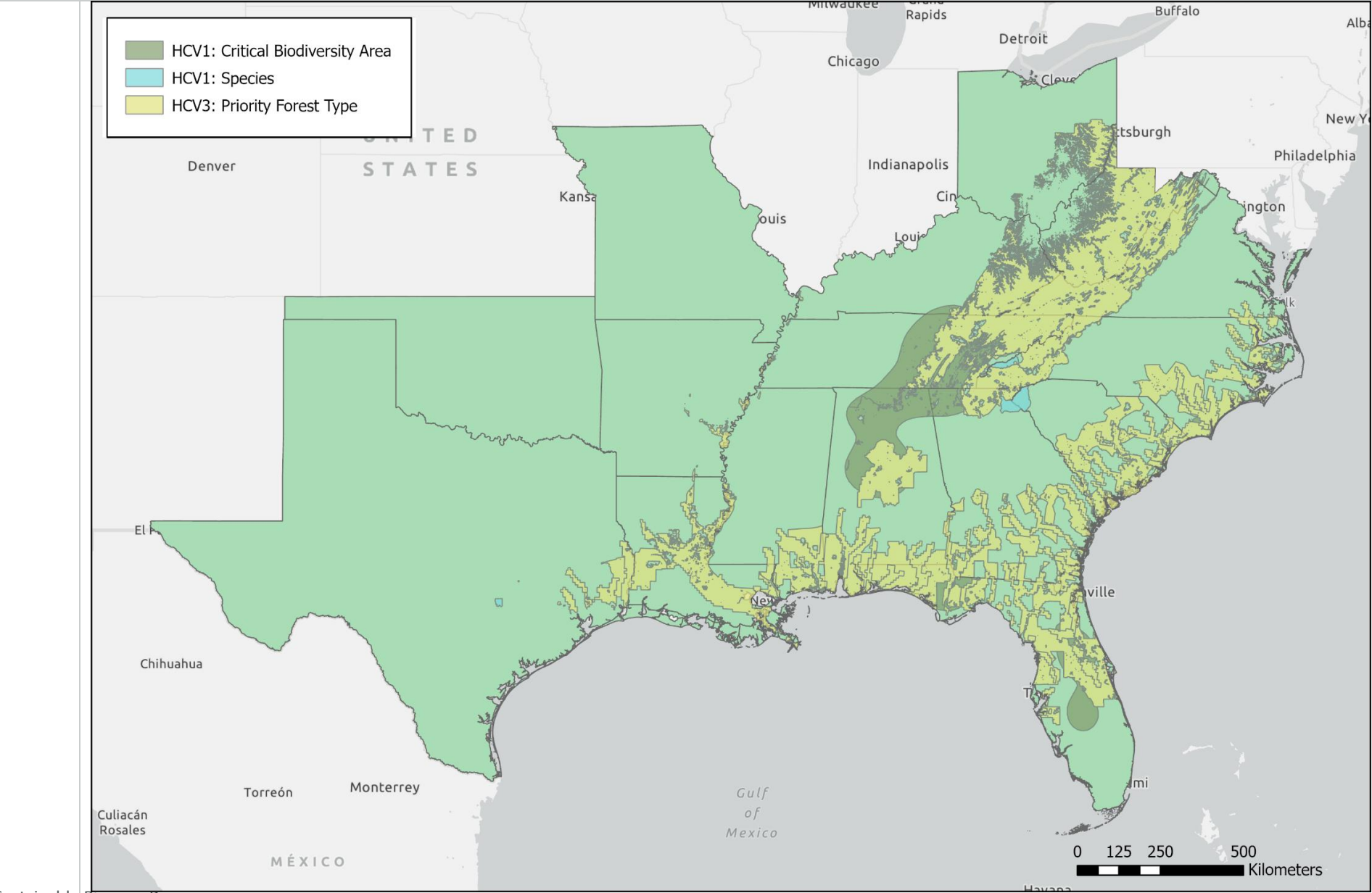


Figure 2.1.3.-2: *Areas of risk, as identified through specification of risk by the FSC US NRA.*

Mitigation: Control measures including the following, which may be implemented in concert with FSC Controlled Wood programs under the FSC US NRA (2019) nexus:

- Assessment of FSC-specified HCVs and areas of specified risk within a biomass producer's supply basin, including primary and processing residue feedstocks:
 - Results of the assessment shall be integrated into a summary of management recommendations to support maintenance or enhancement of HCVs associated with forest types within the supply basin.
 - Results of the summary, including forest type-based management recommendations to support maintenance or enhancement of HCVs, shall be integrated into logger training curricula for company level or coordinated delivery to loggers within the supply region.
 - Requirement that suppliers enter binding written agreements that specify logger training inclusive of forest type-based management recommendations to maintain or enhance HCVs. This applies to both primary and processing residue suppliers.
 - For direct sourcing, coordinate with landowners, foresters, and trained loggers to promote forest-type based management recommendations to support maintenance or enhancement of identified HCVs.

Additional mitigation measures may be implemented in conjunction with the mitigation specifics above. These measures may include:

- Outreach and Education: Using materials as specified in individual mitigation options, communicate to audiences (also as specified) the conservation values of the HCVs, threats from incompatible forest management (as described in the FSC US NRA), and opportunities for conservation through management that enhances HCVs and reduces or eliminates these threats. The desired outcome of these communications is engaging landowners, foresters, consultants, and loggers in HCV conservation within the specified risk area and the organization's supply area.
- Procurement Policy: For organizations that purchase directly from the source forest): Develop/adapt a procurement policy that reflects the communications themes specified in individual mitigation options and clearly states the requirement that the landowner/forester/logger at the source forest will not supply materials from forests where the HCV is threatened as a result of the forest management activities that produced the forest materials.
- Conservation Initiatives: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are supporting or promoting programs or projects to develop new or augment existing programs within the specified risk area and the organization's supply area that will result in: a) increased and improved implementation of forest management practices for conservation of HCVs, and/or b) increased access to incentive programs for landowners who conserve an HCV.

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	- Implement Management Activities: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are facilitating active, on the ground implementation of management activities (also as specified) to restore, maintain, or enhance an HCV, with a goal of long-term conservation within the specified risk area and the organization's supply area. - Landowner Incentives: Engage with and/or provide monetary or in kind resources to: 1) conservation organizations or similar entities (as specified in individual mitigation options) supporting or promoting programs or projects to develop new or augment existing incentive programs for landowners who restore, maintain, or enhance existing examples of HCVs within the specified risk area and organization's supply area, or 2) organizations (also as specified) that work to connect landowners with incentives provided by other entities within the same area. - Direct Influence: (a) Engage with a conservation organization or similar entities, or collaborate with FSC US NRA, to identify landscapes of particular concern related to the risk of receiving non-certified supplies from areas where the HCV is threatened by forest management activities, and then communicate this information to suppliers, along with: 1) recommended BMPs that will conserve an HCV, 2) contact information for organizations that may be interested in working with the landowner on conserving an HCV in question, and 3) a requirement that the landowner/forester/consultant/logger at the source forest either will not provide materials from the landscapes identified, or will document that the forest management practices implemented in the source forest did not threaten the HCV. (b) Document acceptable implementation of BMPs that conserve the HCV for harvests that produce non-certified materials that will be controlled by the Organization. (c) Include BMPs that will conserve the HCV in harvest plans and/or in contracts made with loggers for harvests that produce non-certified materials that will be controlled by the organization and require in those harvest plans and/or contracts that the Best Management Practices are implemented.
<i>Supply Base Verifiers</i>	- FSC US NRA - FSC areas of specified risk - FSC and SFI certification auditing reports - ESA listings - ESA critical habitats - NatureServe Explorer Pro - NatureServe MoBi - Company mitigation procedures and implementation - Staff and supplier interviews
<i>Evidence</i>	American Forest Foundation (AFF). 2021. Risk Based Approach (RBA) for Achieving Conformance with the Netherlands' SDE+ Sustainability Standards (05

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<i>Risk rating</i>	Specified risk

Criterion 2.2 - Ecosystem productivity, functions, and services are maintained or enhanced.

2.2.1	Feedstock shall not be sourced from land that had one of the following statuses in January 2008 and no longer has that status due to land conversion: a. Forests; b. Wetlands; c. Peatlands; d. Highly biodiverse grasslands
<i>Findings</i>	Scale of assessment Analysis of land use change was evaluated for the RRA’s full geographic scope. In all land types, analysis was conducted with an emphasis on private forest lands, which provide the vast majority of feedstock into biomass supply chains, along with other non-National Forest System (NFS) land tenures including State and local government, non-governmental organizations (NGO), environmental non-governmental organizations (ENGO), and others. Change detection analysis was conducted at various scales, depending on the availability of the most appropriate data for each ecosystem type. Changes in (a) forest land use were analyzed at the USDA Forest Service’s (FS) Forest Inventory and Analysis (FIA) Unit level. Analysis To evaluate this Indicator, original quantitative and qualitative analysis was conducted, along with analysis of relevant literature, including preexisting assessments evaluating risks and impacts to biodiversity associated with forest sourcing in the geography of interest. These preexisting resources are widely accepted and have precedence in the forestry community in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this

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indicator, as appropriate. For this indicator specifically, mitigation options and approaches were a focus of stakeholder feedback.

To evaluate the risk of sourcing feedstock from converted land types, geospatial change detection analysis was conducted for three types of land use: a. Forests, b. Wetlands, and d. Highly biodiverse grasslands, using the best available dataset for that specific land use. In each case, the relevant dataset was leveraged comparing the extent of that land type in January 2008 (or as close as possible to that date, based on the best available data availability) and the present (using the latest available datasets). Additionally, qualitative analysis was conducted for each land type to triangulate or corroborate results of quantitative analysis. Qualitative analyses included review of relevant literature and preexisting assessments related to land use change and sourcing risks. These preexisting resources are widely accepted and have precedence in the forestry community in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. In the case of c. Peatlands, no appropriate quantitative data is available and, thus, preexisting risk assessments of peatlands and qualitative data is used.

Forests

For a. forests, according to all sources reviewed, the overall rate of deforestation is quite low at the scale of the US, as a whole, and the US Southeast, in which the RRA geography is situated. Similarly, there is consensus that forest harvesting is not a driver of forest loss, and neither is expansion of agriculture. Deforestation is driven by population growth and commercial or residential development.

While there is an array of relevant laws for lands owned by the State and Federal governments, there is no specific legal Federal framework that governs the conversion of private forests, outside of forested wetlands. There are State and local level ordinances that relate to zoning and are used by essentially all major metropolitan areas. However, these are varied and diverse and, as a result, not suited to appropriate analysis at the scale of the RRA. In the absence of consistent Federal legislation, to evaluate factual trends in forest land use, the USDA FS's FIA data were queried across the entire geographic assessment area. We evaluated the area of timberland at two time periods: one containing measurements collected immediately before 2008 and one collected at the most recent measurement. Timberland is defined by FIA as a subset of forest land in non-reserved status and capable of producing 20 cubic feet per acre per year (1.4 cubic meters per ha per year) of wood from trees classified as timber species and designated as a timber forest type (Westfall et al. 2022). Timberland was selected because it is the forested land base most likely to be supplying feedstock into biomass supply chains. FIA data are collected in a panel design, with up to 20% of plots measured in a single year, hence, all plots are measured over several years (Westfall et al. 2022).

Across the region, average timberland area increased from pre-2008 measurements to most recent ones in nine of 16 States (Table 2.2.1.-1). Overall, timberland area decreased by 0.75%. It is important to note the time periods of comparison in these analyses, because longer durations will result in a more pronounced estimate of change, particularly when investigating timberland and forest land area trends in the FIA data (Coulston, 2024). Several of the States that saw decreases in timberland area were ones with large acreages of non-forest land uses, these include, for example, timberland in Florida and Texas (Meade, 2024).

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Table 2.2.1-1. *Timberland area change by State in the Supply Base, pre-2008 to present.*

State	Pre-2008 measurement years	Timberland area, pre-2008 (million hectares)	Recent measurement years	Timberland area, recent (million hectares)	Percent change in timberland area, pre-2008 to present
Alabama	2001-2007	8.89	2015-2023	9.04	1.68%
Arkansas	2000-2007	6.27	2019-2023	6.43	2.52%
Florida	2002-2007	5.87	2014-2020	5.55	-5.44%
Georgia	1998-2007	9.56	2015-2022	9.30	-2.79%
Kentucky	2005-2007	4.61	2013-2019	4.62	0.35%
Louisiana	2001-2005	5.44	2015-2021	5.70	4.84%
Mississippi	2006	7.31	2017-2022	7.22	-1.22%
Missouri	2004-2007	5.44	2015-2021	5.45	0.22%
North Carolina	2003-2007	6.75	2016-2022	6.81	0.96%
Ohio	2007	3.04	2015-2021	2.91	-4.00%
Oklahoma	1993 (east), 1989 (west)	2.43	2017-2021	2.50	3.00%
South Carolina	2002-2007	4.98	2017-2021	4.87	-2.19%
Tennessee	2000-2007	5.19	2012-2020	5.10	-1.64%
Texas	2001-2007	5.61	2014-2020	5.09	-9.37%
Virginia	2002-2007	5.50	2017-2022	5.57	1.33%

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West Virginia	2004-2007	4.37	2015-2021	4.39	0.56%
TOTALS	-	91.26	-	90.55	-0.75%

Recognizing that forest loss is localized and largely driven by development, to more precisely identify areas affected by forest loss, change was also evaluated at the FIA unit level. This is the most granular level of analysis and is the level at which can be most accurately and reliably identified. FIA Units are aggregations of counties. This is the level at which risk is specified, based on statistical viability. FIA unit results are provided in the Annexes, units of specified risk and counties within those units are identified in the conclusion section for this Indicator.

The results of this analysis, showing slight increases or decreases in timberland area at FIA Unit levels, align with results from the USDA's Resource Planning Act Assessment (Oswalt et al. 2022), which showed stable estimates of timberland area from 1953 through 2017 for the US South (their Figure 1-12).

The Forest Stewardship Council's US National Risk Assessment (FSC US NRA) also evaluated the risk of conversion of forests to non-forest uses. The FSC US NRA evaluated population growth between 2015 and 2016, along with residential building permits issued during the same time period. Counties with greater than 2% population growth and the issuance of building permits above threshold of 1,500 during this period were designated for risk of wood associated with conversion entering the Forest Stewardship Council's (FSC) Controlled Wood supply chain.

Within the geography of the RRA specifically, 46 counties were designated with specified risk by FSC (Table 2.2.1-2 and the Annexes). The FSC-specified counties overlap in some cases with the results of the analysis of the FIA data. See Table 2.2.1-2 below.

Table 2.2.1-2: *Counties Specified for Risk of Conversion in FSC US NRA*

State	County		State	County		State	County
Alabama	Baldwin		Florida	Volusia		North Carolina	Pender
Florida	Clay		Georgia	Barrow		North Carolina	Wake
Florida	Collier		Georgia	Bryan		South Carolina	Berkeley
Florida	Flagler		Georgia	Cherokee		South Carolina	Horry
Florida	Hernando		Georgia	Clayton		South Carolina	Jasper
Florida	Hillsborough		Georgia	Columbia		South Carolina	Lancaster

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Florida	Lake		Georgia	Effingham		South Carolina	York
Florida	Lee		Georgia	Forsyth		Texas	Bastrop
Florida	Nassau		Georgia	Henry		Texas	Brazos
Florida	Orange		Georgia	Paulding		Texas	Liberty
Florida	Osceola		North Carolina	Brunswick		Texas	Montgomery
Florida	Pasco		North Carolina	Cabarrus		Texas	Waller
Florida	Polk		North Carolina	Chatham		Virginia	Loudoun
Florida	Santa Rosa		North Carolina	Currituck		Virginia	New Kent
Florida	St. Johns		North Carolina	Johnston			
Florida	St. Lucie		North Carolina	Mecklenburg			

Wetlands

For b. wetlands, land use history and the impact of legislation was evaluated. The US Clean Water Act (CWA) is the dominant Federal regulatory mechanism for protection of wetlands, which is further articulated at the State level through the implementation of BMPs. Specifically, Section 404 of the CWA regulates the discharge of dredged or fill material and specifies activities must not convert wetlands to uplands and/or new uses (EPA, 2020). The rigorous and longstanding enforcement of the CWA suggests conversion of any wetland to dried alternative ecosystems is likely to have occurred before its enactment in 1972, and well before the 2008 cut off specified by the SBP requirements. In the early twentieth century, wetland drainage was encouraged and, in some circumstances, subsidized, to promote the expansion of agriculture and plantation forestry across the US South. Previous analyses of land use histories, such as the American Forest Foundation's (AFF) Risk Based Approach (RBA) report most wetland conversion occurred in the 1940s and 1950s and, particularly, dredging of wetland areas was greatly reduced following passage of the CWA in 1972 (AFF, 2021).

In addition, as required by the CWA, implementation and enforcement of Best Management Practices (BMPs) at the State level, which has been widely found to be effective, significantly reduces the risk of the sourcing biomass from wetlands, generally, but especially from those converted after January 1, 2008. Experts and stakeholders note in other analyses, while there is little new silvicultural drainage, some trees are grown in existing ditches and canals. These water features are heavily regulated, and drainage is not an issue that comes up regularly in forest management. Overall, silvicultural operations in forested

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wetlands are compatible with long-term sustainability when appropriate silvicultural systems, forest operations, and forestry BMPs are applied (Aust, et al. 2019). As noted elsewhere in the RRA, BMPs and logger training are an industry norm, and it is estimated that the majority of feedstock flowing into biomass supply chains is sourced via an SFI Fiber Sourcing Program at primary sourcing.

To corroborate the qualitative analysis, and more specifically assess risk of wetland conversions during the specified timeframe, geospatial change detection analyses was conducted comparing the National Land Cover Database (NLCD) data from 2008 to 2021 (most recent available). For wetland land types, NLCD applies the values 90 and 95 to the relevant land base. In this analysis, values 90 and 95 were compared and where 2006 wetland values were not equal to 90 or 95, wetland conversion likely occurred. To identify wetland conversion, total wetlands were summarized for both years, the results are below, showing the difference in total wetlands. This analysis yields a net increase in wetlands of 1.18% across the RRA's geography and no losses were reported for any of the States with the RRA's geography (Table 2.2.1.-3).

Table 2.2.1-3: Change in Wetland Area 2008 to 2021 by State

State	Wetland* Area (Ac.)		Change in Wetland Area 2008 to 2021	
	2008	2021	Acres	Percent
Alabama	3,904,932	3,931,030	26,098	0.67%
Arkansas	3,587,490	3,623,259	35,770	1.00%
Florida	13,174,979	13,245,328	70,349	0.53%
Georgia	6,678,790	6,706,828	28,038	0.42%
Kentucky	360,415	365,754	5,339	1.48%
Louisiana	9,614,270	9,835,580	221,310	2.30%
Mississippi	5,257,659	5,369,937	112,277	2.14%
Missouri	971,686	1,016,911	45,225	4.65%
North Carolina	4,965,181	4,977,541	12,359	0.25%
Ohio	441,117	454,657	13,540	3.07%
Oklahoma	462,599	496,715	34,116	7.37%
South Carolina	4,588,262	4,598,109	9,848	0.21%
Tennessee	900,233	909,975	9,742	1.08%
Texas	6,429,113	6,535,448	106,335	1.65%

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Virginia	1,467,917	1,478,175	10,258	0.70%
West Virginia	46,366	49,244	2,877	6.21%
TOTAL	62,851,010	63,594,491	743,482	1.18%

Peatlands

For c. peatlands, estimates of peatland extent globally range from 2-4% of the Earth's land area but are estimated to contain up to one-third of the world's soil carbon (UNEP, 2022). Precise locations of peatland deposits are not well understood. New analysis and tools are enhancing understanding of the current extent of peatlands or at least the shortcomings of previous estimates, including overestimation of presence in parts of mid- and high latitudes of the Northern Hemisphere (Xu et.al., 2018), where the geography of this RRA is situated.

The United Nations Environmental Programme (UNEP) estimates that 32% of the world's peatland are found in North America. The majority of these are found in the subarctic and boreal zones, outside of the RRA's geography. Previous studies within the RRA's geography suggest the extent of peatlands is limited in this region of the US (AFF, 2021). There are, however, notable peatland ecosystems, such as the Everglades National Park in Florida and Okefenokee National Wildlife Refuge in Georgia (USFWS, 2022), which are generally managed by the Federal government under protected status and are not a source of biomass sourcing.

These peatlands are in comparatively good condition, compared to peatlands in other places globally, less than 2% of peatlands in North America region are estimated to be degraded, likely in a period before 2008 and implementation of the CWA. Historically, drainage for agriculture has been the main threat to North American peatlands, but they are now also threatened by oil and gas exploitation (generally outside the RRA's geography). Conversion to forests was not identified as a threat to peatlands by any source consulted.

Within the RRA's geographic scope, peatlands tend to be associated with histosol soils, which meet SBP's definition for peatland (areas with soils containing at least a 40cm deep layer of peaty material in the first 80cm of the soil). According to the US Department of Agriculture's (USDA) Illustrated Guide to Soil Taxonomy V2.0, 2015, "histosols are formed in thick accumulations of organic matter from decaying plant material. The organic-dominated layers are typically at least 40 cm thick and commonly much thicker." As such, this definition for histosols in the US aligns with the SBP definition for peatlands. Further, review of the literature and consultation with experts confirmed that peatlands are terrestrial wetland ecosystems. As a subset of wetlands, the analyses completed for Indicator 3.2.1 would apply to peatlands (USFWS, 1979). This analysis yields a net increase in wetlands of 1.18% across the RRA's geography and no losses were reported for any of the states with the RRA's geography. As such, risk of sourcing feedstock from forests displacing wetlands in 2008 is low.

Highly Biodiverse Grasslands

For d. highly biodiverse grasslands, because there is no widely recognized preexisting assessment of grasslands for this region, analysis began with consultation of experts of grasslands and grassland ecology of the Southern US to evaluate the application of the term *highly biodiverse grasslands*, as

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defined by SBP (and the EU, 2018) and their status in the RRA's geography.

According to experts consulted, the definition provided by the SBP and European Union (EU) legislation is not well suited to the grasslands in the US. There is consensus across all reviewed sources and experts, that intact, biodiverse grasslands are extremely rare within the RRA's geography and have been for over 100 years. Intact, natural, native, highly biodiverse grasslands, as described in part i. of the SBP/EU definition are estimated to remain at 1-5% of historical pre-European colonial levels and have been stable at these levels for more than 100 years, as this conversion occurred before the US Civil War (1861) (Estes, 2024, Estes et al., 2016, Murray, 2024, Muir, 2024). As such, the likelihood of sourcing feedstock from highly biodiverse grasslands in 2008 is extremely low.

According to experts, grasslands in the US differ from other grasslands globally, which tend to be defined by climatic conditions, particularly conditions which are too dry to support trees, as is common in the Asian and African grasslands, including the Serengeti. Historically, grasslands in southern North America were maintained by periodic wildfires and grazing of large animals, including specifically significant bison (*Bison bison*) herds. These ecosystems favoured biodiverse forbs and bunchgrasses while limiting forests to protected areas such as river drainages and rocky outcroppings. Colonial European farm plows and subsequent loss of topsoil, over-grazing livestock, and aversion to fire by European colonists and later inhabitants (pyrophobia) eventually pushed those boundaries away from biodiverse grasslands to today's invaded juniper and mesquite savannahs in the western part of this RRA's geography, or cultivated pasture monocultures in the eastern part (Estes, 2024, Estes et al., 2024, Murray, 2024, Muir, 2024, USDA, 2024).

For the second part of the definition of *highly biodiverse grasslands*, as defined by SBP and EU legislation, experts consulted found this definition problematic for application to ecosystems in the US. Experts consulted provided consensus that historic native grasslands were eradicated from US and there are currently no datasets that can reliably be used to analyse change in restored grasslands, as roughly defined in the second half of the definition (ii). The USDA Forest Service (FS) maintains US National Grasslands, a constellation of Federally owned and managed grassland properties, which are located outside of the geographic scope of this RRA, except for Texas where the Rita Blanca National Grassland was established well before 2008. However, the US Federal government does not maintain a register of grasslands classified as highly biodiverse. Experts additionally caution that remotely sensed data, best suited for analysis at the scale of the RRA, cannot be used to distinguish between restored biodiverse grasslands populated by native species and monoculture pasture lands, which are by far much more expansive on the landscape. Additionally, there are 118 restored native species grassland ecosystems that have their own distinct signatures, which are not yet characterized digitally. As such, change detection analysis of restored grasslands using remotely sensed data is not reliable (Estes, 2024, Murray, 2024, Muir, 2024). All experts consulted agreed that grasslands meeting this definition would be very limited in their extent and generally unlikely to be displaced by forest or represent any meaningful contribution to the forest feedstock supply chain, thus, not presenting significant risk. Experts consulted noted that, in general, forest management is generally compatible with grasslands management because, in the absence of fire, the overstory is removed enabling light for the herbaceous understory. The caveats would be that management activities must preserve soil integrity (see Indicator 2.2.3.) and use of herbicides must be limited (see Indicator 2.2.7.). However, experts consulted for the Western part of the RRA geography, including notably Texas and Oklahoma, indicated further development of a biomass sector for encroaching mesquite and juniper could be an economic driver of grassland restoration.

Although qualitative analysis suggests that risk for feedstock sourcing from displaced highly biodiverse grasslands is low, the datasets were evaluated against the definition provided by the SBP Standards. NLCD has a code called *Grassland/Herbaceous*, which is defined as "areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be

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utilized for grazing.” This data definition only partially aligns with ii of the SBP/EU definition, limiting the appropriateness of the dataset for purposes of analysis, largely because it includes all pastures and grasslands, nearly if not all of which, all experts consulted agree, would not be highly biodiverse. As such, quantitative analysis was not conducted.

The FSC US NRA evaluated the risk of wood being sourced from areas where high conservation values (HCVs) are threatened by forest management activities. The only identified HCVs in this category associated with grasslands related to montane meadows in the Central California Critical Biodiversity Area, outside the geographic scope of this RRA. However, consultation with experts note the association of various grasses and herbaceous ecosystems in association with some of the Critical Biodiversity Areas (CBA) identified in the FSC US NRA. These include specified risk areas associated with longleaf pine (*Pinus palustris*) including Native Longleaf Pine Ecosystems, the Southern Appalachians CBA, and the Florida Panhandle CBA. Note that the Central Texas CBA, of which only a small portion is forested, is designated low risk for the entire CBA. However, these are more appropriately characterized as forested ecosystems and are not described as grasslands ecosystems or otherwise meet the SBP definition as such.

There are no specific Federal legal mechanisms preventing the conversion of remaining highly biodiverse grasslands on any non-Federal lands, including privately owned forests, except in cases where they may provide habitat for known federally protected threatened or endangered species under the ESA (see Indicators 2.1.1., 2.1.2., and 2.1.3.). However, there are provisions in the US Farm Bill that apply to grasslands restoration. The Farm Bill is a bundled package of legislation passed by Congress roughly every five years that outlines policies for agriculture and food in the US. The Farm Bill is the primary source of funding for conservation on private lands. The 2018 Farm Bill included funding for the Grassland Conservation Reserve Program (CRP), a voluntary Federal program that contracts with agricultural producers so that environmentally sensitive agricultural land is not farmed or ranched but instead used for conservation benefits. The program emphasizes support for grazing operations, plant and animal biodiversity, and grassland and land containing shrubs and forbs under the greatest threat of conversion (Farm Service Agency, 2024). Renewal of funding for the Grassland CRP program is contingent on continued allocations in future Farm Bills. Data about the extent and location of program application in the RRA geography is not available.

Additionally, the US North American Grasslands Conservation Act (2022), is a *proposed* piece of legislation in Congress that was referred to the Committee on Environment and Public Works in 2022 (Congress, 2024). If approved, the legislation would create an incentive-based program for private landowners to conserve and restore grassland ecosystems, primarily in the western US, outside of the RRA geography. The bill was referred to the Congressional Subcommittee on Conservation Research and Biotechnology in November of 2024.

The nongovernmental conservation sector also offers a range of programs including several under the Southern Grasslands Institute, housed at Austin Peay State University at Clarksville, Tennessee. The philanthropically funded organization serves the majority of the RRA’s geography with targeted strategies related to preservation and restoration of grasslands in the region.

Enforcement and monitoring

As established in Indicator 1.1.1., the US has a well-developed set of laws covering all aspects of ecosystem health, including soils protection. Through the decades, these laws have been consistently enforced through robust monitoring systems.

Related to a. forests, while there are a diversity of local zoning laws and ordinances, there is no Federal framework that governs the conversion of private forests, outside of forested wetlands. However, the extent of forest lands is rigorously monitored and reported via the FIA program, using an established and

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consistent methodology. The complete census is generally completed for forest lands in five to eight years, depending on the state. The most current dataset is always available via the USDA FS’s online data access tool EVALIDator. Additionally, the FS’s Southern Research Station publishes annual online summaries of key forest metrics including forest land areas and timberland outputs in One-Click Factsheets. These provide ongoing monitoring and reflect coordination with a range of State and Federal partners, scientists, analysts, computer specialists.

FSC maintains a robust, complex and multifaceted normative framework for the development and maintenance of its Controlled Wood National Risk Assessments. This framework includes but is not limited to the Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002V2-0 EN), FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002), Interpretations of the Normative Framework, Controlled Wood (9/09/2024), and a List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). All these guiding mechanisms are subject to FSC’s triumvirate governance system and related processes for the development of procedures, directives, interpretations, derogations, and other forms of FSC’s normative framework. Additionally, the FSC US NRA specifically describes the approach for maintenance of the NRA (FSC, 2019).

For FSC Controlled Wood certificate holders, conformity with the FSC Controlled Wood Standards and conforming application of the FSC US NRA and related control measures is evaluated by third-party certification bodies. The certificate status may be verified using the FSC certificate public search database (<https://connect.fsc.org/fsc-public-certificate-search>).

Related to b. wetlands and c. peatlands, the CWA is rigorously enforced, like all laws in the US. The US Environmental Protection Agency (EPA) has regulatory authority for the CWA generally. As it relates to Section 404 (the CWA section addressing wetlands), violations fall into two broad categories: failure to comply with the terms or conditions of a Section 404 permit or discharging dredged or fill material to waters of the US without a permit. In either case, since 1989, the EPA and US Army Corps of Engineers (ACE) share authority for oversight. Under their agreement, ACE, as the Federal agency that issues permits, has the lead on ACE-issued permit violation cases. For unpermitted discharges, EPA and ACE determine the appropriate lead agency based on criteria their agreement. EPA and ACE consider a wide variety of factors when identifying enforcement action for 404 violations. These factors include the amount of fill, the size of the water body (acres of wetlands filled and the environmental significance), discharger's previous experience with Section 404 requirements, and discharger's compliance history. In most instances, EPA and ACE prefer to resolve Section 404 violations through voluntary compliance or administrative enforcement. There is, however, a long-documented history of criminal enforcements (EPA, 2024). Fines for violations of Section 404 of CWA range from \$2,500 to \$50,000 per day and up to six years in prison (EPA, 2024).

Related to c. highly biodiverse grasslands, there are currently no specific Federal legal mechanisms preventing the conversion of these grasslands on any non-Federal lands, including privately owned forests, except in cases where they may provide habitat for known federally protected threatened or endangered species under the ESA (see Indicators 2.1.1., 2.1.2., and 2.1.3.). This reflects the near complete eradication of highly biodiverse grasslands in the decades following colonization of the RRA geography by Europeans. There are government and conservation program in place, primarily directed at restoration of eradicated grassland ecosystems, which monitor their own activities. The US Grasslands CRP program, aimed at grasslands restoration, is strictly monitored and controlled by the USDA’s Farm Service Agency (FSA) at the site level. Information about the extent and locations of enrolled private lands is not made public available. However, failure to carry out terms of the CRP contract, including inconsistent management practices, will result in termination of the agreement and forfeiture of payments as well as payment of liquidated damages.

Risk conclusion and justification

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	a. Forests: While there is consensus that deforestation rates are quite low in the US and for the RRA geography, analysis of FIA for the given time period indicates net loss of timberland for the RRA geography of less than 1% (0.75%) with localized losses and gains. Similarly, using methodology based on population growth and issuance of housing permits, which is not based on change detection analysis of the forest itself, the FSC US NRA specified risk for a set of counties within the RRA’s geography. Despite relatively low rates of forest loss, with recognition to the precedence of the FSC US NRA and the results of original analysis for the RRA’s geography, risk is specified as it relates to forests in this Indicator (See Figure 2.2.1.-1 and Table 2.2.1.-1).

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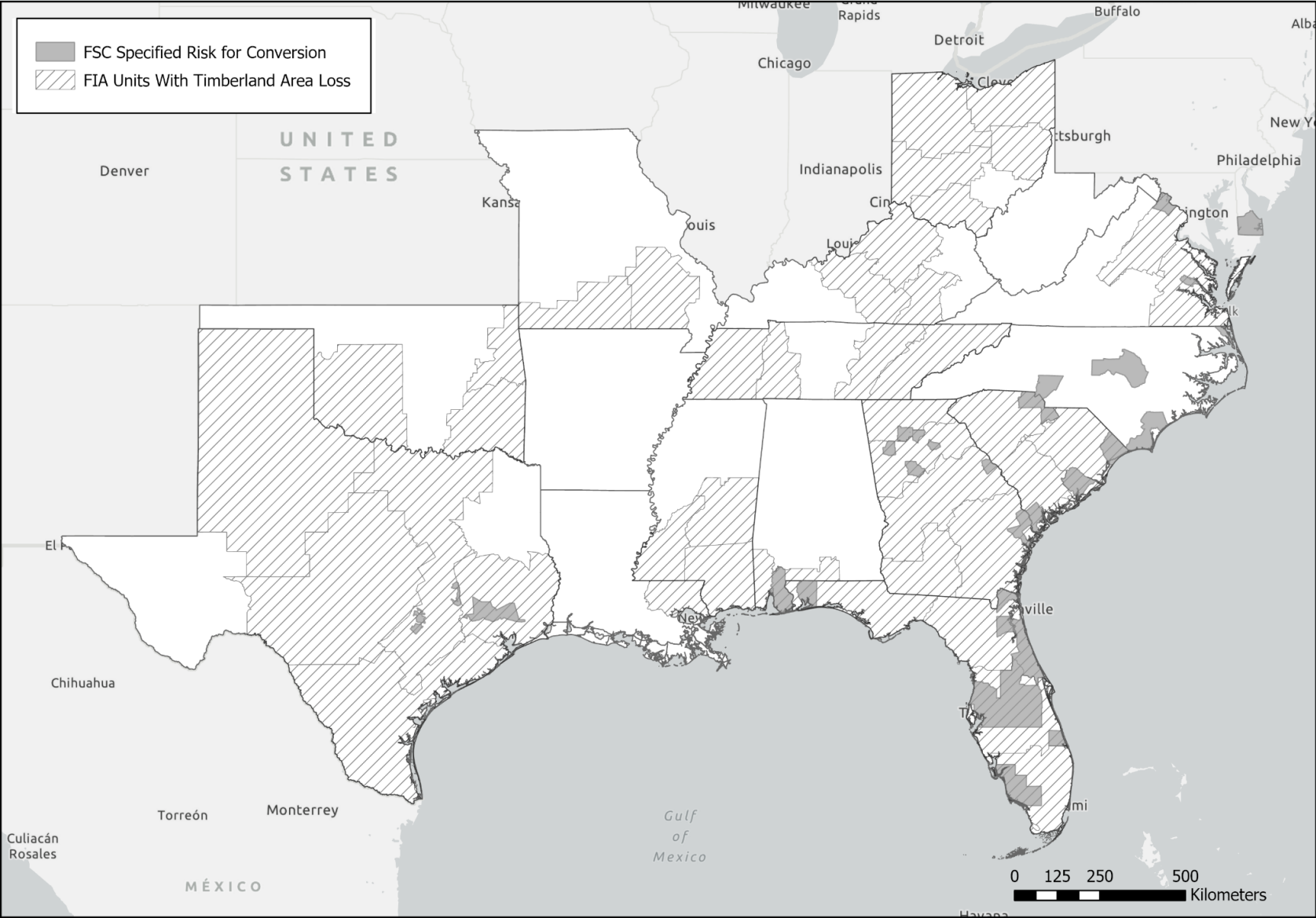


Figure 2.2.1.-1: Areas of Specified risk, as identified either by the FSC US National Risk Assessment or through analysis of FIA Units for forest loss.

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State	Counties/Parishes of Specified Risk As indicated via FSC US NRA specification or FIA unit analysis of timberland loss
Alabama	Baldwin, Covington, Escambia, Mobile, Washington
Arkansas	No counties
Florida	All counties
Georgia	All counties
Kentucky	Adair, Anderson, Bath, Bell, Boone, Bourbon, Boyle, Bracken, Breathitt, Breckinridge, Bullitt, Campbell, Carroll, Casey, Clark, Clay, Clinton, Cumberland, Estill, Fayette, Fleming, Franklin, Gallatin, Garrard, Grant, Grayson, Green, Hancock, Hardin, Harrison, Hart, Henry, Jackson, Jefferson, Jessamine, Kenton, Knox, Larue, Laurel, Lee, Lincoln, McCreary, Madison, Marion, Mason, Meade, Mercer, Metcalfe, Montgomery, Nelson, Nicholas, Oldham, Owen, Owsley, Pendleton, Pulaski, Robertson, Rockcastle, Russell, Scott, Shelby, Spencer, Taylor, Trimble, Washington, Wayne, Whitley, Woodford
Louisiana	East Baton Rouge, East Feliciana, Livingston, St. Helena, St. Tammany, Tangipahoa, Washington
Mississippi	Adams, Amite, Attala, Claiborne, Clarke, Copiah, Covington, Forrest, Franklin, George, Greene, Hancock, Harrison, Hinds, Jackson, Jasper, Jefferson, Jefferson Davis, Jones, Kemper, Lamar, Lauderdale, Lawrence, Leake, Lincoln, Madison, Marion, Neshoba, Newton, Noxubee, Pearl River, Perry, Pike, Rankin, Scott, Simpson, Smith, Stone, Walthall, Wayne, Wilkinson, Winston
Missouri	Barry, Bollinger, Butler, Carter, Christian, Crawford, Dent, Douglas, Howell, Iron, McDonald, Madison, Newton, Oregon, Ozark, Reynolds, Ripley, St. Francois, Shannon, Stone, Taney, Texas, Washington, Wayne, Webster, Wright
North Carolina	Brunswick, Cabarrus, Chatham, Currituck, Johnston, Mecklenburg, Pender, Wake
Ohio	Adams, Allen, Ashland, Ashtabula, Auglaize, Belmont, Brown, Butler, Carroll, Champaign, Clark, Clermont, Clinton, Columbiana, Coshocton, Crawford, Cuyahoga, Darke, Defiance, Delaware, Erie, Fairfield, Fayette, Franklin, Fulton, Gallia, Geauga, Greene, Guernsey, Hamilton, Hancock, Hardin, Harrison, Henry, Highland, Holmes, Huron, Jackson, Jefferson, Knox, Lake, Lawrence, Licking, Logan, Lorain, Lucas, Madison, Mahoning, Marion, Medina, Mercer, Miami, Monroe, Montgomery, Morrow, Muskingum, Noble, Ottawa, Paulding, Pickaway, Pike, Portage, Preble, Putnam, Richland, Ross, Sandusky, Scioto, Seneca, Shelby, Stark, Summit, Trumbull, Tuscarawas, Union, Van Wert, Warren, Wayne, Williams, Wood, Wyandot

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Oklahoma	Adair, Atoka, Beckham, Blaine, Bryan, Caddo, Canadian, Cherokee, Choctaw, Coal, Comanche, Cotton, Custer, Delaware, Dewey, Grady, Greer, Harmon, Haskell, Jackson, Jefferson, Kingfisher, Kiowa, Latimer, Le Flore, McCurtain, McIntosh, Mayes, Muskogee, Ottawa, Pittsburg, Pushmataha, Roger Mills, Sequoyah, Stephens, Tillman, Washita
South Carolina	All counties
Tennessee	Anderson, Benton, Bledsoe, Blount, Bradley, Campbell, Carroll, Carter, Chester, Claiborne, Cocke, Crockett, Cumberland, Decatur, Dyer, Fayette, Fentress, Franklin, Gibson, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hardeman, Hardin, Hawkins, Haywood, Henderson, Henry, Hickman, Houston, Humphreys, Jefferson, Johnson, Knox, Lake, Lauderdale, Lawrence, Lewis, Loudon, McMinn, McNairy, Madison, Marion, Meigs, Monroe, Morgan, Obion, Overton, Perry, Pickett, Polk, Putnam, Rhea, Roane, Scott, Sequatchie, Sevier, Shelby, Stewart, Sullivan, Tipton, Unicoi, Union, Van Buren, Warren, Washington, Wayne, Weakley, White
Texas	Andrews, Angelina, Archer, Armstrong, Atascosa, Austin, Bailey, Bandera, Bastrop, Baylor, Bee, Bell, Bexar, Blanco, Borden, Bosque, Brazoria, Brazos, Briscoe, Brooks, Brown, Burleson, Burnet, Caldwell, Calhoun, Callahan, Cameron, Carson, Castro, Chambers, Childress, Clay, Cochran, Coke, Coleman, Collin, Collingsworth, Colorado, Comal, Comanche, Concho, Cooke, Coryell, Cottle, Crockett, Crosby, Dallam, Dallas, Dawson, Deaf Smith, Delta, Denton, DeWitt, Dickens, Dimmit, Donley, Duval, Eastland, Edwards, Ellis, Erath, Falls, Fannin, Fayette, Fisher, Floyd, Foard, Fort Bend, Freestone, Frio, Gaines, Galveston, Garza, Gillespie, Glasscock, Goliad, Gonzales, Gray, Grayson, Grimes, Guadalupe, Hale, Hall, Hamilton, Hansford, Hardeman, Hardin, Harris, Hartley, Haskell, Hays, Hemphill, Hidalgo, Hill, Hockley, Hood, Hopkins, Houston, Howard, Hunt, Hutchinson, Irion, Jack, Jackson, Jasper, Jefferson, Jim Hogg, Jim Wells, Johnson, Jones, Karnes, Kaufman, Kendall, Kenedy, Kent, Kerr, Kimble, King, Kinney, Kleberg, Knox, Lamar, Lamb, Lampasas, La Salle, Lavaca, Lee, Leon, Liberty, Limestone, Lipscomb, Live Oak, Llano, Lubbock, Lynn, McCulloch, McLennan, McMullen, Madison, Martin, Mason, Matagorda, Maverick, Medina, Menard, Midland, Milam, Mills, Mitchell, Montague, Montgomery, Moore, Motley, Navarro, Newton, Nolan, Nueces, Ochiltree, Oldham, Orange, Palo Pinto, Parker, Parmer, Polk, Potter, Rains, Randall, Reagan, Real, Refugio, Roberts, Robertson, Rockwall, Runnels, Sabine, San Augustine, San Jacinto, San Patricio, San Saba, Schleicher, Scurry, Shackelford, Sherman, Somervell, Starr, Stephens, Sterling, Stonewall, Sutton, Swisher, Tarrant, Taylor, Terry, Throckmorton, Tom Green, Travis, Trinity, Tyler, Uvalde, Val Verde, Victoria, Walker, Waller, Washington, Webb, Wharton, Wheeler, Wichita, Wilbarger, Willacy, Williamson, Wilson, Wise, Yoakum, Young, Zapata, Zavala

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Virginia	Accomack, Albemarle, Amherst, Arlington, Brunswick, Caroline, Charles City, Chesterfield, Culpeper, Dinwiddie, Essex, Fairfax, Fauquier, Fluvanna, Gloucester, Goochland, Greene, Greensville, Hanover, Henrico, Isle of Wight, James City, King and Queen, King George, King William, Lancaster, Loudoun, Louisa, Madison, Mathews, Middlesex, Nelson, New Kent, Northampton, Northumberland, Orange, Prince George, Prince William, Rappahannock, Richmond, Southampton, Spotsylvania, Stafford, Surry, Sussex, Westmoreland, York
West Virginia	No counties

Table 2.2.1.-1: *Areas of Specified risk, as identified either by the FSC US National Risk Assessment or through analysis of FIA Units for forest loss.*

Areas of specified risk (Figure 2.2.1.-1 and Table 2.2.1.-1):

- Counties identified as areas of specified risk by FSC US NRA
- Counties within FIA Units identified in this analysis and enumerated in the Annexes.

Mitigation: To mitigate risk of sourcing feedstock from areas of forest converted to other land uses, biomass producers must implement control measures consistent with those identified in the FSC US NRA (2019). These include specifically:

1. Development and implementation of binding written agreements with suppliers that prohibit the delivery of material originating from known conversions of forest to nonforest use.
- b. Wetlands and c. Peatlands: The existence and rigorous implementation and enforcement of the CWA since 1972 would generally preclude the conversion of wetlands and peatlands, as a subset of wetlands, resulting in the flow of feedstock into biomass supply chains. Original analysis of NLCD data comparing wetland area in 2008 and the present (most recent data) corroborates this conclusion, showing slight increases in wetland areas. Last, the ongoing implementation of BMPs, generally and especially under SFI Fiber Sourcing programs where the majority of primary sourcing occurs, further protects against the conversion of wetlands and the flow of any feedstock into the supply chain. Therefore, it is concluded that the risk class for Indicator 2.2.1. regarding b. Wetlands and c. Peatlands is **low risk**.
- d. Highly Biodiverse Grasslands: While there are no specific lands in place to prevent the conversion of highly biodiverse grasslands, these ecosystems were almost entirely eradicated from the geography of the RRA in the decades following colonization by Europeans. As such, experts are in consensus that the risk of sourcing feedstock from forests that displaced lands that were highly biodiverse grasslands in 2008 is very remote. Therefore, it is concluded that the risk class for Indicator 2.2.1. regarding d. Highly biodiverse grasslands is **low risk**.

*Supply
Base*

- State BMP manuals

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<i>Verifiers</i>	• Supplier agreements • Secondary supplier audit checklists • Company District of Origin Process • State Implementation Committee’s logger training databases • State Forestry BMPs compliance reports • State One-Click Fact Sheets • FSC Centralized National Risk Assessments (PSU-PRO-10-002V2-0 EN) • FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002) • Interpretations of the Normative Framework, Controlled Wood (9/09/2024) • FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN).
<i>Evidence reviewed</i>	<u>Forests</u> Coulston, J. PhD, Project Leader/Supervisory Research Forester, USDA Forest Service, Southern Research Station. 26 August 2024. Meade, J. Forester, USDA Forest Service, Southern Research Station. 2024. Personal communication and interviews, September 2024. Oswalt, S.N., Smith, W.B., Miles, P.D., and Pugh, S.A. 2019. Forest Resources of the United States, 2017: a technical document supporting the Forest Service 2020 RPA Assessment. Gen. Tech. Rep. WO-97. Washington, DC: US Department of Agriculture, Forest Service, Washington Office. 223 p. Westfall, J.A., Coulston, J.W., Moisen, G.G., and Andersen, H.E. 2022. Sampling and estimation documentation for the enhanced Forest Inventory and Analysis Program. US Department of Agriculture, Forest Service, Northern Research Station. US Department of Agriculture Forest Service. 2024 EVALIDator. Access: https://apps.fs.usda.gov/fiadb-api/evaluator US Department of Agriculture Forest Service. 2024. Forest Inventory and Analysis- Southern Research Station. Access: https://research.fs.usda.gov/srs/centers/fia <u>Wetlands and Peatlands</u> American Forest Foundation (AFF). 2021. Risk Based Approach (RBA) for Achieving Conformance with The Netherlands SDE+ Sustainability Requirements. Cristan, R., Aust, W.M., Bolding, M.C., Barrett, S.M., Munsell, J.F., and Schilling, E. 2015, “Effectiveness of forestry best management practices in the United States: Literature review”, Forest Ecology and Management. https://www.sciencedirect.com/journal/forest-ecology-and-management Environmental Protection Agency (EPA). 2024. Enforcement under CWA Section 404. Access: https://www.epa.gov/cwa-404/enforcement-under-cwa-section-

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<i>Risk rating</i>	Specified risk
2.2.2	Ecosystems, their health, vitality, functions and services in the Supply Base shall be maintained or enhanced.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary regions of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia, privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted, along with analysis of relevant literature, including preexisting assessments evaluating risks and impacts to biodiversity associated with forest sourcing in the geography of interest. These preexisting resources are widely accepted and have precedence in the forestry community in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. There is a system of Federal laws in place that support or enhance ecosystems and their related productivity, functions, and services. These include, notably, the US Clean Water Act (CWA), the US Endangered Species Act (ESA) and others. The CWA is the essential Federal legislation addressing water protection in the US, as discussed in the Introduction section of this RRA. It is administered by the US Environmental Protection Agency (EPA) and establishes the fundamental structure for regulating discharges of pollutants into the "waters of the United States" and regulating water quality standards for surface waters. This nexus of laws impacts a range of ecosystems that involve water or hydrologic function and services including forests and forested wetlands, as discussed in Indicator 2.2.1.. The US EPA has regulatory authority for the CWA generally.

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As noted in the Introduction and elsewhere in this RRA, States have developed Best Management Practices (BMPs) to meet their responsibilities under the CWA. Each State in the RRA geography has developed forestry BMPs and can regulate or stop forestry operations that create non-point source pollution that could damage water resources, including health, vitality, function, and productivity of related ecosystems including forests.

As noted in Indicators 2.1.1., 2.1.2., and 2.1.3., the ESA administered by the US Fish and Wildlife Service (FWS) provides legal protection for species the agency designates as threatened or endangered and their related habitats. The stated purpose of ESA is “*Provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation....*” (FWS, 2024). As such, the ESA serves to ensure that ecosystems are protected.

As described elsewhere, in association with the ESA law, States are required by the US Congress to have a State Wildlife Action Plan (SWAP) to receive funding for grants through the FWS. SWAPs have been developed for every US State and are updated approximately every 10 years. State level plans are required to identify at-risk wildlife and key habitats and communities. As Florida’s Fish and Wildlife Commission describes, to benefit the most species, SWAPs generally use an “ecosystem-based approach to conserving species by addressing the needs of their associated ecosystem” (Florida Fish and Wildlife Commission, 2019). As such, species conservation serves as an apparatus for protection of the range of ecosystems at both the State and Federal levels.

Again, as explained in Indicators 2.1.1., 2.1.2. and 2.1.3., there are two nonregulatory pathways for identifying ecosystems for protections. First, NatureServe’s Global Ranking System provides a long and well-documented means identifying imperilled species and ecosystems using defensible and scientifically rigorous and repeatable standards. This system was established in the 1980s by The Nature Conservancy (TNC) scientists as a means for categorizing the relative imperilment of species of plants, animals, and natural ecological communities, on the global, national or subnational levels to prioritize conservation action. Started by TNC but now led by NatureServe, the ranking system is a globally standardized, repeatable, peer-reviewed system that factors in rarity, trends, and threats data on species and ecosystems to determine imperilment on a scale of 1 to 5 (NatureServe, 2009). NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk (Faber-Langenhoven, 2012) sets out the methodology for conservation status assignment of species and ecosystems within the NatureServe system. G1 and G2 ranks, respectively, refer to critically imperiled and imperiled, and of very high or high risk of extinction due to rarity, range limitations, few populations and other factors (Faber-Langendoen, 2012). Species and associated ecosystems that are also listed by the ESA are not protected by Federal law.

The Forest Stewardship Council’s US National Risk Assessment (FSC US NRA) provides a well vetted mechanism for the identification of ecosystems, the focus of this indicator, as well as the status of their health, vitality, function, and services. This analysis mobilizes the High Conservation Value (HCV) approach, as described in the HCV Resource Network’s (HCV RN) Common Guidance, and aligns with SBP’s definition for *ecosystems* (FSC, 2019, FSC 2023). Thus, it is an appropriate resource for this evaluation. HCVs related to this Indicator includes HCV2 (landscape level ecosystems, ecosystem mosaics and Intact Forest Landscapes), HCV3 (ecosystems and habitats), and HCV4 (ecosystem services) and are identified and evaluated within the existing FSC US NRA. The FSC US NRA specifies risk related to the impact of forest management on the following rare ecosystems (HCV3) in the RRA’s geography: Mesophytic Cove Sites, Late Successional Bottomland Hardwoods, and Native Longleaf Pine Systems. These ecosystems may be maintained or enhanced under laws such as the CWA but are not directly identified in law.

Enforcement and monitoring

The CWA and ESA is rigorously enforced, like all laws in the US, as demonstrated in Indicator 1.1.1.. There is a long-documented history of criminal

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enforcements (EPA, 2024). Fines for violations of Section 404 of CWA range from \$2,500 to \$50,000 per day and up to six years in prison (EPA, 2024). Violations of ESA

BMP implementation is monitored by State agencies and remarkably high compliance rates are consistently found. Reported rates of compliance range between 81-99% in the States included in the RRA scope (NASF, 2019). As outlined in the BMP overview, BMP training programs are widely used in each of the States within the geography of the RRA and required under SFI Fiber Sourcing, a mainstay in forest-based procurement in the region.

Similarly, the legal protections in place under the ESA are strictly enforced. Violations of ESA are punishable by civil penalties of up to \$25,000 for each violation and criminal penalties of up to \$50,000 and one-year imprisonment upon conviction of violations of the Act. Since ESA prohibits the take of these species, including harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collection, or other such attempts, the ESA and its accompanying enforcement ensure the protection of listed species under Federal law. According to Title 18 of the Criminal Provisions of the US Criminal Code, violations of the ESA are punishable with criminal misdemeanour penalties of up to one year imprisonment and fines pursuant to a maximum of \$50,000 (EPA, 2024).

In terms of effectiveness, ESA is regarded as “one of the strongest laws of any nation for preventing species extinction” and has been successful in preventing the extinction of 99% of the species that have been listed since its enactment in 1973. As of 2019, only two species [dusky seaside sparrow (*Ammospiza maritima nigrescens*) and green blossom pearly mussel (*Epioblasma torulosa gubernaculum*)] are known to have become extinct in the Southeast region since the passage of the ESA, and neither of those species was forest-dependent or was likely to have been impacted by forest management activities (Greenwald et al., 2019).

In addition to Federal law, within the RRA geography, States may have laws protecting species at risk including those identified in their SWAPs as Species of Greatest Conservation Need (SGCN). SWAPs also outline comprehensive monitoring programs and State agencies, alongside the FWS, conduct ongoing monitoring of species populations and habitat. Penalties for violations of State related species laws vary. For example, a misdemeanour in Georgia is punishable by up to 12 months in jail and a maximum fine of \$1,000, a misdemeanour in South Carolina with penalties of a \$1,000 fine or one-year imprisonment, or both, and a third-degree felony in Florida punishable by up to five years in prison and a fine of up to \$5,000 (AFF, 2021). However, SWAPs in and of themselves do not provide protection for species listed as SGCN in the plans, and there are no laws within Southeast states that specifically address these SGCNs.

Ecosystems identified via HCV3 under the FSC US NRA may be maintained or enhanced under laws such as the ESA and CWA but are not directly identified in laws for specific protective measures.

Risk conclusion and justification

Ecosystems enjoy protections under a range of laws, including the CWA and ESA, which are consistently implemented and enforced. However, ecosystems identified via species ranking of G1 and G2 under the NatureServe Global Ranking system or the FSC NRA are not protected by law within the RRA's geography.

Thus, there is **specified risk** for:

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- Nature Serve Network identified G1-G2 animal species not on the ESA threatened or endangered list, G1-G2 plant species (Figure 2.1.3.-1)
- FSC US NRA identified ecosystems (HCV3) (Figure 2.1.3.-2)

Mitigation

In the context of a privately owned landscape governed by private property rights, biomass producers are limited in their abilities to directly control management actions and decision making.

There is longstanding evidence supporting supplier engagement and logger training as strategies to influence practices during harvest operations. Studies have found that logger training, for instance, results in enhanced knowledge and awareness around specific issues (Barnett et. al, 2012 Helmkamp et. al, 2004) and even a single introductory course in forest ecology and silviculture can help loggers make more-informed management decisions (Keefer et. al, 2002). Additionally, field guilds reinforce and serve as references for practitioners (Helmkamp et. al, 2004). These approaches can be evaluated through sampling of harvest sites, review of generated materials and interviews.

Studies suggest that outreach and education opportunities may be more influential on landowner behaviours than other forms of programming, such as the development of forest management plans. However, landowner programs, such as the US Forest Service's Forest Stewardship Program, which is among the largest and most significant programs, reach a small fraction of landowners. (Butler et. al, 2014). However, research finds that targeting the right audience, including landowners who plan to harvest, is more likely to result in their taking action to participate in programs (Ma et. al, 2012). As such, the procurement apparatus may provide a beneficial pathway for the distribution of outreach and education tools. Moreover, outreach and education, as well as conservation initiatives, seem likely to provide additional impact. As a result, these mitigation options will continue to be encouraged.

For Nature Serve Network identified G1-G2 animal species not on the ESA threatened or endangered list, G1-G2 plant species (Figure 2.2.2.-1):

Control measures including the following, which may be implemented in concert with SFI Fiber Sourcing certification:

- o Assessment of G1 and G2 plant and animal species and ecosystems by forest type within a biomass producer's supply basin, including primary and processing residue feedstocks:
 - Results of the assessment shall be integrated into a summary of management recommendations to support maintenance or enhancement of identified G1 and G2 species and ecosystems associated with forest types within the supply basin.
 - Results of the summary, including forest type-based management recommendations, shall be integrated into logger training curricula for company level or coordinated delivery to loggers within the supply region.
 - Requirement that suppliers enter binding written agreements that specify logger training inclusive of forest type-based management recommendations to maintain or enhance G1 and G2 species. This applies to both primary and processing residue suppliers.

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- For direct sourcing, coordinate with landowners, foresters, and trained loggers to promote forest-type based management recommendations to support maintenance or enhancement of identified G1 and G2 species and ecosystems, specifically in conjunction with NatureServe's MoBi modelled habitat data layer or NatureServe Pro.

For FSC US NRA identified species, ecosystems, and HCVs (Figure 2.2.2.-2):

Control measures including the following, which may be implemented in concert with FSC Controlled Wood programs under the FSC US NRA (2019) nexus:

- Assessment of FSC-specified HCVs and areas of specified risk within a biomass producer's supply basin, including primary and processing residue feedstocks:
 - Results of the assessment shall be integrated into a summary of management recommendations to support maintenance or enhancement of HCVs associated with forest types within the supply basin.
 - Results of the summary, including forest type-based management recommendations to support maintenance or enhancement of HCVs, shall be integrated into logger training curricula for company level or coordinated delivery to loggers within the supply region.
 - Requirement that suppliers enter binding written agreements that specify logger training inclusive of forest type-based management recommendations to maintain or enhance HCVs. This applies to both primary and processing residue suppliers.
 - For direct sourcing, coordinate with landowners, foresters, and trained loggers to promote forest-type based management recommendations to support maintenance or enhancement of identified HCVs.

Additional mitigation measures may be implemented in conjunction with the mitigation specified above. These measures may include and may be co-implemented with FSC Controlled Wood programs under the FSC US NRA (2019) nexus:

- Outreach and Education: Using materials as specified in individual mitigation options, communicate to audiences (also as specified) the conservation values of the HCVs, threats from incompatible forest management (as described in the FSC US NRA), and opportunities for conservation through management that enhances HCVs and reduces or eliminates these threats. The desired outcome of these communications is engaging landowners, foresters, consultants, and loggers in HCV conservation within the specified risk area and the organization's supply area.
- Procurement Policy: For organizations that purchase directly from the source forest): Develop/adapt a procurement policy that reflects the communications themes specified in individual mitigation options and clearly states the requirement that the landowner/forester/logger at the source forest will not supply materials from forests where the HCV is threatened as a result of the forest management activities that produced the forest materials.
- Conservation Initiatives: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are supporting or promoting programs or projects to develop new or augment existing

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	programs within the specified risk area and the organization's supply area that will result in: a) increased and improved implementation of forest management practices for conservation of HCVs, and/or b) increased access to incentive programs for landowners who conserve an HCV. ▪ Implement Management Activities: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are facilitating active, on the ground implementation of management activities (also as specified) to restore, maintain, or enhance an HCV, with a goal of long-term conservation within the specified risk area and the organization's supply area. ▪ Landowner Incentives: Engage with and/or provide monetary or in kind resources to: 1) conservation organizations or similar entities (as specified in individual mitigation options) supporting or promoting programs or projects to develop new or augment existing incentive programs for landowners who restore, maintain, or enhance existing examples of HCVs within the specified risk area and organization's supply area, or 2) organizations (also as specified) that work to connect landowners with incentives provided by other entities within the same area. ▪ Direct Influence: (a) Engage with a conservation organization or similar entities, or collaborate with FSC US NRA, to identify landscapes of particular concern related to the risk of receiving non-certified supplies from areas where the HCV is threatened by forest management activities, and then communicate this information to suppliers, along with: 1) recommended BMPs that will conserve an HCV, 2) contact information for organizations that may be interested in working with the landowner on conserving an HCV in question, and 3) a requirement that the landowner/forester/consultant/logger at the source forest either will not provide materials from the landscapes identified, or will document that the forest management practices implemented in the source forest did not threaten the HCV. (b) Document acceptable implementation of BMPs that conserve the HCV for harvests that produce non-certified materials that will be controlled by the Organization. (c) Include BMPs that will conserve the HCV in harvest plans and/or in contracts made with loggers for harvests that produce non-certified materials that will be controlled by the organization and require in those harvest plans and/or contracts that the Best Management Practices are implemented.

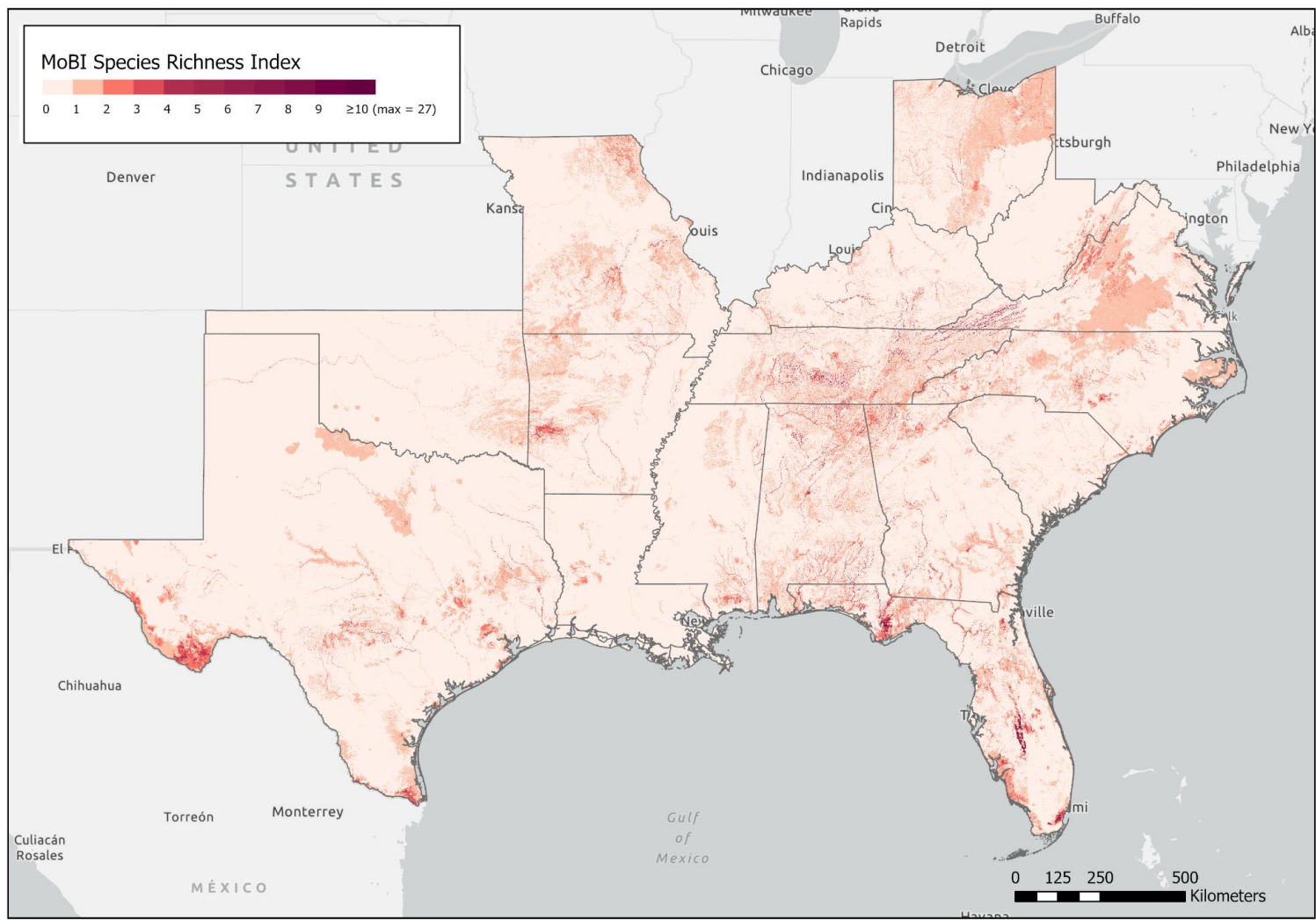


Figure 2.2.2.-1: Areas of specified risk as identified by the element occurrence or modelled habitat of G1 and G2 species (NatureServe, 2024).

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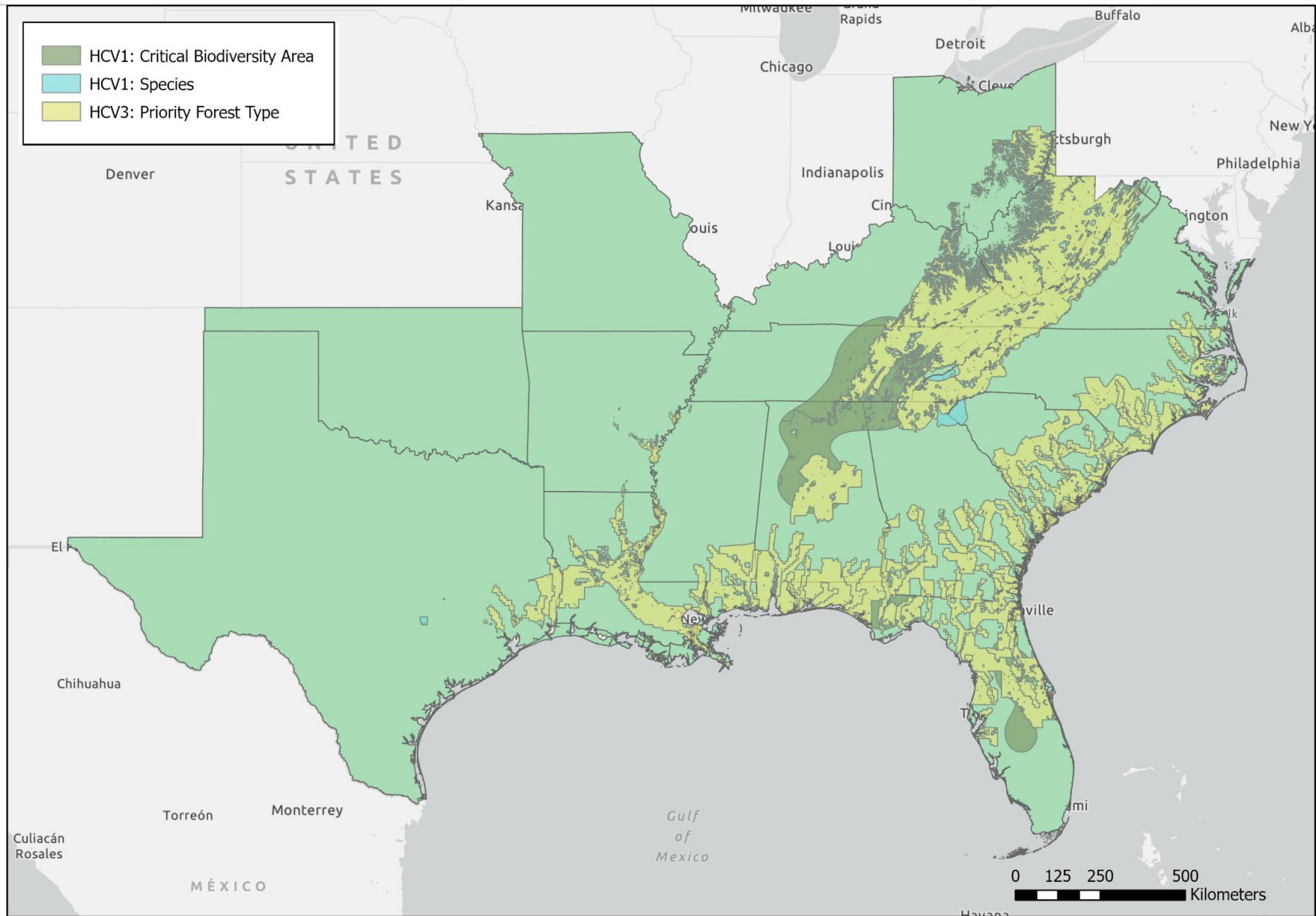


Figure 2.2.2.-2: Areas of risk, as identified through specification of risk by the FSC US NRA.

Mitigation: Control measures including the following, which may be implemented in concert with FSC Controlled Wood programs under the FSC US NRA (2019) nexus:

- Assessment of FSC-specified HCVs and areas of specified risk within a biomass producer's supply basin, including primary and processing residue feedstocks:
 - Results of the assessment shall be integrated into a summary of management recommendations to support maintenance or enhancement of HCVs associated with forest types within the supply basin.
 - Results of the summary, including forest type-based management recommendations to support maintenance or enhancement of HCVs, shall be integrated into logger training curricula for company level or coordinated delivery to loggers within the supply region.
 - Requirement that suppliers enter binding written agreements that specify logger training inclusive of forest type-based management recommendations to maintain or enhance HCVs. This applies to both primary and processing residue suppliers.
 - For direct sourcing, coordinate with landowners, foresters, and trained loggers to promote forest-type based management recommendations to support maintenance or enhancement of identified HCVs.

Additional mitigation measures may be implemented in conjunction with the mitigation specifies above. These measures may include:

- Outreach and Education: Using materials as specified in individual mitigation options, communicate to audiences (also as specified) the conservation values of the HCVs, threats from incompatible forest management (as described in the FSC US NRA), and opportunities for conservation through management that enhances HCVs and reduces or eliminates these threats. The desired outcome of these communications is engaging landowners, foresters, consultants, and loggers in HCV conservation within the specified risk area and the organization's supply area.
- Procurement Policy: For organizations that purchase directly from the source forest): Develop/adapt a procurement policy that reflects the communications themes specified in individual mitigation options and clearly states the requirement that the landowner/forester/logger at the source forest will not supply materials from forests where the HCV is threatened as a result of the forest management activities that produced the forest materials.
- Conservation Initiatives: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are supporting or promoting programs or projects to develop new or augment existing programs within the specified risk area and the organization's supply area that will result in: a) increased and improved implementation of forest management practices for conservation of HCVs, and/or b) increased access to incentive programs for landowners who conserve an HCV.
- Implement Management Activities: Engage with, and/or provide monetary or in kind resources to, conservation organizations or similar entities (as specified in individual mitigation options) that are facilitating active, on the ground implementation of management activities

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	(also as specified) to restore, maintain, or enhance an HCV, with a goal of long-term conservation within the specified risk area and the organization's supply area. ▪ Landowner Incentives: Engage with and/or provide monetary or in kind resources to: 1) conservation organizations or similar entities (as specified in individual mitigation options) supporting or promoting programs or projects to develop new or augment existing incentive programs for landowners who restore, maintain, or enhance existing examples of HCVs within the specified risk area and organization's supply area, or 2) organizations (also as specified) that work to connect landowners with incentives provided by other entities within the same area. ▪ Direct Influence: (a) Engage with a conservation organization or similar entities, or collaborate with FSC US NRA, to identify landscapes of particular concern related to the risk of receiving non-certified supplies from areas where the HCV is threatened by forest management activities, and then communicate this information to suppliers, along with: 1) recommended BMPs that will conserve an HCV, 2) contact information for organizations that may be interested in working with the landowner on conserving an HCV in question, and 3) a requirement that the landowner/forester/consultant/logger at the source forest either will not provide materials from the landscapes identified, or will document that the forest management practices implemented in the source forest did not threaten the HCV. (b) Document acceptable implementation of BMPs that conserve the HCV for harvests that produce non-certified materials that will be controlled by the Organization. (c) Include BMPs that will conserve the HCV in harvest plans and/or in contracts made with loggers for harvests that produce non-certified materials that will be controlled by the organization and require in those harvest plans and/or contracts that the Best Management Practices are implemented.
<i>Supply Base Verifiers</i>	• FSC US NRA • FSC areas of specified risk • Forest certification auditing reports • ESA listings • ESA critical habitats • NatureServe Explorer Pro • NatureServe MoBi • Company mitigation procedures and implementation • Staff and supplier interviews
<i>Evidence</i>	American Forest Foundation (AFF). 2021. Risk Based Approach (RBA) for Achieving Conformance with The Netherlands SDE+ Sustainability Requirements.

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<i>reviewed</i>	Congressional Research Service. 2021. The Endangered Species Act: Overview and Implementation (Updated March 4, 2021), CRS Report Prepared for Members and Committees of Congress. Access: https://crsreports.congress.gov/(ref:R46677). Cristan, R., Aust, W.M., Bolding, M.C., Barrett, S.M., Munsell, J.F., and Schilling, E. 2015. "Effectiveness of forestry best management practices in the United States: Literature review", Forest Ecology and Management, http://www.elsevier.com/locate/foreco Environmental Protection Agency (EPA). 2024. Enforcement under CWA Section 404. Access: https://www.epa.gov/cwa-404/enforcement-under-cwa-section-404 Environmental Protection Agency (EPA). 2024. Criminal Provisions of Water Pollution. Access: https://www.epa.gov/enforcement/criminal-provisions-water-pollution Faber-Langendoen, D., Nichols, J., Master, L., Snow, K., Tomaino, A., Bittman, R., Hammerson, G., Heidel, B., Ramsay, L., Teucher, A., and Young, B. 2012. NatureServe Conservation Status Assessments: Methodology for Assigning Ranks. NatureServe, Arlington, VA. Faber-langendoen, D., Baldwin, K., Peet, R.K., Medinger, D., Muldavin, E., Keller-Wolf, T., and Josse, C. 2017. The EcoVeg approach in the Americas: US, Canadian, and International Vegetation Classifications. Phytocoenologia. Published online December 2017. Forest Stewardship Council (FSC). 2014. Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2014. FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2023. US National Risk Assessment Implementation Resources. Access: https://us.fsc.org/en-us/certification/controlled-wood/us-nra-implementation-resources Forest Stewardship Council (FSC). 2024. Interpretations of the Normative Framework, Controlled Wood (9/09/2024). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2024. List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). Access: https://connect.fsc.org/document-centre Greenwald, N., Suckling, K.F., Hartl, B., and Mehrhoff, L.A. Extinction and the US Endangered Species Act. Peer. 2019 Apr 22,7:e6803. doi: 10.7717/peerj.6803. PMID: 31065461, PMCID: PMC6482936. National Association of State Foresters (NASF). 2019. "Protecting the Nation's Water, State Forestry Agencies and Best Management Practices. https://www.stateforesters.org/newsroom/protecting-the-nations-water-state-forestryagencies-and-best-management-practices/ National Council for Air and Stream Improvement (NCASI). 2012. Assessing the effectiveness of contemporary forestry best management practices (BMPs): focus on roads. Research Triangle Park, NC. National Council for Air and Stream Improvement, Inc., Special Report No. 12–01. https://www.ncasi.org/wp-content/uploads/2019/02/sr12-01.pdf
<i>Risk rating</i>	Specified risk

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2.2.3	Soil quality in the Supply Base shall be maintained or enhanced.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary regions of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia, privately owned forests including smallholders (or family forest landowners) and larger private landholdings, including industrial management and ownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The geography for this assessment has a well-developed and mature forest industry. Underlying the region's forest industry, is a legal and regulatory framework that ensures soils and soil health are protected during harvesting operations, enabling ongoing productivity. As noted elsewhere in this RRA, established Best Management Practices (BMPs) for each of the States in the RRA scope include measures for site preparation and harvesting practices, spot seeding, road building, and other forest management activities designed to minimize soil disturbance and compaction, which support soil structures, fertility, and biological activity, as well as the implementation of measures to reduce deposition and promote retention of sediment and nutrients onsite. Specifically related to soils, studies, including with specific focus in the Southeast US, consistently found that appropriately applied BMPs mitigate erosion and soil disturbance (Hawks et. al, 2022). Additionally, concerning erosion specifically, research suggests that there are no significant differences in erosion rates between biomass and conventional harvesting sites and that proper implementation of BMPs at both conventional and biomass harvest sites underscores water quality protection efforts (Parajuli et. al, 2024). BMP programs are widely used and reported rates of compliance between 81-99% in the states included in the RRA scope (NASF, 2019). As outlined in the BMP overview, BMP training programs are widely used in each of these states within the RRA region, elevating use of the suite of BMPs. This suggests an extremely high rate of implementation and assurance that measures to minimize soil compaction and maximize nutrient retention have been taken. Further, BMPs are a standard practice framework that the forestry sector in the US South takes very seriously and performance on BMPs is a source of pride within the community. This is evidenced by the investments made in educating, training, and monitoring management and harvesting practices carried out by sourcing companies, loggers, foresters, consultants, and private landowners. Under the Sustainable Forestry Initiative's (SFI) Fiber Sourcing, through which

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	the majority of primary feedstock is sourced, BMP implementation and logger training are required, and, as a result, both are industry norms. Through these kinds of investments there is a great deal of awareness and compliance with BMPs generally and specifically as they relate to soils. Insurance companies are also a driving force for training, especially for safety compliance. Finally, a US Department of Agriculture's (USDA) Forest Service technical report found that timber harvesting does not have a long-term impact on forest soil productivity and if changes do exist, these are generally small and only last a few years (USDA, 1979). Enforcement and monitoring As established in Indicator 1.1.1., the US has a well-developed set of laws covering all aspects of ecosystem health, including soil protection. Through the decades, these laws have been consistently enforced through robust monitoring systems. State forestry agencies for each State monitor and enforce BMP implementation. Agency BMP compliance reports are updated regularly but are often supplemented in BMP monitoring by biomass producers and/or their sawmill suppliers conducted at the company level under SFI Fiber Sourcing programs. Forest certification programs also have had an impact on enforcement and monitoring activities. The described practices and enforcement measures working together provide sufficient assurance that soil quality shall be maintained or enhanced. Risk conclusion and justification With rigorous and well-established standard practices and laws, the forestry sector in the US South has done an exemplary job of protecting soil health helping forest inventories and production grow significantly. The sector takes seriously its commitment to complying with these practices and laws as reflected in overall soil health and increased productivity, and the investments the sector makes in education, training, and monitoring. Therefore, it is concluded that the risk class for Indicator 2.2.3. is low risk.
<i>Supply Base Verifiers</i>	• State BMP manuals • Supplier agreements • Secondary supplier audit checklists • Company District of Origin Process • State Implementation Committee's logger training databases • State Forestry BMPs compliance reports • Forest certification auditing reports
<i>Evidence reviewed</i>	Hawks, B., Aust, W.M., Bolding, W.C., Barrett, S.M., Schilling, E., and Fielding, J.A. Linkages between Forestry Best Management Practices and erosion in the southeastern U.S. Journal of Environmental Management. Volume 305. 2022. 114411, ISSN 0301-4797. https://doi.org/10.1016/j.jenvman.2021.114411

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<i>Risk rating</i>	Low risk
2.2.4	Where the removal of harvest forest residues and/or stumps occurs, this shall not lead to irreversible negative impacts to the ecosystem.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. There are no laws preventing or requiring the removal of stumps. However, in the RRA's geography, stump removal is extremely rare, generally, and is

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essentially unheard of for the purposes of biomass sourcing. Original expert interviews for this RRA analysis, as well as those documented in previous widely accepted analyses including the American Forest Foundation's (AFF) Risk Based Approach (RBA) for achieving conformance with the Netherlands' SDE+ requirements for forest management units smaller than 500 ha (Category 2), noted that the practice is operationally impractical and economically not feasible (AFF, 2021, Colston, 2024, Cook, 2024).

The US Forest Service's (FS) Southern Research Station (SRS) has examined stump harvesting potential in the US and has determined that this is not a common practice (Mitchell, 2009). The SRS study found that stump and root mass harvesting "may seem like a very strange and costly way to obtain biomass" and that it is typically only associated with land clearing, such as for road and construction sites (Mitchell, 2009). In the forest, stumps are expensive to extract and challenging to transport, to the point where this practice is usually cost prohibitive. Moreover, transportation costs would be high because the odd-shaped stump pieces with root masses attached would not compact well or bunk (stack) securely in log trucks. There are issues with residual rocks and soil lumped on the root mass of a stump. Some type of comminution in the woods would be needed to reduce the stump size for transport. Splitting and other preprocessing steps may be required to utilize traditional grinders and chippers, further increasing costs to biomass suppliers down the line (Mitchell, 2009). In most cases, harvesting stumps for biomass is simply not economically viable.

As outlined in the introduction, implementation of Best Management Practices (BMPs) is a standardized practice in the RRA region. BMPs are a state-level expression of the US Clean Water Act (CWA), the primary Federal law in the US governing water pollution and protection of surface waters. The CWA's objective is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The CWA's provisions that are most significant to forestry are section 319 addressing non-point source pollution and section 404 addressing discharge of dredge and fill into waterways and wetlands. As noted in the introduction, states have developed BMPs to meet their responsibilities under CWA. Each State in the geography of the RRA has developed forestry BMPs and can regulate or stop forestry operations that create non-point source pollution that could damage water resources (See Annexes).

Harvesting of stumps is generally inconsistent with BMP implementation at harvesting sites due to soil disturbance and subsequent erosion mitigation that would be needed. Loggers and wood suppliers in the region are well trained in the use of BMPs and consider them a mandatory part of operations, since BMPs are designed in part to control and minimize damaging effects to soil stability, thus loggers avoid removing stumps.

Finally, private landowners typically do not want stumps removed because this practice results in large holes and ground disturbances that would need remediation to address serious safety concerns and improve aesthetics. On the production side, the presence of residual rocks and soil lumped on the root mass of a stump presents safety and mechanical concerns in processing, as well as impacts to product quality. As a result, biomass producers emphasized that their mills would not accept stumps as source material. These producers have standing policies of not accepting stumps and typically screen feedstock supplies for residual rocks and soil (Palmer, 2024, Cook, 2024).

Regarding removal of residues, State BMPs encourage the use and distribution of logging slash across sites for nutrient distribution and to prevent soil erosion. Biomass retention happens naturally due to this beneficial reuse of slash. As examples see:

- Louisiana BMP Manual. "Where accelerated erosion is likely, use methods which leave logging debris and other natural forest litter scattered over the site.
- Arkansas BMP Manual. "Waterbars are recommended for stabilizing inactive roads, firelines, and trails. Logging slash may also be effective. When

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harvesting is completed, disperse water from landings and skid trails using water bars, logging slash, or vegetative cover.”

- Mississippi BMP Manual. “Slash is the debris such as unmerchantable limbs and tree tops created in the process of a normal logging operation. Slash dispersal is probably the most immediate solution for prevention of soil movement on an active logging site. Wherever possible slash should be scattered back over exposed soil on skid trails and evenly dispersed across logging sets. Slash has also been used successfully to build water bars on skid trails.”
- South Carolina Biomass BMPs. “These guidelines focus on protecting sensitive sites based on soils characteristics. They provide a map of the State shaded to indicate the relative operability as it relates to harvesting operations utilizing forest residuals. The focus is on maintaining adequate residual material so that no bare soil is exposed. These guidelines, along with those developed in other states, are precautionary and based on assumptions of potential impacts.”

Even where it occurs in experimental levels of forest residual removal, research suggests that there are not significant negative impacts to biodiversity or soils. The National Council for Air and Stream Improvement (NCASI) conducted a review of biofuel harvests on coarse woody debris and biodiversity. In the review they stated, “Pilot biomass harvests report post-harvest changes in coarse woody debris (CWD) levels much smaller than the experimental changes involved in the studies we analyzed” (Riffell, et al., 2011).

Woody biomass harvest also had limited effects on the early-successional, breeding bird community. The successional trajectory of vegetation structure, rather than availability of harvest residues, primarily drove avian use of regenerating stands. (Grotsky, et al., 2016).

Several studies have investigated the response of soil carbon to harvesting and biomass removal. In most instances there is little, if any, change in mineral soil carbon. Changes in surface carbon are variable, with harvest often increasing carbon in the top organic layer initially and differing (experimental) levels of residual biomass removal levels being reflected in changing carbon content of surface soil layers. These findings also demonstrate that there are several variables at play including climate and decomposition rates.

Review of previous supply base evaluations demonstrate that some biomass producers in the region complement these proven approaches to residue removal with programs to assure BMPs are followed, and biodiversity is protected. Evaluation of forest residual levels to assure site protection is a part of this procedure (Drax Global, 2022).

Enforcement and monitoring

As noted above, biomass producers are self-motivated to avoid stumps in feedstock sourcing for economic, operational, and safety reasons. Similarly, landowners are self-motivated to avoid the practice on their lands for cost, safety, and aesthetic reasons.

Since the harvesting of stumps is generally inconsistent with BMPs and because BMPs encourage retention of residuals onsite, monitoring of BMPs is relevant to this Indicator. High level of compliance with BMPs helps ensure residue removal does not occur to help ensure water quality protection. State forestry agencies for each State monitors and enforces BMP implementation. Their compliance reports are updated regularly but are often supplemented in BMP monitoring conducted by biomass producers and/or their sawmill suppliers at the company level under Sustainable Forestry Initiative’s (SFI) Fiber Sourcing programs, which are widely used across the sector. The Forest Stewardship Council’s (FSC) Forest Management Standards also place a great emphasis monitoring BMPs, which cover all aspects of this Indicator.

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	As established in Indicator 1.1.1., US laws are consistently implemented. The CWA is rigorously enforced, like all laws in the US. As it relates to Section 404, violations fall into two broad categories: failure to comply with the terms or conditions of a Section 404 permit or discharging dredged or fill material to waters of the US without a permit. In either case, since 1989, the US Environmental Protection Agency (EPA) and Army Corps of Engineers (ACE) share authority for oversight. Under their agreement, ACE, as the Federal agency that issues permits, has the lead on ACE-issued permit violation cases. For unpermitted discharges, EPA and ACE determine the appropriate lead agency based on criteria their agreement. EPA and ACE consider a wide variety of factors when identifying enforcement action for Section 404 violations. These factors include the amount of fill, size of the water body (acres of wetlands filled and environmental significance), discharger's previous experience with Section 404 requirements, and discharger's compliance history. In most instances, EPA and ACE prefer to resolve Section 404 violations through voluntary compliance or administrative enforcement. There is, however, a long-documented history of criminal enforcements (EPA, 2024). Fines for violations of Section 404 of CWA range from \$2,500 to \$50,000 per day and up to six years in prison (EPA, 2024). The described practices and enforcement measures, working together, provide sufficient assurance that the removal of harvested forest residues and/or stumps shall not lead to irreversible negative impacts to the ecosystem. Risk conclusion and justification Given that it is very unlikely that biomass will be sourced from stumps, or that mills will accept stump material even if it were removed for reasons other than biomass production, it follows that the risk is accordingly low that feedstock would be sourced from stumps. Pertaining to residue removal, State BMPs require compliance with a rigorous set of practices to protect water quality and prevent soil erosion, with some states explicitly calling for residue retention onsite. Also, because BMP compliance coupled with a strong network of Federal laws and regulations, residue removal is likewise characterized as low risk. Therefore, it is concluded that the risk class for Indicator 2.2.4. is low risk.
<i>Supply Base Verifiers</i>	• State BMP manuals • Company procurement policies • Interviews with procurement and operational personnel • SFI Fiber Sourcing Certificates • Supplier agreements • Purchase agreements • Controlled Wood/Controlled Source Risk Assessment
<i>Evidence reviewed</i>	American Forest Foundation (AFF). 2021. Risk Based Approach (RBA) for Achieving Conformance with The Netherlands SDE+ Sustainability Requirements. Arkansas Department of Agriculture, Forestry Division. Best Management Practices for Water Quality Protection. 2021. Accessed: https://www.agriculture.arkansas.gov/wp-content/uploads/2022/01/AR-Best-Management-Practices.pdf

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<i>Risk rating</i>	Low risk
2.2.5	Quality and quantity of ground water, surface water and water downstream shall be maintained or enhanced.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder

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perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

The US Clean Water Act (CWA) is the primary Federal law in the US governing water pollution and the protection of surface waters. Its objective is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. CWA provisions that are most significant to forestry are Section 319 addressing non-point source pollution and Section 404 addressing discharge of dredge and fill into waterways and wetlands. As noted in the Introduction, States have developed BMPs to meet their responsibilities under CWA. Each State in the RRA geography has developed forestry Best Management Practices (BMPs) and can regulate or stop forestry operations that create non-point source pollution that could damage water resources (See Annexes).

Compliance with BMPs is a strong indicator of water quality maintenance and environmental protection or enhancement. BMPs have been reported to improve water quality 80-90% above prior practices as well as reducing the deposition of sediment, nutrients, and organic matter (Walbridge, 1993). BMPs are also widely implemented in the region with reported rates of compliance between 81-99% in the states included in the RRA scope (NASF, 2019). As outlined in the BMP overview in the Introduction, BMP training programs are widely used in each of these RRA states and are required under SFI Fiber Sourcing, a mainstay in forest-based procurement in the region as well as FSC Forest Certification.

The Forest Stewardship Council's US National Risk Assessment (FSC US NRA) indicator 3.4 HCV4 determined there is a low risk of forest management activities affecting water quality. Further the report states, "Evidence of the effectiveness of forestry BMPs, combined with the reported levels of compliance, indicates that there is a high likelihood that HCV4 are being effectively protected throughout the assessment area through the implementation of forestry BMPs associated with State nonpoint source pollution programs." The effectiveness of forestry BMPs is well documented in the FSC US NRA.

Enforcement and monitoring

As established in Indicator 1.1.1., US laws are consistently implemented. The CWA is rigorously enforced, like all laws in the US. As it relates to Section 404, violations fall into two broad categories: failure to comply with the terms or conditions of a Section 404 permit or discharging dredged or fill material to waters of the United States without a permit. In either case, since 1989, the US Environmental Protection Agency (EPA) and US Army Corps of Engineers (ACE) share authority for oversight. Under their agreement, ACE, as the Federal agency that issues permits, has the lead on ACE-issued permit violation cases. For unpermitted discharges, EPA and ACE determine the appropriate lead agency based on criteria in their agreements. EPA and ACE consider a wide variety of factors when identifying enforcement action for Section 404 violations. These factors include the amount of fill, size of the water body (acres of wetlands filled and the environmental significance), discharger's previous experience with Section 404 requirements, and the discharger's compliance history. In most instances, EPA and the ACE prefer to resolve Section 404 violations through voluntary compliance or administrative enforcement. There is, however, a long-documented history of criminal enforcements (EPA, 2024). Fines for violations of Section 404 of CWA range from \$2,500 to \$50,000 per day and up to six years in prison (EPA, 2024).

State forestry agencies for each State monitor and enforce BMP implementation. Their compliance reports are updated regularly but are often supplemented in BMP monitoring conducted by biomass producers and/or their sawmill suppliers at the company level under Sustainable Forestry Initiative's (SFI) Fiber Sourcing programs.

Described practices and enforcement measures, working together, provide sufficient assurance that quality and quantity of ground water, surface water, and

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	water downstream shall be maintained or enhanced. Risk conclusion and justification Based on the effective regulation and monitoring system, including high compliance rates with BMPs, it is concluded that the risk class for Indicator 2.2.5. is low risk.
<i>Supply Base Verifiers</i>	• State BMP manuals • Supplier agreements • Secondary supplier audit checklists • Company District of Origin Process • State Implementation Committee's logger training databases • State Forestry BMPs compliance reports
<i>Evidence reviewed</i>	American Forest Foundation (AFF). 2021. Risk Based Approach (RBA) for Achieving Conformance with The Netherlands SDE+ Sustainability Requirements. Cristan, R., Aust, W.M., Bolding, M.C., Barrett, S.M., Munsell, J.F., and Schilling, E. 2015. "Effectiveness of forestry best management practices in the United States: Literature review". Forest Ecology and Management. http://www.elsevier.com/locate/foreco Environmental Protection Agency (EPA). 2024. Criminal Provisions of Water Pollution. Access: https://www.epa.gov/enforcement/criminal-provisions-water-pollution Environmental Protection Agency (EPA). 2024. Enforcement under CWA Section 404. Access: https://www.epa.gov/cwa-404/enforcement-under-cwa-section-404 National Association of State Foresters (NASF). 2019. "Protecting the Nation's Water, State Forestry Agencies and Best Management Practices". https://www.stateforesters.org/newsroom/protecting-the-nations-water-state-forestryagencies-and-best-management-practices/ National Council for Air and Stream Improvement (NCASI). 2012. Assessing the effectiveness of contemporary forestry best management practices (BMPs): focus on roads. Research Triangle Park, NC. National Council for Air and Stream Improvement, Inc., Special Report No. 12–01. https://www.ncasi.org/wp-content/uploads/2019/02/sr12-01.pdf State BMPs (see Annexes). Walbridge, M.R. 1993. Functions and values of forested wetlands in the southern United States. J. For. 91:15–19. https://doi.org/10.1093/jof/91.5.15
<i>Risk rating</i>	Low risk

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2.2.6	Air emissions shall comply with national legislation or in the absence of national legislation with industry best practice.
Findings	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. There is no indication of adverse effects on air emissions and air quality of any significance from fiber sourcing activities in the RRA’s geography. Forestry operations are like other agricultural practices that generally occur in less populated regions and do not affect the overall air quality. The monitoring and statistical data on air quality across the US is available at the US Environmental Protection Agency (EPA) website. The EPA and its partners in state, local, and Tribal air quality programs design and implement ambient air monitoring networks to meet multiple objectives that include providing publicly available air pollution data, supporting compliance with the National Ambient Air Quality Standards (NAAQS) and emissions strategy development, and supporting air pollution research studies (EPA, 2024). All of these are required elements of the US Clean Air Act (CAA), a comprehensive Federal law that regulates emissions (EPA, 2024). Specific applicable air quality laws for feedstock sourcing in the RRA’s geography include those addressing air quality in the form of smoke from prescribed fires and fugitive emissions, mostly in the form of dust. States develop and follow established air quality plans, and laws required and approved by the EPA, under the CAA. State laws govern open burning and regulate prescribed fire use in land management, which is critical for the restoration and maintenance of important ecosystems within the region. Prescribed burning is a traditional and scientifically established land management technique used in the US. As defined by the US Forest Service (FS), “Prescribed fires, also known as prescribed burns, refer to the controlled application of fire by a team of fire experts under specified weather conditions to restore health to ecosystems that depend on fire” (USFS, 2024). In the US Southeast prescribed burning is a common land management tool in longleaf pine ecosystems and oak (<i>Quercus spp.</i>) and pine (<i>Pinus spp.</i>) savannas. Prescribed fire is used to remove logging residues, clear brush, and improve wildlife habitats. Laws affecting these practices require that burning activities be conducted in accordance with State and Federal policies that address a variety of factors, including consideration of weather conditions for smoke dispersal and other risks to public safety or human health, including air emission impacts. Burn bans are issued by State and local governments when conditions are not suitable. States have systems for

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concerned citizens to report arson or illegal burning. Burn permits, supervised by a Certified Prescribed Burn Manager and/or an approved Prescribed Burn Plan (including smoke management), are common industry best practices and regulatory requirements. Landowners must be aware of the applicable local laws for the use of prescribed fire in land management and for burning residues after logging. Landowners commonly work with natural resource professionals to ensure compliance with the requirements, including notification, permitting, and supervision of the burn activity. Additional resources and systems for the safe and effective use of prescribed fire are addressed in various plans and documents, including the US Forest Service's (FS) National Prescribed Fire Resource and Mobilization Strategy, the Southeast Prescribed Fire Initiative, the Smoke Management Guidebook for Prescribed Burning in the Southern Region, and each State's Forest Action Plan. To support effective implementation of the State Forest Action Plans, the FS provides funding for training, education, and risk reduction (USFS, 2022). State agencies provide information to support responsible decision making by prescribed burn managers through websites with links to local fire weather forecasts, wind forecasts, 'red flag' warnings, and opportunities for burn insurance and permit applications. For example, North Carolina provides a website with access to regulatory information and an online process for applying for a permit. Records of burn permits and enforcement actions are maintained through State level reporting. The US National Prescribed Fire Use Survey Report is prepared every three years and addresses prescribed fire policies, management of prescribed fire programs, how much and where prescribed fire is implemented and its effects (NASF, 2021). Compliance with regulations and best practices is incentivized because land managers that follow the requirements are generally granted legal liability limitations under the law. In the absence of negligence, landowners are not liable for damages resulting from prescribed fire conducted in accordance with the law. There is no evidence that laws or industry best practices related to open burning are regularly or systemically contravened. State and Federal forestry agencies are also responsible for wildfire prevention and suppression.

State laws and industry best practices also address fugitive dust as a form of air pollution potentially created by forest management. Fugitive emissions are addressed in both State and Federal laws, as well as industry best practices that include reasonable precautions to prevent particulate matter from becoming airborne during harvesting or hauling, such as using a reduced speed on dirt roads or wetting roads or landings to suppress dust. There is no evidence that laws or industry best practices for fugitive emissions laws are regularly or systemically contravened in feedstock sourcing.

Enforcement and monitoring

The EPA is the Federal agency responsible for ambient air monitoring, which includes the collection and measurement of samples of ambient air pollutants to evaluate the status of the atmosphere as compared to clean air standards and historical information. The monitoring procedures, functions, and resulting data can be found on the EPA's website. The Ambient Air Monitoring Program is established nationwide throughout the US and covers rural areas, where most forest management occurs, as well as suburban and urban areas. Monitored variables include particulate matter and particulates specific to the use of diesel fuels. The program collects national air quality data on criteria pollutants, including Carbon Monoxide (CO), Oxides of Nitrogen (NO₂ and NO₃), Ozone (O₃), Lead (Pb), Particulate Matter (PM) - both particulates with aerodynamic diameters below 10 micrometers (PM-10), and particulates with aerodynamic diameters below 2.5 micrometers (PM-2.5), Sulfur Dioxide (SO₂), and Volatile Organic Compounds (VOC) (EPA, 2024). Monitoring agencies conduct periodic network assessments (at least every five years) and submit to EPA an annual monitoring network plan intended to meet current and emerging needs of the networks. These annual plans are submitted to EPA after monitoring agencies make them available to the public. EPA provides public access to many of these plans on the State Monitoring Agency Annual Air Monitoring Plans and Network Assessments_webpage. The most recent plans are available at State and local agency websites. In making plans to optimize the ambient air monitoring networks, monitoring agencies must meet minimum monitoring requirements. These minimum monitoring requirements provide for what pollutants to measure, how many monitoring sites a network needs, and where to locate sites. In most

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	cases, monitoring agencies operate more than the minimum monitoring requirements to meet all data needs (EPA, 2024). In optimizing ambient air monitoring networks, monitoring resources focus on the communities most impacted, with a smaller number of sites located in areas that may provide representative air pollution upwind or downwind of a populated area. To help inform air quality between monitoring stations, EPA and the air monitor programs utilize additional datasets. As established in Principle 1, enforcement of law is both rigorous and consistent in US. Criminal provisions for violations of CAA range with penalties of fines and up to 15 years in prison (EPA, 2024). The outcome of established Federal laws, State laws, and industry best practices working together is that air emissions comply with national legislation when feedstock sourcing from private and public lands. Risk conclusion and justification On the foundation of a comprehensive set of Federal and State laws, which are rigorously enforced, air emissions from forestry operations connected to feedstock sourcing comply with applicable legislation. In fact, there is no evidence of significant emissions from such operations. Therefore, it is concluded that the risk class for Indicator 2.2.6. is low risk.
<i>Supply Base Verifiers</i>	• Publicly available information on the protection of air quality • Level of enforcement • Regional, publicly available data from a credible third party • Existence of a strong legal framework in the region • Regional and State Best Management Practices • Records of BMP field inspections
<i>Evidence reviewed</i>	Environmental Protection Agency (EPA). 2024. Air Data: Air Quality Data Collected at Outdoor Monitors Across the US Accessed 18 September 2024. https://www.epa.gov/outdoor-air-quality-data Environmental Protection Agency (EPA). 2024. Criminal Provisions of the Clean Air Act. https://www.epa.gov/enforcement/criminal-provisions-clean-air-act Environmental Protection Agency (EPA). 2024. Reviewing National Ambient Air Quality Standards (NAAQS): Scientific and Technical Information. Accessed: https://www.epa.gov/naaqs Environmental Protection Agency (EPA). 2024. State Monitoring Agency Annual Air Monitoring Plans and Network Assessments. Accessed 18 September 2024. https://www.epa.gov/amtic/state-monitoring-agency-annual-air-monitoring-plans-and-network-assessments Environmental Protection Agency (EPA). 2024. Summary of the Clean Air Act. https://www.epa.gov/laws-regulations/summary-clean-air-act National Association of State Foresters (NASF). 2021. National Prescribed Fire Use Survey Report. https://www.prescribedfire.net/pdf/2021-National-Rx-Fire-Use-Report_FINAL.pdf

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	US Forest Service (USFS). 2022. Wildfire and Prescribed Fire in the Eastern Region. https://www.fs.usda.gov/detail/r9/home/?cid=fseprd1024266 US Forest Service (USFS). 2024. Prescribed Fire. https://www.fs.usda.gov/managing-land/prescribed-fire
<i>Risk rating</i>	Low risk
2.2.7	Pesticides shall only be used as part of an Integrated Pest Management (IPM) plan in compliance with national legislation, chemical safety data sheets and industry best practice. Banned pesticides shall not be used.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. Pesticide use in forest management, whether for insect and disease control or for vegetation management, is regulated under the US Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Pesticides and all other chemical applications in the US adhere to the Federal regulation for their use, including the safety data sheets provided through the EPA registration and licensing. Requirements for licensing of the personnel in charge of and carrying out the application of chemicals, storage and use of authorized chemicals, use of personal protective equipment, and filling and washing of spraying equipment are enforced by the responsible Federal and State authorities. Integrated Pest Management (IPM) plans are prepared in accordance with applicable Federal programs and State permitting processes. IPM is widely practiced in US forest management as the most economically efficient, ecologically effective, and socially desirable approach to pest management. State BMPs contain further guidelines for IPM and for proper chemical applications. Pesticides are used to control significant threats from insects or competing vegetation, based on monitoring and assessment, and applications are carried out in accordance with regulations and by trained and licensed operators. Use of pesticides is documented in landowner records, including certification audit reports where applicable. Class 1A and 1B pesticides, as defined by the World Health Organization, and chlorinated hydrocarbons are not used. There is no report of the use

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	of banned pesticides in forestry in the US. Enforcement and monitoring FIFRA provides for federal regulation of pesticide distribution, sale, and use. The EPA has responsibility for implementing and enforcing the FIFRA regulations. All pesticides distributed or sold in the US must be registered (licensed) by the EPA. Operators must follow application guidelines prescribed for each chemical by the EPA. Application of pesticides is regulated as a “point source” pollutant under Section 402 of the US Clean Water Act (CWA). States have authority to issue Pesticide General Permits (PGPs). State permits and permitting processes are specific to each jurisdiction, but in general they require the development of application plans, accurate record keeping, and conformance with a set of criteria for operators that are applying pesticides (commonly referred to as Applicators in most states). Applicators must follow the permit requirements to ensure the proper application of pesticides, including requirements for training, licensing, and periodic inspections of equipment for proper maintenance, calibration, and storage. Landowners whose lands are third-party certified must provide additional assurances of compliance with applicable pesticide regulations and their minimized, targeted use within IPM plans. Federal cost share programs that assist private landowners complying with sustainable forest management, operate in accordance with an IPM strategy. The US Natural Resource Conservation Service (NRCS) oversees Federal cost share programs and provides funding for conservation practices on private lands. The NRCS has defined IPM as a Conservation Practice Standard with requirements for how it is to be practiced by landowners enrolled in NRCS programs. The outcome of Federal laws, State enforcement, and industry practices working together is that pesticides shall only be used as part of an IPM strategy in compliance with Federal legislation, State regulations, chemical safety, data sheets, and industry best practices when sourcing feedstock from private and public lands. Risk conclusion and justification Based upon the existence of clear and consistent Federal regulation, State oversight and permitting process, BMP guidance, landowner assistance program and ongoing performance, it is concluded that the risk class for Indicator 2.2.7. is low risk.
<i>Supply Base Verifiers</i>	• EPA regulations • NRCS programs • BMPs and BMP monitoring reports • State permitting authorities
<i>Evidence reviewed</i>	Arkansas Department of Agriculture. 2024. Plant Industries. https://agriculture.arkansas.gov/plant-industries/pesticide-section/registration/ Environmental Protection Agency (EPA). 2023. Pesticide Permitting. https://www.epa.gov/npdes/pesticide-permitting Environmental Protection Agency (EPA). 2024. Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Federal Facilities. Florida Department of Environmental Protection. 2011. Generic Permit for Pollutant Discharges to Surface Waters of the State from the Application of Pesticides. https://www.flrules.org/gateway/readRefFile.asp?refId=243&filename=pesticide_generic_permit.pdf

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	North Carolina Forest Service. 2017. NPDES Pesticide General Permit for Application of Pesticides on Surface Waters in North Carolina. https://www.ncagr.gov/divisions/nc-forest-service South Carolina Forestry Commission. 2023. Best Management Practices Reports. https://www.scfc.gov/development/best-management-practices/best-management-practices-reports/ US Department of Agriculture Natural Resources Conservation Services. 2019. Pest Management Conservation System (Ac.) (595) Conservation Practice Standard. https://www.nrcs.usda.gov/resources/guides-and-instructions/pest-management-conservation-system-ac-595-conservation-practice Virginia Department of Agriculture and Consumer Services. 2023. Becoming a Certified Pesticide Applicator. https://www.vdacs.virginia.gov/pesticide-applicator-certification.shtml
<i>Risk rating</i>	Low risk
2.2.8	Waste shall be disposed of in an environmentally appropriate manner.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. Proper disposal of both oily and non-oily (e.g., hydraulic fluid) waste is a key component of forestry Best Management Practices (BMPs) as the standard practices require the removal of garbage and other wastes. BMP manuals are widely available on-line for each State within the RRA region. Chemical use and other waste disposal in forest management operations follow these BMPs as well as US Environmental Protection Agency (EPA) guidance under the US

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	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and include in-woods practices. A review of the EPA’s Civil Cases and Settlements by statute resulted in no findings related to forest management activities (EPA, 2024). In addition, forest product companies and biomass producer companies in the region generally develop their own training and monitoring programs, including legal agreements with foresters and loggers, to ensure that forest residue post harvesting is removed with the same care and compliance as round wood. This is a component of monitoring under the Sustainable Forestry Initiative (SFI) Fiber Sourcing program, under which the majority of primary furnish in the region is sourced. Many larger wood suppliers have procurement organizations that require the monitoring of trash removal through BMP monitoring reports. Enforcement and monitoring As established in Indicator 1.1.1., the US has a robust legal and regulatory system that deters the violations of Federal and State regulations. A robust set of State and Federal laws and BMPs govern waste disposal. For example, a 2019 survey of South Carolina BMP compliance found 100% compliance for biomass harvesting, including waste disposal. Described practices and enforcement measures, working together, provide sufficient assurance that waste is disposed of in an environmentally appropriate manner. Risk conclusion and justification Like many other aspects of forestry operations, waste disposal is regulated by a stringent and robust set of Federal and State BMPs. As a mature industry in the region, companies have a set of tools beyond laws to help ensure compliance. Therefore, it is concluded that the risk class for Indicator 2.2.8. is low risk.
<i>Risk rating</i>	Low risk
<i>Supply Base Verifiers</i>	• State and Federal laws • State BMP manuals • SFI Fiber Sourcing Certificates • Supplier agreements • Purchase agreements • Controlled Wood/Controlled Source Risk Assessments • Certified Sourcing Implementation Manual • Company District of Origin Process
<i>Evidence reviewed</i>	Environmental Protection Agency (EPA). 2024. Civil and Cleanup Enforcement Casers and Settlement. Accessed: https://www.epa.gov/enforcement/civil-and-cleanup-enforcement-cases-and-settlements

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	Federal Insecticide Fungicide and Rodenticide Act. 7 U.S.C. §§ 136 et seq. Washington, DC. Accessed: https://www.epa.gov/enforcement/federal-insecticide-fungicide-and-rodenticide-act-fifra-and-federal-facilities Forestry Association of South Carolina. South Carolina Top Logger. Accessed: https://www.scforestry.org/top-forestry-programs.htm Georgia Master Timber Harvester. Georgian Master Timber Harvester Continuing Education. Accessed: https://gamth.org/continuing-education National Association of State Foresters (NASF). 2016. Effectiveness of Forest BMPs in the United States: Literature Review. Forest Ecology and Management. Accessed: https://www.stateforesters.org/wp-content/uploads/2018/09/Literature-Review-published-in-Forest-Ecology-and-Management.pdf National Association of State Foresters (NASF). 2019. Protecting the Nation's Water: State Forestry Agencies and Best Management Practices. Accessed: https://www.stateforesters.org/wp-content/uploads/2019/12/NASF-2019-BMP-Final.pdf New March. 2024a. RRA Input Survey Results. SurveyMonkey. South Carolina Forest Commission. 2021. South Carolina Best Management Practices: Forest Biomass Harvesting Recommendations: A Supplement to South Carolina's Best Management Practices for Forestry. Accessed: https://www.scfc.gov/wp-content/uploads/2021/07/BiomassSupplementHarvesting.pdf
<i>Risk rating</i>	Low risk
2.2.9	Harvesting levels shall be justified as to how they can be sustained with reference to inventory and growth data for the Supply Base.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, original quantitative and qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. There is no specific Federal law specifying harvest levels on private lands in the US. However, harvesting levels have been sustainably maintained for the

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recent decades. Growth and yield data from the US Department of Agriculture (USDA) Forest Service's (FS) Forest Inventory and Analysis (FIA) dataset are the most current and comprehensive measurement of forest inventories on all landownerships across the US.

To evaluate this Indicator, FIA data was queried across the RRA geographic assessment area. Growth to removal ratios were evaluated to assess the sustainability of harvest levels. Key variables were: (1) average annual net growth (gross growth minus mortality) of aboveground biomass of trees (at least 2.54 cm [1-inch] in diameter) on timberland, (2) average annual gross growth of aboveground biomass of trees (at least 2.54 cm [1-inch] in diameter) on timberland, and (3) average annual removals of aboveground biomass of trees (at least 2.54 cm [1-inch] in diameter) on timberland. Removals include trees removed from the inventory by harvesting or other cultural operations (such as timber-stand improvement) or by land clearing. Mortality includes removals due to natural disturbance events (insect, disease, wildfire, etc.) These variables were assessed for a range of years, beginning as early as 1998 and running as recently as 2023, based on the cycle of FIA inventory in that State.

Across the region, average annual net growth was observed to be 1.8 times that of average annual removals and average annual gross growth to be 2.4 times that of average annual removals (Table 2.2.9.-1). Net growth to removals ratios were lower on private lands (1.7) compared to public lands (3.3, excluding National Forests) (Table 2.2.9.-2).

Table 2.2.9.-1. *Annual growth and removal estimates for each RRA State across the Supply Base.*

State	Gross growth (million tonne, annual)	Net growth (million tonne, annual)	Removals (million tonne, annual)
Alabama	66.15	52.07	29.15
Arkansas	43.58	34.34	18.15
Florida	27.32	18.81	14.06
Georgia	63.03	46.54	32.75
Kentucky	26.48	17.97	8.06
Louisiana	37.66	28.27	16.90
Mississippi	61.43	48.85	24.07
Missouri	23.75	13.51	5.48
North Carolina	49.51	36.67	21.82

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Ohio	16.48	9.91	4.94
Oklahoma	11.15	8.14	5.28
South Carolina	34.91	27.54	19.71
Tennessee	31.48	22.46	9.52
Texas	33.71	26.39	16.93
Virginia	42.6	30.84	16.75
West Virginia	24.45	16.2	5.25
TOTALS	593.69	438.51	248.82

Table 2.2.9.-2. Annual growth and removals estimates for public and private ownerships across the Supply Base.

Ownership	Gross growth (million tonne, annual)	Net growth (million tonne, annual)	Removals (million tonne, annual)
Private	530.07	400.45	237.11
Public	63.65	38.04	11.68
TOTALS	593.69	438.51	248.82

This finding of a net growth to removal ratio of 1.8 was similar to the value of 1.5 computed from data presented in the US's 2020 Resource Planning Act Assessment report (Oswalt et al., 2019) after summing the States in the RRA's geography area (their Table 36). The 1.8 value was identical to what was observed for the net growth to removal ratio for the Southern US region as reported in the USDA's National Report on Sustainable Forests (Oswalt et al., 2020, Figure 13-2). The value also comparable to the value of growth to drain ratio of 1.4 analyzed by Forisk Consulting for southern yellow pines in the US South, the most intensively managed species group in the region. Similarly, a recent ResourceWise study reported that, since 1953, growth has been greater than removals ranging between 1.11 and 2.40 for the US South. The historic high of 2.40 occurred during the downturn in lumber markets between 2012 and

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	2017. Comparatively, between 2017 and the recent assessment, growth to removal ratio was 1.26 and higher than the lower rates between 1977 and 1987 (ResourceWise, 2024). Additionally, in light of market and pricing variations experienced during the Covid-19 pandemic, the quantity of wood produced during the period was nearly unchanged from per-pandemic levels (Prestemon et. al, 2022), suggesting stability. Enforcement and monitoring There is no overarching Federal regulatory framework dictating harvest levels or annual allowable cut. However, harvesting levels are observed on an ongoing basis via the USDA Forest Service’s FIA program (see introduction section). There is a US FS Quality Assurance program that ensures the FIA methodology and census is rigorously upheld, ensuring the integrity of results. Risk conclusion and justification While there is no Federal legal framework dictating harvest levels or annual allowable cut, original analyses of USFS FIA data for annual harvest rates, along with similar analysis and studies conducted by the Federal government and others demonstrate growth consistently exceeds harvesting since the 1950s. These monitoring efforts and analysis are an ongoing part of meeting national level forest sustainability objectives such as those defined and periodically reported in the Montreal Process Criteria and Indicators (USDA Forest Service, 2024). Therefore, it is concluded that the risk class for Indicator 2.2.9. is low risk.
<i>Supply Base Verifiers</i>	• FIA datasets via EVALIDator • State One-Click Factsheets
<i>Evidence reviewed</i>	Forisk Consulting. 2024. Local timber supply and growth-to-drain in the US South. Published July 18, 2024. Available at: https://forisk.com/blog/2024/07/18/local-timber-supply-and-growth-to-drain-in-the-u-s-south/ Oswalt, S.N. 2021. Indicator 2.13: Annual harvest of wood products by volume and as a percentage of net growth or sustained yield. Washington, DC: US Department of Agriculture, Forest Service, Research and Development. 3 p. https://research.fs.usda.gov/sites/default/files/2022-03/Indicator2.13.pdf Oswalt, S.N., Smith, W.B., Miles, P.D., and Pugh, S.A. 2019. Forest Resources of the United States, 2017: a technical document supporting the Forest Service 2020 RPA Assessment. Gen. Tech. Rep. WO-97. Washington, DC: US Department of Agriculture, Forest Service, Washington Office. 223 p. Prestemon, J. and Guo, G. 2022. COVID-19 and Forest Products Analysis of the pandemic’s effect on the forest products sector, including lumber pricing and demand, reduction of labor. Forest Product Sectors. February 3, 2022. Access: https://doi.org/10.1287/orms.2022.01.16 ResourceWise. 2024. Demand and Forest Productivity in the US South An Update Report August 26, 2024. US Department of Agriculture Forest Service. 2024. Sustainability Reporting. Access: https://research.fs.usda.gov/inventory/sustainability US Department of Agriculture Forest Service, Forest Inventory and Analysis Program. 2024. Forest Inventory EVALIDator web-application Version 2.1.2. St. Paul, MN: US Department of Agriculture, Forest Service, Northern Research Station. Available at: https://apps.fs.usda.gov/fiadb-api/evalidator

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<i>Risk rating</i>	Low risk
2.2.10	Harvested areas shall be regenerated.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. There is no single Federal law in place for ensuring forest productivity through post-harvest regeneration on private lands in the US. However, harvesting levels have been sustainably maintained for the recent decades. Several State Best Management Practices (BMPs) include provisions for natural regeneration, hand planting, mechanical planting, and direct seeding as a component of silvicultural operations. For example, the Virginia BMP Manual includes a general specification for regeneration, including site preparation, planting spacing, and other elements with the specific aim of enhancing forest establishment, improving environmental protection of woodlands, and reducing the regeneration gap or the time to start a new forest (Virginia Department of Forestry, 2011). In alignment with the BMPs, most forests in the RRA area regenerate naturally following a harvest. Natural regeneration includes natural seeding, stump sprouts, or root sprouts from existing trees. According to a recent comprehensive study by the US Forest Service, timberlands across the southern US have the highest rates of planting across all US forests. Alabama has 33% of its total timberland planted, followed by Georgia (32%), Mississippi (32%), Florida (31%), and Louisiana (31%). These States, all of which are located in the RRA area, have the highest planting rates relative to total timberland across the US. The loblolly/shortleaf (<i>Pinus taeda</i>/<i>Pinus echinata</i>) forest type group represents 71% of all planted forests in the US South (Oswalt et al. 2019). Additionally, landowners are incentivized by their own values and economic drivers to regenerate as soon as possible. As discussed in the Introduction, the family landowners that own the majority of the forest land base in the RRA's geography and provide more than half of the wood flowing into biomass production typically own land for values derived from the forest including beauty or scenery (80% of all ownerships), wildlife habitat (70%), nature protection

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	(70%), family legacy (70%), privacy (70%), and water protection (60%) (Butler et al., 2018). All these top objectives align with prompt regeneration. For both the family landowners and large industrial management and landownership, forest-based income is a source of revenues, thus they are also incentivized to quickly regenerate post-harvest to maximize economic returns and other benefits. Even without a single, specific Federal law, forest productivity resulting from regeneration remains very high. Harvesting levels remain well below growth levels (see analyses for Indicator 2.2.9.) and a recent study by ResourceWise presented that, overall, today’s forest inventory is the greatest it has been for the last 70 years (ResourceWise, 2024). Figure 2.2.10.-1 illustrates the strength of inventory levels, against harvesting volumes.

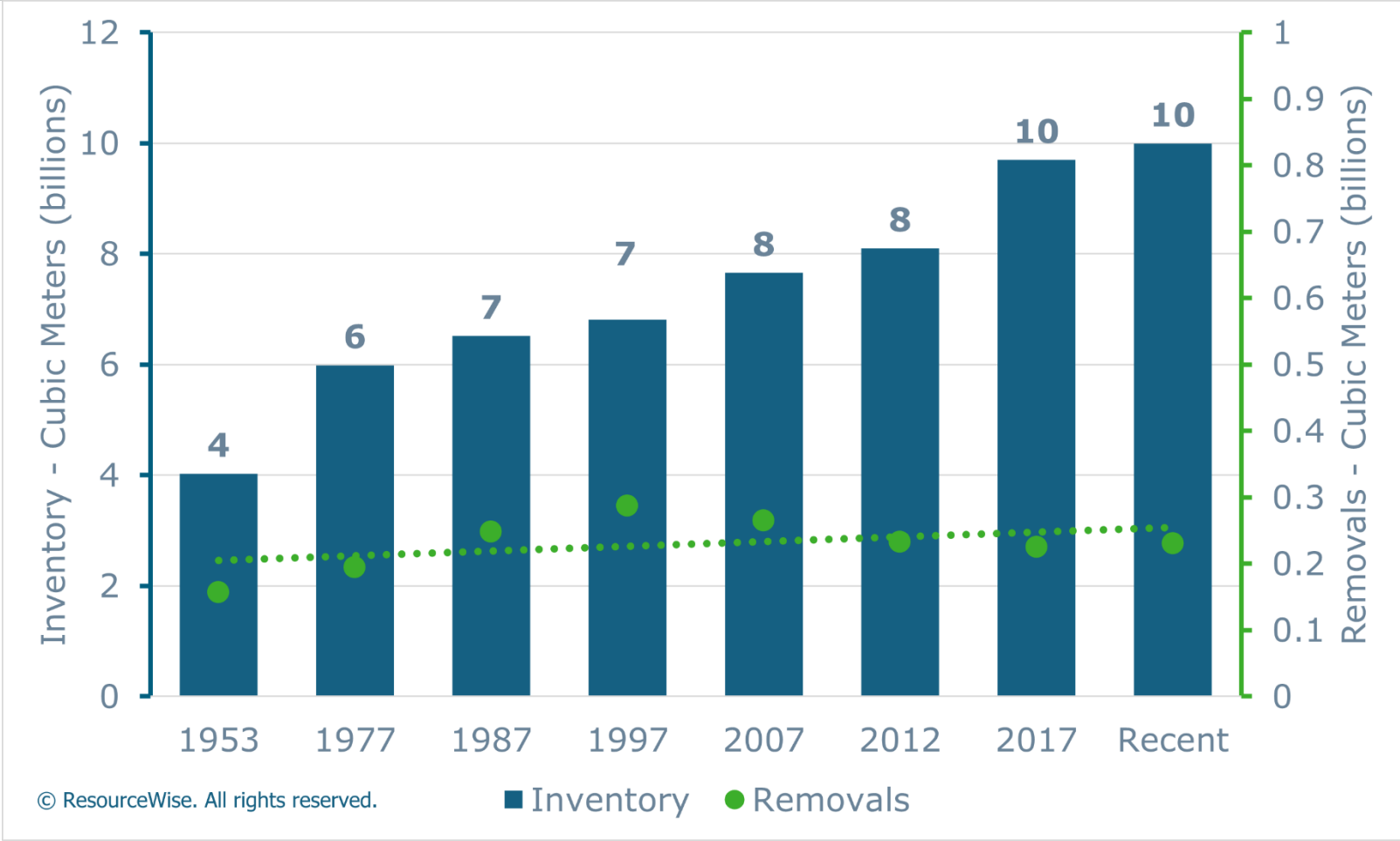


Figure 2.2.10.-1: Inventory and Removals, US South, 1953-Present. (ResourceWise, 2024)

Enforcement and monitoring

State forestry agencies for each State monitor and enforce BMP implementation. These agency BMP compliance reports are updated regularly but are often supplemented in BMP monitoring by biomass producers and/or their sawmill suppliers conducted at the company level under SFI Fiber Sourcing programs. Harvesting, forest inventories, and landowner objectives are observed on an ongoing basis via the US Forest Service’s Forest Inventory and Analysis (FIA)

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	program (see Introduction). There is a USFS Quality Assurance program that ensures the FIA methodology and census is rigorously upheld, ensuring the integrity of results. Risk conclusion and justification There is no Federal legal framework in place for ensuring forest productivity through post-harvest regeneration on private lands in the US. However, State BMPs include provisions for reforestation and there is a history of strong evidence of forest productivity as measured by harvest to inventory rates. Additionally, reforestation aligns with typical landowner objectives, for both family and industrial management and landownerships. Therefore, it is concluded that the risk class for Indicator 2.2.10. is low risk.
<i>Supply Base Verifiers</i>	• FIA datasets via EVALIDator • State One-Click Factsheets
<i>Evidence reviewed</i>	American Forest Foundation (AFF). 2021. Risk Based Approach (RBA) for Achieving Conformance with The Netherlands SDE+ Sustainability Requirements. Butler, B.J., Butler, S.M., Caputo, J., Dias, J., Robillard, A., and Sass, E.M. 2020. Family forest ownerships of the United States, 2018: results from the USDA Forest Service, National Woodland Owner Survey. Gen. Tech. Rep. NRS-199. Madison, WI: US Department of Agriculture, Forest Service, Northern Research Station. 52 p. [plus 4 appendices] https://doi.org/10.2737/NrS-GTR-199 Oswalt, S.N., Smith, W.B., Miles, P.D., and Pugh, S.A. 2019. Forest Resources of the United States, 2017: a technical document supporting the Forest Service 2020 RPA Assessment. Gen. Tech. Rep. WO-97. Washington, DC: US Department of Agriculture, Forest Service, Washington Office. 223 p. ResourceWise. 2024. Demand and Forest Productivity in the US South An Update Report August 26, 2024. Virginia Department of Forestry. 2011. Virginia's Forestry Best Management Practices for Water Quality Technical Manual, 2011.
<i>Risk rating</i>	Low risk
2.2.11	The impacts of natural processes such as fires, pests and diseases shall be managed.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered.

Analysis

To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

Impacts of the natural disturbances of fire, pests, and diseases on US forests are managed at multiple levels of responsibility. Federal agencies provide nationwide response systems as well as monitoring and reporting of forest conditions and have enforcement responsibilities. State agencies have responsibilities for land management and landowner assistance within their jurisdictions. Individual private landowners are responsible for management actions on their own properties to mitigate, avoid, or recover from the impacts of natural disturbances. Forests in the US are subject to a wide range of natural processes and diverse pests and diseases, both native and exotic or invasive.

Landowners and land managers are responsible for applying silvicultural methods that improve the health and resiliency of forests and respond to the impacts of natural processes and natural disturbances. Technical assistance programs, cost-share, and incentives are offered to assist private landowners engaging in sustainable forest management practices. Replanting after a natural disturbance, such as wildfire, hurricanes, windthrows to name a few, on private forest lands is supported by cost-share programs and other disaster recovery programs.

The US Department of Agriculture (USDA) Forest Service (FS) conducts periodic aerial surveys as well as field inspections and inventory programs to monitor and assess forest pest and disease outbreaks on forest lands throughout the US. Each State has a forestry agency, department, or division with responsibility for providing services and outreach, land management, and oversight of forest practices and the management of natural processes. These agencies frequently collaborate with local universities and research organizations to understand forest pathology and other expertise in the management of pest and disease threats and other natural processes. State forestry agencies assist forest landowners in the management of natural processes by conducting forest pest surveys and evaluations, providing educational information, and offering technical assistance and financial resources for preventing or responding to threats and impacts.

The US National Cohesive Wildland Fire Management Strategy focuses on preparation and response to fire risks and impacts, especially in the wildland urban interface where public safety is of greatest concern. The Cohesive Strategy is an interagency effort, with USFS, State agencies, municipal organizations, emergency service authorities, and NGOs included as partners.

The US Natural Resources Conservation Service's (NRCS) Integrated Pest Management Plan assists in the effective management of natural processes related to pests and their impacts to forests. The Plan is required for landowners who receive Federal cost share and is available to all landowners as a model of best practice.

Each State has Forest and Wildlife Action Plans that address invasive species, pests, wildfire, and other threats specific to the conditions of that state. These

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	plans are periodically updated through a robust assessment process with leadership by experts on the planning teams, and the planning process requires public consultation. State Plans provide goals and strategies to manage and prevent harmful effects of natural processes and other threats to forest health and productivity. USDA FS's Forest Inventory and Analysis (FIA) inventories provide insight for forest conditions throughout the nation. Each State has access to detailed information about current and changing forest conditions over time. The FIA system tracks indicators for invasive species and forest pests and provides data for quantifying damage from fires and natural disturbances. Regional groups also assist in forest health evaluations and management systems. For example, in the Southern region the southern pine beetle is closely monitored through collaboration across multiple states to ensure consistency and effective response systems. Education and technical assistance are provided to landowners to encourage biomass harvesting and various forms of thinning treatments to reduce tree density and assist in the prevention of outbreaks. Enforcement and monitoring Managing the natural processes of fires, pests, and diseases impacting US forests is a primary responsibility of the USFS and supported through partnerships with State forestry agencies and universities. The National Cohesive Wildland Fire Management Strategy is a comprehensive approach to managing impacts of the natural processes of fires on US forests. Plant pest quarantine programs and the USDA's Animal and Plant Health Inspection Service (APHIS) monitor and enforce regulations pertaining to invasive species and protection of forests and agricultural productivity. Federal cost-share funds and programs require adherence to the NRCS's Integrated Pest Management Plan. The outcome of Federal agencies, such as the USDA Forest Service, State forest agencies, university Extension, and individual landowners working together is that the impacts of natural processes, such as fires, pests, and diseases, are managed when sourcing feedstock from private and public lands. Risk conclusion and justification Based upon the robust Federal system of managing the impacts of natural processes, the collaboration with State level authorities and universities, the effective engagement of private landowners, and consistent ongoing performance, it is concluded that the risk class for Indicator 2.2.11. is low risk.
<i>Supply Base Verifiers</i>	• FIA datasets • Interviews with private and State Forest management staff • General knowledge about forest practices collected from general engagement with the forest sector
<i>Evidence reviewed</i>	Association of Fish and Wildlife Agencies. 2022. State Wildlife Action Plans. https://www.fishwildlife.org/afwa-informs/state-wildlife-action-plans Evans, A.M. and Finkral, A.J. 2009. "From renewable energy to fire risk reduction: a synthesis of biomass harvesting and utilization case studies in US forests". Global Change Biology Bioenergy. https://doi.org/10.1111/j.1757-1707.2009.01013.x National Interagency Fire Center. 2024. Fire Prevention, Education, and Mitigation. https://www.nifc.gov/fire-information/fireprevention-education-mitigation Southern Group of State Foresters. 2023. "Implementing the Shared Stewardship Strategy A Collection of Success Stories from the US South".

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	https://southernforests.org/wp-content/uploads/2023/03/SGSF-Final-Report_FINALSharedStewardship.pdf US Department of Agriculture Forest Service (USFS). 2024. Data and Tools. https://research.fs.usda.gov/products/dataandtools US Department of Agriculture Forest Service (USFS). 2024. Insect and Diseases. https://www.fs.usda.gov/main/r8/forest-grasslandhealth/insects-diseases
<i>Risk rating</i>	Low risk
2.2.12	Genetically modified trees shall not be used.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The use of genetically modified trees in forestry is strictly regulated in the US by the Federal government, which employs measures that are generally more stringent than in Europe or Asia (Seneca Creek, 2019). There is a range of biotechnology regulations and coordinated by US Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), Environmental Protection Agency (EPA), and US Department of Health and Human Services' Food and Drug Administration (FDA). FDA has primary responsibility for ensuring the safety of human food and animal feed. EPA regulates pesticides, including plants with plant-incorporated protectants (pesticides intended to be produced and used in a living plant), to ensure public safety. APHIS, through its Biotechnology Regulatory Services (BRS) program, regulates the introduction of organisms using genetic engineering that may pose a risk (APHIS, 2024). APHIS is the leading agency for implementing controls related to forest applications. Primary Federal laws include the US Plant Protection Act (PPA) and US Agricultural Risk Protection Act. There are no approvals for genetically modified trees in the US.

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	The Forest Stewardship Council's US National Risk Assessment (FSC US NRA) concluded Low Risk for the "commercial use of GMO (tree) species" in the 48 lower states (FSC, 2019). This assessment found no commercial uses of genetically modified trees taking place across the wood supply areas. There have been field trials of multiple genera but no commercial plantings. Enforcement and monitoring As established in Indicator 1.1.1., the US has a robust legal and regulatory and enforcement system that deters noncompliance with Federal laws, which would apply to the illegal use of genetically modified trees. Monitoring and regulatory oversight for illegal use of genetically modified trees is led by APHIS, in collaboration with the EPA and FDA. In the case of the PPA, criminal penalties include up to a year in prison and civil penalties ranging up to \$500,000, which would be adjudicated through the Federal judiciary, under the US Department of Justice. The described practices and enforcement measures working together provide sufficient assurance that genetically modified trees shall not be used. Risk conclusion and justification The use of genetically modified trees in the US including the RRA's geography, is strictly regulated and essentially non-existent within the commercial arena. At this point in time, there is very low risk of GMO trees being planted and harvested commercially to enter the feedstock supply. The FSC US NRA and Seneca Creek study commissioned by American Hardwood Export Council both conclude low risk for use of genetically modified trees. Therefore, it is concluded that the risk class for Indicator 2.2.12. is low risk.
<i>Supply Base Verifiers</i>	• FSC US NRA • Purchase agreements • Company District of Origin Process • FAO Preliminary Review of Biotechnology in Forestry
<i>Evidence reviewed</i>	Agricultural Risk Protection Act of 2000. Public Law No. 106-224, 114 Stat. 400. Washington, DC. Accessed: https://www.aphis.usda.gov/sites/default/files/agriskprotact2000.pdf Animal and Plant Health Inspection Service. 2024. Biotechnology Regulations. Accessed: https://www.aphis.usda.gov/biotechnology/regulations Forest Stewardship Council (FSC). 2019. US National Risk Assessment. Access: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Plant Protection Act of 2000. 7 U.S.C. §§ 7701 et seq. Washington, DC. Accessed: https://www.aphis.usda.gov/sites/default/files/PPAText.pdf Seneca Creek Associates. 2019. Assessment of Lawful Sourcing and Sustainability: US Hardwood Exports, prepared for the American Hardwood Export Council. Partial Accessed: https://www.americanhardwood.org/en/environmental-profile/seneca-creek
<i>Risk rating</i>	Low risk

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Principle 3 - Feedstock is only sourced from Supply Bases where the forest carbon stock is stable or increasing in the long term

Criterion 3.1 - Feedstock sourcing is consistent with international requirements for land use, land-use change and forestry (LULUCF) emissions.

3.1.1	LULUCF emissions shall be accounted for through one of the following routes: Route A Feedstock may be sourced from a country of origin which is party to the Paris Agreement, and which has submitted a Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) covering carbon emissions and removals from agriculture, forestry and land use which ensure the changes in carbon stock associated with biomass harvest are counted towards the country's commitment to reduce or limit greenhouse gas emissions, or Route B Feedstock may be sourced from a country of origin which is party to the Paris Agreement and has national or sub-national laws in place (developed in accordance with Article 5 of the Paris Agreement and applicable in the area of harvest), to conserve and enhance carbon stocks and sinks, and provided there is evidence that reported LULUCF-sector emissions do not exceed removals, or Route C Feedstock may be sourced from a Supply Base where an assessment demonstrates that both the carbon stock is stable, and the forests' capacity to act as a carbon sink is stable or increasing over the long term.
<i>Findings</i>	Scale of assessment The RRA geographic scope of this RRA is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, stakeholders and experts were consulted, and qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

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	The US rejoined the Paris Agreement on January 20, 2020, but plans to withdraw have been announced as were announced in January of 2025, as the Trump administration entered office. The country's effective exit from the agreement will be effective from January, 27th 2026. Considering these developments, Route C applies. As indicated in Indicator 3.2.1., analysis of carbon stocks for the RRA geography are consistently stable or increasing, for decades, supporting the stable or increasing capacity of the forests to act as a sink. This analysis finds that, across the region, an increase of aboveground live carbon stocks of 22.37% since 2008 was observed, from approximately 4.7 to 5.7 billion tonne (Table 3.2.1.-1). Carbon stocks increased as little as 5.81% in Texas to as high as 66.10% in Oklahoma. Carbon stocks increased at a greater rate on public lands compared to private lands, with an increase of 38.95% and 21.09%, respectively (Table 3.2.1.-2). Enforcement and monitoring The US has met obligations and required reporting since rejoining the Paris Agreement and those will continue until the US's exit is effective on January 26th 2026. Reporting under the Paris Agreement is subject to multilateral assessment. In light of the US's planned withdrawal from the Paris Agreement, Route C for this indicator also applies, and analysis (Domke, et al., 2023) indicates the sourcing region included within the scope of the RRA provides a supply base where the carbon stock is stable and forest capacity to act as a carbon stock is stable or increasing. Additional information about monitoring and enforcement of inventory and growth (i.e., growth and drain) is reported in the analysis for Indicator 2.2.9. and Indicator 3.2.1. describes the monitoring of carbon stocks. Risk conclusion and justification On January 20, 2025, the United States (US) President signed Executive Order 14162 directing the United States Ambassador to the United Nations to submit a formal written notification of the United States' withdrawal from the Paris Agreement. This formal notification was submitted to the United Nations by the US Ambassador on January 26, 2025. Article 28 of the Paris Agreement stipulates that "withdrawal shall take effect upon expiry of one year from the date of receipt by the Depositary of the notification of withdrawal" meaning as of January 27, 2026 the United States will no longer be a party to the Paris Agreement and from this date on, Routes A and B of Indicator 3.1.1 will cease to apply to US feedstock. Until January 26, 2026, Route A is deemed to still be applicable. From January 27, 2026, onwards, Route C is the only option for compliance with this indicator.
<i>Supply Base Verifiers</i>	• UNFCCC website and NDC registry • UNFCCC national communications and biennial reports • FIA datasets via EVALIDator • State One-Click Factsheets
<i>Evidence reviewed</i>	Domke, G.M., Walters, B.F., Giebink, C.L., Greenfield, E.J., J. Smith, J.E., et al. 2023. Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990-2021. Resource Bulletin WO-101. Washington, DC: US Department of Agriculture Forest Service, Washington Office. 10 p. Available at: https://www.fs.usda.gov/research/treesearch/66035

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	New March. 2024a. RRA Input Survey Results. SurveyMonkey. USA, Nationally Determined Contribution. Access: https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%2021%202021%20Final.pdf US Department of Agriculture Forest Service, Forest Inventory and Analysis Program. 2024. Forest Inventory EVALIDator web-application Version 2.1.2. St. Paul, MN: U.S Department of Agriculture, Forest Service, Northern Research Station. Available at: https://apps.fs.usda.gov/fiadb-api/evalidator Westfall, J.A., Coulston, J.W., Gray, A.N., Shaw, J.D., et al. 2024. A national-scale tree volume, biomass, and carbon modeling system for the United States. US Department of Agriculture, Forest Service. Available at: http://dx.doi.org/10.2737/WO-GTR-104
<i>Risk rating</i>	Low risk - Until 26 January 2026, Route A Specified risk - From 27 January 2026, Route C

Criterion 3.2 - Carbon stocks in the forest area of the Supply Base are stable or increasing in the long term.

3.2.1	All feedstock sourcing shall be consistent with either of these two options: Option A Feedstock may be sourced from Supply Bases where an assessment of the Supply Base shows that the forest carbon stocks are stable or increasing, or Option B Feedstock may be sourced, if the assessment shows that the forest carbon stocks are declining in the Supply Base, provided that the decline is due to natural processes (fire, pests etc.), and sourcing of feedstock has the aim to recover feedstock that would otherwise be lost or to assist regeneration.
<i>Findings</i>	Scale of assessment The RRA geographic scope of this RRA is the primary regions of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis of land use change was evaluated for the full geographic scope of the RRA. Analysis was conducted with an emphasis on private forest lands, which provide the vast majority of feedstock into biomass supply chains, along with other non-NFS land tenures including State and local government, NGO and others. Change detection analysis was conducted at the level of FIA Unit and State levels. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest

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sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

There is no Federal legal framework in place specifying carbon stocking on private lands in the US. However, aboveground carbon stocks levels have been stable or increasing for decades.

Carbon is continuously cycled in ecosystems and comprised of biomass aboveground, below ground, dead wood, litter, and soil, as well as harvested forest products. Aboveground biomass includes the tree’s bole, branches, stump bark, seeds, and foliage. As trees photosynthesize and grow, carbon is removed from the atmosphere and stored in living tree biomass. (Domke, 2020) Aboveground carbon was used as the appropriate value because it is most closely related to the flow of feedstock and removal of carbon from the site.

The US Forest Service’s (FS) Forest Inventory and Analysis (FIA) dataset is the most current and comprehensive measurement of forest inventories on all landownerships across the US. To evaluate this Indicator, FIA data was queried across the entire RRA geographic assessment area. Aboveground carbon stocks in live trees (at least 2.54-cm [1 -inch] in diameter) on timberland were obtained for two time periods: the first corresponding to years no more recent than 2008 and the second the most recent estimates available, with data collected as recent as 2023. Measurement periods differed for each US State depending on sampling schedules. The year 2008 was selected for the first measurement because it aligns with the time period outlined in Criterion 2.2. and represents the approximate final year when most annual inventories for the FIA data were complete for each State in the Supply Base. Carbon was estimated using a series of equations developed by the USFS that determine tree volume, biomass, and carbon (Westfall et al. 2024).

Growth to removal ratios were evaluated across the region to assess sustainability of harvest levels. Key variables were: (1) average annual net growth (gross growth minus mortality) of aboveground biomass of trees (at least 2.54 cm [1-inch] in diameter) on timberland, (2) average annual gross growth of aboveground biomass of trees (at least 2.54 cm [1-inch] in diameter) on timberland, and (3) average annual removals of aboveground biomass of trees (at least 2.54 cm [1-inch] in diameter) on timberland. Removals include trees removed from inventory by harvesting or other cultural operations (such as timber-stand improvement) or by land clearing.

Across the region, an increase of aboveground live carbon stocks of 22.37% since 2008 was observed, from approximately 4.7 to 5.7 billion tonne (Table 3.2.1.-1). Carbon stocks increased as little as 5.81% in Texas to as high as 66.10% in Oklahoma. Carbon stocks increased at a greater rate on public lands compared to private lands, with an increase of 38.95% and 21.09%, respectively (Table 3.2.1.-2).

Table 3.2.1.-1. *Changes in carbon stocks in live trees on timberland in each State across the Supply Base, pre-2008 to 2023.*

State	First measurement period (pre-2008)	Carbon in live trees (million tonne, pre-2008)	Second measurement period (most recent)	Carbon in live trees (million tonne, most recent)	Percent change in carbon in live trees, pre-2008 to most recent

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Alabama	2001-2007	387.30	2015-2023	522.85	35.00
Arkansas	2000-2007	291.74	2019-2023	370.67	27.05
Florida	2002-2007	232.96	2014-2020	266.36	14.34
Georgia	1998-2007	453.38	2015-2022	538.50	18.77
Kentucky	2005-2007	295.24	2013-2019	338.80	14.75
Louisiana	2001-2005	239.9	2015-2021	308.84	28.74
Mississippi	2006	322.06	2017-2022	463.75	43.99
Missouri	2004-2007	293.62	2015-2021	330.92	12.70
North Carolina	2003-2007	387.39	2016-2022	478.86	23.61
Ohio	2007	196.23	2015-2021	222.26	13.27
Oklahoma	1993 (east), 1989 (west)	65.72	2017-2021	109.16	66.10
South Carolina	2002-2007	247.68	2017-2021	289.36	16.83
Tennessee	2000-2007	341.68	2012-2020	394.24	15.38
Texas	2001-2007	224.65	2014-2020	237.70	5.81
Virginia	2002-2007	362.71	2017-2022	455.42	25.56
West Virginia	2004-2007	316.36	2015-2021	373.10	17.94
TOTALS	-	4,658.62	-	5,700.79	22.37

Table 3.2.1.-2. Changes in carbon stocks in live trees on public and private timberlands across the Supply Base, pre-2008 to 2023.

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	<table><tr><th>Ownership</th><th>Carbon in live trees (million tonne, pre-2008)</th><th>Carbon in live trees (million tonne, most recent)</th><th>Percent change in carbon in live trees, pre-2008 to most recent</th></tr><tr><td>Private</td><td>4323.46</td><td>5235.13</td><td>21.09</td></tr><tr><td>Public</td><td>335.15</td><td>465.7</td><td>38.95</td></tr><tr><td>TOTALS</td><td>4,658.61</td><td>5,700.83</td><td>22.37</td></tr></table>	Ownership	Carbon in live trees (million tonne, pre-2008)	Carbon in live trees (million tonne, most recent)	Percent change in carbon in live trees, pre-2008 to most recent	Private	4323.46	5235.13	21.09	Public	335.15	465.7	38.95	TOTALS	4,658.61	5,700.83	22.37
Ownership	Carbon in live trees (million tonne, pre-2008)	Carbon in live trees (million tonne, most recent)	Percent change in carbon in live trees, pre-2008 to most recent														
Private	4323.46	5235.13	21.09														
Public	335.15	465.7	38.95														
TOTALS	4,658.61	5,700.83	22.37														
	The finding of this original analysis of increasing carbon stocks in the region is corroborated with similar findings that show that strong carbon sink strength of forests in the Southern US, particularly on private lands (Domke et al. 2023). Enforcement and monitoring There is no overarching Federal regulatory framework dictating carbon stocking levels. However, carbon stocking levels are observed on an ongoing basis via the USFS’s FIA program (see Introduction). There is a USFS Quality Assurance program that ensures the FIA methodology and census is rigorously upheld, ensuring the integrity of results. Risk conclusion and justification While there is no Federal legal framework dictating carbon levels, original analyses of USFS FIA data, along with similar analysis and studies conducted by the Federal government and others demonstrate increasing carbon levels. Based on consistent ongoing performance, it is concluded that the risk class for Indicator 3.2.1. is low risk.																
Supply Base Verifiers	- FIA datasets via EVALIDator - State One-Click Factsheets																
Evidence reviewed	Domke, G.M., Walters, B.F., Giebink, C.L., Greenfield, E.J., J. Smith, J.E., et al. 2023. Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990-2021. Resource Bulletin WO-101. Washington, DC: US Department of Agriculture Forest Service, Washington Office. 10 p. Available at: https://www.fs.usda.gov/research/treesearch/66035 New March. 2024a. RRA Input Survey Results. SurveyMonkey. US Department of Agriculture Forest Service, Forest Inventory and Analysis Program. 2024. Forest Inventory EVALIDator web-application Version 2.1.2. St. Paul, MN: U.S Department of Agriculture, Forest Service, Northern Research Station. Available at: https://apps.fs.usda.gov/fiadb-api/evalidator																

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	Westfall, J.A., Coulston, J.W., Gray, A.N., Shaw, J.D., et al. 2024. A national-scale tree volume, biomass, and carbon modelling system for the United States. US Department of Agriculture, Forest Service. Available at: http://dx.doi.org/10.2737/WO-GTR-104
<i>Risk rating</i>	Low risk
3.2.2	Primary feedstock shall not be sourced from forest areas where site productivity is low and, according to local definitions or norms, the areas are classified as low-productive or difficult to regenerate.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis of land use change was evaluated for the full RRA geographic scope. Analysis was conducted with an emphasis on private forest lands, which provide the vast majority of feedstock into biomass supply chains, along with other non-NFS land tenures including State and local governments, NGOs, and others. Change detection analysis was conducted at State levels. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. During an online listening session, 55% of respondents agreed or strongly agreed that there are adequate frameworks in place to ensure ecosystem productivity, functions, and services maintained or enhanced. Thirty-three percent were neutral and 11% had no opinion. Similarly, in the survey conducted during this period, 80% of respondents agreed or strongly agreed that there are adequate frameworks in place. The remaining 20% neither agreed nor disagreed (New March, 2024). While there is no Federal regulatory mechanism to prevent the planting and harvesting of trees on sites with low productivity, there is a history of incentivized planting of these areas for environmental and stabilization purposes. Specifically, the planting on unproductive and degraded lands tends to reflect implementation of US Federal policies, particularly the now retired US Soil Bank Program and still available US Conservation Reserve Program (CRP), which provides supplemental funding to landowners for planting trees for soil conservation and to improve environmental health and quality (Helms, 1985, Chen et. al,

USDA 2020). Neither program’s purpose was commercial timber production.

As a local definition reflecting practical and cultural norms, the US Forest Service (FS) defines “marginal lands” within its Forest Inventory and Analysis (FIA) protocol and inventory as “marginal.” Forested areas, in the FIA vernacular, are classified as marginal if the site productivity of a forest does not reach a minimum to grow crops of industrial wood, based on the culmination of mean annual increment in fully stocked stands (Burril et al., 2024).

Original analysis was undertaken to evaluate this Indicator with consideration for this definition’s alignment with the SBP specification. USFS FIA data were queried across the entire RRA geographic assessment area. This volume increment was between 0.0 and 1.3 cubic meters/ha/yr (0.0 and 19 cubic feet/ac/yr), as defined by FIA’s site productivity class code (SITECLCD). Total area designated as forest land and not in reserve status (defined as land that is permanently prohibited from being managed to produce wood products through statute or agency mandate) was determined for these conditions. A subset of these marginal lands that were harvested was also quantified. Harvesting was defined as the removal of one or more trees from a stand since the last measurement (or within the last five years for new plots) across an area at least 0.40 ha (1 acre) in size.

Across the RRA region, 19.5 million ha of marginal forest land was reported, the majority of which occurred in Texas (17.3 million ha) and Oklahoma (1.9 million ha) (Table 3.2.2.-1). The proportion of these marginal lands harvested during the assessed period was low less than 1% (0.40%). This methodological approach and results were confirmed in interviews with FIA scientists and staff (Coulston, 2024, Meade, 2024). Additionally, experts consulted in Florida corroborated that risk of commercial harvesting of feedstock from these lands classified as marginal is low (Demers, 2024).

Table 3.2.2.-1. *Total area of marginal forest land and a subset of those lands which have been harvested in each US State across the Supply Base, approximately 2012 to 2023.*

State	Marginal forest land (hectares)	Marginal forest land that has been harvested (hectares)	Percent of marginal forest land that has been harvested
Alabama	2,384	0.00	0.00
Arkansas	9,896	0.00	0.00
Florida	145,198	3,067	2.11
Georgia	2	0.00	0.00
Kentucky	2,355	0.00	0.00

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Louisiana	9,216	0.00	0.00
Mississippi	1,786	0.00	0.00
Missouri	76,503	8,108	10.60
North Carolina	17,635	0.00	0.00
Ohio	1,969	0.00	0.00
Oklahoma	1,864,297	14,532	0.78
South Carolina	9,557	0.00	0.00
Tennessee	8,288	0.00	0.00
Texas	17,315,389	51,879	0.30
Virginia	31,137	0.00	0.00
West Virginia	3,016	0.00	0.00
TOTALS	19,498,628	77,586	0.40

Our finding that the majority of marginal, low productivity forest lands in Texas and Oklahoma is supported by expert knowledge of landscapes found there, namely brushlands and open lands with few trees forming a dense canopy (Coulston, 2024, Demers, 2024, Meade, 2024).

Enforcement and monitoring

While there is no Federal regulatory framework to prevent the planting and harvesting of trees on sites with low productivity, original analyses of USFS FIA data, corroborated by expert engagement, strongly suggests the risk of feedstock sourcing from marginal lands is very low. Indeed, given the abundance of productive forest land, there is little incentive for this practice. Any planting of trees on marginal or degraded lands for purposes of stabilization via the CRP program, is strictly monitored and controlled by the US Department of Agriculture’s Farm Service Agency (FSA) at the site level. Information about the extent and locations of enrolled private lands is not made publicly available. However, failure to carry out US Conservation Reserve Program (CRP) contract terms, including inconsistent management practices, results in termination of the agreement and forfeiture of payments as well as payment of liquidated damages (FSA, 2024). The outcome of federal, state, and local agencies, along with private landowners, consultants, and expert stakeholders, working together is that primary feedstock is not

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	sourced from forest areas classified as low productivity in alignment with national standards and definitions, when sourcing from private and public lands. Risk conclusion and justification While there is no Federal regulatory mechanism to prevent the planting and harvesting of trees on sites with low productivity, there is little incentive to do so. Original analyses of USFS FIA data, corroborated by expert engagement strongly suggests the risk of sourcing from low productivity lands is very low. Based on consistent ongoing performance, it is concluded that the risk class for Indicator 3.2.2. is low risk.
<i>Supply Base Verifiers</i>	• Company district of origin processes • Company inspection and monitoring • FIA EVALIDator
<i>Evidence reviewed</i>	Burrill, E.A., DiTommaso, A.M., Turner, J.A., Pugh, S.A., Christensen, G., et al. 2024. The Forest Inventory and Analysis Database, FIADB user guides, volume database description (version 9.2), nationwide forest inventory (NFI). US Department of Agriculture, Forest Service. 1042 p. Available at: https://research.fs.usda.gov/understory/forest-inventory-and-analysis-database-user-guide-nfi Chen, G., Pan, S., Hayes, D.J., and Tian, H. "Spatial and Temporal Patterns of Plantation Forests in the United States since the 1930s: An Annual and Gridded Data Set for Regional Earth System Modeling." <i>Earth System Science Data</i>, 9 (2017): 545–556. Coulston, J., PhD. Project Leader/Supervisory Research Forester, USDA Forest Service, Southern Research Station. August 2024. Personal Interview. Demers, C. Extension Program Manager – Florida Land Steward, University of Florida, School of Forest, Fisheries, & Geomatics Sciences. September 2024: Personal communication. Domke, G.M., Walters, B.F., Giebink, C.L., Greenfield, E.J., et al. 2023. Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990-2021. Resource Bulletin WO-101. Washington, DC: US Department of Agriculture Forest Service, Washington Office. 10 p. Available at: https://www.fs.usda.gov/research/treesearch/66035 Helms, J.D. "Brief History of the USDA Soil Bank Program." NRCS Historical Insights (January 1985). Meade, J. Forester, USDA Forest Service, Southern Research Station. September 2024. Personal Interview. New March. 2024a. RRA Input Survey Results. SurveyMonkey. US Department of Agriculture Farm Service Agency. "Conservation Reserve Program." 2020. https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program US Department of Agriculture Forest Service, Forest Inventory and Analysis Program. 2024. Forest Inventory EVALIDator web-application Version 2.1.2. St. Paul, MN: US Department of Agriculture, Forest Service, Northern Research Station. Available at: https://apps.fs.usda.gov/fiadb-api/evalidator
<i>Risk rating</i>	Low risk

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3.2.3	Primary feedstock shall not be sourced from forest areas in the Supply Base which, according to local definitions or norms, are classified as having combined attributes of high carbon stocks and high conservation value (HCV).
<i>Findings</i>	Scale of assessment The RRA geographic scope of this RRA is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The Forest Stewardship Council's US National Risk Assessment (FSC US NRA) was reviewed as a principal source because of its robust multistakeholder development process, wide acceptance, and existing precedence amongst the forest community in the US, including in the states of biomass production reviewed under this RRA. The FSC US NRA reflects local definitions and norms and was thoroughly vetted by a spectrum of locally rooted stakeholders and experts. The FSC US NRA specifically analyzes the risk of wood sourcing from areas characterized as High Conservation Values (HCV), mobilizing the HCV approach, as described in the HCV Resource Network's (HCV RN) Common Guidance. All HCV types were analyzed in the FSC US NRA including HCV1 (species diversity), HCV2 (landscape level ecosystems, ecosystem mosaics and Intact Forest Landscapes), HCV3 (ecosystems and habitats), and HCV4 (ecosystem services). The FSC US NRA specifies risk related to the sourcing of wood forests where HCVs are threatened by management activities, including any HCV areas that would represent high carbon stocks. While the FSC US NRA does not explicitly analyze for high carbon stocks, the assessment recognizes forests as a carbon sink generally and notes the carbon values associated with Old Growth (HCV3). The FSC US NRA identifies Old Growth in the Pacific Coast, Rocky Mountain, and Southwest regions, but not in the Southeast or Appalachian regions that overlap with the RRA's geography. In summary, FSC US NRA does analyse risk of sourcing wood from HCVs and specifies risk related to the sourcing of wood forests where HCVs are threatened by management activities, including those associated with high carbon values. None of those HCVs exist within the geography of the RRA and, thus, would not be affected by biomass sourcing. Enforcement and monitoring

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	There are no laws that explicitly identify or protect HCVs, including those that also comprise high carbon stocks. The The FSC US NRA, the primary source for identifying risk of sourcing from forest areas with HCVs, is not a legal mechanism. However, as noted above the FSC US NRA, mobilizing local definitions and norms, notes the carbon values associated with Old Growth (HCV3) within the US. None are in the geography of the RRA. FSC maintains a robust, complex, and multifaceted normative framework for the development and maintenance of Controlled Wood National Risk Assessments. This framework includes but is not limited to the Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002V2-0 EN), FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002), Interpretations of the Normative Framework, Controlled Wood (9/09/2024), List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). All these guiding mechanisms are subject to FSC's triumvirate governance system and related processes for the development of procedures, directives, interpretations, derogations, and other forms of FSC's normative framework. Additionally, the FSC US NRA specifically describes the approach for maintenance of the NRA (FSC, 2019). As such, the system and risk designations are rigorously monitored. Risk conclusion and justification There are no laws that explicitly identify or protect HCVs, as identified by the FSC US NRA, including those that also comprise high carbon stocks. However, the FSC US NRA is a principal and widely recognized source that mobilizes local definitions and norms. NRA specifies risk related to the sourcing of wood forests where HCVs are threatened by management activities, including any HCV areas that would represent high carbon stocks. While the FSC US NRA does not explicitly analyze for high carbon stocks, the assessment recognizes high carbon values associated with Old Growth (HCV3) and specified risk in association with this HCV. However, none of these specified risk areas occur in the US Southeast or Appalachian regions that overlap with the RRA's geography. Therefore, it is concluded that the risk class for Indicator 3.2.3. is low risk.
<i>Supply Base Verifiers</i>	• FSC US NRA • FSC areas of specified risk • ESA listings • ESA critical habitats • NatureServe Explorer Pro • NatureServe MoBi • Company mitigation procedures and implementation • Staff and supplier interviews
<i>Evidence reviewed</i>	Forest Stewardship Council (FSC). 2014. Development and Approval of FSC Centralized National Risk Assessments (PSU-PRO-10-002 v3). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2014. FSC National Risk Assessment Framework Procedure (FSC-PRO-60-002 v3). Access: https://connect.fsc.org/document-

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	centre Forest Stewardship Council (FSC). 2019. FSC-NRA-USA V1-0: FSC US Controlled Wood National Risk Assessment (US NRA). Access: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Forest Stewardship Council (FSC). 2023. US National Risk Assessment Implementation Resources. Access: https://us.fsc.org/en-us/certification/controlled-wood/us-nra-implementation-resources Forest Stewardship Council (FSC). 2024. Interpretations of the Normative Framework, Controlled Wood (9/09/2024). Access: https://connect.fsc.org/document-centre Forest Stewardship Council (FSC). 2024. List of FSC Approved Controlled Wood Documents (FSC-PRO-60-002b V2-0 EN). Access: https://connect.fsc.org/document-centre New March. 2024a. RRA Input Survey Results. SurveyMonkey. Streeter, J.R., Bhattacharjee, J., and Kandel, B. 2023. Aboveground Carbon Stock in a Bottomland Hardwood Forest in the Southeastern United States. Forests 14, no. 5: 974. https://doi.org/10.3390/f14050974
<i>Risk rating</i>	Low

Criterion 3.3 - Feedstock sourcing shall not compete with wood sourcing for long-lived wood products.

3.3.1	Feedstock sourcing shall be in compliance with the principles of cascading use, high quality stem wood shall not be used as feedstock if it is in substantial demand for long-lived products in the Supply Base.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments of forest sourcing in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages

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was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

The US Forest Service (FS) provides Federal direction for forest management-, and State-level authorities responsible for forest-specific policies and frameworks within the RRA geography (See Principle 1 for further discussion of legal structures). The US Department of Energy (DOE) advances the national, economic, and energy security of the US and promotes scientific and technological innovation in support of that mission and in accordance with laws passed by Congress and signed by the President, and a host of Executive Orders issued by the President. The US also has Federal consumer protection laws that prevent fraud, deception, and unfair business practices. Antitrust laws prohibit anticompetitive business practices, and these laws have the goal of promoting free and fair competition in the marketplace.

The primary policies for promotion of the increased use of bioenergy and woody biomass in the US are the US Biomass Research and Development Act of 2000, US Farm Bill of 2002 and its amendments, US Healthy Forest Restoration Act (HFRA) of 2003, US Energy Policy Act of 2005 (EPA), US Energy Independence and Security Act of 2007 (EISA), and US Food Conservation and Energy Act of 2008 (Food, Conservation, and Energy Act of 2008) (Page-Dumroese, 2022). Federal laws are followed and applied by State and local legislation and include policies and incentives to encourage woody biomass production and utilization depending on local conditions. Federal and State governments have developed policies and regulatory instruments to support the production of electricity and heat from forest biomass. Researchers that reviewed and classified legislation and policy instruments about woody biomass from all US states reported the identification of 388 policies, 95 tax incentives, 63 subsidies and grants, 129 rules and regulations, 67 education and consultation tools, and 33 financing and contracting instruments (Page-Dumroese, 2022). The Department of Energy's (DOE) Bioenergy Technologies Office (BETO) supports research, development, and demonstration to enable sustainable use of domestic biomass and waste resources to produce biofuels and bioproducts. The DOE has completed analysis of biomass supplies in the US and its sustainable production. The analysis shows the capacity to produce more than one billion tons of biomass per year from forest and agricultural resources in the US, sufficient to meet expected market demand through 2050 (DOE, 2023).

A recent report by Resource Wise evaluated the market demand and forest productivity in the US South, including the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia. Although this doesn't represent all the states within the RRA scope, it represents the vast majority of the area and of US biomass pellet production and is a sufficient sample to evaluate risk given the consistency across the broader region. The analysis found that the US South is one of the most productive wood baskets in the world, producing 22% of global industrial roundwood. It also determined that the US pellet export industry has less than a 0.1% impact on the proportion of wood removed compared to forest inventory (ResourceWise, 2024). In 2022 (the most recent available data for analysis), wood pellets accounted for 4% of total harvest removals and 0.08% of total forest inventory – an increase from 1.00% and 0.02%, respectively since 2012 (ResourceWise, 2024). These results are corroborated by Timber Product Output and Use annual reports produced by the USFS in collaboration with State agencies. For example, the most recent reports for Louisiana (2022), Mississippi (2022), Kentucky (2022), Texas (2022), and Florida (2022) note that bioenergy and fuelwood comprise 4.4%, 5.2%, 1.4%, 4.7% and 10% of roundwood production, respectively (US Forest Service, 2022).

Figure 3.3.1.-1 shows market prices in the SE region are differentiated by product group. Between 2010 and 2022, stumpage prices for hardwood sawtimber averaged \$36.87 per ton while pine sawtimber, used primarily for construction purposes, averaged \$27.97 per ton (ResourceWise, 2024). The average pine pulpwood stumpage price over the same time period was \$10.42 per ton while hardwood pulpwood was \$8.77 per ton (ResourceWise, 2024). The price paid for slash (harvest residuals) was between zero dollars (\$0.00) or \$1.00 per ton (ResourceWise, 2024).

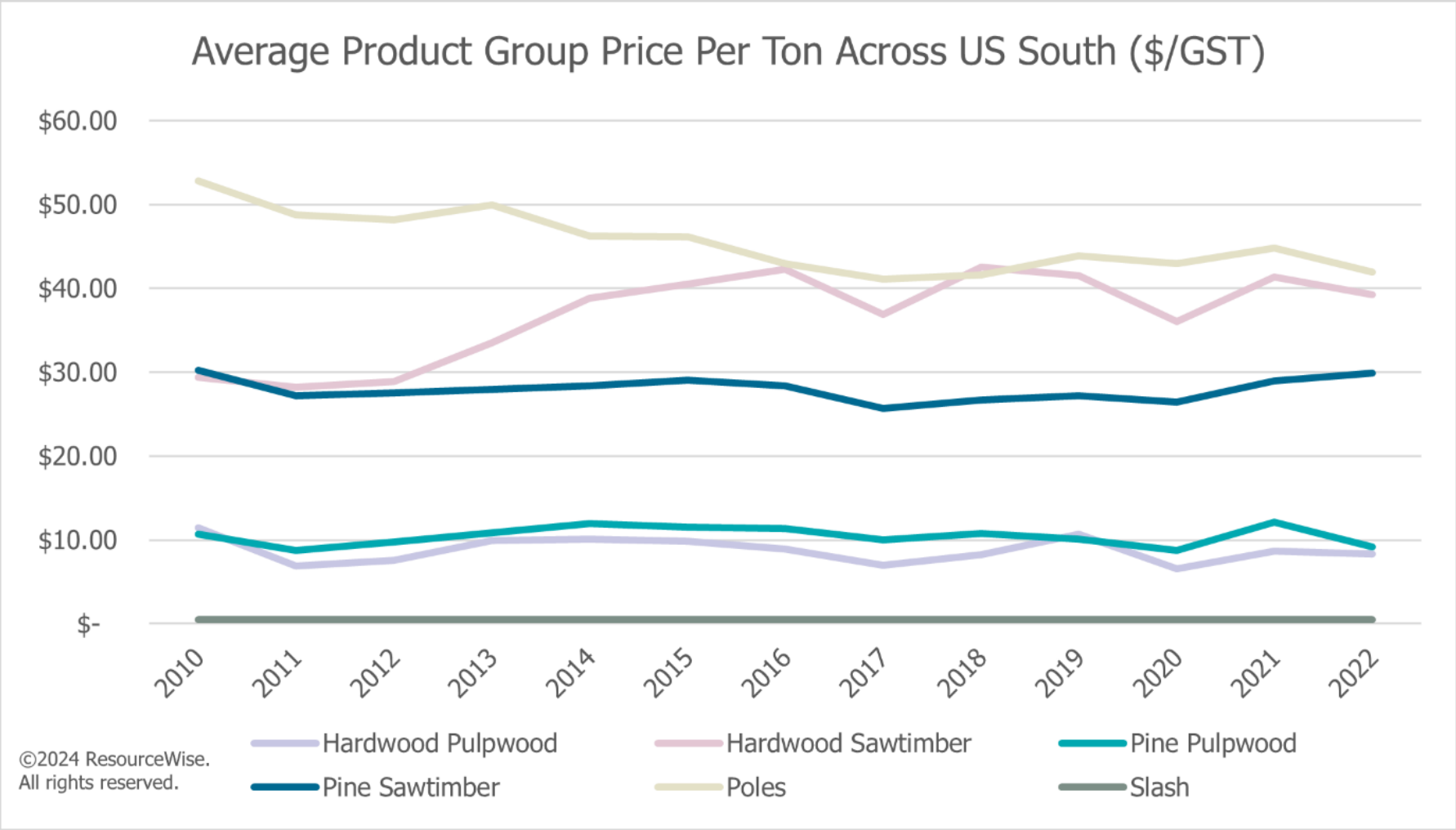


Figure 3.3.1.-1: Average Product Group Price per Ton Across US South. (ResourceWise, 2024)

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Given cost differences, as shown in Figure 3.3.1.-1, predominantly low-quality wood is used for biomass production. The economic realities of raw material sourcing costs are a primary prohibition on the use of higher-quality wood for energy purposes. In practice, mostly low-quality wood is used, but nothing legally prohibits the use of higher-quality wood. Firewood, wood waste, and other low-value wood are the main sources of biomass production in the US South. Industrial roundwood is used in sawmilling and the wood-based panel industry (i.e., particleboard, fiberboard, and veneer sheets). Although Federal legislation or regulation does not directly address the use of high-quality wood for energy purposes, research and stakeholder consultation suggests that in practice, there is no evidence of frequent, large-scale wood sales against the cascade principle. The principles of cascading use are specifically referenced in the language of this indicator for the SBP Standard, and the cascading principle is a key feature of the Renewable Energy Directive 2023/2413 (REDIII). The Cascading Principle introduces a structured hierarchy for the use of wood, similar to the waste hierarchy (reduce, reuse, recycle, etc.). Application of a cascaded approach results in prioritizing the use of wood in long-lived products, such as furniture and building materials, before other uses and products with shorter in-use time periods (such as paper, packaging, or energy products) are considered. As described above and shown in the data for the US South, the cascading principle often operates quite naturally in markets where price differences automatically result in higher cost raw materials being utilized for longer-lived products. For further discussion of the principle and the SBP application, see the SBP paper released in November 2024 (SBP, 2024).

Timber and pulpwood prices have consistently been higher than biomass prices. Research has also found there is sufficient woody biomass in the SE region to support greater production of wood pellets for domestic and international markets without redirecting timber from sawtimber and pulpwood production (North, 2021). Identified obstacles to increased biomass production in the region include price competition with conventional wood products and high costs associated with harvesting low-grade wood for biomass (North, 2021). Based on consultation with experts and other stakeholders, including those with forest market expertise, high-quality timber is not used for energy production on a large scale. On a small scale, it is conceivable that high biomass prices might encourage the use of high-quality roundwood for energy production from time to time, however, negative effects to the viability of mills producing long-lived forest products were not evidenced within the sourcing region. Wood pellet production in the SE region makes significant use of sawmill residuals, estimated at 50% or more of the feedstocks based on knowledge of the RRA authors and review of existing Company Risk Assessments within the RRA's geography. Through the utilization of sawmill residuals (and other secondary and tertiary feedstocks) the markets encourage the use of wood according to the cascading principle.

In 1992, the US National Energy Policy Act was enacted to encourage the use of renewable energy sources. An Executive Order (EO) 13134, issued in August 1999, further encouraged the development and promotion of bio-based products and bioenergy. As of 2004, biomass energy represented about half of all renewable energy production in the US, but by 2022 biomass represented only 37%, as solar energy rose from 1% to over 14% and wind from 2% to nearly 30% (Bowyer, 2024).

The report The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050 was published by the US Department of State and the US Executive Office of the President in 2021 and defines biomass strategies for the US. The strategy recognizes biomass as a key component of efforts to decarbonize the energy sector and that biomass offers lower-cost mitigation than decarbonization strategy alternatives. The strategy includes bioenergy use in range of different energy pathways (e.g., liquid fuel, biogas, electricity, and hydrogen production) and combining biomass energy with carbon capture and storage (BECCS) to further reduce GHG emissions. The US Department of Energy's (DOE) Energy Earthshot program focuses on decarbonizing the fuel and chemical industry through alternative sources of carbon to advance cost-effective technologies with a minimum of 85% lower greenhouse gas emissions by 2035. The long-term strategy also addresses the necessary safeguards to ensure actual emissions reductions and consideration of possible consequences of large-scale biomass production and use (e.g., competition with food production and biodiversity and broader ecosystem impacts).

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	Currently, most biomass production including industrial pellet production from the US is provided to export markets. Given the US policy commitment to renewable energy, biomass energy, and BECCS, the demand for domestic use of biomass could impact future markets and the cascading principle. Also, the COVID-19 pandemic significantly disrupted supply chains in recent years and home building in the US declined dramatically during this time, which created significant market fluctuations and pricing variability. The market alone might not be enough to ensure the cascading use of wood in the coming years if similar market and societal disturbances continue. As shown in Figure 3.3.1.-2, the market share for wood pellet production amongst industries in the US that use pulpwood and byproduct wood residuals has risen from 1.3% in 2012 to 3.4% in 2017 and to 6.1% in 2022, which represents approximately 9 million tons out of the total 148 million metric tons of production in 2022 (ResourceWise, 2024).

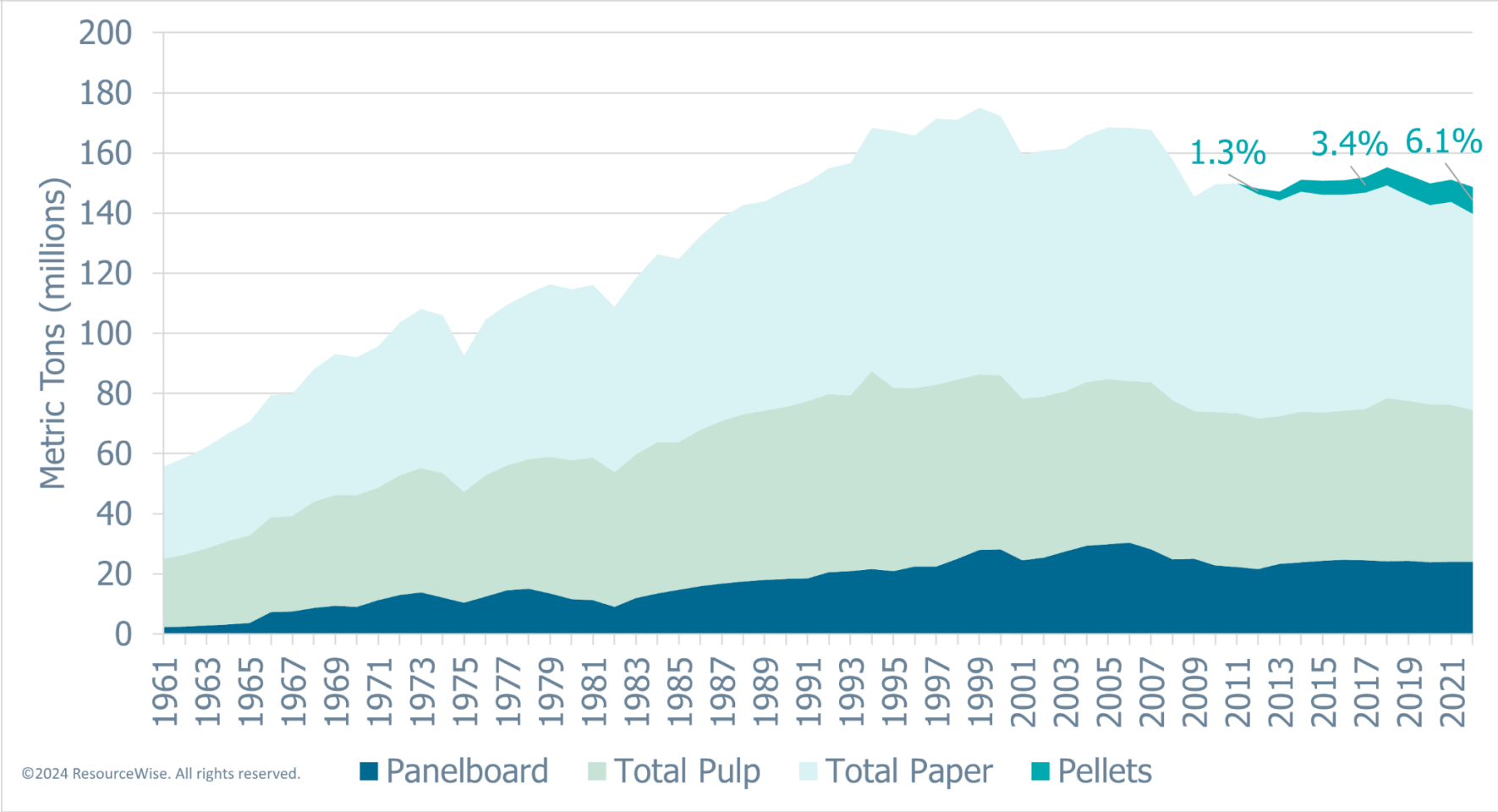


Figure 3.3.1.-2. *US Industrial Wood Pellet Market Share of Wood Fiber Producers.* (Source: ResourceWise, 2024)

Enforcement and monitoring

Regular monitoring and enforcement are conducted and reported by Federal and State agencies. The DOE has responsibilities for regulations related to energy. DOE coordinates across the Federal government on climate priorities, including clean energy technologies, and utilizes its regulatory authority to advance energy efficiency and scientific research.

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	The US Environmental Protection Agency (EPA) has responsibility for enforcement of regulations affecting air and water pollution. The US Federal Trade Commission (FTC) and US Department of Justice (DOJ) have regulatory authority for business operations. The FTC enforces Federal consumer protection laws that prevent fraud, deception, and unfair business practices. The Commission also enforces Federal antitrust laws that prohibit anticompetitive business practices. The US Bureau of Competition investigates alleged unfair methods of competition and other antitrust violations. The DOJ's Antitrust Division is responsible for enforcing US antitrust laws with the goal of promoting free and fair competition in the marketplace. Risk conclusion and justification Even though legislative or regulatory requirements do not directly address the issue, markets have most likely thus far steered the use of wood according to the cascade principle and the risk for noncompliance can be considered low. There are examples of producing biomass from wood that could be used for other purposes; however, such cases only happen on a small scale and without negative effects to the viability of mills producing longer-lived forest products. As market factors are subject to change over time, developments both in biomass demand and price must be considered when reassessing this Indicator. In particular, prices of pulpwood and wood chips should continue to be monitored. The market alone might not be enough to ensure the cascading use of wood in the coming years if market and societal disturbances continue like those experienced during the COVID-19 pandemic. Therefore, it is concluded that the risk class for Indicator 3.3.1. is low risk.
<i>Supply Base Verifiers</i>	• Relevant reports and webpages of the Department of Energy • Relevant national and State acts, laws, and regulations • Expert consultation • Price data and analysis • Relevant reports • Statistical data • Public reports and plans • Official statistics
<i>Evidence reviewed</i>	Bowyer, J. 2024. Bioenergy Update: A US Outlook. Accessed 9 September 2024. https://dovetailinc.org/portfoliodetail.php?id=669e881d359d4 Cheyne, K. Director of Sustainability, Drax Global Biomass. August 2024. Personal interview. Cook, S. Manager, Sustainability Standards, Enviva. August 2024. Personal interview. Coulston, J., PhD. Project Leader/Supervisory Research Forester, USDA Forest Service, Southern Research Station. August 2024. Personal interview. Federal Trade Commission. Accessed 18 September 2024 https://www.ftc.gov/enforcement

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	Grant, D. Senior Manager, Sustainability, Enviva. August 2024. Personal interview. New March. 2024a. RRA Input Survey Results. SurveyMonkey. North, B.W. and Pienaar, E.F. 2021. Continued obstacles to wood-based biomass production in the southeastern United States. <i>GCB Bioenergy</i>, 13: 1043-1053. https://doi.org/10.1111/gcbb.12834 Page-Dumroese, D.S., Franco, C.R., Archuleta, J.G., Taylor, M.E., Kidwell, K., High, J.C., and Adam, K. 2022. Forest Biomass Policies and Regulations in the United States of America. <i>Forests</i> 2022. 13(9), 1415. https://doi.org/10.3390/f13091415 Palmer, B. Sustainability Manager, Drax Global Biomass. August 2024. Personal interview. ResourceWise. 2024. Demand and Forest Productivity in the US South: An Update Report. August 26, 2024. https://img1.wsimg.com/blobby/go/9afce926-cdfb-428d-9af3-8ec23009b16a/RW_USIPA_Demand_Forest_Productivity%20(Final).pdf Sustainable Biomass Program (SBP). 2024. The Cascading Principle Considerations on guidance and options for applying the Cascading Principle through SBP Standards. Access: /https://sbpcert.wpenginepowered.com/wp-content/uploads/2024/12/SBP_Cascading_Principle_v2_Final_16Dec24.pdf. US Department of Energy (DOE). 2023. 2023 Billion Ton Report. Accessed 9 September 2024. https://www.energy.gov/eere/bioenergy/articles/departments-energy-releases-report-outlining-how-america-can-sustainably US Department of Energy (DOE). 2024. Laws DOE Administers. Accessed 9 September 2024. https://www.energy.gov/gc/laws-doe-administers/ US Department of Energy Bioenergy Technologies Office (BETO). https://www.energy.gov/eere/bioenergy/bioenergy-technologies-office US Department of Justice Antitrust Division. Accessed 18 September 2024. https://www.justice.gov/atr/mission US Department of State. 2021. <i>The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050</i>. Published by the United States Department of State and the United States Executive Office of the President. Accessed 9 September 2024. https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf US Forest Service. 2024. Timber Products Output (TPO) One Click Factsheets. Access: https://research.fs.usda.gov/products/dataandtools/tools/timber-products-output-tpo-one-click-factsheets
<i>Risk rating</i>	Low risk

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Principle 4 - Feedstock sourcing benefits people and communities

Criterion 4.1 - Decent working conditions are provided, and labour rights are safeguarded.

4.1.1	Freedom of association and the right to collective bargaining shall be respected in the workplace.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to forest sourcing benefiting people and communities in the geography of interest. These preexisting resources have precedence in the forestry community and are widely accepted in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. While the US has been a member of the International Labor Organization (ILO) since 1980, it has not ratified all the ILO conventions. Due to US membership in the ILO, the nation has shown a commitment to promote the principles set in the ILO Declaration on Fundamental Principles and Rights at Work. This commitment is seen in the Federal laws set forth to protect the freedom of association and the right to collective bargaining. At the core of this framework is the National Labor Relations Act (NLRA) of 1935, which provides legal protections of workers' rights to associate and engage in collective bargaining in the forestry sector. The NLRA prohibits employers from interfering with worker participation in labor organizations or their efforts to improve employment terms and conditions. The majority of the states in this geography are referred to as 'right to work' states. "Right to Work" laws allow employees to work without being required to join a union or pay union dues as a condition of employment. While the NLRA is important to this legal framework to protect worker's rights, there are more than 80 US laws associated with "freedom of association, collective bargaining, and industrial relations," including the US Constitution according to the Forest Stewardship Council's (FSC) extensive US National Risk Assessment (NRA) (FSC, 2019). This assessment included rigorous analysis of 21 indicators including legal authority and evaluation of mechanisms at the State level. Low risk was found for all dimensions of illegality related to Controlled Wood Category 2: Wood harvested in violation of traditional and human rights. Conclusions of the FSC US NRA are widely recognized as credible and used in the US forestry community. The US Department of Labor (DOL) works alongside State agencies to enforce laws related to labor and worker safety. The US Occupational Safety and Health

Act (OSHA) outlines standards for workplace safety and health. OSHA is the Federal body responsible for implementing these regulations. OSHA administers these laws for the private sector and Federal employees, although States may manage enforcement under an approved State plan. In States without this type of plan, OSHA conducts all workplace safety inspections and investigations. OSHA requires that records of accidents, injuries, and any corrective actions be kept. Employers with three or more workers are required to carry Workers' Compensation insurance. Employees can initiate complaints without fear of retaliation.

Enforcement and monitoring

To enforce these protections, the NLRA created the US National Labor Relations Board (NLRB), an independent Federal agency with field offices across the country. This ensures nationwide enforcement of labor laws related to collective bargaining and unfair working conditions. To further demonstrate the US government's commitment to these rights, the US Department of Labor maintains the AboutWorker.gov website, which provides easily accessible information and education on workers' rights, including the right to organize. The national average for union membership was 10% in 2023 (US Bureau of Labor Statistics, 2024). Ohio and Missouri are the only States in the geography that are not 'right to work' states. A study in 2023 found that States with right to work laws experience an increase in job opening rates and employment levels but declines in wages and union membership rates. While States that recently implemented right to work laws indicated these laws did not have a significant variation in workers' overall financial well-being (Dasgupta and Merchant, 2023).

The US Fair Labor Standards Act (FLSA) protects workers from wage theft. The US Migrant and Seasonal Worker Protection Act provides protections on wages and working conditions for migrant workers. The US DOL Wage and Hour Division investigates cases of wage theft on behalf of workers. The US Equal Pay Act mandates equal pay for men and women performing similar work in the same workplace. Title VII of the US Civil Rights Act forbids workplace discrimination, including wage discrimination, based on race, color, religion, sex, or national origin. These Federal laws establish a foundation of protection for employees in the workplace.

Federal law mandates that employers provide a safe workplace and proper safety training for employees. OSHA carries out field inspections based on scheduled inspections, reports of imminent hazards, workplace fatalities, and employee complaints or referrals. Any worker has the right to file a complaint alleging unsafe conditions and request an OSHA inspection. It is unlawful for employers to retaliate against workers who file complaints (29 USC. Section 660 (c)). Additionally, the US Bureau of Labor Statistics offers publicly accessible data on work-related injuries, illnesses, and fatalities.

A recent Executive Order (14025) issued by President Biden, that applies both to the private and public sector, reaffirmed the US policy to encourage workers to organize and collective bargaining. This order established a task force and mandated a report with recommended actions to further support workers' rights. The task force will make recommendations regarding changes to policies, practices, and programs. The task force will include members from the NLRB, the Federal Labor Relations Authority, the National Mediation Board, and others as needed.

State labor agencies play an important role in handling issues not covered by Federal law or supplementing Federal protections. State labor agencies are monitored by the US Department of Labor. State labor agencies enforce State-specific labor laws. These laws create the legal framework that supports workers' rights.

Federal and State agencies, private stakeholders, and legal frameworks such as the NLRA and OSHA work in tandem to protect and enforce freedom of association and the right to collective bargaining in the workplaces sourcing feedstock from private and public lands.

Risk conclusion and justification

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	These risk assessments, legal protections, enforcement mechanisms, educational resources, and policy initiatives provide a strong conclusion that the US promotes and protects freedom of association and the right to collective bargaining in the private and public sectors. The Federal laws establish foundational worker protections that empower employees to advocate for their rights without fear of retaliation. Therefore, it is concluded that the risk class for Indicator 4.1.1. is low risk.
<i>Supply Base Verifiers</i>	• Federal laws • Federal agency resources • Executive Orders • Academic articles • International standards • Advocacy group resources • State Plans
<i>Evidence reviewed</i>	Civil Rights Act of 1964, Title VII. 42 U.S.C. §§ 2000e et seq. Washington, DC. Cornell Law School. Collective Bargaining. 2023. https://www.law.cornell.edu/wex/collective_bargaining Dasgupta, K. and Merchant, Z. 2023. Understanding Workers' Financial Wellbeing in States with Right-to-Work Laws. https://www.Federalreserve.gov/econres/notes/feds-notes/understanding-workers-financial-wellbeing-in-states-with-right-to-work-laws-20230908.html Equal Pay Act of 1963. 29 U.S.C. § 206(d). Washington, DC. Fair Labor Standards Act of 1938. 29 U.S.C. §§ 201 et seq. Washington, DC. Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Forest Stewardship Council Self-Assessment for Core Labor Requirements (FSC). 2022. https://us.fsc.org/download.02142022-self-assessment-template-en-final-fsc-us-27-aug-2021-form-short.540.htm International Labour Organization (ILO). Ratifications for the US. https://normlex.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102871 National Bureau of Economic Research. 2022. Impacts of Right-to-Work Laws on Unionization and Wages. https://www.nber.org/digest/202208/impacts-right-work-laws-unionization-and-wages National Labor Relations Act (NLRA) of 1935. 29 U.S.C. §§ 151 et seq. Washington, DC.

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	National Right to Work Legal Defense Foundation. 2024. Right to Work States. https://www.nrtw.org/right-to-work-States/ Occupational Safety and Health Act of 1970. 29 U.S.C. §§ 651 et seq. Washington, DC. Occupational Safety and Health Administration (OSHA). 2024. State Plans. https://www.osha.gov/Stateplans The White House. 2021. Executive Order on Worker Organizing and Empowerment. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/04/26/executive-order-on-worker-organizing-and-empowerment/ US Department of Labor. 2024. State Labor Offices. https://www.dol.gov/agencies/whd/State/contacts US Department of Labor. 2024. Summary of the Major Laws of the Department of Labor. https://www.dol.gov/general/aboutdol/majorlaws
<i>Risk rating</i>	Low risk
4.1.2	Forced or compulsory labour shall not be used.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to forest sourcing benefiting people and communities in the geography of interest. These preexisting resources have precedence in the forestry community and are widely accepted in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The US has comprehensive Federal and State laws prohibiting child labor and forced labor. Employment of minors under age 18 is restricted under specific conditions, while forced labor is banned entirely. Federal legislation, like the US Trafficking Victims Protection Act (TVPA) (2000) and the US Abolish Human Trafficking Act (AHTA) (2017), are specifically designed to prevent human trafficking and forced labor. The US Fair Labor Standards Act of 1938 establishes protection for minors, ensuring their health, safety, and education are not compromised by their workplace. The US Department of Labor's Wage and Hour Division has administrative oversight over the US Fair Labor Standards Act (FLSA). The FLSA sets standards for minimum age of employment, maximum hours,

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and types of work permissible for minors. The US legal framework creates multiple layers of protection against exploitative labor practices involving children or forced workers. Both Federal and State authorities play important roles in enforcing these laws.

The US Constitution's 13th Amendment states, "Neither slavery or involuntary servitude, except as punishment for crime whereof the party shall have been duly convicted, shall exist within the US, or any place subject of their jurisdiction." Forced or compulsory labor is illegal in the US. The term 'involuntary servitude' encompasses situations where workers' are forced to work against their will under threats of physical harm, legal coercion, or other forms of compulsion. This Amendment created a foundation for the legal framework in place to protect workers from forced or compulsory labor.

To build off this framework are several Federal laws that explicitly prohibit forced labor. The AHTA defines and criminalizes human trafficking. The TVPA includes forced labor and makes it illegal to recruit, harbor, transport, provide, or obtain a person for labor or services through the use of force, fraud, or coercion (Trafficking Victims Protection Act, 2000). The US Code Title 18, Section 1589 criminalizes obtaining labor or services through threats of harm, physical restraint, abuse of the legal process, or any other scheme where to coerce individuals to work against their will (US Department of Justice, 2015). The US Department of Justice (DOJ), Department of Homeland Security, and Department of State are the primary investigating agencies for instances of forced labor, human trafficking, and other related offenses.

The US has an international obligation since it is also signatory to various ILO conventions that prohibit forced labor such as the International Labor Organization (ILO) Convention No. 29 (Forced Labour Convention) and ILO Convention No. 105 (Abolition of Forced Labour Convention). ILO Convention 105 has been ratified by the US and is in force.

Biomass producers and those under contractual agreements are subject to laws and regulations established in the US. To mitigate risk, biomass producers issue their own risk assessments to ensure child labor is not used in their supply chain (Enviva, 2020; Drax Global 2024).

The Forest Stewardship Council's US National Risk Assessment (FSC US NRA) thoroughly analyzed the legal frameworks in place to prevent forced or compulsory labor. This assessment included rigorous analysis of 21 indicators including legal authority and evaluation of mechanisms at the State level. Low risk was found for all dimensions of illegality related to Controlled Wood Category 2: Wood harvested in violation of traditional and human rights. The conclusions of the FSC US NRA are widely recognized as credible and used in the US forestry community.

Enforcement and monitoring

The US Department of Labor (DOL) is responsible for enforcing the FLSA and other labor laws that indirectly combat forced labor. For the private sector, it has been shown empowering workers, supporting them, setting clear expectations for supplies, removing practices that creates environments for exploitation to thrive, and preventing forced labor from taking place. The FLSA creates safe, fair working environments thus empowering workers. The DOL conducts audits and inspections of workplaces involving high-risk industries, like the forestry sector where heavy machinery is used. State laws can provide more protection than Federal laws mandate, but they cannot provide less. Where State standards are weaker than those provided in FLSA, Federal law preempts the State standard as discussed in Indicator 1.1.1.

As addressed above, USC Title 18, Section 1589 is a legal framework that prohibits forced or compulsory labor. Anyone in violation is subject to criminal penalty including up to 20 years of imprisonment, with even harsher penalties if the offense involves the death of the victim. In 2022, the US Department of Defense (DoD) investigated 101 human trafficking-related cases involving military, civilian, and contractor personnel. Of the 101 cases investigated, only four were related

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	to forced labor (Trafficking in Persons Report, 2023). Those four cases were not connected to the forestry sector. In 2021, there were 31 cases of forced labor compared to the four from 2022. The decrease in cases suggests improved enforcement and compliance along with an increase in awareness and prevention efforts. The US collaborates with international partners to combat forced labor globally, which helps monitor and address cross-border trafficking and labor exploitation domestically by providing additional intelligence and resources. In 2023, there were 1,387 prosecutions of human trafficking in the Western Hemisphere (Trafficking in Persons Report, 2024). In the US, the National Human Trafficking Hotline connects victims and survivors of sex and labor trafficking services and support. The hotline staff are trained to listen to survivors, provide immediate safety planning, field tips for suspected trafficking, and provide options for survivors. The hotline can be accessed via phone, email, text, or online chat. The US government invests in public awareness and training programs to prevent forced labor. These trainings provide awareness of the signs of forced labor and the legal obligations to report such practices. The combined efforts of Federal and State agencies, strict enforcement of labor laws such as the FLSA, and oversight by organizations like the DOJ, DOL, and Department of Homeland Security, along with compliance measures implemented by biomass producers, result in a robust framework. This framework ensures that forced or compulsory labor is not used when sourcing feedstock from private and public lands. Risk conclusion and justification These risk assessments, legal protections, enforcement mechanisms, training programs, and policy initiatives provide for a strong conclusion that the US has a credible legal framework in place to prevent forced labor and compulsion in this sector. Based on consistent ongoing performance, it is concluded that the risk class for Indicator 4.1.2. is low risk.
<i>Supply Base Verifiers</i>	• Federal laws • Federal agency resources • Non-Governmental Organizations • International standards • Risk Assessments
<i>Evidence reviewed</i>	Abolish Human Trafficking Act of 2017. 34 U.S.C. §§ 20701 et seq. Washington, DC. Blue Campaign. 2024. What is Forced Labor? https://www.dhs.gov/blue-campaign/forced-labor Drax Global. 2023. Modern Slavery Statement. https://www.drax.com/wp-content/uploads/2024/03/2023-Modern-Slavery-Statement.pdf Enviva. 2022. Supply Based Report. Fair Labor Standards Act of 1938. 29 U.S.C. §§ 201 et seq. Washington, DC. Forest Stewardship Council Self-Assessment for Core Labor Requirements (FSC). 2022. https://us.fsc.org/download.02142022-self-assessment-template-en-final-

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	fsc-us-27-aug-2021-form-short.540.htm International Labour Organization (ILO). 2024. Ratifications for United States of America. https://normlex.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102871 National Human Trafficking Hotline. 2024. Myths and Facts. https://humantraffickinghotline.org/en/human-trafficking/myths-facts Office to Monitor and Combat Trafficking in Persons. 2024. Connecting the Dots: Preventing Forced Labor by Empowering Workers. https://www.State.gov/wp-content/uploads/2024/08/24-02934-TIP_Factsheet-Labor-Rights-FL-Prevention-Accessible-08.14.2024-1.pdf Office on Trafficking in Persons. 2024. National Human Trafficking Hotline. https://www.acf.hhs.gov/otip/victim-assistance/national-human-trafficking-hotline Trafficking Victims Protection Act of 2000. 22 U.S.C. §§ 7101 et seq. Washington, DC. US Department of Justice. 2015. Involuntary Servitude, Forced Labor, And Sex Trafficking Statutes Enforced https://www.justice.gov/crt/involuntary-servitude-forced-labor-and-sex-trafficking-statutes-enforced US Department of Labor. 2024. List of Goods Produced by Child Labor or Forced Labor. https://www.dol.gov/sites/dolgov/files/ilab/child_labor_reports/tda2023/2024-tvpra-list-of-goods.pdf US Department of State. 2022. 2022 Trafficking in Persons Report. https://www.State.gov/wp-content/uploads/2022/10/20221020-2022-TIP-Report.pdf US Department of State. 2023. 2023 Trafficking in Persons Report. https://www.State.gov/reports/2023-trafficking-in-persons-report/united-states US Department of State. 2024. Public Awareness and Training. https://www.State.gov/humantrafficking-public-awareness-training/ US Department of State (DoS). 2024. 2024 Trafficking in Persons Report. https://www.state.gov/reports/2024-trafficking-in-persons-report/
<i>Risk rating</i>	Low risk
4.1.3	Child labour shall not be used.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis

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To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk and analysing the US legal frameworks in place to prevent child labor in this sector in the RRA geography. These preexisting assessments have precedence in the forestry community and are widely accepted in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

No one under 18 years can be employed in any occupation considered by the US Secretary of Labor to be hazardous, while forced labor is universally banned. Federal statutes like the US Trafficking Victims Protection Act (TVPA) of 2000 and the US Abolish Human Trafficking Act of 2017 combat human trafficking and forced labor. The US Fair Labor Standards Act (FLSA) of 1938 establishes protections for minors, ensuring their workplaces are not compromising their health, safety, education, and overall well-being. The FLSA sets the minimum working age and maximum working hours. The FLSA prohibits employment of workers under the age of 18 in forestry or reforestation activities that have been deemed "hazardous" by the Department of Labor (DOL). For instance, workers under 18 years may not engage in most forestry services, timber tract management, forest fire fighting, forest fire prevention, logging, or use chainsaws. These prohibitions include tree planting, chemical applications, and tree thinning operations.

Child labor is strictly prohibited in the US, particularly in hazardous industries such as forestry. In the US, there is an extensive network of Federal laws in place to regulate and prevent the use of child labor. FLSA establishes minimum age requirements for employment and sets forth specific restrictions on the hours and types of work minors can perform. Children under the age of 14 are prohibited from employment. The law limits the number of hours children aged 14 and 15 can work and restricts them from working during school hours. Those aged 16 and 17 are allowed more hours. The FLSA includes a list of hazardous occupations, known as 'Hazardous Occupations Orders' (HOO). HOO No. 4 (HO 4) prohibits minors from performing tasks in the forestry sector deemed hazardous such as logging and working in mills (Wage and Hour Division, 2016). Additionally, States have legislation that further limit the hours and days per week minors may work in non-farm employment.

Comprehensive legal requirements addressing prevention of child labor are stipulated in detail within the US Code of Federal Regulations (29 CFR Part 570). Section 570.54 specifically lists "certain occupations to be particularly hazardous for the employment of minors between 16 and 18 years of age" that relate to forestry and associated occupations. Section 212.c of the FLSA States: "No employer shall employ any oppressive child labor in commerce or in the production of goods for commerce or in any enterprise engaged in commerce or in the production of goods for commerce." Some exceptions for employment of minors are provided in Section 213.c such as for employment in family agriculture operations with parental consent.

The Forest Stewardship Council's US National Risk Assessment (FSC US NRA) thoroughly analyzed the legal frameworks that are in place to prevent child labor. This assessment included rigorous analysis of 21 indicators including legal authority and evaluation of mechanisms at the State level. Low risk was found for all dimensions of illegality related to Controlled Wood Category 2: Wood harvested in violation of traditional and human rights. FSC US NRA conclusions are widely recognized as credible and used in the US forestry community.

As discussed in Indicator 4.1.2, biomass producers and those under contractual agreements, are subject to laws established in the United States. To mitigate risk, biomass producers issue their own risk assessments to ensure child labor is not used in their supply chain (Enviva, 2020; Drax Global, 2024).

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	Enforcement and monitoring The DOL is responsible for enforcing labor and worker safety laws in conjunction with corresponding State agencies. The DOL's Wage and Hour Division (WHD) conducts inspections and investigations to ensure industries comply with Federal child labor laws. For wilful violation of child labor laws, the FLSA provides a fine of up to \$10,000, and if there's a second offense committed, the offender can face up to six months imprisonment. Employers are required to maintain documentation that verify ages and roles of the employees. According to a recent DOL news release, there was a 69% increase in illegal child labor cases between 2018 and 2022. There is no indication that this statistic is referring to the forestry sector. The news release demonstrates DOL's increasing focus on enforcing Federal labor laws, continuing to monitor these numbers, and holding employers accountable. In addition, DOL is now emphasizing cross-training to ensure every agency is able to identify and report child labor exploitation, creating and updating materials to ensure the general public has access to the information necessary to prevent child labor violations, and pursuing partnerships that engage every facet of the Federal government (US DOL, 2023). The outcome of Federal and State laws working together, most notably the FLSA, prohibitions within hazardous occupations orders, and proactive enforcement by the DOL's Wage and Hour Division, ensures child labor is not used in the forestry sector or in sourcing feedstocks from private and public lands. Risk conclusion and justification Based upon the established legal frameworks and enforcement mechanisms aimed at preventing child labor in the US, as evidenced by the FLSA, the TVPA, and the DOL enforcement efforts, it is concluded that the risk class for Indicator 4.1.3. is low risk.
<i>Supply Base Verifiers</i>	• Federal agency resources • Federal law • International organizations • Press releases • Risk Assessments
<i>Evidence reviewed</i>	Abolish Human Trafficking Act of 2017. 34 U.S.C. §§ 20701 et seq. Washington, DC. Drax Global. 2023. Modern Slavery Statement. https://www.drax.com/wp-content/uploads/2024/03/2023-Modern-Slavery-Statement.pdf Enviva. 2022. Supply Based Report. Fair Labor Standards Act of 1938. 29 U.S.C. §§ 201 et seq. Washington, DC. Forest Stewardship Council Self-Assessment for Core Labor Requirements (FSC). 2022. https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra

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	Forest Stewardship Council US. 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra International Labour Organization (ILO). 2004. Global Child Labour Trends. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_norm/@declaration/documents/publication/wcms_decl_wp_25_en.pdf Office of the Secretary. 2023. Departments of Labor, Health and Human Services announce additional steps to tackle child labor violations, strengthen coordination. https://www.dol.gov/newsroom/releases/osec/osec20230324 Office of the Secretary. 2023. Department of Labor, Interagency Task Force announce recent actions to combat exploitative child labor with new partnerships, innovative tactics, ramped up enforcement. https://www.dol.gov/newsroom/releases/osec/osec20230727 Trafficking Victims Protection Act of 2000. 22 U.S.C. §§ 7101 et seq. Washington, DC. US Department of Labor. 2022. 2022 Findings on the Worst Forms of Child Labor. https://www.dol.gov/sites/dolgov/files/ILAB/child_labor_reports/tda2022/2022-Findings-on-the-Worst-Forms-of-Child-Labor.pdf US Department of Labor. 2024. List of Goods Produced by Child Labor or Forced Labor. https://www.dol.gov/sites/dolgov/files/ilab/child_labor_reports/tda2023/2024-tvpra-list-of-goods.pdf US Department of Labor. n.d. FLSA-Child Labor Rules Advisor. https://webapps.dol.gov/elaws/whd/flsa/cl/enforcement.asp US Department of Labor. n.d. Prohibited Occupations for Non-Agricultural Employees. https://webapps.dol.gov/elaws/whd/flsa/docs/haznonag.asp US Department of Labor: Wage and Hour Division. 2016. Fact Sheet #43: Child Labor Provisions of the Fair Labor Standards Act (FLSA) for Non-agricultural Occupations. https://www.dol.gov/agencies/whd/fact-sheets/43-child-labor-non-agriculture US Department of Labor: Wage and Hour Division. n.d. Wages and the Fair Labor Standards Act. https://www.dol.gov/agencies/whd/flsa
<i>Risk rating</i>	Low risk
4.1.4	Workers shall not be discriminated in hiring, remuneration, access to training, promotion, termination or retirement.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered.

Analysis

To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk and analysing the US legal frameworks in place to prevent discrimination in this sector in the geography of interest. These preexisting assessments have precedence in the forestry community and are widely accepted in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

Federal laws addressing workplace discrimination include several pieces of legislation: the US Equal Pay Act of 1963, US Civil Rights Act of 1964, US Age Discrimination in Employment Act of 1967, US Rehabilitation Act of 1973, US Civil Service Reform Act of 1978, US Pregnancy Discrimination Act of 1978, US Americans with Disabilities Act of 1990, and US Pregnant Workers Fairness Act of 2022. These laws prohibit discrimination in various forms, whether in hiring, earnings, training opportunities, promotions, or the terms of termination and retirements. Harassment is also treated as a form of discrimination under Title VII of the US Civil Rights Act (CRA) of 1964, making it unlawful in the workplace. There are additional State laws that protect against workplace discrimination thus further strengthening the Federal mandates.

The Forest Stewardship Council’s US National Risk Assessment (FSC US NRA) identified low risk concerning Controlled Wood Indicator 2.2, which emphasizes that labor rights, including those outlined in the International Labor Organization’s Fundamental Principles and Rights at Work are respected. This includes protections against workplace discrimination, and as the FSC US NRA notes, there was no indication of systemic discrimination based on race, religion, disability, or age in the US forest sector (FSC, 2019).

Civil rights in the US are protected under the US Constitution and reinforced through multiple Federal laws. The Bill of Rights, which consists of the first 10 amendments to the US Constitution, outlines essential protections for individuals, including limitations on government infringement on individual’s rights. Notably, the 14th Amendment guarantees equal protection under the law, ensuring that State governments cannot infringe upon the rights of individuals. Similar protections exist at the State level. For example, Article 1 of the Alabama Constitution establishes individual rights, prohibits arbitrary infringement on those rights, and affirms that “all power is inherent in the people.” The CRA bans discrimination based on race, gender, religion, and other protected categories.

While independent contractors are not covered under Federal discrimination laws, they are protected by the contracts mutually agreed upon. If the contracts are breached in any way the affected party can sue.

Enforcement and monitoring

Federal and State laws prevent workplace discrimination, thus ensuring decent working conditions. At the Federal level, the US Equal Employment Opportunity Commission (EEOC) is responsible for enforcing laws that prohibit discrimination in the workplace. Employers with 15 or more employees are typically subject to EEOC oversight, ensuring workers are protected from unlawful treatment. The EEOC collects data on individual discrimination charges and monitors trends across industries. If a formal complaint is filed, the EEOC conducts an investigation. The EEOC has a free mediation program where neutral mediators provide employers and charging parties to reach a mutually agreed upon solution (EEOC, 2024). The EEOC administrative enforcement and litigation to promote broad compliance with anti-discrimination laws in the private sector, local, and State government. EEOC secured approximately \$440.5 million for victims of employment

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	discrimination (EEOC, 2024). The Civil Rights Division of the US Department of Justice (DOJ) is tasked with enforcing Federal laws prohibiting discrimination based on race, color, sex, disability, religion, familial status, national origin, and citizenship status, and ensures compliance with constitutional guarantees, including equal protection for all individuals regardless of their background. Penalties for violations of civil rights, such as fines and imprisonment are outlined in the USC Part 1, Chapter 13. Organizations like the American Civil Liberties Union (ALCU) plays a significant role in ensuring domestic and international human rights are upheld. The US Commission on Civil Rights is an independent, bipartisan agency that investigates and reports on civil rights issues. The Commission's jurisdiction includes discrimination. Congress mandated that the Commission establish Advisory Committees in every state. These State committees advise the Commission about civil rights matters in their locales. The anti-discrimination laws established at both the Federal- and State-level, along with enforcement by agencies, like the EEOC and the DOJ, ensure that workers are protected from discrimination in hiring, wages, training access, promotions, terminations, and retirement across the forestry sector and in sourcing feedstock from public and private lands. Risk conclusion and justification Based on the existence of clear and comprehensive Federal laws, state-level protections, and strong enforcement mechanisms, it is concluded that the risk class for Indicator 4.1.4. is low risk.
<i>Supply Base Verifiers</i>	• Federal agencies • Federal laws • Relevant reports • Risk Assessments • State agencies • State constitutions • State laws • US Constitution
<i>Evidence reviewed</i>	Age Discrimination in Employment Act of 1967. 29 U.S.C. §§ 621 et seq. Washington, DC. Alabama Constitution. 1901. Americans with Disabilities Act of 1990. 42 U.S.C. §§ 12101 et seq. Washington, DC. Civil Rights Act of 1964. 42 U.S.C. §§ 2000e et seq. Washington, DC.

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	Civil Service Reform Act of 1978. 5 U.S.C. §§ 1101 et seq. Washington, DC. Equal Pay Act of 1963. 29 U.S.C. § 206(d). Washington, DC. Forest Stewardship Council (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Migrant and Seasonal Worker Protection Act of 1983. 29 U.S.C. §§ 1801 et seq. Washington, DC. Pregnancy Discrimination Act of 1978. 42 U.S.C. §§ 2000e et seq. Washington, DC. Pregnant Workers Fairness Act of 2022. 42 U.S.C. § 2000gg-1. Washington, DC. Rehabilitation Act of 1973. 29 U.S.C. §§ 701 et seq. Washington, DC. US Commission on Civil Rights. Civil Rights Directory: State and Local Agencies. https://www.usccr.gov/files/pubs/crd/stateloc/all.htm US Constitution. US Department of Justice. 2022. Civil Rights Division at 65: A Report on Recent Cases and Highlights. https://www.justice.gov/crt/page/file/1555981/dl?inline US Department of Justice. 2024. Civil Rights Division Homepage. https://www.justice.gov/crt US Equal Employment Opportunity Commission (EEOC). 2023. Annual Performance Report. https://www.eeoc.gov/2023-annual-performance-report#_Toc150772727 US Equal Employment Opportunity Commission (EEOC). 2023. EEOC Releases Annual Performance Report for Fiscal Year 2023. https://www.eeoc.gov/newsroom/eeoc-releases-annual-performance-report-fiscal-year-2023 US Equal Employment Opportunity Commission. (EEOC). 2023. Enforcement and Litigation Statistics. https://www.eeoc.gov/data/enforcement-and-litigation-statistics-0 US Equal Employment Opportunity Commission (EEOC). 2024. Prohibited Employment Policies/Practices. https://www.eeoc.gov/prohibited-employment-policiespractices US Equal Employment Opportunity Commission (EEOC). 2024. Small Business Information. https://www.eeoc.gov/publications/get-facts-series-small-business-information Wikipedia. 2023. List of anti-discrimination laws in the United States. https://en.wikipedia.org/wiki/List_of_anti-discrimination_laws_in_the_United_States
<i>Risk rating</i>	Low risk
4.1.5	Wages paid to workers shall meet or exceed the legal minimum wage or where there is no statutory minimum wage industry norms shall be

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	met or exceeded.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including analysing the US legal frameworks in place to confirm wages paid to workers shall meet or exceed the legal minimum wage in this sector in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The US has a comprehensive legal framework to ensure wages paid to workers meet or exceed the legal minimum wage. The US Equal Pay Act requires that men and women in the same workplace be given equivalent compensation for work that is comparable. The main law of this framework is the US Fair Labor Standards Act (FLSA). The FLSA establishes a Federal minimum wage. The FLSA also sets requirements for minimum wage and overtime pay for employees in the private sector as well as Federal, State, and local governments. According to the US Department of Labor (DOL), "the overtime premium rate is one and one-half times the employee's regular rate, unless otherwise specified," (US DOL WHD, 2024) and is required after 40 hours of work in a work week. There are additional minimum wage laws provided at the State level. For example, Florida requires a higher minimum wage for its State. The legal requirements for minimum wage are clear and widely accessible. Employers are required to adhere to the higher wage in cases where State or local laws have a higher minimum wage than the Federal requirement. The Bureau of Labor Statistics (BLS) provides extensive data on wage levels across different industries. Those reports prove that industry standards often exceed the minimum wage requirements for this sector. The median wage in the forestry sector exceeds the Federal minimum wage (Bureau of Labor Statistics, 2023). Since 1987, the Migrant and Seasonal Worker Protection Act (MSWPA) has applied to forestry contract workers. Provisions provide protection for seasonal and migrant workers in the forestry sector conducting reforestation, pre-commercial thinning and other seasonal work, as well as vehicle safety, safe housing, disclosure of wages and hours, and payroll record keeping. Enforcement and monitoring The FLSA requires employers to record daily and weekly hours worked, rates of pay, additions to or deductions from wages, and total wages paid. Minimum wage laws in the US are primarily the responsibility of the DOL's Wage and Hour Division (WHD). The WHD enforces the FLSA and ensures employers

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	comply with the Federal minimum wage requirements. The WHD conducts investigations based on routine audits and complaints to identify and rectify violations. In 2023, the WHD conducted thousands of investigations, which resulted in the recovery of more than \$270 million in back wages and damages for more than 160,000 workers (WHD, 2023). There is no indication this statistic is in any way indicative of issues in the forestry sector, but it does show the WHD imposes penalties on employers who violate wage requirements. Each State has its own labor department. These departments play a role in enforcing State-specific minimum wage laws. Local enforcement agencies oversee compliance with local minimum wage ordinances and have the authority to issue penalties. For the MSWPA, the DOL conducts audits of reforestation contractors that serve in an independent contractor role. Landowners are required by DOL to ensure that contractors providing services are certified by the DOL and comply with the major provisions of the Act (US DOL, 2016). The outcome of Federal laws, State-specific requirements, and oversight by the DOL working together ensures that wages in the forestry sectors meet or exceed minimum wage standards. Risk conclusion and justification Based on the existence of a comprehensive Federal legal framework, state-level wage laws, and strong enforcement mechanisms, it is concluded that the risk class for Indicator 4.1.5. is low risk.
<i>Supply Base Verifiers</i>	• Federal agency resources • Federal laws • Labor statistics and data • State laws • State-level resources
<i>Evidence reviewed</i>	Fair Labor Standards Act of 1938. 29 U.S.C. §§ 201 et seq. Washington, DC. Migrant and Seasonal Worker Protection Act of 1983. 29 U.S.C. §§ 1801 et seq. Washington, DC. National Conference of State Agencies. 2024. State Minimum Wages. https://www.ncsl.org/labor-and-employment/State-minimum-wages US Bureau of Labor Statistics (BOL). 2023. Occupational Employment and Wage Statistics. https://www.bls.gov/oes/current/oes191032.htm US Bureau of Labor Statistics (BOL). 2024. Quarterly Census of Employment and Wages. https://www.bls.gov/opub/hom/cew/concepts.htm US Department of Agriculture (USDA). Migrant and Seasonal Agricultural Worker Protection Act of 1983. https://www.ers.usda.gov/webdocs/publications/41928/19060_ah719e_1_.pdf US Department of Labor. 2016. Wages and Hours Worked: Worker Protections in Agriculture. https://webapps.dol.gov/elaws/elg/mspa.htm US Department of Labor: Wage and Hour Division. 2010. Fact Sheet #63: Application of Federal Labor Laws to

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	Reforestation https://www.dol.gov/agencies/whd/fact-sheets/63-reforestation US Department of Labor: Wage and Hour Division. 2023. Quarterly Census of Employment and Wages. https://www.dol.gov/agencies/whd/data US Department of Labor: Wage and Hour Division. 2024. State Labor Offices. https://www.dol.gov/agencies/whd/State/contacts US Department of Labor: Wage and Hour Division. 2024. State Minimum Wage Laws. https://www.dol.gov/agencies/whd/minimum-wage/State
<i>Risk rating</i>	Low risk
4.1.6	Working hours shall comply with legal requirements.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including analysis of the US legal frameworks in place to show working hours comply with legal requirements in this sector in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages were thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The US standard of an eight-hour workday, five days a week is the result of a mix of labor action, advocacy, economic competition, and pioneering employers. The US Fair Labor Standards Act (FLSA) sets standards for minimum wage, overtime pay, recordkeeping, and youth employment in the private sector (Sahadi, 2023). Under the FLSA, non-exempt employees are entitled to overtime pay at a rate of one and a half times their regular rate of pay for any hours worked over 40 in a workweek. This law applies to most workers in this sector. States often provide further protections by enacting State-level laws to ensure employees are not working excessive hours without compensation (Blakely-Gray, 2023). For example, some States have laws for the minimum length of a meal period required for employees in the private sector (US DOL, 2023). Federal and State laws also impose limits on working hours for roles involving operating heavy machinery or other hazardous tasks. These laws are designed to protect workers from accidents. For logging, labor productivity rates have increased while hours worked have declined (McDaniel, 2021).

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	Compliance with these legal requirements is generally high across the US forestry sector. Most employers have established policies that align with both Federal and State labor laws. Enforcement and monitoring The US Department of Labor’s (DOL) Wage and Hour Division conducts investigations in response to employee complaints. State labor departments also enforce working hour laws, especially where State regulations provide greater protections than the FLSA. Employers who violate working hour regulations may face fines and lawsuits. According to a US Bureau of Labor Statistics news release, the average hours full-time employees spent working was 8.49 hours in 2023 (US Bureau of Labor Statistics, 2023). The outcome of the FLSA, State labor laws, and enforcement by the DOL’s Wage and Hour Division working together is that working hours comply with legal requirements when sourcing feedstock from private and public lands. Risk conclusion and justification Based on the existence of clear Federal and state-level regulations, high compliance rates, and enforcement mechanisms, it is concluded that the risk class for Indicator 4.1.6. is low risk.
<i>Supply Base Verifiers</i>	• BP producer procedures • Federal agency resources • Federal laws • Labor standards • State laws • Wage and hour resources
<i>Evidence reviewed</i>	Blakely-Gray, R. 2023. Overtime Laws by State. https://www.patriotsoftware.com/blog/payroll/overtime-laws-by-state/ Fair Labor Standards Act of 1938. 29 U.S.C. §§ 201 et seq. Washington, DC. McDaniel, V. 2022. Maintaining Productivity in the Logging Industry. https://research.fs.usda.gov/srs/products/compasslive/maintaining-productivity-logging-industry Sahadi, J. 2023. Why do we work 9 to 5? https://www.cnn.com/2023/09/09/success/work-culture-9-to-5-curious-consumer/index.html US Bureau of Labor Statistics (BOL). 2023. Average Hours Employed People Spent Working on Days Worked by Day of Week. https://www.bls.gov/charts/american-time-use/emp-by-ftpt-job-edu-h.htm US Department of Labor. n.d. Fair Labor Standards Act Advisor. https://webapps.dol.gov/elaws/whd/flsa/screen74.asp#:~ US Department of Labor: Wage and Hour Division. 2008. Fact Sheet #22: Hours Worked Under the Fair Labor Standards Act.

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	https://www.dol.gov/agencies/whd/fact-sheets/22-flsa-hours-worked US Department of Labor: Wage and Hour Division. 2010. Fact Sheet #63: Application of Federal Labor Laws to Reforestation https://www.dol.gov/agencies/whd/fact-sheets/63-reforestation US Department of Labor: Wage and Hour Division. 2023. Minimum Length of Meal Period Required under State Law. https://www.dol.gov/agencies/whd/state/meal-breaks#Colorado US Department of Labor: Wage and Hour Division. 2024. Overtime Pay. https://www.dol.gov/agencies/whd/overtime
<i>Risk rating</i>	Low risk
4.1.7	Workers shall have access to health care provisions, sickness benefits, retirement benefits, invalidity benefits, death benefits, and workers' compensation.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including analysing the US legal frameworks in place to show workers shall have access to healthcare in this sector in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. In the US, worker access to health care, sickness benefits, retirement benefits, invalidity benefits, death benefits, and workers' compensation is governed by Federal laws and State laws. The US Affordable Care Act (ACA) and US Family and Medical Leave Act (FMLA) are Federal laws that constitute the legal framework to protect workers benefits. The ACA mandates that employers with 50 or more full-time employees offer affordable health insurance that provides minimum value to 95% of their full-time employees and their children up to age 26. Employers with fewer than 50 employees can offer health insurance through the Small Business Health Options

	Program (SHOP). The FMLA requires all public agencies and private companies with more than 50 employees to provide up to 12 weeks of unpaid leave each year for childbirth, personal healthcare, or to care for a sick family member. While there is no Federal law mandating paid sick leave, many employers offer it voluntarily. Social Security provides a basic level of retirement income for most US workers. The Employee Retirement Income Security Act (ERISA) (1974) is a Federal law that sets minimum standards for most voluntarily established retirement and health plans in private industry. Many employers also offer 401(k) plans or other retirement savings options. State programs are required to be as effective as those required by Federal law. States require employers to provide workers' compensation insurance, which covers medical expenses and partial wage replacement for workers injured on the job. According to the US Census Bureau, appropriately 86% of US private sector employees worked for businesses that provided employer-sponsored health insurance (Grundy et al., 2024). This data was based on a 3-year average (2020-2022) collected by the Insurance Component of the Medical Expenditure Panel Survey (MEPS-IC). If employers do not offer healthcare or workers do not qualify, workers can enroll in US government sponsored health coverage, which is available via healthcare.gov. If workplace injuries take place, workers are entitled to workers' compensation via State Workers' Compensation programs. Workers' compensation insurance rates for loggers are typically quite high, particularly for non-mechanized operations. Typically, mechanized operations carry workers' compensation insurance given the comparatively lower rates and the high value of capital investment in equipment. Many non-mechanized logging companies are small, comprising only a few people, and/or are formed as sole proprietorships or partnerships. Therefore, many of these smaller operations are not required by law to carry workers' compensation insurance. If an employer is not required to provide worker's compensation insurance and an employee gets hurt at work, even though the injured worker is not entitled to workers' compensation benefits, they still have the option to file a lawsuit against the employer for damages. It is common practice for individuals and groups of forest workers to operate as independent contractors. In January 2024, the US Department of Labor (DOL) issued a new rule for determining worker status as an employee or an independent contractor to reduce the risk of worker misclassification, and subsequent loss of benefits to employees (US DOL, 2024). Enforcement and monitoring There are many Federal and State agencies that enforce and monitor workers access to health care, sickness benefits, retirement benefits, invalidity benefits, death benefits, and workers' compensation. The DOL Employee Benefits Security Administration (EBSA) enforces the ACA's employer mandate. In turn, the US Internal Revenue Service (IRS) monitors compliance for health care provisions and imposes penalties on non-compliant employers. Each State has insurance commissioners that regulate insurance markets and enforce ACA provisions at the state-level. The DOL's Wage and Hour Division enforces FMLA, while State labor departments enforce State-specific paid sick leave laws. The EBSA enforces the ERISA through investigations and audits of pension plans. The US Social Security Administration monitors Social Security benefits. The IRS regulates the tax aspects of retirement plans. Worker's compensation laws vary by State. Businesses that fail to carry compensation insurance face fines, lawsuits, or even criminal charges. The National

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	Federation of Independent Business lists each State’s workers’ compensation requirements (NFIB, 2017). Risk conclusion and justification Given well-established laws pertaining to health care provisions, workers’ compensation, and benefits, a strong track record of enforcement, and the conclusions of other, widely accepted analyses, along with direct feedback from stakeholders and experts, it is concluded that the risk class for Indicator 4.1.7. is low risk.
<i>Supply Base Verifiers</i>	• Employee benefits • Federal agency resources • Federal laws • Healthcare resources • State-level agencies
<i>Evidence reviewed</i>	Affordable Care Act of 2010. 42 U.S.C. §§ 18001 et seq. Washington, DC. Cigna. 2024. Employer mandate overview. https://www.cigna.com/employers/insights/informed-on-reform/employer-mandate Employee Retirement Income Security Act (ERISA) of 1974. 29 U.S.C. §§ 1001 et seq. Washington, DC. Family Medical Leave Act of 1993. 29 U.S.C. §§ 2601 et seq. Washington, DC. Grundy, A., McLain, K., and Zelibor, Y. 2024. US Census Bureau. “Medical Expenditure Panel Survey – Insurance Component Shows 86% of Private-Sector Employees Worked for Establishments that Offered Health Insurance.” https://www.census.gov/library/stories/2024/02/health-care-costs.html Healthcare.gov. How the Affordable Care Act affects small businesses. https://www.healthcare.gov/small-businesses/learn-more/how-aca-affects-businesses/ Healthcare.gov. 2024. The Marketplace in your State. https://www.healthcare.gov/marketplace-in-your-state/ KFF. 2023. Employer Health Benefits Survey. https://www.kff.org/report-section/ehbs-2023-summary-of-findings/ KFF. 2024. State Insurance Commissioners. https://www.kff.org/other/State-indicator/State-insurance-commissioners/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D National Federation of Independent Business. 2017. Workers’ Compensation Laws-State by State Comparison. https://www.nfib.com/content/legal-compliance/legal/workers-compensation-laws-state-by-state-comparison-57181/ US Department of Labor. 2024. State Workers’ Compensation Officials. https://www.dol.gov/agencies/owcp/wc#TN US Department of Labor. n.d. Employee Retirement Income Security Act (ERISA). https://www.dol.gov/general/topic/retirement/erisa US Department of Labor: Wage and Hour Division. 2024. State Labor Offices. https://www.dol.gov/agencies/whd/state/contacts US Department of Labor: Wage and Hour Division. 2024. US Department of Labor announces final rule on classifying workers as employees or independent

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	contractors under the Fair Labor Standards Act. https://www.dol.gov/newsroom/releases/whd/whd20240109-1
<i>Risk rating</i>	Low risk
4.1.8	Training shall be provided for all workers to allow them to implement the conditions set out in all elements of the SBP Standards relevant to their responsibilities.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator qualitative analysis was conducted of relevant literature, including analyzing US legal frameworks in place to show trainings are provided for all workers in this sector in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. In the US, worker training is essential piece to ensure compliance with industry standards and sustainable management practices in this sector. This compliance is mandated by several forest certification programs, industry organizations, and through Federal guidelines. The Sustainable Forestry Initiative (SFI) requires employees and contractors to be trained to meet sustainability standards relevant to their job responsibilities. The SFI Objective 13 (Training and education) emphasizes the importance of improving sustainable forestry practices through training and education programs. It is mandatory for workers involved in forestry operations, including loggers, to undergo formal training, which includes safety protocols and business management for SFI certification (Forest Resources Association, 2023). As noted in the Introduction and in other analyses within this RRA, SFI Fiber Sourcing certification is widely utilized across the forest product sector and likely influences operations associated with the majority of feedstock. Biomass producers integrate training into their written procedures. These procedures include employee training protocols, safety management systems, health and safety performance reports, and process risk and safety. The US Occupational Safety and Health Administration (OSHA) mandates employers to train their workers on workplace safety practices, including the use of

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	personal protective equipment (PPE) and handling hazardous equipment. Enforcement and monitoring The SFI Implementation Committee is responsible for monitoring and enforcing continued training and education for those pursuing SFI certification. Each committee member has a different responsibility to achieve this in their written procedures. Biomass producers and other companies involved in forestry conduct internal audits to ensure compliance with their written procedures. The internal audits may include reviewing trainings records, creating reports with safety statistics in the workplace, assessing employee knowledge, and evaluating the effectiveness of the procedures in place. Companies also ensure compliance by providing training requirement in their contracts with outside vendors. OSHA maintains responsibility for oversight and enforcement of worker health and safety laws for this sector. To comply with OSHA standards, employers must show records of completed trainings and worker certifications. If an OSHA citation is issued, the employer must post the citation at or near the work area involved. Each citation must remain posted until the violation has been corrected, or for three working days, whichever is longer. Risk conclusion and justification Given well-established laws and industry standards pertaining to worker training, a strong track record of enforcement, and the conclusions of other, widely accepted analyses, along with direct feedback from stakeholders and experts, it is concluded that the risk class for Indicator 4.1.8. is low risk.
<i>Supply Base Verifiers</i>	• BP procedures and reports • Federal agencies and resources • Certification standards • Labor and safety regulations • Workforce trainings
<i>Evidence reviewed</i>	Drax Global. 2022. Health, Safety, and Wellbeing. https://www.drax.com/us/health-safety-and-wellbeing/ Drax Global. 2023. ESG Performance Report. https://www.drax.com/wp-content/uploads/2024/03/Final-Signed-ESG-2023-Supplement.pdf Forest Resources Association. 2023. SFI. "Report on the Status of Logger Training and Education (LT&E) Programs in 32 Forested US States & Four Canadian Provinces." https://www.sfi.org/_download.php?id=32&mode=files&name=Logger_Training_and_Education_SFI_Report_2022.pdf Office of Efficiency and Renewable Energy. 2024. Bioenergy Workforce Training Opportunities Map. https://www.energy.gov/eere/bioenergy/bioenergy-workforce-training-opportunities-map Occupational Safety and Health Administration (OSHA). 2024a. Employer Responsibilities. https://www.osha.gov/workers/employer-responsibilities Occupational Safety and Health Administration (OSHA). 2024b. Workers Rights and Protections. https://onedrive.live.com/view.aspx?resid=11325292400FBCC4!17762&cid=11325292400fbcc4&authkey=!ABPgDWuO03LBJqk&CT=1727095899782&OR=I

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	temsView Sustainable Forestry Initiative (SFI). 2022. Forest Management Standard. https://forests.org/wp-content/uploads/2022_SFI_StandardsandRules_section2.pdf Sustainable Forestry Initiative (SFI). n.d. Implementation Committees. https://forests.org/sic/ Wage and Hour Division. 2024. US Department of Labor announces final rule on classifying workers as employees or independent contractors under the Fair Labor Standards Act. https://www.dol.gov/newsroom/releases/whd/whd20240109-1
<i>Risk rating</i>	Low risk
4.1.9	Mechanisms shall be in place for resolving grievances and disputes in the workplace.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator qualitative analysis was conducted of relevant literature, including analysing the US legal frameworks in place to document the mechanisms used to resolve grievances and disputes for all workers in this sector in the geography of interest. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The US has labor laws at the Federal- and State-level that provide a legal framework for resolving grievances and disputes in the workplace. These mechanisms ensure workers have the ability to raise concerns regarding working conditions, pay, harassment, and other issues, and creates opportunities for employers to address these issues fairly. Although grievance policies are not required by law, most employers have a policy to: (1) mitigate legal risks by avoiding disputes escalating to the Equal Employment Opportunity Commission (EEOC), (2) comply with anti-discrimination laws, and (3) promote employee satisfaction. Most workplaces integrate grievance mechanisms in their internal policies. The US National Labor Relations Act (NLRA) plays a role in protecting workers' rights to organize and bargain collectively. Under the NLRA, workers in the US can form unions and participate in collective bargaining agreements to help resolve grievances. This procedure typically includes informal discussions, formal

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	complaints, and mediation. Additionally, the EEOC prohibits employment discrimination based on race, color, religion, sex, national origin, age, and/or disability. Workers may file grievances with the EEOC if they've been subjected to discriminatory practices. The US Office of Human Resources Management (OHRM) is another mechanism in place for resolving grievances and disputes. It is responsible for implementing government wide and departmental policies, employee programs, and activities in all aspects of human resources. OHRM's website has a page that lists the different offices to contact depending on the grievance or dispute. For example, for discrimination a worker can contact the EEOC, the Office of the Special Counsel, or the US Merit Systems Protection Board. Enforcement and monitoring In unionized workplaces, collective bargaining agreements are the primary tools for managing grievances. The collective bargaining agreements contain step-by-step procedures for addressing workplace disputes and are enforced by the union representatives who advocate for workers and ensure compliance with labor laws. Noncompliance to grievance procedures can result in legal action, overseen by the US National Labor Relations Board (NLRB). The NLRB and EEOC play critical roles in resolving workplace grievances and disputes. Workers who believe their rights under Federal labor laws have been violated can file complaints with those two agencies. These agencies then investigate claims and may pursue litigation against employers who failed to comply. The US Department of Labor also enforces workplace laws related to wages, overtimes, and safety, which offers another avenue for workers to resolve grievances related to working conditions or pay. Forest certification programs conduct regular audits of certified companies to ensure compliance with established grievance resolution processes. During the audits, records of complaints are examined, worker access to grievance mechanisms and assess are verified, and dispute resolution compliance with company policies and certification requirements are evaluated. Suspension or revocation of a company's certification can result if the company is not in compliance. Some companies engage in third-party arbitration or mediation services to resolve disputes between workers and management. These neutral third parties are used when internal resolution efforts fail or when they are required by collective bargaining agreements. Workers may also take their grievances to the judicial system. US labor laws provide for legal recourse through State and Federal courts where workers can pursue claims related to discrimination, wrongful termination, wage theft, or unsafe working conditions. Risk conclusion and justification Based upon the existence of clear Federal and State regulations, established grievance resolution mechanisms, industry standards, and ongoing enforcement efforts, it is concluded that the risk class for Indicator 4.1.9. is low risk.
<i>Supply Base Verifiers</i>	• Federal laws • Federal agencies • Legal information resources • Biomass producer procedures

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<i>Evidence reviewed</i>	Age Discrimination in Employment Act of 1967. 29 U.S.C. §§ 621 et seq. Washington, DC. Bloomberg Law. 2024. Labor and Employment Law. https://pro.bloomberglaw.com/insights/labor-employment/labor-employment-law/#what-are-the-major-types-of-employment-law Civil Rights Act of 1964. 42 U.S.C. §§ 2000e et seq. Washington, DC. Drax Global. 2022. Human Rights. https://www.drax.com/wp-content/uploads/2024/02/Human-Rights-Policy-2024.pdf Federal Trade Commission. n.d. Protection Against Discrimination and Other Prohibited Practices. https://www.ftc.gov/policy-notice/no-fear-act/protections-against-discrimination Equal Pay Act of 1963. 29 U.S.C. § 206(d). Washington, DC. National Labor Relations Act of 1935. 29 U.S.C. §§ 151 et seq. Washington, DC. National Labor Relations Board. 2024. Who We Are. https://www.nlr.gov/about-nlr/who-we-are Office of Human Resources Management. 2024. Grievances and Complaints. https://www.commerce.gov/hr/employees/work-life-balance/grievances-and-complaints US Department of Agriculture (USDA). n.d. Alternative Dispute Resolution Program. https://fas.usda.gov/about-fas/civil-rights/alternative-dispute-resolution-adr-program US Equal Employment Opportunity Commission (EEOC). 2024. Overview. https://www.eeoc.gov/overview
<i>Risk rating</i>	Low risk
4.1.10	Safeguards shall be put in place to protect the health and safety of workers by developing, communicating and implementing policies and procedures.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis

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	To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. In the US, safeguarding the health and safety of workers is a top priority and can be seen in the policies and procedures in place. The US Department of Labor's Occupational Safety and Health Administration (OSHA) has national responsibility for enforcing the Occupational Safety and Health (OSH) Act of 1970. OSHA is primarily responsible for regulating workplace safety. It sets mandatory standards and requires employers to develop and communicate policies aimed at preventing workplaces injuries, illnesses, and fatalities. OSHA has established, and enforces, health and safety standards for general industry and for some specific industries. OSHA standards for logging operations require that employees provide a comprehensive set of personal protective equipment (PPE) to workers (at no cost) that is maintained in serviceable condition. Many States operate their own occupational health and safety programs. These State programs oversee the development of safety policies. This ensures that safeguards are adapted to regional variations while maintaining a national baseline for worker protection. Employers are obligated to develop, maintain, and communicate health and safety policies in written form, and provide proper training to comply with those policies. Enforcement and monitoring OSHA maintains responsibility for oversight and enforcement of worker health and safety laws for private sector and federal workers and employers. OSHA conducts field inspections in response to imminent danger reports, fatalities, and worker complaints or referrals. Any employee can submit a complaint to report hazardous working conditions and request an OSHA inspection. When violations are found OSHA has the authority to issue fines, mandate corrections to policies inside the workplace, or, in severe cases, shut down operations until compliance can be achieved. State-level OSHA agencies conduct parallel inspections and provide training resources and guidance to companies to help them develop effective safety policies. OSHA and State programs encourage workers to file complaints if safety policies are not followed or if unsafe conditions are presents. Companies are required to maintain records of training sessions and OSHA inspectors may reviews these records to ensure compliance. Forestry certification programs also require proof of training. If workplace injuries take place, then workers are entitled to workers' compensation. Risk conclusion and justification Based on the clear Federal regulations enforced by OSHA, state-level safety programs, comprehensive health and safety policies mandated for employers, and forest certification programs, it is concluded that the risk class for Indicator 4.1.10. is low risk.
<i>Supply Base Verifiers</i>	• Federal laws • Grievance mechanisms • Occupational Safety and Health information

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	• State-level resources • Workers' Compensation
<i>Evidence reviewed</i>	Occupational Safety and Health Act of 1970 (OSHA). 29 U.S.C. §§ 651 et seq. Washington, DC. Occupational Safety and Health Administration (OSHA). 2024. File a Complaint. https://www.osha.gov/workers/file-complaint Occupational Safety and Health Administration (OSHA). 2024. Links to State Plans' Safety and Health Standards and Regulations. https://www.osha.gov/Stateplans/Statestandards Occupational Safety and Health Administration (OSHA). 2024. Logging-Overview. https://www.osha.gov/logging Occupational Safety and Health Administration (OSHA). 2024. State Plans. https://www.osha.gov/Stateplans Occupational Safety and Health Administration (OSHA). 2024. Worker Rights and Protections. https://www.osha.gov/workers USA.gov. 2024. Workers' Compensation. https://www.usa.gov/workers-compensation
<i>Risk rating</i>	Low risk

Criterion 4.2 - Feedstock sourcing benefits communities.

4.2.1	Negative social and community impacts shall be identified and avoided.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

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	The US Census Bureau conducts a nationwide survey every 10 years, gathering data on various factors such as population density, income distribution, education levels, and employment. This data allows companies and policymakers to assess how different populations, particularly rural and economically disadvantaged communities, might be affected. The Census also provides data on changes in local economies over time, helping to assess whether feedstock sourcing contributes to community development or leads to adverse social outcomes like unemployment or displacement. By using Census data, assessments can be conducted on a large scale. Each State has its own federally mandated Forest Action Plan. State forestry agencies develop these plans to assess conditions and trends of forests, identify priority issues, and outline strategies for addressing forest-related challenges. These Plans were required by the 2008 Farm Bill, to include a public consultation process, and are updated periodically. These Plans ensure forest management benefits local communities and economies by promoting sustainable forestry practices. They often include goals to support rural economies, improve public health, and enhance quality of life for residents. Enforcement and monitoring In addition to utilizing Census data, the Environmental Justice Screening and Mapping Tool (EJScreen) and the Environmental Protection Agency Mapper developed by the US Environmental Protection Agency (EPA) are tools to monitor the impact of feedstock sourcing on communities. The EJScreen combines environmental data with demographic information to identify communities that are at higher risk to experience negative social or environmental impacts due to industrial activities. Th EJScreen helps track whether biomass and forestry operations are contributing to environmental degradation, pollution, or health risks in nearby communities. The tool can also be used to monitor whether legal safeguards are being properly enforced. By overlaying environmental and demographic data, EJScreen provides insights into whether feedstock sourcing is benefiting local communities or disproportionately harming marginalized groups. It also helps in documenting positive contributions of feedstock sourcing such as job creation and infrastructure development. State Forest Action Plans involve consultation with local communities and stakeholders to identify and address potential negative social impacts. For example, the Georgia Forestry Commission worked with stakeholders from various areas to address forest health, water quality, sustainable community programs, marketing, fire management, conservation, and wildlife to develop Georgia’s Plan (Georgia Forestry Commission, 2020). The outcome of the US Census Bureau, State Forest Action Plans, and the EPA’s EJ Screen working together is that negative social and community impacts are identified and avoided when sourcing feedstock from private and public lands. Risk conclusion and justification Based on the existence of data collection by the US Census Bureau, State Forest Action Plans designed to promote community benefits, tools like the Environmental Justice Screening and Mapping Tool for monitoring impacts, and stakeholder consultation to address potential social issues, it is concluded that the risk class for Indicator 4.2.1. is low risk.
<i>Supply Base Verifiers</i>	• Demographic and census data • Environmental justice tools • Federal laws

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	State-Level level resources
<i>Evidence reviewed</i>	Environmental Protection Agency (EPA). 2024. Environmental Justice Screening and Mapping Tool. https://ejscreen.epa.gov/mapper/ Environmental Protection Agency (EPA). 2024. EJScreen: Environmental Justice Screening and Mapping Tool. https://www.epa.gov/ejscreen Farm Bill of 2008. Public Law No. 110-246, 122 Stat. 1651. Washington, DC. Georgia Forestry Commission. 2020. Optimizing the benefits of trees and forests for current and future generations. https://gatrees.org/forest-management-conservation/georgias-forest-action-plan/ National Association of State Foresters (NASF). 2024. Forest Action Plans. https://www.stateforesters.org/forest-action-plans/ US Census Bureau. 2023. Census Datasets. https://www.census.gov/data/datasets.html US Census Bureau. 2024. Homepage. https://data.census.gov/ US Department of Agriculture Forest Service. 2024. Forest Legacy. https://www.fs.usda.gov/managing-land/private-land/forest-legacy
<i>Risk rating</i>	Low risk
4.2.2	Feedstock sourcing shall positively contribute to the local economy, including employment.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. Feedstock sourcing plays an important role in the local economy, particularly in the US Southeast. The US Southeast is known as one of the most productive

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wood baskets in the world. The region produces 22% of global industrial roundwood (USIPA, 2024). Biomass production serves as a significant source of stable employment and economic activity in this region. The US Census Bureau and the US Bureau of Labor Statistics (BLS) provide data on employment trends, economic activity, and labor force participation. The BLS tracks job creation, wages, and employment levels. The US Southeast median annual wage was \$67,330 in May 2023 (BLS, 2023). According to the BLS, the overall employment is projected to grow 5% from 2023 to 2033.

A study from 2013, highlighted the positive economic impact that feedstock sourcing can have on local economies, particularly in rural and low-income areas. According to the research, the co-firing of wood pellets for electricity generation offers a valuable source of income for forest-based communities in Alabama (Kebede et al., 2013). As in Alabama, the expansion of the wood pellet industry in the US SE region generates direct employment in feedstock collection, pellet production, and transportation, while also creating indirect jobs in related sectors such as equipment manufacturing and maintenance services. Wood pellet production provides a sustainable income stream for landowners and workers in these communities, which contributes to poverty reduction thus improving the local economy. A 2016 study reported that one job in the wood pellet mill would have a higher impact on forestry and logging than one job in a paper mill (Brandeis and Guo, 2016). It further explored the negative economic effects southern local economies experienced at the site of closed pulp, paper, and paperboard mills. Additionally, a study from 2017 reported that the transatlantic wood pellet trade is an example of a mutually beneficial system, that provides environmental as well as socioeconomic benefits in both the SE US and Europe (Parish, 2017).

The National Alliance of Forest Owners (NAFO) is a national advocacy organization that is committed to advancing Federal policies to ensure working forests provide clean air, clean water, wildlife habitats, and jobs. According to NAFO, total direct, indirect, and induced employment impacts associated with private timberlands annually come to 2.5 million jobs, \$109 billion in payroll, and \$288 billion in manufacturing and sales (NAFO, 2019). Private timberland is responsible for 85.7% of the total jobs and 85.4% of the overall payroll linked to all timberlands (NAFO, 2024).

The Southern Group of State Foresters (SGSF) and economic studies by Forest2Market highlight the impact of forestry on the economy in the Southeast US. For example, in Georgia, forestry contributes approximately \$36 billion annually to the State's economy and the industry supports more than 141,000 jobs in this state.

Enforcement and monitoring

There are several mechanisms in place to enforce and monitor the positive contribution of feedstock sourcing to local economies. The US Department of Labor (DOL) and State-level labor departments enforce labor laws. Through that enforcement, they monitor employment trends and collect data on wages and working conditions. These departments conduct inspections and investigations to ensure compliance with labor standards.

The US Bureau of Labor Statistics continuously tracks and reports on employment statistics, wage data, and industry trends. Their Quarterly Census of Employment and Wages (QCEW) program provides detailed employment and wage data at the county, state, and national levels. The QCEW covers more than 95% of existing US jobs (Bureau of Labor Statistics, 2024).

State-level forestry agencies monitor the health and economic impacts of forest industries within their jurisdictions. State and Private Forestry Fact sheets provides information about the condition, management practices, and ecological and economic benefits of state-owned and privately-owned forested lands (Georgia State and Private Forestry Fact Sheet, 2024).

Organizations like NAFO and SGSF regularly commission and publish economic impact studies that assess the contribution of forestry. Trade associations like US

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	Industrial Pellet Association also monitor industry trends and advocate for policies that support sustainable industry growth and positive economic impacts. These mechanisms provide layers of enforcement and monitoring to ensure that feedstock sourcing positively contributes to the local economies and employment when sourcing feedstock from private and public lands. Risk conclusion and justification Based on the significant role of feedstock sourcing in the economy of the RRA geography, as evidenced by employment data from the US Census Bureau and Bureau of Labor Statistics, positive economic impacts highlighted in various studies, and substantial job creation reported by organizations like NAFO, it is concluded that the risk class for Indicator 4.2.2. is low risk.
<i>Supply Base Verifiers</i>	• Federal labor statistics • Relevant reports • State-level resources • Workforce and economic impact studies
<i>Evidence reviewed</i>	Brandeis, C. and Guo, Z. 2016. Decline in the Pulp and Paper Industry: Effects on Backward-Linked Forest Industries and Local Economies. https://www.srs.fs.usda.gov/pubs/ja/2016/ja_2016_brandeis_001.pdf Georgia Forestry Commission. 2024. State and Private Forestry Fact Sheet-Georgia 2024. https://apps.fs.usda.gov/nicportal/temppdf/sfs/naweb/ga_std.pdf Georgia Forestry Commission. 2024. Sustainability Report for Georgia's Forests. https://gatrees.org/wp-content/uploads/2020/01/Sustainability-Report-2024-WebVer.pdf Kebede, E., Ojumu, G., and Adozsi, E. 2013. Wood Pellet Co-Firing for Electric Generation Source of Income for Forest Based Low Income Communities in Alabama. https://www.researchgate.net/publication/275996102_Wood_Pellet_Co-Firing_for_Electric_Generation_Source_of_Income_for_Forest_Based_Low_Income_Communities_in_Alabama National Alliance of Forest Owners (NAFO). 2019. The Economic Impact of Privately-Owned Forests in the 32 Major Forested States. https://nafoalliance.org/wp-content/uploads/2018/11/Forest2Market_Economic_Impact_of_Privately-Owned_Forests_April2019.pdf National Alliance of Forest Owners (NAFO). 2024. Homepage. https://nafoalliance.org/ Parish, E. 2017. Investigating the Sustainability of Southeastern United States' Wood Pellet Production for Use in European Biopower Facilities. https://trace.tennessee.edu/cgi/viewcontent.cgi?article=6372&context=utk_graddiss ResourceWise. 2024. Demand and Forest Productivity in the US South: An Update Report. https://img1.wsimg.com/blobby/go/9afce926-cdfb-428d-9af3-8ec23009b16a/RW_USIPA_Demand_Forest_Productivity%20(Final).pdf Southern Group of State Foresters. 2024. Homepage. https://southernforests.org/

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	Southern Group of State Foresters. 2024. Investment in State and Private Forests. https://southernforests.org/priorities/implementing-a-generational-investment-in-State-and-private-forests/ Southern Group of State Foresters. 2024. Mapping the Southern State Forestry Workforce Landscape. https://southernforests.org/wp-content/uploads/2024/06/Workforce-Study-Report-2024-Public.pdf US Bureau of Labor Statistics (BOL). 2023. Occupational Employment and Wages. https://www.bls.gov/oes/current/oes191032.htm#st US Bureau of Labor Statistics (BOL). 2023. Quickfacts. https://www.bls.gov/ooh/life-physical-and-social-science/conservation-scientists.htm US Department of Labor. 2024. Employment and Unemployment. https://www.dol.gov/general/topic/statistics/employment US Department of Labor. 2024. Industries. https://www.dol.gov/general/topic/statistics/industries US Department of Labor. 2024. Wages, Earnings, and Benefits. https://www.dol.gov/general/topic/statistics
<i>Risk rating</i>	Low risk
4.2.3	Food, water supply or high conservation values (HCVs) that are essential for the fulfilment of basic needs of communities shall be maintained or enhanced.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. The US has legal mechanisms and support services in place to combat food insecurity. In 2023, 86.5% of households in the US were food secure while 13.5% were rated as food insecure. According to the US Department of Agriculture (USDA), out of this 13.5%, 5.1% of the population experienced low food security.

USDA food and nutrition assistance programs aim to increase food security by providing low-income households access to food as well as nutrition education. The US Clean Water Act (CWA) is essential in protection bodies of water from pollution. The CWA mandates water quality standards and regulates pollutants to ensure the health of water courses and watersheds that supply drinking water and irrigation for agriculture. In the Southeast, states such as Georgia, have implemented Best Management Practices (BMPs) to ensure timber harvesting activities near water bodies follow specific guidelines to prevent contamination and maintain water quality for local communities. As discussed in Indicator 2.1.2, the Forest Stewardship Council’s US National Risk Assessment’s (FSC US NRA) core function was to evaluate the risk of sourcing wood from the forest in which High Conservation Values (HCVs) are threatened. This analysis evaluated each of the identified HCVs and threats and impacts to them. The FSC US NRA identified and evaluated the areas of HCV pertaining to biodiversity. The US Endangered Species Act (ESA) is a legal framework that provides protection and conservation of threatened and endangered species. The formal listing of species derived from the presence of the ESA identifies species in need of protection, establishes critical habitat areas, and leads to the development of conservation plans aimed at preventing species or sub-species extinction and preserving the ecosystems the species is dependent on. The US Fish and Wildlife Service (FWS) lists species as endangered or threatened to ensure the appropriate protective measures apply (see the analysis under Indicators 2.1.1 and 2.1.2 for further information). The US Forest Service (FS) provides private landowners with technical, educational, and financial assistance to mitigate the risk of threats to forests such as invasive species, pests, disease, wildfire, and maintain clean air and water. The FS’s programs include the (1) Forest Health Protection program, which provides technical and financial assistance on forest health, (2) Forest Stewardship, which provides technical assistance to encourage long-term forest management, and (3) the Inflation Reduction Act’s Forest Landowner Support, which provides grants to support underserved and small-acreage forest landowner participation in emerging private markets for climate mitigation and forest resilience (USFS, 2024). Enforcement and monitoring Since 1995, the USDA has collected data on food adequacy and access, food spending, and food assistance for the US. The Food Security Supplement (FSS), conducted by the US Census Bureau, sends out a survey annually to collect this information. By monitoring food security annually, the USDA can maintain and even enhance the Federal food and nutrition assistance programs. The US Environmental Protection Agency (EPA) enforces the CWA by regular monitoring and issuing penalties for violations. State agencies enforce Best Management Practices (BMPs) to protect water quality (see Indicators 1.1.1 and 2.2.5). Some States have implemented water protection laws, such as Florida’s Watershed Protection Act, to further support the federally enforced CWA. The EPA offers resources, tools, and databases addressing impaired waters. For example, the MyEnvironment search applications allows users to access information on all of EPA’s water programs, such as water quality assessment, drinking water analyses, and discharge permits for their local area. Violating the CWA can result in fines and imprisonment, and affected private citizens can choose to sue polluters directly HCVs are protected through Federal wildlife protection laws such as the ESA. The listing of species under ESA follows extensive species habitat range mapping and stakeholder consultations. This requires the involvement of local communities and Indigenous People which is implemented by the FWS under the supervision of the Secretary of Interior. Violations of the ESA can result in heavy fines and imprisonment.

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	Risk conclusion and justification Based on the established legal mechanisms and support services aimed at maintaining food security, protecting water quality, and conserving HCVs in the US, as evidenced by the USDA's data on food security, enforcement of the CWA, and protections afforded by the ESA, it is concluded that the risk class for Indicator 4.2.3. is low risk.
<i>Supply Base Verifiers</i>	• Environmental compliance and enforcement • Federal laws • Federal agency and resources • Relevant research • Relevant Risk Assessments • State-level resources
<i>Evidence reviewed</i>	Bigelow, D. and Borchers, A. 2012. Major Uses of Land in the United States. https://www.ers.usda.gov/webdocs/publications/84880/eib-178.pdf?v=0 Environmental Protection Agency (EPA). 2024. Criminal Provisions of Water Pollution. https://www.epa.gov/enforcement/criminal-provisions-water-pollution Environmental Protection Agency (EPA). 2024. Clean Water Act Compliance Monitoring. https://www.epa.gov/compliance/clean-water-act-cwa-compliance-monitoring Florida Department of Environmental Protection. 2022. Water Supply. https://floridadep.gov/owper/water-policy/content/water-supply Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Iowa Ag Review. 2008. Breaking the Link between Food and Biofuels. https://www.card.iaState.edu/iowa_ag_review/summer_08/IAR.pdf The Clean Water Act of 1972. 33 U.S.C. §§ 1251 et seq. Washington, DC. US Department of Agriculture. 2024. Measurement. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/measurement/ US Department of Agriculture. 2024. State Fact Sheets: United States. https://data.ers.usda.gov/reports.aspx?ID=17854 US Department of Agriculture: Economic Research Service. 2023. Household Food Security in the United States in 2023. https://www.ers.usda.gov/webdocs/publications/109896/err-337.pdf?v=4423.8 US Department of Agriculture Forest Service. 2024. Private Land. https://www.fs.usda.gov/managing-land/private-land
<i>Risk rating</i>	Low risk

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4.2.4	Legal, customary, and traditional tenure and use rights of Indigenous Peoples and local communities related to the Supply Base shall be identified, documented, and respected.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to forest sourcing benefiting people and communities in the geography of interest. These preexisting resources have precedence in the forestry community and are widely accepted in the US. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA’s development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. As discussed in Indicator 1.1.2, land tenure and use rights are assigned and transferred through legal documents such as leases, contracts, easements, and deeds. These documents are recorded and maintained at the county level which are accessible to the public. If disagreements about land use and tenure rights arise, there are means through the judicial system to resolve disagreements. Through the US Constitution and treaties, the US government has built formal relationships with recognized Native American Tribes. These treaties are legally binding and establish a trust responsibility that requires the Federal government to safeguard the rights, lands, and resources outlined in the agreements. Currently, more than 650 treaties have been signed between the Federal government and Native American Tribes, and there are 574 federally recognized Tribes across 35 states in the US. Additionally, 13 States have recognized one or more Tribes at the state-level (Report on the Status of Indian Forest Lands, 2019). Tribal sovereignty allows for self-governance and economic development on reservation lands. The US National Historic Preservation Act and the US Native American Graves Protection and Repatriation Act establishes protections for culturally significant sites and resources. The US Tribal Forest Protection Act enables Indigenous communities to participate in the management of Federal forests, which ensures that their use rights are both respected and integrated into forest management activities. Indigenous Peoples and local communities have customary and traditional use rights related to the land. These rights are often recognized in legally binding treaties. The Forest Stewardship Council’s (FSC) extensive US National Risk Assessment (NRA) included a comprehensive evaluation of risk for illegally harvested wood entering FSC controlled wood supply chains within the conterminous US. This assessment included rigorous analysis and review of 21 indicators including legal

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	authority and evaluation of mechanisms at the State level. Low risk was determined for all dimensions of illegality related to Controlled Wood Category 1: Illegally harvested wood and Category 2: Wood harvested in violation of traditional and human rights to be “low risk.” The conclusions of the FSC’s US NRA are widely recognized as credible and have been universally adopted for use in evaluations of risk in the US forestry community. Enforcement and monitoring The US Bureau of Indian Affairs (BIA) maintain records of federally recognized Tribes and their lands. The BIA also enforces Federal laws related to Tribal lands and resources. The Advisory Council on Historic Preservation (ACHP) oversees the implementation of Section 106 of the US National Historic Preservation Act, which requires Federal agencies to consider the effects of their actions on historic properties, including those of cultural importance to Tribes. Risk conclusion and justification The US comprehensive legal framework, encompassing formal treaties, laws protecting Indigenous rights, and enforcement mechanisms such as the BIA and ACHP, indicates there are effective systems in place to identify, document, and respect the legal, customary, and traditional tenure and use rights of Indigenous Peoples and local communities. Therefore, it is concluded that the risk class for Indicator 4.2.4. is low risk.
<i>Supply Base Verifiers</i>	• US Constitution • Federal laws • Relevant reports
<i>Evidence reviewed</i>	Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra National Historic Preservation Act of 1966. 54 U.S.C. §§ 300101 et seq. Washington, DC. Native American Grave Protection and Repatriation Act of 1990. 25 U.S.C. §§ 3001 et seq. Washington, DC. US Department of Agriculture. 2019. Report on the Status of Indian Forest Lands. https://www.bia.gov/sites/default/files/dup/inline-files/fy_2019_dfwfm_status_report.pdf US Department of Agriculture. 2024. The Tribal Forest Protection Act. https://www.climatehubs.usda.gov/hubs/northern-forests/topic/tribal-forest-protection-act
<i>Risk rating</i>	Low risk
4.2.5	Mechanisms shall be in place for resolving grievances and disputes relating to tenure and use rights of the forest and other land management practices.

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<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate. Grievances and disputes, including those related to tenure and use rights and forest management practices, are regulated by legislation like the US Constitution, labor laws, and certification programs. As discussed in Indicator 1.1.2, land tenure and use rights are assigned and transferred through legal documents such as leases, contracts, easements, and deeds. These titles are recorded and maintained at the county level which are accessible to the public. If disagreements about land use and tenure rights arise, the judicial system can be used to resolve the disagreements. In the US, civil rights are personal rights guaranteed and protected by the US Constitution. Civil rights are also protected by numerous Federal laws. The Bill of Rights, the first 10 amendments to the US Constitution, provide guarantees for upholding individual rights, including limiting the government's ability to infringe on those rights. The Federal Civil Rights Act of 1964 bans discrimination based on race, color, religion, gender, and national origin. The US Office of Occupational Safety and Health Administration (OSHA), a Federal regulatory agency, ensures workers have a safe work environment. OSHA has a complaint process that allows workers to submit complaints to have their workplaces inspected. The law makes it illegal for employers to retaliate against employees who submit complaints. Employees can file a complaint by calling 1-800-321-6742, online via a Complain Form, or mailing or faxing it to their local OSHA area office. US National Historic Preservation Act (NHPA) of 1966 protects the rights of Indigenous Peoples to manage their lands in accordance with their customs and traditions. Federal agencies, such as the US Department of Interior's Bureau of Indian Affairs (BIA), are required to consult with Tribes on decisions and activities that may affect Tribal interests. These requirements have been reinforced by a Presidential Memorandum and Presidential Executive Order (EO 13175) since 2022. The BIA is required to comply with Tribal laws governing Tribal forest lands, as long as they do not compromise the Federal government's trust responsibility. The US Indian Self-Determination Act allows Tribes to exercise autonomy over administering Federal programs designed for their benefit. The US National Indian Forest Resources Management Act (NIFRMA) requires Tribal forest lands to be managed in accordance with the US government's trust

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	responsibility. The Forest Stewardship Council's (FSC) extensive US National Risk Assessment (NRA) included a comprehensive evaluation of risk for illegally harvested wood entering FSC controlled wood supply chains within the conterminous US. The FSC US NRA's robust evaluation included multiple rounds of stakeholder engagement and expert consultation. This assessment included rigorous analysis and review of 21 indicators including legal authority and evaluation of mechanisms at the State level. Low risk was determined for all dimensions of illegality related to Controlled Wood Category 1: Illegally harvested wood and Category 2: Wood harvested in violation of traditional and human rights to be "low risk." The conclusions of the FSC US NRA are widely recognized as credible and have been universally adopted for use in evaluations of risk in the US forestry community. Enforcement and monitoring State forestry agencies play a role in monitoring overall forest management practices and can mediate disputes between landowners and other stakeholders. State agencies also monitor compliance with Best Management Practices (BMPs) and will investigate complaints about mishandled and inappropriate forest management. The US Advisory Council on Historic Preservation oversees the implementation of the NHPA's Section 106, which requires Federal agencies to consider the effects of their actions on historic properties. If the NHPA is violated, legal action by Federal authorities ensues and can include fines, requirements to mitigate damage caused, and possible suspension of permits or funding. For Tribal lands, the enforcement and monitoring of land resource use rights are supported by Federal and State agencies, such as the BIA. The BIA is tasked with ensuring compliance of Tribal laws as long as they align with the Federal government's trust responsibility. Third-party certification schemes audit organizations to ensure their grievance dispute resolution mechanisms are accessible and effective. Certification bodies often engage with local stakeholders as part of an audit to ensure community concerns are heard and addressed. Certified companies are required to document all grievances and major disputes, investigate complaints, and recommend that the organization take corrective actions when necessary. Risk conclusion and justification Based on the established legal frameworks and support mechanisms aimed at addressing grievances and disputes related to land tenure, use rights, and forest management practices in the US, as evidenced by civil rights laws, the National Historic Preservation Act, and forest certification programs, it is concluded that the risk class for Indicator 4.2.5. is low risk.
<i>Supply Base Verifiers</i>	• Executive Orders • Federal laws • Risk Assessments • Supply based evaluations (DRAXDRAX GLOBAL, ENVIVA, FRAM, Highland Pellets) • US Constitution

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<i>Evidence reviewed</i>	Civil Rights Act of 1964. 42 U.S.C. §§ 2000e et seq. Washington, DC. Fair Labor Standards Act of 1938. 29 U.S.C. §§ 201 et seq. Washington, DC. Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Indian Self-Determination and Education Assistance Act of 1975. 25 U.S.C. §§ 5301 et seq. Washington, DC. National Historic Preservation Act of 1966. 54 U.S.C. §§ 300101 et seq. Washington, DC. National Indian Forest Resources Management Act of 1990. 25 U.S.C. §§ 3101 et seq. Washington, DC. Occupational Safety and Health Administration (OSHA). 2024. File a Complaint. https://www.osha.gov/workers/file-complaint Presidential Documents. 2000. Executive Order 13175. https://2009-2017.State.gov/documents/organization/136740.pdf The White House. 2022. Memorandum on Uniform Standards for Tribal Consultation. https://www.whitehouse.gov/briefing-room/presidential-actions/2022/11/30/memorandum-on-uniform-standards-for-tribal-consultation/
<i>Risk rating</i>	Low risk
4.2.6	Where Indigenous Peoples' rights are identified in the Supply Base, and Free Prior and Informed Consent (FPIC) has not been achieved for the proposed and planned activities, a consultation and, if required, accommodation process shall be put in place.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

Annex 1: Detailed findings for Supply Base Evaluation

	In the US, Indigenous Peoples' land and resource rights are legally protected through treaties, the US Constitution, and Federal laws. Land tenure and use rights have been acknowledged through more than 650 treaties signed between the Federal government and Tribes. The US government has a trust responsibility to protect Indigenous lands, resources, and rights. The Federal government recognizes 574 federally recognized Tribes across 35 States and provides legal protections for land use and natural resources within Tribal territories (Report on the Status of Indian Forest Lands, 2019). The rules for Federal recognition are codified in the US Code of Federal Regulations (25 CFR Part 83). Federal agencies are required by several laws to consult with federally recognized Tribes on decisions and activities that may affect Tribes and their members. A Presidential Memorandum and Presidential Executive Order (EO 13175) has been issued to reinforce the mandate for consultation with Tribes and to establish uniform standards for Tribal consultation. The US National Environmental Policy Act (NEPA) mandates consultation with Tribes on projects that may affect their land or resources. The US National Historic Preservation Act requires Federal agencies to consult with Indigenous People when any proposed activity impacts Tribal cultural and historical sites. State laws establish protective measures for historic and prehistoric archaeological sites, including prohibitions against disturbing or removing objects from cemeteries and American Indian burial sites. Locations of cultural sites associated with Native Americans and Tribes are generally not publicly accessible due to protection of confidentiality. Many of these sites exist on both private and State and Federal lands. Free Prior and Informed Consent (FPIC) aligns with many of the consultation mandates in place for Indigenous communities. FPIC ensures that Indigenous Peoples can participate in decision-making processes that may impact their land, resources, and livelihoods. The consultation process is particularly relevant when feedstock sourcing or forest management intersect with traditional hunting, fishing, or cultural practices. The goal of consultation is to reach mutual understanding and accommodation. If FPIC is not achieved, further accommodation processes are developed to ensure Indigenous rights are respected. This may include land use agreements, compensation for impacts, or continuous monitoring to protect traditional practices. Enforcement and monitoring The US Bureau of Indian Affairs (BIA) and the US Forest Service (FS) have established protocols for consultation with Tribes. The US Tribal Forest Protection Act (TFPA) (2004) also ensures that Tribal governments have representation when Federal land management decisions could affect Tribal lands. The TFPA provides a structured platform for Indigenous input on projects. The US Department of the Interior and the BIA have enforcement responsibilities for Tribal rights on land-use based decisions. Risk conclusion and justification Based on the established legal mechanisms and consultation processes protecting Indigenous Peoples' rights in the US, as evidenced by treaties, the US Constitution, NEPA, and TFPA, it is concluded that the risk class for Indicator 4.2.6. is low risk.
<i>Supply Base Verifiers</i>	• Executive Orders • Federal agencies • Federal legislation • Relevant reports

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<i>Evidence reviewed</i>	Advisory Council on Historic Preservation. 2021. Consultation with Indian Tribes in the Section 106 Review Process: The Handbook. https://www.achp.gov/sites/default/files/2021-06/ConsultationwithIndianTribesHandbook6-11-21Final.pdf Federally Recognized Indian Tribe List Act of 1994. 25 U.S.C. § 5130. Washington, DC. US Department of the Interior (USDI). 2019. Report on the Status of Indian Forest Lands. https://www.bia.gov/sites/default/files/dup/inline-files/fy_2019_dfwfm_status_report.pdf US Department of the Interior (USDI). 2022. Current Land, Water, and Wildlife Authorities that can Support Tribal Stewardship and Co-Stewardship. https://www.doi.gov/sites/doi.gov/files/-final-legal-rvw-v-final-pdf-508.pdf US Department of Agriculture (USDA). 2022. The Tribal Forest Protection Act. https://www.climatehubs.usda.gov/hubs/northern-forests/topic/tribal-forest-protection-act National Historic Preservation Act of 1966. 54 U.S.C. §§ 300101 et seq. Washington, DC. National Environmental Policy Act of 1970. 42 U.S.C. §§ 4321 et seq. Washington, DC. Presidential Documents. 2000. Executive Order 13175. https://2009-2017.State.gov/documents/organization/136740.pdf Tribal Forest Protection Act of 2004. 25 U.S.C. §§ 3115 et seq. Washington, DC.
<i>Risk rating</i>	Low risk
4.2.7	Designated cultural heritage sites shall be preserved.
<i>Findings</i>	Scale of assessment The RRA geographic scope is the primary areas of biomass sourcing in the United States (US), encompassing the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; privately owned forests including smallholders (or family forest landowners), and larger private landholdings, including industrial management and landownerships such as timberland investment organizations (TIMOs) and real estate investment trusts (REITs). While private lands are, rightly, the focus of this RRA, public lands, including non-US National Forest Federal lands, State lands, and local government lands, are also considered. Analysis To evaluate this Indicator, qualitative analysis was conducted of relevant literature, including preexisting assessments evaluating risk related to legality of forest sourcing in the RRA geography. Additionally, input from stakeholders and experts was essential in analysis of risk. Stakeholders and experts were specifically engaged in two structured stages: (1) a listening period at the initiation of the RRA's development to support the identification of evidence and data sources, as well as to inform draft risk analysis and conclusions and (2) a formal stakeholder consultation on a draft of this RRA. All stakeholder perspectives communicated during both these stages was thoughtfully considered and integrated into the analysis and conclusion of this indicator, as appropriate.

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The protection of cultural heritage sites is guided by Federal and State laws. The US National Historic Preservation Act (NHPA) of 1966 and the creation of the National Register of Historic Places established a legal framework for identifying and protecting historic and cultural sites. The NHPA mandates that Federal projects and federally funded projects must be reviewed to assess the potential impact on culturally historic sites. The US Archaeological Resources Protection Act (ARPA) (1979) provides additional protections for archaeological sites on Federal and Tribal lands, including penalties for destruction or removal of cultural artifacts. In the US Southeast, States require private landowners to conduct environmental and cultural assessments before beginning land-use activities that could affect cultural heritage sites. These assessments are coordinated with State Historic Preservation Offices (SHPOs) to identify potential risks and mitigation strategies.

At a state-level, NHPA authorizes SHPOs to identify and protect cultural and historic sites. States have their own historical protection laws and registers that work to protect these sites. The National Conference of State Historic Preservation Officers has an interactive map of the US on their website that connects to each State's Historic Preservation Office. For example, the Alabama Historical Commission is responsible for the identification and preservation of Alabama's historical and cultural sites. The Commission works with private landowners and industries to ensure development does not threaten these important sites. The Georgia Historic Preservation Division publishes a four-year plan. The Plan for 2022-2026 focused on "maintaining responsiveness to the mission of preservation through times of great change."

The Forest Stewardship Council US National Risk Assessment (FSC US NRA) made a Low Risk determination for all indicators addressing legality including specifically Protected Sites and Species (1.9) (FSC US, 2019). Additionally, the FSC US NRA concluded Low Risk of forest management negatively affects "Cultural Values. Sites, resources, habitats, and landscapes of global or national cultural, archaeological, or historical significance" (addressed as HCV6 by FSC).

The Sustainable Forestry Initiative (SFI) includes specific objectives for the protection of cultural and historical sites. These objectives require biomass producers to take proactive steps to identify and protect cultural heritage sites within their sourcing regions, often through collaboration with local communities, historians, and archaeologists.

Enforcement and monitoring

The enforcement of cultural heritage preservation laws falls under the jurisdiction of Federal, State, and local agencies. The NHPA is enforced by the US Advisory Council on Historic Preservation (ACHP). The ACHP promotes the preservation, enhancement, and sustainable use of the US's historic resources, and advises the President and Congress on national historic preservation policy. Enforcement mechanisms are applied when private landowners apply for permits or engage in activities that could affect cultural heritage sites. These activities require a formal review under Section 106 of the NHPA, where potential impacts on cultural heritage sites are assessed, and recommendations for preservation are made. If violations occur, then Federal or State authorities issue penalties and restoration requirements. SHPOs maintain State registers of historic places and are responsible for reviewing projects that could potentially impact cultural resources. SHPOs collaborate with Federal agencies, such as the ACHP, to enforce the NHPA.

State Departments of Natural Resources monitor cultural resource management on state-owned lands. These departments work with SHPOs to protect cultural heritage sites located on State lands and ensure land-use activities align with cultural preservation goals. At the local level, county and city planning departments often have historic preservation division that review development proposals to assess their potential impact on cultural heritage sites. Local historic preservation commissions monitor the protection of local historic districts and landmarks, ensuring that any changes to designated properties are properly reviewed and approved. Tribal Historic Preservation Offices (THPOs) are designated by Tribes to serve the same functions as SHPOs. They preserve culturally significant sites

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	on Tribal lands, further enhancing the protection of heritage resources. THPOs are available to advise federal, state, and local agencies on the management of Tribal historic properties and instruct municipalities on Section 106 reviews to represent Tribal interests. Additional monitoring mechanisms include regular surveys and inventories of cultural sites, which State and local agencies conduct to document and assess potential risks. Permit review processes and public reporting systems allow for the identification of threats to cultural heritage sites. Additionally, agencies often use Geographic Information Systems (GIS) mapping to monitor known cultural sites. Risk conclusion and justification Based on the established legal frameworks and enforcement mechanisms aimed at preserving cultural heritage sites in the US, as evidenced by the NHPA, the ARPA, and State-level historic preservation programs, it is concluded that the risk class for Indicator 4.2.7. is low risk.
<i>Supply Base Verifiers</i>	• Federal laws • Risk Assessments • State-level legislation • State-level reports
<i>Evidence reviewed</i>	Advisory Council on Historic Preservation. n.d. Promoting Historic Preservation Act. https://www.achp.gov/ Alabama Historical Commission. Section 106 Regulatory Review. https://ahc.alabama.gov/section106.aspx Archaeological Resources Protection Act of 1979. 16 U.S.C. §§ 470aa et seq. Washington, DC. Forest Stewardship Council US (FSC). 2019. Controlled Wood National Risk Assessment for the Conterminous United States of America. Accessible: https://us.fsc.org/en-us/certification/controlled-wood/fsc-us-controlled-wood-national-risk-assessment-us-nra Georgia Department of Community Affairs. 2022. Preserving the Past in Times of Change. https://www.dca.ga.gov/sites/default/files/hpd_2022-2026_shpp_final_3_22_22.pdf Georgia Historic Preservation Division. 2022. Georgia's State Historic Preservation Plan 2022-2026: Preserving the Past in Times of Change. https://www.dca.ga.gov/node/7902 Georgia Historic Preservation Division. 2024. Environmental Review Frequently Asked Questions. https://www.dca.ga.gov/node/9027 Georgia Historic Preservation Division. 2024. Environmental Review and Compliance. https://www.dca.ga.gov/georgia-historic-preservation-division/environmental-review-compliance Liu, B., Wu, C., Xu, W. et al. Emerging trends in GIS application on cultural heritage conservation: a review. Herit Sci 12, 139 (2024). https://doi.org/10.1186/s40494-024-01265-7 National Historic Preservation Act of 1966. 54 U.S.C. §§ 300101 et seq. Washington, DC.

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<i>Risk rating</i>	Low risk

Annex 2: List of Experts Consulted and Contacts of Working Body

Expert	Affiliation & role
Bubser, Dave	Working Body Member. Cambium Consulting.
Cheyne, Kyla	Director of Sustainability. Drax Global Biomass. August 2024. Personal interview.
Clark, Katie	Working Body Member. Timmons Group.
Cook, Shawn	Manager, Sustainability Standards. Enviva. August 2024. Personal interview.
Coulston, John, PhD	Project Leader/Supervisory Research Forester. USDA Forest Service. Southern Research Station. August 2024. Personal communication.
Doty, Amy	Working Body Member. Meetings and Such.
Entio, Lisandro	Grassland Ecologist. Texas A&M University. August 2024. Personal interview.
Estes, Dwayne, PhD	Cofounder and Executive Director. Southeastern Grasslands Institute. August 2024. Personal correspondence and interview.
Fernholz, Kathryn	Working Body Member. Dovetail Partners.
Golden, Maria	Working Body Member. Dovetail Partners.
Grant, Don	Senior Manager, Sustainability. Enviva. August 2024. Personal interview.
Kazee, Tom	Director of Operations. Woodland Security Inc. August 2024. Personal Interview.
Malmsheimer, Robert, PhD	Working Body Member. State University of New York College of Environmental Science and Forestry.
Crow, Sarah	Working Body Member. New March Strategies, LLC.
Meade, Jason	Forester, USDA Forest Service, Southern Research Station. 2024. September 2024. Personal communication and interviews.
Metnick, Jason	Senior Vice President. Customer Affairs. Sustainable Forestry Initiative. 2024. Personal Communication.
Palmer, Bretta	Sustainability Manager. Drax Global Biomass. August 2024. Personal interview
Russell, Matt, PhD	Working Body Member. Arbor Custom Analytics.
Werner, Eric	Working Body Member. Far North Consulting.
White, Rickie	Working Body Member. Lost Provincial Ecological.

Annex 3 List of Publications Used

- Abolish Human Trafficking Act of 2017. 34 U.S.C. §§ 20701 et seq. Washington, DC.
- Advisory Council on Historic Preservation. 2021. Consultation with Indian Tribes in the Section 106 Review Process: The Handbook. <https://www.achp.gov/sites/default/files/2021-06/ConsultationwithIndianTribesHandbook6-11-21Final.pdf>
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- Americans with Disabilities Act of 1990. 42 U.S.C. §§ 12101 et seq. Washington, DC.
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Annex 4: List of Stakeholders

No.	Organisation	Type of organisation
1	Absentee — Shawnee Tribe of Indians of Oklahoma	Tribal
2	Alabama Forestry Association	State and National Professional Association
3	Alabama Forestry Commission	State and National Professional Association
4	Alabama-Coushatta Tribe of Texas	Tribal
5	AltaForesta	Certification Program
6	American Bird Conservancy	Environmental Conservation Organization
7	American Forest & Paper Association (AF&PA)	Advocacy organization
8	American Forest Foundation (American Tree Farm System)	Certification Program
9	American Forests	Environmental Conservation Organization
10	American Loggers Council	Advocacy organization
11	Apache Tribe of Oklahoma	Tribal
12	Appalachian Hardwood Center, Davis College of Agriculture, Natural Resources and Design West Virginia University	Academia and research organizations
13	Appalachian Trail Conservancy	Advocacy organization
14	Appalachian Voices	Advocacy organization
15	Arbor Day Foundation	Advocacy organization
16	Arkansas Forestry Association	State and National Professional Association
17	Arkansas Forestry Commission Forest Service	State and National Professional Association
18	Association of Consulting Foresters	Consultant
19	Auburn University (Center for Bioenergy and Bioproducts)	Academia and research organizations
20	BIA Eastern Oklahoma Region	Tribal
21	BIA Eastern Region	Tribal
22	BIA Southern Plains Region	Tribal

23	Caddo Nation of Oklahoma	Tribal
24	Canfor	Forest and Forest Products Industry
25	Catawa Nation	Tribal
26	Cherokee Nation	Tribal
27	Cheyenne and Arapaho Tribes, Oklahoma	Tribal
28	Chickahominy Indian Tribe	Tribal
29	Chickahominy Indian Tribe Eastern Division	Tribal
30	Chitimacha Tribe of Louisiana	Tribal
31	Citizen Potawatomi Nation, Oklahoma	Tribal
32	Clearwater Paper	Forest and Forest Products Industry
33	Clemson Forestry and Environmental Conservation	Academia and research organization
34	CM Biomass	Biomass Producer
35	Comanche Nation, Oklahoma	Tribal
36	ControlUnion	Certification Program
37	Coushatta Indian Tribe of Louisiana	Tribal
38	Coushatta Tribe of Louisiana	Tribal
39	Delaware Nation, Oklahoma	Tribal
40	Delaware Tribes of Indians	Tribal
41	Dogwood Alliance	Advocacy organization
42	Drax	Biomass Producer
43	Earthworm	Forestry Consultant
44	Eastern Band of Cherokee Indians	Tribal
45	Eastern Shawnee Tribe of Oklahoma	Tribal
46	Environmental Law Institute	Advocacy organization
47	Enviva Inc	Biomass Producer

48	Evergreen Packaging	Forest and Forest Products Industry
49	FIA Coordinator, Texas A&M Forest Service	Academia and research organization
50	Florida Division of Forestry	State and National Professional Association
51	Florida Forestry Association	State and National Professional Association
52	Forest and Woodland Association of Missouri	State and National Professional Association
53	Forest Landowner Association	Advocacy organization
54	Forest Products Society	Forest and Forest Products Industry
55	Forest Resources Association	Forest and Forest Products Industry
56	Forest Stewards Guild	Environmental Conservation Organization
57	Forest Stewardship Council - US	Certification Program
58	Fort Sill Apache Tribe of Oklahoma	Tribal
59	FRAM	Biomass Producer
60	Georgia Forestry Commission	State and National Professional Association
61	Georgia Pacific	Forest and Forest Products Industry
62	Graphic Packaging	Forest Contractor
63	Greener Options	Forestry Consultant
64	Highland Pellets	Biomass Producer
65	Interfor	Forest Contractor
66	International Paper Co	Forest and Forest Products Industry
67	Intertribal Timber Council	Tribal
68	Iowa Tribe of Oklahoma	Tribal
69	Jena Band of Choctaw Indians	Tribal
70	Kaw Nation, Oklahoma	Tribal
71	Kentucky Division of Forestry	State and National Professional Association
72	Kentucky Forests Industries Association	State and National Professional Association

73	Kialegee Tribal Town	Tribal
74	Kickapoo Traditional Tribe of Texas	Tribal
75	Kickapoo Tribe of Oklahoma	Tribal
76	Kiowa Indian Tribe of Oklahoma	Tribal
77	LJR	Forest and Forest Products Industry
78	Louisiana Department of Agriculture and Forestry	State and National Professional Association
79	Miami Tribe of Oklahoma	Tribal
80	Miccosukee Tribe of Indians	Tribal
81	Mississippi Band of Choctaw Indians	Tribal
82	Mississippi Forestry Commission	State and National Professional Association
83	Mississippi Loggers Association	Forest Contractor
84	Missouri Department of Conservation	State and National Professional Association
85	Missouri Forestkeepers Network	Advocacy organization
86	Monacan Indian Nation	Tribal
87	Nansemond Indian Nation	Tribal
88	NAPCO	Forest and Forest Products Industry
89	National Alliance of Forest Owners	Advocacy organization
90	National Association of State Foresters	State and National Professional Association
91	National Council for Air and Stream Improvement, Inc. (NCASI)	Academia and research organization
92	National Wild Turkey Federation	Advocacy organization
93	Natural Resources Defense Council	Advocacy organization
94	NatureServe	Advocacy organization
95	NC Wildlife Resources Commission	State and National Professional Association
96	North Carolina Division of Forest Resources	State and National Professional Association
97	North Carolina Forestry Association	State and National Professional Association

98	North Carolina Land Trust	Environmental Conservation Organization
99	North Carolina State University College of Natural Resources	Academia and research organization
100	NSF	Academia and research organization
101	Oak Ridge National Laboratory	Academia and research organization
102	Ohio Department of Natural Resources – Forestry	State and National Professional Association
103	Ohio Forestry Association	State and National Professional Association
104	Ohio State University, Forestry Extension	Academia and research organization
105	Oklahoma Forestry Association	State and National Professional Association
106	Oklahoma Forestry Services	State and National Professional Association
107	Oklahoma State University	Academia and research organization
108	Orsted	Environmental Conservation Organization
109	Otoe-Missouria Tribe of Indians, Oklahoma	Tribal
110	Ottawa Tribe of Oklahoma	Tribal
111	Pamunkey Indian Tribe	Tribal
112	Pawnee Nation of Oklahoma	Tribal
113	Peak Renewables	Biomass Producer
114	Peoria Tribe of Indians of Oklahoma	Tribal
115	Pinchot Institute	Advocacy organization
116	Poarch Band of Creek Indians	Tribal
117	Ponca Tribe of Indians of Oklahoma	Tribal
118	Prefered by Nature	Certification Program
119	Programme for the Endorsement of Forest Certification	Certification Program
120	Quapaw Nation	Tribal
121	Rappahannock Tribe, Inc.	Tribal
122	Resources for the Future	Advocacy organization

123	Ruffed Grouse Society	Environmental Conservation Organization
124	RWE	Certification Program
125	Sac & Fox Nation, Oklahoma	Tribal
126	SCS global	Certification Program
127	Seminole Tribe of Florida	Tribal
128	Seneca-Cayuga Nation	Tribal
129	Shawnee Tribe	Tribal
130	Sierra Club	Advocacy organization
131	Smurfit West Rock	Forest and Forest Products Industry
132	Society of American Foresters	Forestry Consultant
133	South Carolina Forestry Commission	State and National Professional Association
134	Southeastern Grasslands Institute	Environmental Conservation Organization
135	Southern Environmental Law Center	Advocacy organization
136	Southern Group of State Foresters	Worker Association
137	Southern Packaging	Forest and Forest Products Industry
138	Steel Dynamics	Forestry Consultant
139	Sustainable Forestry Initiative	Certification Program
140	Tarleton State Univserity- Wildlife and Natural Resources	Academia and research organization
141	Tennessee Department of Agriculture, Division of Forestry	Academia and research organization
142	Tennessee Division of Forestry	State and National Professional Association
143	Texas A&M AgriLife Research	Academia and research organization
144	Texas Forest Service	State and National Professional Association
145	Texas Forestry Association	State and National Professional Association
146	The Chickasaw Nation	Tribal
147	The Choctaw Nation of Oklahoma	Tribal

148	The Conservation Fund	Advocacy organization
149	The Muscogee (Creek) Nation	Tribal
150	The Nature Conservancy	Advocacy organization
151	The Osage Nation	Tribal
152	The Seminole Nation of Oklahoma	Tribal
153	The University of Tennessee Institute of Agriculture	Academia and research organization
154	The Wilderness Society	Advocacy organization
155	Thlopthlocco Tribal Town	Tribal
156	Timberland Investment Resources	Forest and Forest Products Industry
157	Tonkawa Tribe of Indians of Oklahoma	Tribal
158	Tunica-Biloxi Indian Tribe	Tribal
159	United Keetoowah Band of Cherokee Indians in Oklahoma	Tribal
160	United States Industrial Pellet Association	Forest and Forest Products Industry
161	University of Florida (Florida Energy Systems Consortium)	Academia and research organization
162	University of Kentucky, Dept. of Forestry and Natural Resources	Academia and research organization
163	University of Missouri, School of NR	Academia and research organization
164	University of Tennessee Institute of Agriculture	Academia and research organization
165	Upper Mattaponi Tribe	Tribal
166	USFS State & Private	State and National Professional Association
167	VA Forestry Association	State and National Professional Association
168	Virginia Department of Forestry	State and National Professional Association
169	Virginia Tech	Academia and research organization
170	Warnell School of Forestry (UGA)	Academia and research organization
171	West Fraser	Forest and Forest Products Industry
172	West Virginia Division of Forestry	State and National Professional Association

173	West Virginia Extension, Institute for Labor Studies & Research	Academia and research organization
174	West Virginia Forestry Association	State and National Professional Association
175	Weyerhaeuser	Forest and Forest Products Industry
176	Wichita and Affiliated Tribes (Wichita, Keechi, Waco & Tawakonie), Oklahoma	Tribal
177	Woodville/Granuul	Forest and Forest Products Industry
178	Wyandotte Nation	Tribal
179	Yale School of Forestry	Academia and research organization

Annex 5: Stakeholder consultation report

Stakeholder	Comment	Response
Biomass Producer	General Comment: Well Done!	No response needed.
Certification Program	2.2.2: Ecosystems, their health, vitality, functions and services in the Supply Base shall be maintained or enhanced? Mitigation Measures There is little evidence supporting outreach and education and conservation initiatives as effective mechanisms in changing land management behavior, based upon my experience in implementing said activities. Even the best designed are difficult to tie to specific impacts, at scale. 3.2.3: Primary feedstock shall not be sourced from forest areas in the Supply Base which, according to local definitions or norms, are classified as having combined attributes of high carbon stocks and high conservation value (HCV)? Mitigation Measures Same as response to Q25	In the context of a privately owned landscape governed by private property rights, biomass producers are limited in their abilities to directly control management actions and decision making. The effectiveness of landowner outreach and education is difficult to evaluate. Studies suggest that outreach and education opportunities may be more influential on landowner behaviours than other forms of programming, such as the development of forest management plans. However, landowner programs, such as the US Forest Service's Forest Stewardship Program, which is a very significant program, reach a small fraction of landowners. (Butler et al., 2014). However, research finds that targeting the right audience, including landowners who plan to harvest, is more likely to result in their taking action to participate in programs (Ma et al., 2012). As such, procurement apparatus may provide a beneficial apparatus for the distribution of outreach and education tools. Moreover, outreach and education, as well as conservation initiatives, are unlikely to have a negative effect. As a result, these mitigation options will continue to be encouraged. Outcomes of outreach and education remain hard to measure and may require longer time horizons than typical audit cycles. As a result of consideration of this comment and others, the mitigation measures for indicators 2.2.2 and 2.2.3 have been refined to target professionals in the supply chain. There is longstanding evidence supporting supplier engagement and logger training strategies. Studies have found that logger training results in enhanced knowledge and awareness around, for example, safety practices (Helmkamp et al., 2004) and even a single introductory course in forest ecology and silviculture can help loggers make more-informed management decisions (Keefer et al., 2002).

		Additionally, field guilds reinforce and serve as references for practitioners. These approaches can be evaluated through sampling of harvest sites, review of generated materials and interviews related to training use. Sources Butler, B.J., Markowski-Lindsay, M., Snyder, S., et al. 2014. Effectiveness of Landowner Assistance Activities: An Examination of the USDA Forest Service's Forest Stewardship Program, <i>Journal of Forestry</i>, Volume 112, Issue 2, March 2014, Pages 187–197, https://doi.org/10.5849/jof.13-066 Helmkamp, J. Bell, J. Lundstrom, W. Ramprasad, J., and Hague, A. 2004. Assessing safety awareness and knowledge and behavioural change among West Virginia loggers. <i>Injury Prevention</i>, volume 10, issue 4. https://injuryprevention.bmj.com/content/10/4/233.short Keefer, M.J., Finley, J.C., Luloff, A.E., and McDill, M.E. Characterizing Loggers' Forest Management Decisions, <i>Journal of Forestry</i>, Volume 100, Issue 6, September 2002, Pages 8–15, https://doi.org/10.1093/jof/100.6.8 Ma, Z., Butler, B.J., Kittredge, D., and Catanzaro, P. 2012. Factors associated with landowner involvement in forest conservation programs in the U.S.: Implications for policy design and outreach, <i>Land Use Policy</i>, Volume 29, Issue 1, 2012, Pages 53-61, ISSN 0264-8377, https://doi.org/10.1016/j.landusepol.2011.05.004
Consultant	General Comment: The research done for each indicator is rigorous and the reasoning sound behind the designation of risk as well as the mitigation methods.	No response needed.

Environmental Conservation Organization	2.1.1 Key species, habitats, ecosystems, and areas of high conservation value (HCV) pertaining to biodiversity in the Supply Base shall be identified. The ESA map is unprecise as it is only available on county level and only updated every five year. Location of critically imperieled species is not public available and therefore hard to use. 2.1.2 Threats to and impacts on the identified key species, habitats, ecosystems, and areas of high conservation value (HCV) pertaining to biodiversity in the Supply Base shall be identified and evaluated. The ESA map is unprecise as it is only available on county level and only updated every five year. Location of critically imperieled species is not public available and therefore hard to use. 2.2.10 Harvested areas shall be regenerated. You write it yourselves. There are generally no laws in the SE US requiring regeneration. The criterion pertains to regeneration of the specific harvested area. Generally increasing forest areas or harvest to inventory levels does not document it in the specific case. We do not agree that the sum of several factors should warrant a low risk assessment. Additionally, you do not present any arguments or cases why regeneration of the specific area will not take place. Could be perceived as cherry picking documentation. There should be additional mitigation actions taken to ensure that regeneration takes place on the specific area. We suggest this indicator is changed to "specified risk". 3.3.1 Feedstock sourcing shall be in compliance with the principles of cascading use, high quality stem wood shall not be used as feedstock if it is in substantial demand for long-lived products in the Supply Base. We believe the geographic scope is too large to properly assess this	Regarding 2.1.1 and 2.1.2, the presence of ESA listed species, as well as NatureServe ranked G1 and G2 species is made available at the county level, is sufficient to inform management actions and legally required protections of each species. The specific, known locations of ESA listed, as well as NatureServe ranked G1 and G2 species are generally not made publicly available to protect the species. Regarding comments on 2.2.10, the SBP Standard 1 Guidance (May 2023) notes that the Indicator is assessing the sustainability of the 'on-the-ground' impacts due to forest management operations. Assessment of this Indicator should be at the level of homogenous risk at which legal requirements, management systems and/or ecological classifications are similar across forest management operations. The analysis was undertaken in alignment with this guidance and mobilizes an array of considerations, both qualitative and quantitative. The homogeneity of legal requirements and forest conditions, along with typical landowner behaviors and management activities, as well as the consistency of sourcing practices across the sector, all contribute to consistency of performance provided for regeneration levels. This evidence supports the conclusion of low risk. Regarding 3.3.1, the analysis was undertaken in alignment with the SBP Standard 1 Guidance (May 2023), which suggests the area under assessment should be equal to or larger than the supply base. Similarly, this scale is consistent with the scale of biomass markets in the region and several biomass producers have supply basins that comprise the full geographic scope of the region. For an RRA, this is appropriate. Nonetheless, corroborating state level analyses were also integrated into the analysis. Regarding 3.1.1, the US has announced a planned withdrawal from the Paris Agreement. Thus, Route C is applied. Regarding your general comment, presenting relative land areas as references helps diverse audiences understand issues of scale. Presentation of the RRA's geography in terms relative to the Germany land areas has been positively received by European stakeholders in listening sessions.

	indicator. Focusing on a smaller supply base, e.g. individual states, pellet mills wood baskets could potentially come to a different conclusion. For instance you could at least try to do this in a few examples to show whether or not this is the case. We believe this indicator should be specified so biomass producers are forced to take mitigating actions or at least analyse if this is the case. 3.1.1 ??? You have not showed how the US count AFOLU emissions towards the country's commitment. We believe you should cite or refer to the place in law where it is explicitly stated. Sometimes these regulations and NDCs are difficult to understand thus requiring a reference to where it is stated. General Comment: The map on p. 8 where you compare against the area of Germany make it seem as a middle school report where the student try to reach a certain number of pages. Writing what the area is is sufficient.	
Worker Association	General Comment: The RRA is well prepared, and accurately represents the sustainability picture of our southern forests. Our landscape is 86% privately owned, and the RRA does a good job of recognizing the network of laws and regulations, voluntary programs and technical assistance sources that help to minimize risk to values. Mitigation efforts and due diligence by forest products companies are a key piece of the risk mitigation process as well, and the RRA recognizes the few places where those are needed. We support its conclusions. For more detailed information on how SGSF and our member agencies support southern forest sustainability within the wood pellet production sphere, please see https://southernforests.org/wp-content/uploads/2023/03/SGSF-Wood-Pellet-Policy-May-2022.pdf	No response needed.

Annex 6: State Forestry Training and Educational Programs and Resources

State	Training and Educational Programs and Resources
Alabama	Alabama Forestry Association & Sustainable Forestry Initiative. Listing of available learning resources. https://www.alaforestry.org/page/SFI Sustainable Forestry Initiative Alabama. 2022. A Landowners' Guide to Sustainable Forests. https://cdn.ymaws.com/www.alaforestry.org/resource/resmgr/sfi/2022_landowner_s_guide_final.pdf
Arkansas	Arkansas Timber Producers Association. 2024. Logger Training Resources and Access. https://arkloggers.com/training/ Arkansas Forestry Association. 2024. Resources and calendar of events and trainings. https://www.arkforests.org/page/forestmanagement Arkansas SFI Committee. 2019. A Landowners Guide to Sustainable Forests. https://cdn.ymaws.com/www.arkforests.org/resource/resmgr/sfi_2019_booklet_for_web_2.pdf
Florida	Florida Forestry Association. Florida Master Logger Program. https://www.flforestry.org/programs/master-logger/ Florida Master Logger/Other Participant Continuing Logger Education (CLE) Training Requirements. 2024. https://www.flforestry.org/wp-content/uploads/24-ML-Program-letter-to-participants.pdf
Georgia	Sustainable Forestry Initiative Georgia. SFI for Loggers. https://sfi-georgia.org/for-loggers/sfi-for-loggers/ Sustainable Forestry Initiative Georgia. SFI for Landowners. https://sfi-georgia.org/for-landowners/sfi-for-landowners/
Kentucky	University of Kentucky, Dept. of Forestry and Natural Resources. Kentucky Master Logger. https://masterlogger.ca.uky.edu/
Louisiana	Louisiana Forestry Association. Master Loggers Training Program. https://www.laforestry.com/training-program Louisiana Forestry Association. Landowner Guide to Sustainable Forestry. https://www.laforestry.com/sfi-landowner-guide
Mississippi	Mississippi Forestry Association. 2024. Sustainable Forestry in Mississippi. https://cdn.ymaws.com/www.msforestry.net/resource/resmgr/MS_SFI_Landowner_Packet_2024.pdf Mississippi Forestry Association. 2022. Professional Logging Manager Program. https://www.mfaplm.com/page/aboutMississippiStateUniversityExtensionPrograms
Missouri	Missouri Forest Products Association. Master Logger Certification Process. https://www.moforest.org/missouri-logging-council/master-logger-certification-program/master-logger-certification-process/ Missouri Forest Products Association. 2024. Master Logger Certification Process. Professional Timber Harvester Program. Listing of online and in-person classes. https://education.moforest.org/
North Carolina	Sustainable Forestry Initiative North Carolina. Logger Training Program. https://www.ncsfi.org/logger-training Sustainable Forestry Initiative North Carolina. 2017. Private Landowner Resources. Downloadable A Landowner's Guide to Forestry in North Carolina. https://www.ncsfi.org/private-landowner-resources

Ohio	Ohio Forestry Association. 2024. Master Logging Company Program. https://www.ohioforest.org/page/MLProgram Ohio Department of Natural Resources. Landowner Assistance. https://ohiodnr.gov/discover-and-learn/safety-conservation/about-odnr/forestry/landowner-assistance Ohio State University Extension. 2024. Ohio Woodland Stewards Program. https://woodlandstewards.osu.edu/
Oklahoma	Oklahoma Dept. of Agriculture, Food and Forestry. Logger Training. https://ag.ok.gov/logger-training/ Arkansas Forestry Association. 2024. Resources and calendar of events for training. (Includes eastern Oklahoma). https://www.arkforests.org/page/forestmanagement
South Carolina	Forestry Association of South Carolina. 2024. Programs – SFI. Timber Operations Professional Program (TOP). https://www.scforestry.org/top-forestry-programs.htm Forestry Association of South Carolina. 2020. Programs – SFI. Landowner Resources. A Landowner’s Guide to Forestry in South Carolina. https://www.scforestry.org/PDFs/Landowners-Guide-2020-web.pdf
Tennessee	Tennessee Forestry Association. 2024. Master Logger Training Curriculum. https://www.tnforestry.com/master-logger-curric
Texas	Texas Forestry Association. Logger Training. https://www.texasforestry.org/programs/logger-training Sustainable Forestry Initiative Texas. 2022. SFI Landowner Guide to Sustainability. https://www.texasforestry.org/media/TFA_LandownersGuide2023-2-FINAL-PRODUCT.pdf
Virginia	Sustainable Forestry Initiative Virginia. 2023. SHARP Loggers. http://www.virginiasfi.org/sharp-logger-program/ Sustainable Forestry Initiative Virginia. 2023. Forest Landowner Education. http://www.virginiasfi.org/landowner-outreach/
West Virginia	West Virginia Forestry Association. West Virginia Loggers Council. https://www.wvfa.org/wvlc/
National Resources	Sustainable Forestry Initiative. SFI Implementation Committees. https://forests.org/sic/ Report on the Status of Logger Training and Education (LT&E) Programs in 35 Forested US States & 3 Canadian Provinces 2019 Actuals – 2020 Estimates. https://forests.org/wp-content/uploads/Logger-Training-and-Education-Report-2020.pdf

Annex 7: Relevant Laws and Regulations

Law or Regulation	Year Promulgated
United States (US) Constitution	1787
US Forest Reserve Act	1891
US Organic Administration Act	1897
US The Lacey Act	1900
US Federal Employees' Compensation Act (FECA)	1916
US Davis-Bacon Act	1933
US Fish and Wildlife Coordination Act	1934
US National Labor Relations Act (NLRA)	1935
US Fair Labor Standards Act (FLSA)	1938
US Government Employees Training Act	1958
US Multiple Use-Sustained Yield Act (MUSYA)	1960
US Sikes Act	1960
US Contract Work Hours and Safety Standards Act (CWHSSA)	1962
US Equal Pay Act	1963
US Civil Rights Act	1964
US The Wilderness Act (TWA)	1964
US McNamara-O'Hara Service Contract Act (SCA)	1965

US National Historic Preservation Act (NHPA)	1966
US Age Discrimination in Employment Act (ADEA)	1967
US The Wild and Scenic Rivers Act	1968
US National Environmental Policy Act (NEPA)	1969
US Clean Air Act (CAA)	1970
US Occupational Safety and Health Act (OSHA)	1970
US Clean Water Act (CWA)	1972
US Federal Advisory Committee Act (FACA)	1972
US Rehabilitation Act	1973
US Endangered Species Act (ESA)	1973
US Forest and Rangeland Renewable Resources Planning Act (RPA)	1974
US Federal Land Policy and Management Act (FLPMA)	1976
US National Forest Management Act (NFMA)	1976
US Civil Service Reform Act	1978
US The American Indian Religious Freedom Act	1978
US Archaeological Resources Protection Act (ARPA)	1979
US Migrant and Seasonal Agricultural Worker Protection Act (MSPA)	1983
US Americans with Disabilities Act (ADA)	1990
US Native American Graves Protection and Repatriation Act (NAGPRA)	1990

US Family and Medical Leave Act (FMLA)	1993
US Administrative Dispute Resolution Act	1996
US Roadless Rule (66 FR 3244)	2001
US Notification and Federal Employee Anti-discrimination and Retaliation Act	2002
US Healthy Forests Restoration Act (HFRA)	2003
T US he Tribal Forest Protection Act (TFPA)	2004
US Abolish Human Trafficking Act (AHTA)	2017
US Culture and Heritage Cooperation Authority (25 USC. Chapter 32(A)	2008
36 CFR, Part 219. USFS Land Management Planning Rule	2012

Annex 8: State Wildlife Action Plans

- Alabama Wildlife Action Plan. 2015. Alabama Department of Conservation and Natural Resources. Division of Wildlife and Freshwater Fisheries. Revised 2016. https://www.outdooralabama.com/sites/default/files/Research/SWCS/AL_SWAP_FINAL%20June2017.pdf
- Arkansas Wildlife Action Plan. 2015. Arkansas Game and Fish Commission. <https://www.agfc.com/education/arkansas-wildlife-action-plan/>
- Georgia State Wildlife Action Plan. 2015. Georgia Department of Natural Resources, Wildlife Resources Division. <https://georgiawildlife.com/WildlifeActionPlan>
- Florida State Wildlife Action Plan. 2019. Florida Fish and Wildlife Conservation Commission. <https://myfwc.com/conservation/special-initiatives/swap/>
- Kentucky State Wildlife Action Plan. 2023. Kentucky Department of Fish and Wildlife Resources. <https://app.fw.ky.gov/kyswap/>
- Louisiana Wildlife Action Plan. 2015. Addendum 2019. Louisiana Department of Wildlife & Fisheries. <https://www.wlf.louisiana.gov/resources/category/wildlife-action-plans>
- Mississippi State Wildlife Action Plan. 2016. Mississippi Wildlife, Fisheries & Parks, and Mississippi Museum of Natural Science. https://www.mdwfp.com/sites/default/files/2024-03/mississippi_swap_revised_16_september_2016_reduced_.pdf
- Missouri State Wildlife Action Plan. 2015. Missouri Department of Conservation. <https://mdc.mo.gov/sites/default/files/2020-04/SWAP.pdf>
- North Carolina Wildlife Action Plan. 2015. Revised 2016. Addenda 2020 and 2022. North Carolina Wildlife Resources Commission. <https://www.ncwildlife.org/wildlife-habitat/wildlife-action-plan>
- Ohio State Wildlife Action Plan. 2015. Ohio Department of Natural Resources. Ohio Division of Wildlife. <https://ohiodnr.gov/discover-and-learn/safety-conservation/wildlife-management/state-wildlife-action-plan>
- Oklahoma Comprehensive Wildlife Conservation Strategy. 2016. Oklahoma Department of Wildlife Conservation. <https://www.wildlifedepartment.com/sites/default/files/2021-11/Oklahoma%20Comprehensive%20Wildlife%20Conservation%20Strategy.pdf>
- South Carolina State Wildlife Action Plan. 2015. South Carolina Department of Natural Resources. <https://dnr.sc.gov/swap/index.html>
- Tennessee Wildlife Action Plan. 2015. Tennessee Wildlife Resources Agency. <https://www.tn.gov/content/tn/twra/wildlife/action-plan/tennessee-wildlife-action-plan.html>
- Texas State Wildlife Action Plan. 2023. Texas Parks & Wildlife. <https://tpwd.texas.gov/wildlife/wildlife-diversity/swap/>
- Virginia Wildlife Action Plan. 2015. Virginia Department of Wildlife Resources. <https://dwr.virginia.gov/wildlife/wildlife-action-plan/wildlife-action-plan-2015/>
- West Virginia State Wildlife Action Plan. 2015. West Virginia Department of Natural Resources. <https://wvdnr.gov/wp-content/uploads/2021/05/2015-West-Virginia-State-Wildlife-Action-Plan-Submittal-1.pdf>

Annex 9: Forestry Best Management Practices Implementation Rates and Compliance Reports

Best Management Practices Implementation Rates		
State	Percent Implementation Rates Found by NASF ^{1, 2}	State BMP Compliance Reports
Alabama	96	https://www.forestry.alabama.gov/Pages/Management/BMP_Measures.aspx
Arkansas	95	https://www.agriculture.arkansas.gov/wp-content/uploads/2020/05/2017_Monitoring_Report-1.pdf
Florida	>99	https://ccmedia.fdacs.gov/content/download/78966/file/2021-FL-Silv-BMP-Impl-Survey-Report-Final.pdf Survey
Georgia	94	https://gatrees.org/wp-content/uploads/2021/12/PDF_copy_2021_BMP_Survey_Report_Final_Dec10_2021_230pm_send_to_Wendy_for_website.pdf
Kentucky ²	94	Unavailable state data
Louisiana	97	https://www.ldaf.state.la.us/wp-content/uploads/2022/02/2021-BMP-Survey-Report.pdf
Mississippi	96	https://www.mfc.ms.gov/wp-content/uploads/2020/05/2019_BMP_-_Implementation_Survey_V3-with-change-view-Draft.pdf
Missouri	Not reported	Unavailable state data
North Carolina	83	https://ncforestservice.gov/water_quality/wq_bmp_studies.htm
Ohio	81	Unavailable state data
Oklahoma ²	95	https://ag.ok.gov/wp-content/uploads/2020/12/OFS-Report-Implementation-of-Forestry-Best-Management-Practices-in-Eastern-Oklahoma-2010.pdf
South Carolina	89	https://www.scfc.gov/development/best-management-practices/best-management-practices-reports/
Tennessee	96	https://www.tn.gov/content/dam/tn/agriculture/documents/forestry/2019/AgForBMPimpl2017.pdf
Texas	95	https://tfsweb.tamu.edu/uploadedFiles/TFSMain/Manage_Forest_and_Land/Water_Resources_and_BMPs/Stewardship(1)/RD%2011%20BMP%20Implementation%20Report.pdf
Virginia	93	https://dof.virginia.gov/water-quality-protection/logger-assistance/forestry-best-management-practices-bmps-for-water-quality/
West Virginia	97	Unavailable state data

1. NASF. 2019. Protecting the Nation's Water. State Forestry Agencies and Best Management Practices. Accessed: <https://www.stateforesters.org/wp-content/uploads/2019/12/NASF-2019-BMP-Final.pdf>
2. NASF. 2014. Protecting Water Quality State Forestry Best Management Practices. Accessed: https://www.stateforesters.org/sites/default/files/issues-and-policies-document-attachments/Protecting_Water_Quality_through_State_Forestry_BMPs_FINAL.pdf

Annex 10: FSC Specified Risk for Conversion and FIA Loss Unit Comparison

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Alabama	Baldwin County	✓	✓
Alabama	Covington County		✓
Alabama	Escambia County		✓
Alabama	Mobile County		✓
Alabama	Washington County		✓
Florida	Alachua County		✓
Florida	Baker County		✓
Florida	Bradford County		✓
Florida	Brevard County		✓
Florida	Broward County		✓
Florida	Calhoun County		✓
Florida	Charlotte County		✓
Florida	Citrus County		✓
Florida	Clay County	✓	✓
Florida	Collier County	✓	✓
Florida	Columbia County		✓
Florida	DeSoto County		✓
Florida	Dixie County		✓
Florida	Duval County		✓
Florida	Escambia County		✓
Florida	Flagler County	✓	✓
Florida	Franklin County		✓
Florida	Gadsden County		✓
Florida	Gilchrist County		✓
Florida	Glades County		✓
Florida	Gulf County		✓
Florida	Hamilton County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Florida	Hardee County		✓
Florida	Hendry County		✓
Florida	Hernando County	✓	✓
Florida	Highlands County		✓
Florida	Hillsborough County	✓	✓
Florida	Holmes County		✓
Florida	Indian River County		✓
Florida	Jackson County		✓
Florida	Jefferson County		✓
Florida	Lafayette County		✓
Florida	Lake County	✓	✓
Florida	Lee County	✓	✓
Florida	Leon County		✓
Florida	Levy County		✓
Florida	Liberty County		✓
Florida	Madison County		✓
Florida	Manatee County		✓
Florida	Marion County		✓
Florida	Martin County		✓
Florida	Miami-Dade County		✓
Florida	Monroe County		✓
Florida	Nassau County	✓	✓
Florida	Okaloosa County		✓
Florida	Okeechobee County		✓
Florida	Orange County	✓	✓
Florida	Osceola County	✓	✓
Florida	Palm Beach County		✓
Florida	Pasco County	✓	✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Florida	Pinellas County		✓
Florida	Polk County	✓	✓
Florida	Putnam County		✓
Florida	St. Johns County	✓	✓
Florida	St. Lucie County	✓	✓
Florida	Santa Rosa County	✓	✓
Florida	Sarasota County		✓
Florida	Seminole County		✓
Florida	Sumter County		✓
Florida	Suwannee County		✓
Florida	Taylor County		✓
Florida	Union County		✓
Florida	Volusia County	✓	✓
Florida	Wakulla County		✓
Florida	Walton County		✓
Florida	Washington County		✓
Georgia	Appling County		✓
Georgia	Atkinson County		✓
Georgia	Bacon County		✓
Georgia	Baker County		✓
Georgia	Baldwin County		✓
Georgia	Banks County		✓
Georgia	Barrow County	✓	✓
Georgia	Bartow County		✓
Georgia	Ben Hill County		✓
Georgia	Berrien County		✓
Georgia	Bibb County		✓
Georgia	Bleckley County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Georgia	Brantley County		✓
Georgia	Brooks County		✓
Georgia	Bryan County	✓	✓
Georgia	Bulloch County		✓
Georgia	Burke County		✓
Georgia	Butts County		✓
Georgia	Calhoun County		✓
Georgia	Camden County		✓
Georgia	Candler County		✓
Georgia	Carroll County		✓
Georgia	Catoosa County		✓
Georgia	Charlton County		✓
Georgia	Chatham County		✓
Georgia	Chattahoochee County		✓
Georgia	Chattooga County		✓
Georgia	Cherokee County	✓	✓
Georgia	Clarke County		✓
Georgia	Clay County		✓
Georgia	Clayton County	✓	✓
Georgia	Clinch County		✓
Georgia	Cobb County		✓
Georgia	Coffee County		✓
Georgia	Colquitt County		✓
Georgia	Columbia County	✓	✓
Georgia	Cook County		✓
Georgia	Coweta County		✓
Georgia	Crawford County		✓
Georgia	Crisp County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Georgia	Dade County		✓
Georgia	Dawson County		✓
Georgia	Decatur County		✓
Georgia	DeKalb County		✓
Georgia	Dodge County		✓
Georgia	Dooly County		✓
Georgia	Dougherty County		✓
Georgia	Douglas County		✓
Georgia	Early County		✓
Georgia	Echols County		✓
Georgia	Effingham County	✓	✓
Georgia	Elbert County		✓
Georgia	Emanuel County		✓
Georgia	Evans County		✓
Georgia	Fannin County		✓
Georgia	Fayette County		✓
Georgia	Floyd County		✓
Georgia	Forsyth County	✓	✓
Georgia	Franklin County		✓
Georgia	Fulton County		✓
Georgia	Gilmer County		✓
Georgia	Glascok County		✓
Georgia	Glynn County		✓
Georgia	Gordon County		✓
Georgia	Grady County		✓
Georgia	Greene County		✓
Georgia	Gwinnett County		✓
Georgia	Habersham County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Georgia	Hall County		✓
Georgia	Hancock County		✓
Georgia	Haralson County		✓
Georgia	Harris County		✓
Georgia	Hart County		✓
Georgia	Heard County		✓
Georgia	Henry County	✓	✓
Georgia	Houston County		✓
Georgia	Irwin County		✓
Georgia	Jackson County		✓
Georgia	Jasper County		✓
Georgia	Jeff Davis County		✓
Georgia	Jefferson County		✓
Georgia	Jenkins County		✓
Georgia	Johnson County		✓
Georgia	Jones County		✓
Georgia	Lamar County		✓
Georgia	Lanier County		✓
Georgia	Laurens County		✓
Georgia	Lee County		✓
Georgia	Liberty County		✓
Georgia	Lincoln County		✓
Georgia	Long County		✓
Georgia	Lowndes County		✓
Georgia	Lumpkin County		✓
Georgia	McDuffie County		✓
Georgia	McIntosh County		✓
Georgia	Macon County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Georgia	Madison County		✓
Georgia	Marion County		✓
Georgia	Meriwether County		✓
Georgia	Miller County		✓
Georgia	Mitchell County		✓
Georgia	Monroe County		✓
Georgia	Montgomery County		✓
Georgia	Morgan County		✓
Georgia	Murray County		✓
Georgia	Muscogee County		✓
Georgia	Newton County		✓
Georgia	Oconee County		✓
Georgia	Oglethorpe County		✓
Georgia	Paulding County	✓	✓
Georgia	Peach County		✓
Georgia	Pickens County		✓
Georgia	Pierce County		✓
Georgia	Pike County		✓
Georgia	Polk County		✓
Georgia	Pulaski County		✓
Georgia	Putnam County		✓
Georgia	Quitman County		✓
Georgia	Rabun County		✓
Georgia	Randolph County		✓
Georgia	Richmond County		✓
Georgia	Rockdale County		✓
Georgia	Schley County		✓
Georgia	Screven County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Georgia	Seminole County		✓
Georgia	Spalding County		✓
Georgia	Stephens County		✓
Georgia	Stewart County		✓
Georgia	Sumter County		✓
Georgia	Talbot County		✓
Georgia	Taliaferro County		✓
Georgia	Tattnall County		✓
Georgia	Taylor County		✓
Georgia	Telfair County		✓
Georgia	Terrell County		✓
Georgia	Thomas County		✓
Georgia	Tift County		✓
Georgia	Toombs County		✓
Georgia	Towns County		✓
Georgia	Treutlen County		✓
Georgia	Troup County		✓
Georgia	Turner County		✓
Georgia	Twiggs County		✓
Georgia	Union County		✓
Georgia	Upson County		✓
Georgia	Walker County		✓
Georgia	Walton County		✓
Georgia	Ware County		✓
Georgia	Warren County		✓
Georgia	Washington County		✓
Georgia	Wayne County		✓
Georgia	Webster County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Georgia	Wheeler County		✓
Georgia	White County		✓
Georgia	Whitfield County		✓
Georgia	Wilcox County		✓
Georgia	Wilkes County		✓
Georgia	Wilkinson County		✓
Georgia	Worth County		✓
Kentucky	Adair County		✓
Kentucky	Anderson County		✓
Kentucky	Bath County		✓
Kentucky	Bell County		✓
Kentucky	Boone County		✓
Kentucky	Bourbon County		✓
Kentucky	Boyle County		✓
Kentucky	Bracken County		✓
Kentucky	Breathitt County		✓
Kentucky	Breckinridge County		✓
Kentucky	Bullitt County		✓
Kentucky	Campbell County		✓
Kentucky	Carroll County		✓
Kentucky	Casey County		✓
Kentucky	Clark County		✓
Kentucky	Clay County		✓
Kentucky	Clinton County		✓
Kentucky	Cumberland County		✓
Kentucky	Estill County		✓
Kentucky	Fayette County		✓
Kentucky	Fleming County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Kentucky	Franklin County		✓
Kentucky	Gallatin County		✓
Kentucky	Garrard County		✓
Kentucky	Grant County		✓
Kentucky	Grayson County		✓
Kentucky	Green County		✓
Kentucky	Hancock County		✓
Kentucky	Hardin County		✓
Kentucky	Harrison County		✓
Kentucky	Hart County		✓
Kentucky	Henry County		✓
Kentucky	Jackson County		✓
Kentucky	Jefferson County		✓
Kentucky	Jessamine County		✓
Kentucky	Kenton County		✓
Kentucky	Knox County		✓
Kentucky	Larue County		✓
Kentucky	Laurel County		✓
Kentucky	Lee County		✓
Kentucky	Lincoln County		✓
Kentucky	McCreary County		✓
Kentucky	Madison County		✓
Kentucky	Marion County		✓
Kentucky	Mason County		✓
Kentucky	Meade County		✓
Kentucky	Mercer County		✓
Kentucky	Metcalfe County		✓
Kentucky	Montgomery County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Kentucky	Nelson County		✓
Kentucky	Nicholas County		✓
Kentucky	Oldham County		✓
Kentucky	Owen County		✓
Kentucky	Owsley County		✓
Kentucky	Pendleton County		✓
Kentucky	Pulaski County		✓
Kentucky	Robertson County		✓
Kentucky	Rockcastle County		✓
Kentucky	Russell County		✓
Kentucky	Scott County		✓
Kentucky	Shelby County		✓
Kentucky	Spencer County		✓
Kentucky	Taylor County		✓
Kentucky	Trimble County		✓
Kentucky	Washington County		✓
Kentucky	Wayne County		✓
Kentucky	Whitley County		✓
Kentucky	Woodford County		✓
Louisiana	East Baton Rouge Parish		✓
Louisiana	East Feliciana Parish		✓
Louisiana	Livingston Parish		✓
Louisiana	St. Helena Parish		✓
Louisiana	St. Tammany Parish		✓
Louisiana	Tangipahoa Parish		✓
Louisiana	Washington Parish		✓
Mississippi	Adams County		✓
Mississippi	Amite County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Mississippi	Attala County		✓
Mississippi	Claiborne County		✓
Mississippi	Clarke County		✓
Mississippi	Copiah County		✓
Mississippi	Covington County		✓
Mississippi	Forrest County		✓
Mississippi	Franklin County		✓
Mississippi	George County		✓
Mississippi	Greene County		✓
Mississippi	Hancock County		✓
Mississippi	Harrison County		✓
Mississippi	Hinds County		✓
Mississippi	Jackson County		✓
Mississippi	Jasper County		✓
Mississippi	Jefferson County		✓
Mississippi	Jefferson Davis County		✓
Mississippi	Jones County		✓
Mississippi	Kemper County		✓
Mississippi	Lamar County		✓
Mississippi	Lauderdale County		✓
Mississippi	Lawrence County		✓
Mississippi	Leake County		✓
Mississippi	Lincoln County		✓
Mississippi	Madison County		✓
Mississippi	Marion County		✓
Mississippi	Neshoba County		✓
Mississippi	Newton County		✓
Mississippi	Noxubee County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Mississippi	Pearl River County		✓
Mississippi	Perry County		✓
Mississippi	Pike County		✓
Mississippi	Rankin County		✓
Mississippi	Scott County		✓
Mississippi	Simpson County		✓
Mississippi	Smith County		✓
Mississippi	Stone County		✓
Mississippi	Walthall County		✓
Mississippi	Wayne County		✓
Mississippi	Wilkinson County		✓
Mississippi	Winston County		✓
Missouri	Barry County		✓
Missouri	Bollinger County		✓
Missouri	Butler County		✓
Missouri	Carter County		✓
Missouri	Christian County		✓
Missouri	Crawford County		✓
Missouri	Dent County		✓
Missouri	Douglas County		✓
Missouri	Howell County		✓
Missouri	Iron County		✓
Missouri	McDonald County		✓
Missouri	Madison County		✓
Missouri	Newton County		✓
Missouri	Oregon County		✓
Missouri	Ozark County		✓
Missouri	Reynolds County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Missouri	Ripley County		✓
Missouri	St. Francois County		✓
Missouri	Shannon County		✓
Missouri	Stone County		✓
Missouri	Taney County		✓
Missouri	Texas County		✓
Missouri	Washington County		✓
Missouri	Wayne County		✓
Missouri	Webster County		✓
Missouri	Wright County		✓
North Carolina	Brunswick	✓	
North Carolina	Cabarrus	✓	
North Carolina	Chatham	✓	
North Carolina	Currituck	✓	
North Carolina	Johnston	✓	
North Carolina	Mecklenburg	✓	
North Carolina	Pender	✓	
North Carolina	Wake	✓	
Ohio	Adams County		✓
Ohio	Allen County		✓
Ohio	Ashland County		✓
Ohio	Ashtabula County		✓
Ohio	Auglaize County		✓
Ohio	Belmont County		✓
Ohio	Brown County		✓
Ohio	Butler County		✓
Ohio	Carroll County		✓
Ohio	Champaign County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Ohio	Clark County		✓
Ohio	Clermont County		✓
Ohio	Clinton County		✓
Ohio	Columbiana County		✓
Ohio	Coshocton County		✓
Ohio	Crawford County		✓
Ohio	Cuyahoga County		✓
Ohio	Darke County		✓
Ohio	Defiance County		✓
Ohio	Delaware County		✓
Ohio	Erie County		✓
Ohio	Fairfield County		✓
Ohio	Fayette County		✓
Ohio	Franklin County		✓
Ohio	Fulton County		✓
Ohio	Gallia County		✓
Ohio	Geauga County		✓
Ohio	Greene County		✓
Ohio	Guernsey County		✓
Ohio	Hamilton County		✓
Ohio	Hancock County		✓
Ohio	Hardin County		✓
Ohio	Harrison County		✓
Ohio	Henry County		✓
Ohio	Highland County		✓
Ohio	Holmes County		✓
Ohio	Huron County		✓
Ohio	Jackson County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Ohio	Jefferson County		✓
Ohio	Knox County		✓
Ohio	Lake County		✓
Ohio	Lawrence County		✓
Ohio	Licking County		✓
Ohio	Logan County		✓
Ohio	Lorain County		✓
Ohio	Lucas County		✓
Ohio	Madison County		✓
Ohio	Mahoning County		✓
Ohio	Marion County		✓
Ohio	Medina County		✓
Ohio	Mercer County		✓
Ohio	Miami County		✓
Ohio	Monroe County		✓
Ohio	Montgomery County		✓
Ohio	Morrow County		✓
Ohio	Muskingum County		✓
Ohio	Noble County		✓
Ohio	Ottawa County		✓
Ohio	Paulding County		✓
Ohio	Pickaway County		✓
Ohio	Pike County		✓
Ohio	Portage County		✓
Ohio	Preble County		✓
Ohio	Putnam County		✓
Ohio	Richland County		✓
Ohio	Ross County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Ohio	Sandusky County		✓
Ohio	Scioto County		✓
Ohio	Seneca County		✓
Ohio	Shelby County		✓
Ohio	Stark County		✓
Ohio	Summit County		✓
Ohio	Trumbull County		✓
Ohio	Tuscarawas County		✓
Ohio	Union County		✓
Ohio	Van Wert County		✓
Ohio	Warren County		✓
Ohio	Wayne County		✓
Ohio	Williams County		✓
Ohio	Wood County		✓
Ohio	Wyandot County		✓
Oklahoma	Adair County		✓
Oklahoma	Atoka County		✓
Oklahoma	Beckham County		✓
Oklahoma	Blaine County		✓
Oklahoma	Bryan County		✓
Oklahoma	Caddo County		✓
Oklahoma	Canadian County		✓
Oklahoma	Cherokee County		✓
Oklahoma	Choctaw County		✓
Oklahoma	Coal County		✓
Oklahoma	Comanche County		✓
Oklahoma	Cotton County		✓
Oklahoma	Custer County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Oklahoma	Delaware County		✓
Oklahoma	Dewey County		✓
Oklahoma	Grady County		✓
Oklahoma	Greer County		✓
Oklahoma	Harmon County		✓
Oklahoma	Haskell County		✓
Oklahoma	Jackson County		✓
Oklahoma	Jefferson County		✓
Oklahoma	Kingfisher County		✓
Oklahoma	Kiowa County		✓
Oklahoma	Latimer County		✓
Oklahoma	Le Flore County		✓
Oklahoma	McCurtain County		✓
Oklahoma	McIntosh County		✓
Oklahoma	Mayes County		✓
Oklahoma	Muskogee County		✓
Oklahoma	Ottawa County		✓
Oklahoma	Pittsburg County		✓
Oklahoma	Pushmataha County		✓
Oklahoma	Roger Mills County		✓
Oklahoma	Sequoyah County		✓
Oklahoma	Stephens County		✓
Oklahoma	Tillman County		✓
Oklahoma	Washita County		✓
South Carolina	Abbeville County		✓
South Carolina	Aiken County		✓
South Carolina	Allendale County		✓
South Carolina	Anderson County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
South Carolina	Bamberg County		✓
South Carolina	Barnwell County		✓
South Carolina	Beaufort County		✓
South Carolina	Berkeley County	✓	✓
South Carolina	Calhoun County		✓
South Carolina	Charleston County		✓
South Carolina	Cherokee County		✓
South Carolina	Chester County		✓
South Carolina	Chesterfield County		✓
South Carolina	Clarendon County		✓
South Carolina	Colleton County		✓
South Carolina	Darlington County		✓
South Carolina	Dillon County		✓
South Carolina	Dorchester County		✓
South Carolina	Edgefield County		✓
South Carolina	Fairfield County		✓
South Carolina	Florence County		✓
South Carolina	Georgetown County		✓
South Carolina	Greenville County		✓
South Carolina	Greenwood County		✓
South Carolina	Hampton County		✓
South Carolina	Horry County	✓	✓
South Carolina	Jasper County	✓	✓
South Carolina	Kershaw County		✓
South Carolina	Lancaster County	✓	✓
South Carolina	Laurens County		✓
South Carolina	Lee County		✓
South Carolina	Lexington County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
South Carolina	McCormick County		✓
South Carolina	Marion County		✓
South Carolina	Marlboro County		✓
South Carolina	Newberry County		✓
South Carolina	Oconee County		✓
South Carolina	Orangeburg County		✓
South Carolina	Pickens County		✓
South Carolina	Richland County		✓
South Carolina	Saluda County		✓
South Carolina	Spartanburg County		✓
South Carolina	Sumter County		✓
South Carolina	Union County		✓
South Carolina	Williamsburg County		✓
South Carolina	York County	✓	✓
Tennessee	Anderson County		✓
Tennessee	Benton County		✓
Tennessee	Bledsoe County		✓
Tennessee	Blount County		✓
Tennessee	Bradley County		✓
Tennessee	Campbell County		✓
Tennessee	Carroll County		✓
Tennessee	Carter County		✓
Tennessee	Chester County		✓
Tennessee	Claiborne County		✓
Tennessee	Cocke County		✓
Tennessee	Crockett County		✓
Tennessee	Cumberland County		✓
Tennessee	Decatur County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Tennessee	Dyer County		✓
Tennessee	Fayette County		✓
Tennessee	Fentress County		✓
Tennessee	Franklin County		✓
Tennessee	Gibson County		✓
Tennessee	Grainger County		✓
Tennessee	Greene County		✓
Tennessee	Grundy County		✓
Tennessee	Hamblen County		✓
Tennessee	Hamilton County		✓
Tennessee	Hancock County		✓
Tennessee	Hardeman County		✓
Tennessee	Hardin County		✓
Tennessee	Hawkins County		✓
Tennessee	Haywood County		✓
Tennessee	Henderson County		✓
Tennessee	Henry County		✓
Tennessee	Hickman County		✓
Tennessee	Houston County		✓
Tennessee	Humphreys County		✓
Tennessee	Jefferson County		✓
Tennessee	Johnson County		✓
Tennessee	Knox County		✓
Tennessee	Lake County		✓
Tennessee	Lauderdale County		✓
Tennessee	Lawrence County		✓
Tennessee	Lewis County		✓
Tennessee	Loudon County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Tennessee	McMinn County		✓
Tennessee	McNairy County		✓
Tennessee	Madison County		✓
Tennessee	Marion County		✓
Tennessee	Meigs County		✓
Tennessee	Monroe County		✓
Tennessee	Morgan County		✓
Tennessee	Obion County		✓
Tennessee	Overton County		✓
Tennessee	Perry County		✓
Tennessee	Pickett County		✓
Tennessee	Polk County		✓
Tennessee	Putnam County		✓
Tennessee	Rhea County		✓
Tennessee	Roane County		✓
Tennessee	Scott County		✓
Tennessee	Sequatchie County		✓
Tennessee	Sevier County		✓
Tennessee	Shelby County		✓
Tennessee	Stewart County		✓
Tennessee	Sullivan County		✓
Tennessee	Tipton County		✓
Tennessee	Unicoi County		✓
Tennessee	Union County		✓
Tennessee	Van Buren County		✓
Tennessee	Warren County		✓
Tennessee	Washington County		✓
Tennessee	Wayne County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Tennessee	Weakley County		✓
Tennessee	White County		✓
Texas	Andrews County		✓
Texas	Angelina County		✓
Texas	Archer County		✓
Texas	Armstrong County		✓
Texas	Atascosa County		✓
Texas	Austin County		✓
Texas	Bailey County		✓
Texas	Bandera County		✓
Texas	Bastrop County	✓	✓
Texas	Baylor County		✓
Texas	Bee County		✓
Texas	Bell County		✓
Texas	Bexar County		✓
Texas	Blanco County		✓
Texas	Borden County		✓
Texas	Bosque County		✓
Texas	Brazoria County		✓
Texas	Brazos County	✓	✓
Texas	Briscoe County		✓
Texas	Brooks County		✓
Texas	Brown County		✓
Texas	Burleson County		✓
Texas	Burnet County		✓
Texas	Caldwell County		✓
Texas	Calhoun County		✓
Texas	Callahan County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Texas	Cameron County		✓
Texas	Carson County		✓
Texas	Castro County		✓
Texas	Chambers County		✓
Texas	Childress County		✓
Texas	Clay County		✓
Texas	Cochran County		✓
Texas	Coke County		✓
Texas	Coleman County		✓
Texas	Collin County		✓
Texas	Collingsworth County		✓
Texas	Colorado County		✓
Texas	Comal County		✓
Texas	Comanche County		✓
Texas	Concho County		✓
Texas	Cooke County		✓
Texas	Coryell County		✓
Texas	Cottle County		✓
Texas	Crockett County		✓
Texas	Crosby County		✓
Texas	Dallam County		✓
Texas	Dallas County		✓
Texas	Dawson County		✓
Texas	Deaf Smith County		✓
Texas	Delta County		✓
Texas	Denton County		✓
Texas	DeWitt County		✓
Texas	Dickens County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Texas	Dimmit County		✓
Texas	Donley County		✓
Texas	Duval County		✓
Texas	Eastland County		✓
Texas	Edwards County		✓
Texas	Ellis County		✓
Texas	Erath County		✓
Texas	Falls County		✓
Texas	Fannin County		✓
Texas	Fayette County		✓
Texas	Fisher County		✓
Texas	Floyd County		✓
Texas	Foard County		✓
Texas	Fort Bend County		✓
Texas	Freestone County		✓
Texas	Frio County		✓
Texas	Gaines County		✓
Texas	Galveston County		✓
Texas	Garza County		✓
Texas	Gillespie County		✓
Texas	Glasscock County		✓
Texas	Goliad County		✓
Texas	Gonzales County		✓
Texas	Gray County		✓
Texas	Grayson County		✓
Texas	Grimes County		✓
Texas	Guadalupe County		✓
Texas	Hale County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Texas	Hall County		✓
Texas	Hamilton County		✓
Texas	Hansford County		✓
Texas	Hardeman County		✓
Texas	Hardin County		✓
Texas	Harris County		✓
Texas	Hartley County		✓
Texas	Haskell County		✓
Texas	Hays County		✓
Texas	Hemphill County		✓
Texas	Hidalgo County		✓
Texas	Hill County		✓
Texas	Hockley County		✓
Texas	Hood County		✓
Texas	Hopkins County		✓
Texas	Houston County		✓
Texas	Howard County		✓
Texas	Hunt County		✓
Texas	Hutchinson County		✓
Texas	Irion County		✓
Texas	Jack County		✓
Texas	Jackson County		✓
Texas	Jasper County		✓
Texas	Jefferson County		✓
Texas	Jim Hogg County		✓
Texas	Jim Wells County		✓
Texas	Johnson County		✓
Texas	Jones County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Texas	Karnes County		✓
Texas	Kaufman County		✓
Texas	Kendall County		✓
Texas	Kenedy County		✓
Texas	Kent County		✓
Texas	Kerr County		✓
Texas	Kimble County		✓
Texas	King County		✓
Texas	Kinney County		✓
Texas	Kleberg County		✓
Texas	Knox County		✓
Texas	Lamar County		✓
Texas	Lamb County		✓
Texas	Lampasas County		✓
Texas	La Salle County		✓
Texas	Lavaca County		✓
Texas	Lee County		✓
Texas	Leon County		✓
Texas	Liberty County	✓	✓
Texas	Limestone County		✓
Texas	Lipscomb County		✓
Texas	Live Oak County		✓
Texas	Llano County		✓
Texas	Lubbock County		✓
Texas	Lynn County		✓
Texas	McCulloch County		✓
Texas	McLennan County		✓
Texas	McMullen County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Texas	Madison County		✓
Texas	Martin County		✓
Texas	Mason County		✓
Texas	Matagorda County		✓
Texas	Maverick County		✓
Texas	Medina County		✓
Texas	Menard County		✓
Texas	Midland County		✓
Texas	Milam County		✓
Texas	Mills County		✓
Texas	Mitchell County		✓
Texas	Montague County		✓
Texas	Montgomery County	✓	✓
Texas	Moore County		✓
Texas	Motley County		✓
Texas	Navarro County		✓
Texas	Newton County		✓
Texas	Nolan County		✓
Texas	Nueces County		✓
Texas	Ochiltree County		✓
Texas	Oldham County		✓
Texas	Orange County		✓
Texas	Palo Pinto County		✓
Texas	Parker County		✓
Texas	Parmer County		✓
Texas	Polk County		✓
Texas	Potter County		✓
Texas	Rains County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Texas	Randall County		✓
Texas	Reagan County		✓
Texas	Real County		✓
Texas	Refugio County		✓
Texas	Roberts County		✓
Texas	Robertson County		✓
Texas	Rockwall County		✓
Texas	Runnels County		✓
Texas	Sabine County		✓
Texas	San Augustine County		✓
Texas	San Jacinto County		✓
Texas	San Patricio County		✓
Texas	San Saba County		✓
Texas	Schleicher County		✓
Texas	Scurry County		✓
Texas	Shackelford County		✓
Texas	Sherman County		✓
Texas	Somervell County		✓
Texas	Starr County		✓
Texas	Stephens County		✓
Texas	Sterling County		✓
Texas	Stonewall County		✓
Texas	Sutton County		✓
Texas	Swisher County		✓
Texas	Tarrant County		✓
Texas	Taylor County		✓
Texas	Terry County		✓
Texas	Throckmorton County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Texas	Tom Green County		✓
Texas	Travis County		✓
Texas	Trinity County		✓
Texas	Tyler County		✓
Texas	Uvalde County		✓
Texas	Val Verde County		✓
Texas	Victoria County		✓
Texas	Walker County		✓
Texas	Waller County	✓	✓
Texas	Washington County		✓
Texas	Webb County		✓
Texas	Wharton County		✓
Texas	Wheeler County		✓
Texas	Wichita County		✓
Texas	Wilbarger County		✓
Texas	Willacy County		✓
Texas	Williamson County		✓
Texas	Wilson County		✓
Texas	Wise County		✓
Texas	Yoakum County		✓
Texas	Young County		✓
Texas	Zapata County		✓
Texas	Zavala County		✓
Virginia	Accomack County		✓
Virginia	Albemarle County		✓
Virginia	Amherst County		✓
Virginia	Arlington County		✓
Virginia	Brunswick County		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Virginia	Caroline County		✓
Virginia	Charles City County		✓
Virginia	Chesterfield County		✓
Virginia	Culpeper County		✓
Virginia	Dinwiddie County		✓
Virginia	Essex County		✓
Virginia	Fairfax County		✓
Virginia	Fauquier County		✓
Virginia	Fluvanna County		✓
Virginia	Gloucester County		✓
Virginia	Goochland County		✓
Virginia	Greene County		✓
Virginia	Greensville County		✓
Virginia	Hanover County		✓
Virginia	Henrico County		✓
Virginia	Isle of Wight County		✓
Virginia	James City County		✓
Virginia	King and Queen County		✓
Virginia	King George County		✓
Virginia	King William County		✓
Virginia	Lancaster County		✓
Virginia	Loudoun County	✓	✓
Virginia	Louisa County		✓
Virginia	Madison County		✓
Virginia	Mathews County		✓
Virginia	Middlesex County		✓
Virginia	Nelson County		✓
Virginia	New Kent County	✓	✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Virginia	Northampton County		✓
Virginia	Northumberland County		✓
Virginia	Orange County		✓
Virginia	Prince George County		✓
Virginia	Prince William County		✓
Virginia	Rappahannock County		✓
Virginia	Richmond County		✓
Virginia	Southampton County		✓
Virginia	Spotsylvania County		✓
Virginia	Stafford County		✓
Virginia	Surry County		✓
Virginia	Sussex County		✓
Virginia	Westmoreland County		✓
Virginia	York County		✓
Virginia	Alexandria city		✓
Virginia	Charlottesville city		✓
Virginia	Chesapeake city		✓
Virginia	Colonial Heights city		✓
Virginia	Emporia city		✓
Virginia	Fairfax city		✓
Virginia	Falls Church city		✓
Virginia	Franklin city		✓
Virginia	Fredericksburg city		✓
Virginia	Hopewell city		✓
Virginia	Manassas city		✓
Virginia	Manassas Park city		✓
Virginia	Newport News city		✓
Virginia	Norfolk city		✓

State name	County name	FSC Specified Risk of Conversion	Within an FIA Region Presenting Forest Loss
Virginia	Petersburg city		✓
Virginia	Poquoson city		✓
Virginia	Richmond city		✓
Virginia	Suffolk city		✓
Virginia	Virginia Beach city		✓
Virginia	Williamsburg city		✓

Annex 11: Timberland Change Tables

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Alabama	Baldwin	01 Southwest-South	-0.37
Alabama	Covington	01 Southwest-South	-0.37
Alabama	Escambia	01 Southwest-South	-0.37
Alabama	Mobile	01 Southwest-South	-0.37
Alabama	Washington	01 Southwest-South	-0.37
Alabama	Choctaw	02 Southwest-North	0
Alabama	Clarke	02 Southwest-North	0
Alabama	Conecuh	02 Southwest-North	0
Alabama	Marengo	02 Southwest-North	0
Alabama	Monroe	02 Southwest-North	0
Alabama	Sumter	02 Southwest-North	0
Alabama	Wilcox	02 Southwest-North	0
Alabama	Autauga	03 Southeast	2.59
Alabama	Barbour	03 Southeast	2.59
Alabama	Bullock	03 Southeast	2.59
Alabama	Butler	03 Southeast	2.59
Alabama	Chambers	03 Southeast	2.59
Alabama	Chilton	03 Southeast	2.59
Alabama	Coffee	03 Southeast	2.59
Alabama	Crenshaw	03 Southeast	2.59
Alabama	Dale	03 Southeast	2.59
Alabama	Dallas	03 Southeast	2.59
Alabama	Elmore	03 Southeast	2.59
Alabama	Geneva	03 Southeast	2.59
Alabama	Henry	03 Southeast	2.59
Alabama	Houston	03 Southeast	2.59
Alabama	Lee	03 Southeast	2.59

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Alabama	Lowndes	03 Southeast	2.59
Alabama	Macon	03 Southeast	2.59
Alabama	Montgomery	03 Southeast	2.59
Alabama	Pike	03 Southeast	2.59
Alabama	Russell	03 Southeast	2.59
Alabama	Tallapoosa	03 Southeast	2.59
Alabama	Bibb	04 West Central	3.37
Alabama	Fayette	04 West Central	3.37
Alabama	Greene	04 West Central	3.37
Alabama	Hale	04 West Central	3.37
Alabama	Lamar	04 West Central	3.37
Alabama	Marion	04 West Central	3.37
Alabama	Perry	04 West Central	3.37
Alabama	Pickens	04 West Central	3.37
Alabama	Tuscaloosa	04 West Central	3.37
Alabama	Blount	05 North Central	0
Alabama	Calhoun	05 North Central	0
Alabama	Cherokee	05 North Central	0
Alabama	Clay	05 North Central	0
Alabama	Cleburne	05 North Central	0
Alabama	Coosa	05 North Central	0
Alabama	Cullman	05 North Central	0
Alabama	Etowah	05 North Central	0
Alabama	Jefferson	05 North Central	0
Alabama	Randolph	05 North Central	0
Alabama	Shelby	05 North Central	0
Alabama	St. Clair	05 North Central	0
Alabama	Talladega	05 North Central	0
Alabama	Walker	05 North Central	0

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Alabama	Winston	05 North Central	0
Alabama	Colbert	06 North	4.93
Alabama	DeKalb	06 North	4.93
Alabama	Franklin	06 North	4.93
Alabama	Jackson	06 North	4.93
Alabama	Lauderdale	06 North	4.93
Alabama	Lawrence	06 North	4.93
Alabama	Limestone	06 North	4.93
Alabama	Madison	06 North	4.93
Alabama	Marshall	06 North	4.93
Alabama	Morgan	06 North	4.93
Arkansas	Arkansas	01 South Delta	6.9
Arkansas	Chicot	01 South Delta	6.9
Arkansas	Desha	01 South Delta	6.9
Arkansas	Jefferson	01 South Delta	6.9
Arkansas	Lee	01 South Delta	6.9
Arkansas	Lincoln	01 South Delta	6.9
Arkansas	Lonoke	01 South Delta	6.9
Arkansas	Monroe	01 South Delta	6.9
Arkansas	Phillips	01 South Delta	6.90
Arkansas	Prairie	01 South Delta	6.90
Arkansas	Clay	02 North Delta	14.49
Arkansas	Craighead	02 North Delta	14.49
Arkansas	Crittenden	02 North Delta	14.49
Arkansas	Cross	02 North Delta	14.49
Arkansas	Greene	02 North Delta	14.49
Arkansas	Jackson	02 North Delta	14.49
Arkansas	Lawrence	02 North Delta	14.49
Arkansas	Mississippi	02 North Delta	14.49

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Arkansas	Poinsett	02 North Delta	14.49
Arkansas	St. Francis	02 North Delta	14.49
Arkansas	Woodruff	02 North Delta	14.49
Arkansas	Ashley	03 Southwest	2.09
Arkansas	Bradley	03 Southwest	2.09
Arkansas	Calhoun	03 Southwest	2.09
Arkansas	Clark	03 Southwest	2.09
Arkansas	Cleveland	03 Southwest	2.09
Arkansas	Columbia	03 Southwest	2.09
Arkansas	Dallas	03 Southwest	2.09
Arkansas	Drew	03 Southwest	2.09
Arkansas	Grant	03 Southwest	2.09
Arkansas	Hempstead	03 Southwest	2.09
Arkansas	Hot Spring	03 Southwest	2.09
Arkansas	Howard	03 Southwest	2.09
Arkansas	Lafayette	03 Southwest	2.09
Arkansas	Little River	03 Southwest	2.09
Arkansas	Miller	03 Southwest	2.09
Arkansas	Nevada	03 Southwest	2.09
Arkansas	Ouachita	03 Southwest	2.09
Arkansas	Pike	03 Southwest	2.09
Arkansas	Sevier	03 Southwest	2.09
Arkansas	Union	03 Southwest	2.09
Arkansas	Garland	04 Ouachita	1.60
Arkansas	Logan	04 Ouachita	1.60
Arkansas	Montgomery	04 Ouachita	1.60
Arkansas	Perry	04 Ouachita	1.60
Arkansas	Polk	04 Ouachita	1.60
Arkansas	Pulaski	04 Ouachita	1.60

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Arkansas	Saline	04 Ouachita	1.60
Arkansas	Scott	04 Ouachita	1.60
Arkansas	Sebastian	04 Ouachita	1.60
Arkansas	Yell	04 Ouachita	1.60
Arkansas	Baxter	05 Ozark	0.79
Arkansas	Benton	05 Ozark	0.79
Arkansas	Boone	05 Ozark	0.79
Arkansas	Carroll	05 Ozark	0.79
Arkansas	Cleburne	05 Ozark	0.79
Arkansas	Conway	05 Ozark	0.79
Arkansas	Crawford	05 Ozark	0.79
Arkansas	Faulkner	05 Ozark	0.79
Arkansas	Franklin	05 Ozark	0.79
Arkansas	Fulton	05 Ozark	0.79
Arkansas	Independence	05 Ozark	0.79
Arkansas	Izard	05 Ozark	0.79
Arkansas	Johnson	05 Ozark	0.79
Arkansas	Madison	05 Ozark	0.79
Arkansas	Marion	05 Ozark	0.79
Arkansas	Newton	05 Ozark	0.79
Arkansas	Pope	05 Ozark	0.79
Arkansas	Randolph	05 Ozark	0.79
Arkansas	Searcy	05 Ozark	0.79
Arkansas	Sharp	05 Ozark	0.79
Arkansas	Stone	05 Ozark	0.79
Arkansas	Van Buren	05 Ozark	0.79
Arkansas	Washington	05 Ozark	0.79
Arkansas	White	05 Ozark	0.79
Florida	Alachua	01 Northeast	-5.12

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Florida	Baker	01 Northeast	-5.12
Florida	Bradford	01 Northeast	-5.12
Florida	Clay	01 Northeast	-5.12
Florida	Columbia	01 Northeast	-5.12
Florida	Dixie	01 Northeast	-5.12
Florida	Duval	01 Northeast	-5.12
Florida	Flagler	01 Northeast	-5.12
Florida	Gilchrist	01 Northeast	-5.12
Florida	Hamilton	01 Northeast	-5.12
Florida	Lafayette	01 Northeast	-5.12
Florida	Levy	01 Northeast	-5.12
Florida	Madison	01 Northeast	-5.12
Florida	Marion	01 Northeast	-5.12
Florida	Nassau	01 Northeast	-5.12
Florida	Putnam	01 Northeast	-5.12
Florida	St. Johns	01 Northeast	-5.12
Florida	Suwannee	01 Northeast	-5.12
Florida	Taylor	01 Northeast	-5.12
Florida	Union	01 Northeast	-5.12
Florida	Volusia	01 Northeast	-5.12
Florida	Bay	02 Northwest	-3.23
Florida	Calhoun	02 Northwest	-3.23
Florida	Escambia	02 Northwest	-3.23
Florida	Franklin	02 Northwest	-3.23
Florida	Gadsden	02 Northwest	-3.23
Florida	Gulf	02 Northwest	-3.23
Florida	Holmes	02 Northwest	-3.23
Florida	Jackson	02 Northwest	-3.23
Florida	Jefferson	02 Northwest	-3.23

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Florida	Leon	02 Northwest	-3.23
Florida	Liberty	02 Northwest	-3.23
Florida	Okaloosa	02 Northwest	-3.23
Florida	Santa Rosa	02 Northwest	-3.23
Florida	Wakulla	02 Northwest	-3.23
Florida	Walton	02 Northwest	-3.23
Florida	Washington	02 Northwest	-3.23
Florida	Brevard	03 Central	-3.27
Florida	Citrus	03 Central	-3.27
Florida	DeSoto	03 Central	-3.27
Florida	Hardee	03 Central	-3.27
Florida	Hernando	03 Central	-3.27
Florida	Highlands	03 Central	-3.27
Florida	Hillsborough	03 Central	-3.27
Florida	Indian River	03 Central	-3.27
Florida	Lake	03 Central	-3.27
Florida	Manatee	03 Central	-3.27
Florida	Okeechobee	03 Central	-3.27
Florida	Orange	03 Central	-3.27
Florida	Osceola	03 Central	-3.27
Florida	Pasco	03 Central	-3.27
Florida	Pinellas	03 Central	-3.27
Florida	Polk	03 Central	-3.27
Florida	Sarasota	03 Central	-3.27
Florida	Seminole	03 Central	-3.27
Florida	St. Lucie	03 Central	-3.27
Florida	Sumter	03 Central	-3.27
Florida	Broward	04 South	-22.64
Florida	Broward	04 South	-22.64

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Florida	Charlotte	04 South	-22.64
Florida	Collier	04 South	-22.64
Florida	Dade	04 South	-22.64
Florida	Glades	04 South	-22.64
Florida	Hendry	04 South	-22.64
Florida	Lee	04 South	-22.64
Florida	Martin	04 South	-22.64
Florida	Monroe	04 South	-22.64
Florida	Palm Beach	04 South	-22.64
Georgia	Appling	01 Southeast	-2.87
Georgia	Atkinson	01 Southeast	-2.87
Georgia	Bacon	01 Southeast	-2.87
Georgia	Brantley	01 Southeast	-2.87
Georgia	Bryan	01 Southeast	-2.87
Georgia	Bulloch	01 Southeast	-2.87
Georgia	Camden	01 Southeast	-2.87
Georgia	Candler	01 Southeast	-2.87
Georgia	Charlton	01 Southeast	-2.87
Georgia	Chatham	01 Southeast	-2.87
Georgia	Clinch	01 Southeast	-2.87
Georgia	Coffee	01 Southeast	-2.87
Georgia	Dodge	01 Southeast	-2.87
Georgia	Echols	01 Southeast	-2.87
Georgia	Effingham	01 Southeast	-2.87
Georgia	Emanuel	01 Southeast	-2.87
Georgia	Evans	01 Southeast	-2.87
Georgia	Glynn	01 Southeast	-2.87
Georgia	Jeff Davis	01 Southeast	-2.87
Georgia	Jenkins	01 Southeast	-2.87

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Georgia	Johnson	01 Southeast	-2.87
Georgia	Laurens	01 Southeast	-2.87
Georgia	Liberty	01 Southeast	-2.87
Georgia	Long	01 Southeast	-2.87
Georgia	McIntosh	01 Southeast	-2.87
Georgia	Montgomery	01 Southeast	-2.87
Georgia	Pierce	01 Southeast	-2.87
Georgia	Screven	01 Southeast	-2.87
Georgia	Tattnall	01 Southeast	-2.87
Georgia	Telfair	01 Southeast	-2.87
Georgia	Toombs	01 Southeast	-2.87
Georgia	Treutlen	01 Southeast	-2.87
Georgia	Ware	01 Southeast	-2.87
Georgia	Wayne	01 Southeast	-2.87
Georgia	Wheeler	01 Southeast	-2.87
Georgia	Baker	02 Southwest	-1.37
Georgia	Ben Hill	02 Southwest	-1.37
Georgia	Berrien	02 Southwest	-1.37
Georgia	Brooks	02 Southwest	-1.37
Georgia	Colquitt	02 Southwest	-1.37
Georgia	Cook	02 Southwest	-1.37
Georgia	Crisp	02 Southwest	-1.37
Georgia	Decatur	02 Southwest	-1.37
Georgia	Dooly	02 Southwest	-1.37
Georgia	Early	02 Southwest	-1.37
Georgia	Grady	02 Southwest	-1.37
Georgia	Irwin	02 Southwest	-1.37
Georgia	Lanier	02 Southwest	-1.37
Georgia	Lowndes	02 Southwest	-1.37

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Georgia	Miller	02 Southwest	-1.37
Georgia	Mitchell	02 Southwest	-1.37
Georgia	Seminole	02 Southwest	-1.37
Georgia	Thomas	02 Southwest	-1.37
Georgia	Tift	02 Southwest	-1.37
Georgia	Turner	02 Southwest	-1.37
Georgia	Wilcox	02 Southwest	-1.37
Georgia	Worth	02 Southwest	-1.37
Georgia	Baldwin	03 Central	-0.54
Georgia	Bibb	03 Central	-0.54
Georgia	Bleckley	03 Central	-0.54
Georgia	Burke	03 Central	-0.54
Georgia	Butts	03 Central	-0.54
Georgia	Calhoun	03 Central	-0.54
Georgia	Chattahoochee	03 Central	-0.54
Georgia	Clay	03 Central	-0.54
Georgia	Columbia	03 Central	-0.54
Georgia	Crawford	03 Central	-0.54
Georgia	Dougherty	03 Central	-0.54
Georgia	Glascok	03 Central	-0.54
Georgia	Greene	03 Central	-0.54
Georgia	Hancock	03 Central	-0.54
Georgia	Harris	03 Central	-0.54
Georgia	Houston	03 Central	-0.54
Georgia	Jasper	03 Central	-0.54
Georgia	Jefferson	03 Central	-0.54
Georgia	Jones	03 Central	-0.54
Georgia	Lamar	03 Central	-0.54
Georgia	Lee	03 Central	-0.54

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Georgia	Lincoln	03 Central	-0.54
Georgia	Macon	03 Central	-0.54
Georgia	Marion	03 Central	-0.54
Georgia	McDuffie	03 Central	-0.54
Georgia	Monroe	03 Central	-0.54
Georgia	Morgan	03 Central	-0.54
Georgia	Muscogee	03 Central	-0.54
Georgia	Peach	03 Central	-0.54
Georgia	Pike	03 Central	-0.54
Georgia	Pulaski	03 Central	-0.54
Georgia	Putnam	03 Central	-0.54
Georgia	Quitman	03 Central	-0.54
Georgia	Randolph	03 Central	-0.54
Georgia	Richmond	03 Central	-0.54
Georgia	Schley	03 Central	-0.54
Georgia	Stewart	03 Central	-0.54
Georgia	Sumter	03 Central	-0.54
Georgia	Talbot	03 Central	-0.54
Georgia	Taliaferro	03 Central	-0.54
Georgia	Taylor	03 Central	-0.54
Georgia	Terrell	03 Central	-0.54
Georgia	Twiggs	03 Central	-0.54
Georgia	Upson	03 Central	-0.54
Georgia	Warren	03 Central	-0.54
Georgia	Washington	03 Central	-0.54
Georgia	Webster	03 Central	-0.54
Georgia	Wilkes	03 Central	-0.54
Georgia	Wilkinson	03 Central	-0.54
Georgia	Banks	04 North Central	-6.36

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Georgia	Barrow	04 North Central	-6.36
Georgia	Carroll	04 North Central	-6.36
Georgia	Clarke	04 North Central	-6.36
Georgia	Clayton	04 North Central	-6.36
Georgia	Cobb	04 North Central	-6.36
Georgia	Coweta	04 North Central	-6.36
Georgia	DeKalb	04 North Central	-6.36
Georgia	Douglas	04 North Central	-6.36
Georgia	Elbert	04 North Central	-6.36
Georgia	Fayette	04 North Central	-6.36
Georgia	Forsyth	04 North Central	-6.36
Georgia	Franklin	04 North Central	-6.36
Georgia	Fulton	04 North Central	-6.36
Georgia	Gwinnett	04 North Central	-6.36
Georgia	Hall	04 North Central	-6.36
Georgia	Haralson	04 North Central	-6.36
Georgia	Hart	04 North Central	-6.36
Georgia	Heard	04 North Central	-6.36
Georgia	Henry	04 North Central	-6.36
Georgia	Jackson	04 North Central	-6.36
Georgia	Madison	04 North Central	-6.36
Georgia	Meriwether	04 North Central	-6.36
Georgia	Newton	04 North Central	-6.36
Georgia	Oconee	04 North Central	-6.36
Georgia	Oglethorpe	04 North Central	-6.36
Georgia	Paulding	04 North Central	-6.36
Georgia	Polk	04 North Central	-6.36
Georgia	Rockdale	04 North Central	-6.36
Georgia	Spalding	04 North Central	-6.36

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Georgia	Troup	04 North Central	-6.36
Georgia	Walton	04 North Central	-6.36
Georgia	Bartow	05 North	-7.02
Georgia	Catoosa	05 North	-7.02
Georgia	Chattooga	05 North	-7.02
Georgia	Cherokee	05 North	-7.02
Georgia	Dade	05 North	-7.02
Georgia	Dawson	05 North	-7.02
Georgia	Fannin	05 North	-7.02
Georgia	Floyd	05 North	-7.02
Georgia	Gilmer	05 North	-7.02
Georgia	Gordon	05 North	-7.02
Georgia	Habersham	05 North	-7.02
Georgia	Lumpkin	05 North	-7.02
Georgia	Murray	05 North	-7.02
Georgia	Pickens	05 North	-7.02
Georgia	Rabun	05 North	-7.02
Georgia	Stephens	05 North	-7.02
Georgia	Towns	05 North	-7.02
Georgia	Union	05 North	-7.02
Georgia	Walker	05 North	-7.02
Georgia	White	05 North	-7.02
Georgia	Whitfield	05 North	-7.02
Kentucky	Floyd	01 Eastern	0.60
Kentucky	Harlan	01 Eastern	0.60
Kentucky	Knott	01 Eastern	0.60
Kentucky	Leslie	01 Eastern	0.60
Kentucky	Letcher	01 Eastern	0.60
Kentucky	Martin	01 Eastern	0.60

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Kentucky	Perry	01 Eastern	0.60
Kentucky	Pike	01 Eastern	0.60
Kentucky	Boyd	02 Northern Cumberland	0
Kentucky	Carter	02 Northern Cumberland	0
Kentucky	Elliott	02 Northern Cumberland	0
Kentucky	Greenup	02 Northern Cumberland	0
Kentucky	Johnson	02 Northern Cumberland	0
Kentucky	Lawrence	02 Northern Cumberland	0
Kentucky	Lewis	02 Northern Cumberland	0
Kentucky	Magoffin	02 Northern Cumberland	0
Kentucky	Menifee	02 Northern Cumberland	0
Kentucky	Morgan	02 Northern Cumberland	0
Kentucky	Powell	02 Northern Cumberland	0
Kentucky	Rowan	02 Northern Cumberland	0
Kentucky	Wolfe	02 Northern Cumberland	0
Kentucky	Bell	03 Southern Cumberland	-3.45
Kentucky	Breathitt	03 Southern Cumberland	-3.45
Kentucky	Clay	03 Southern Cumberland	-3.45
Kentucky	Estill	03 Southern Cumberland	-3.45
Kentucky	Jackson	03 Southern Cumberland	-3.45
Kentucky	Knox	03 Southern Cumberland	-3.45
Kentucky	Laurel	03 Southern Cumberland	-3.45
Kentucky	Lee	03 Southern Cumberland	-3.45
Kentucky	McCreary	03 Southern Cumberland	-3.45
Kentucky	Owsley	03 Southern Cumberland	-3.45
Kentucky	Rockcastle	03 Southern Cumberland	-3.45
Kentucky	Whitley	03 Southern Cumberland	-3.45
Kentucky	Anderson	04 Bluegrass	-1.14
Kentucky	Bath	04 Bluegrass	-1.14

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Kentucky	Boone	04 Bluegrass	-1.14
Kentucky	Bourbon	04 Bluegrass	-1.14
Kentucky	Boyle	04 Bluegrass	-1.14
Kentucky	Bracken	04 Bluegrass	-1.14
Kentucky	Campbell	04 Bluegrass	-1.14
Kentucky	Carroll	04 Bluegrass	-1.14
Kentucky	Clark	04 Bluegrass	-1.14
Kentucky	Fayette	04 Bluegrass	-1.14
Kentucky	Fleming	04 Bluegrass	-1.14
Kentucky	Franklin	04 Bluegrass	-1.14
Kentucky	Gallatin	04 Bluegrass	-1.14
Kentucky	Garrard	04 Bluegrass	-1.14
Kentucky	Grant	04 Bluegrass	-1.14
Kentucky	Harrison	04 Bluegrass	-1.14
Kentucky	Henry	04 Bluegrass	-1.14
Kentucky	Jefferson	04 Bluegrass	-1.14
Kentucky	Jessamine	04 Bluegrass	-1.14
Kentucky	Kenton	04 Bluegrass	-1.14
Kentucky	Lincoln	04 Bluegrass	-1.14
Kentucky	Madison	04 Bluegrass	-1.14
Kentucky	Mason	04 Bluegrass	-1.14
Kentucky	Mercer	04 Bluegrass	-1.14
Kentucky	Montgomery	04 Bluegrass	-1.14
Kentucky	Nicholas	04 Bluegrass	-1.14
Kentucky	Oldham	04 Bluegrass	-1.14
Kentucky	Owen	04 Bluegrass	-1.14
Kentucky	Pendleton	04 Bluegrass	-1.14
Kentucky	Robertson	04 Bluegrass	-1.14
Kentucky	Scott	04 Bluegrass	-1.14

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Kentucky	Shelby	04 Bluegrass	-1.14
Kentucky	Spencer	04 Bluegrass	-1.14
Kentucky	Trimble	04 Bluegrass	-1.14
Kentucky	Washington	04 Bluegrass	-1.14
Kentucky	Woodford	04 Bluegrass	-1.14
Kentucky	Adair	05 Pennyroyal	-0.46
Kentucky	Breckinridge	05 Pennyroyal	-0.46
Kentucky	Bullitt	05 Pennyroyal	-0.46
Kentucky	Casey	05 Pennyroyal	-0.46
Kentucky	Clinton	05 Pennyroyal	-0.46
Kentucky	Cumberland	05 Pennyroyal	-0.46
Kentucky	Grayson	05 Pennyroyal	-0.46
Kentucky	Green	05 Pennyroyal	-0.46
Kentucky	Hancock	05 Pennyroyal	-0.46
Kentucky	Hardin	05 Pennyroyal	-0.46
Kentucky	Hart	05 Pennyroyal	-0.46
Kentucky	Larue	05 Pennyroyal	-0.46
Kentucky	Marion	05 Pennyroyal	-0.46
Kentucky	Meade	05 Pennyroyal	-0.46
Kentucky	Metcalf	05 Pennyroyal	-0.46
Kentucky	Nelson	05 Pennyroyal	-0.46
Kentucky	Pulaski	05 Pennyroyal	-0.46
Kentucky	Russell	05 Pennyroyal	-0.46
Kentucky	Taylor	05 Pennyroyal	-0.46
Kentucky	Wayne	05 Pennyroyal	-0.46
Kentucky	Allen	06 Western Coalfield	4.76
Kentucky	Barren	06 Western Coalfield	4.76
Kentucky	Butler	06 Western Coalfield	4.76
Kentucky	Caldwell	06 Western Coalfield	4.76

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Kentucky	Christian	06 Western Coalfield	4.76
Kentucky	Crittenden	06 Western Coalfield	4.76
Kentucky	Daviess	06 Western Coalfield	4.76
Kentucky	Edmonson	06 Western Coalfield	4.76
Kentucky	Henderson	06 Western Coalfield	4.76
Kentucky	Hopkins	06 Western Coalfield	4.76
Kentucky	Logan	06 Western Coalfield	4.76
Kentucky	McLean	06 Western Coalfield	4.76
Kentucky	Monroe	06 Western Coalfield	4.76
Kentucky	Muhlenberg	06 Western Coalfield	4.76
Kentucky	Ohio	06 Western Coalfield	4.76
Kentucky	Simpson	06 Western Coalfield	4.76
Kentucky	Todd	06 Western Coalfield	4.76
Kentucky	Union	06 Western Coalfield	4.76
Kentucky	Warren	06 Western Coalfield	4.76
Kentucky	Webster	06 Western Coalfield	4.76
Kentucky	Ballard	07 Western	8.06
Kentucky	Calloway	07 Western	8.06
Kentucky	Carlisle	07 Western	8.06
Kentucky	Fulton	07 Western	8.06
Kentucky	Graves	07 Western	8.06
Kentucky	Hickman	07 Western	8.06
Kentucky	Livingston	07 Western	8.06
Kentucky	Lyon	07 Western	8.06
Kentucky	Marshall	07 Western	8.06
Kentucky	McCracken	07 Western	8.06
Kentucky	Trigg	07 Western	8.06
Louisiana	Catahoula	01 North Delta	30.21
Louisiana	Concordia	01 North Delta	30.21

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Louisiana	East Carroll	01 North Delta	30.21
Louisiana	Franklin	01 North Delta	30.21
Louisiana	Madison	01 North Delta	30.21
Louisiana	Morehouse	01 North Delta	30.21
Louisiana	Richland	01 North Delta	30.21
Louisiana	Tensas	01 North Delta	30.21
Louisiana	West Carroll	01 North Delta	30.21
Louisiana	Acadia	02 South Delta	8.68
Louisiana	Ascension	02 South Delta	8.68
Louisiana	Assumption	02 South Delta	8.68
Louisiana	Avoyelles	02 South Delta	8.68
Louisiana	Cameron	02 South Delta	8.68
Louisiana	Iberia	02 South Delta	8.68
Louisiana	Iberville	02 South Delta	8.68
Louisiana	Jefferson	02 South Delta	8.68
Louisiana	Lafayette	02 South Delta	8.68
Louisiana	Lafourche	02 South Delta	8.68
Louisiana	Orleans	02 South Delta	8.68
Louisiana	Plaquemines	02 South Delta	8.68
Louisiana	Pointe Coupee	02 South Delta	8.68
Louisiana	St. Bernard	02 South Delta	8.68
Louisiana	St. Charles	02 South Delta	8.68
Louisiana	St. James	02 South Delta	8.68
Louisiana	St. John the Baptist	02 South Delta	8.68
Louisiana	St. Landry	02 South Delta	8.68
Louisiana	St. Martin	02 South Delta	8.68
Louisiana	St. Mary	02 South Delta	8.68
Louisiana	Terrebonne	02 South Delta	8.68
Louisiana	Vermilion	02 South Delta	8.68

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Louisiana	West Baton Rouge	02 South Delta	8.68
Louisiana	West Feliciana	02 South Delta	8.68
Louisiana	Allen	03 Southwest	3.97
Louisiana	Beauregard	03 Southwest	3.97
Louisiana	Calcasieu	03 Southwest	3.97
Louisiana	Evangeline	03 Southwest	3.97
Louisiana	Grant	03 Southwest	3.97
Louisiana	Jefferson Davis	03 Southwest	3.97
Louisiana	La Salle	03 Southwest	3.97
Louisiana	Natchitoches	03 Southwest	3.97
Louisiana	Rapides	03 Southwest	3.97
Louisiana	Sabine	03 Southwest	3.97
Louisiana	Vernon	03 Southwest	3.97
Louisiana	East Baton Rouge	04 Southeast	-2.34
Louisiana	East Feliciana	04 Southeast	-2.34
Louisiana	Livingston	04 Southeast	-2.34
Louisiana	St. Helena	04 Southeast	-2.34
Louisiana	St. Tammany	04 Southeast	-2.34
Louisiana	Tangipahoa	04 Southeast	-2.34
Louisiana	Washington	04 Southeast	-2.34
Louisiana	Bienville	05 Northwest	1.16
Louisiana	Bossier	05 Northwest	1.16
Louisiana	Caddo	05 Northwest	1.16
Louisiana	Caldwell	05 Northwest	1.16
Louisiana	Claiborne	05 Northwest	1.16
Louisiana	De Soto	05 Northwest	1.16
Louisiana	Jackson	05 Northwest	1.16
Louisiana	Lincoln	05 Northwest	1.16
Louisiana	Ouachita	05 Northwest	1.16

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Louisiana	Red River	05 Northwest	1.16
Louisiana	Union	05 Northwest	1.16
Louisiana	Webster	05 Northwest	1.16
Louisiana	Winn	05 Northwest	1.16
Mississippi	Bolivar	01 Delta	7.59
Mississippi	Coahoma	01 Delta	7.59
Mississippi	Holmes	01 Delta	7.59
Mississippi	Humphreys	01 Delta	7.59
Mississippi	Issaquena	01 Delta	7.59
Mississippi	Leflore	01 Delta	7.59
Mississippi	Quitman	01 Delta	7.59
Mississippi	Sharkey	01 Delta	7.59
Mississippi	Sunflower	01 Delta	7.59
Mississippi	Tallahatchie	01 Delta	7.59
Mississippi	Tunica	01 Delta	7.59
Mississippi	Warren	01 Delta	7.59
Mississippi	Washington	01 Delta	7.59
Mississippi	Yazoo	01 Delta	7.59
Mississippi	Alcorn	02 North	0.60
Mississippi	Benton	02 North	0.60
Mississippi	Calhoun	02 North	0.60
Mississippi	Carroll	02 North	0.60
Mississippi	Chickasaw	02 North	0.60
Mississippi	Choctaw	02 North	0.60
Mississippi	Clay	02 North	0.60
Mississippi	DeSoto	02 North	0.60
Mississippi	Grenada	02 North	0.60
Mississippi	Itawamba	02 North	0.60
Mississippi	Lafayette	02 North	0.60

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Mississippi	Lee	02 North	0.60
Mississippi	Lowndes	02 North	0.60
Mississippi	Marshall	02 North	0.60
Mississippi	Monroe	02 North	0.60
Mississippi	Montgomery	02 North	0.60
Mississippi	Oktibbeha	02 North	0.60
Mississippi	Panola	02 North	0.60
Mississippi	Pontotoc	02 North	0.60
Mississippi	Prentiss	02 North	0.60
Mississippi	Tate	02 North	0.60
Mississippi	Tippah	02 North	0.60
Mississippi	Tishomingo	02 North	0.60
Mississippi	Union	02 North	0.60
Mississippi	Webster	02 North	0.60
Mississippi	Yalobusha	02 North	0.60
Mississippi	Attala	03 Central	-3.42
Mississippi	Clarke	03 Central	-3.42
Mississippi	Jasper	03 Central	-3.42
Mississippi	Kemper	03 Central	-3.42
Mississippi	Lauderdale	03 Central	-3.42
Mississippi	Leake	03 Central	-3.42
Mississippi	Neshoba	03 Central	-3.42
Mississippi	Newton	03 Central	-3.42
Mississippi	Noxubee	03 Central	-3.42
Mississippi	Rankin	03 Central	-3.42
Mississippi	Scott	03 Central	-3.42
Mississippi	Simpson	03 Central	-3.42
Mississippi	Smith	03 Central	-3.42
Mississippi	Winston	03 Central	-3.42

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Mississippi	Covington	04 South	-4.88
Mississippi	Forrest	04 South	-4.88
Mississippi	George	04 South	-4.88
Mississippi	Greene	04 South	-4.88
Mississippi	Hancock	04 South	-4.88
Mississippi	Harrison	04 South	-4.88
Mississippi	Jackson	04 South	-4.88
Mississippi	Jefferson Davis	04 South	-4.88
Mississippi	Jones	04 South	-4.88
Mississippi	Lamar	04 South	-4.88
Mississippi	Lawrence	04 South	-4.88
Mississippi	Marion	04 South	-4.88
Mississippi	Pearl River	04 South	-4.88
Mississippi	Perry	04 South	-4.88
Mississippi	Stone	04 South	-4.88
Mississippi	Walthall	04 South	-4.88
Mississippi	Wayne	04 South	-4.88
Mississippi	Adams	05 Southwest	-0.98
Mississippi	Amite	05 Southwest	-0.98
Mississippi	Claiborne	05 Southwest	-0.98
Mississippi	Copiah	05 Southwest	-0.98
Mississippi	Franklin	05 Southwest	-0.98
Mississippi	Hinds	05 Southwest	-0.98
Mississippi	Jefferson	05 Southwest	-0.98
Mississippi	Lincoln	05 Southwest	-0.98
Mississippi	Madison	05 Southwest	-0.98
Mississippi	Pike	05 Southwest	-0.98
Mississippi	Wilkinson	05 Southwest	-0.98
Missouri	Bollinger	01 Eastern Ozarks	-1.83

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Missouri	Butler	01 Eastern Ozarks	-1.83
Missouri	Carter	01 Eastern Ozarks	-1.83
Missouri	Crawford	01 Eastern Ozarks	-1.83
Missouri	Dent	01 Eastern Ozarks	-1.83
Missouri	Iron	01 Eastern Ozarks	-1.83
Missouri	Madison	01 Eastern Ozarks	-1.83
Missouri	Oregon	01 Eastern Ozarks	-1.83
Missouri	Reynolds	01 Eastern Ozarks	-1.83
Missouri	Ripley	01 Eastern Ozarks	-1.83
Missouri	Shannon	01 Eastern Ozarks	-1.83
Missouri	St. Francois	01 Eastern Ozarks	-1.83
Missouri	Washington	01 Eastern Ozarks	-1.83
Missouri	Wayne	01 Eastern Ozarks	-1.83
Missouri	Barry	02 Southwestern Ozarks	-1.23
Missouri	Christian	02 Southwestern Ozarks	-1.23
Missouri	Douglas	02 Southwestern Ozarks	-1.23
Missouri	Howell	02 Southwestern Ozarks	-1.23
Missouri	McDonald	02 Southwestern Ozarks	-1.23
Missouri	Newton	02 Southwestern Ozarks	-1.23
Missouri	Ozark	02 Southwestern Ozarks	-1.23
Missouri	Stone	02 Southwestern Ozarks	-1.23
Missouri	Taney	02 Southwestern Ozarks	-1.23
Missouri	Texas	02 Southwestern Ozarks	-1.23
Missouri	Webster	02 Southwestern Ozarks	-1.23
Missouri	Wright	02 Southwestern Ozarks	-1.23
Missouri	Benton	03 Northwestern Ozarks	0.43
Missouri	Camden	03 Northwestern Ozarks	0.43
Missouri	Cedar	03 Northwestern Ozarks	0.43
Missouri	Dallas	03 Northwestern Ozarks	0.43

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Missouri	Hickory	03 Northwestern Ozarks	0.43
Missouri	Laclede	03 Northwestern Ozarks	0.43
Missouri	Maries	03 Northwestern Ozarks	0.43
Missouri	Miller	03 Northwestern Ozarks	0.43
Missouri	Morgan	03 Northwestern Ozarks	0.43
Missouri	Phelps	03 Northwestern Ozarks	0.43
Missouri	Polk	03 Northwestern Ozarks	0.43
Missouri	Pulaski	03 Northwestern Ozarks	0.43
Missouri	St. Clair	03 Northwestern Ozarks	0.43
Missouri	Adair	04 Prairie	1.25
Missouri	Andrew	04 Prairie	1.25
Missouri	Atchison	04 Prairie	1.25
Missouri	Audrain	04 Prairie	1.25
Missouri	Barton	04 Prairie	1.25
Missouri	Bates	04 Prairie	1.25
Missouri	Buchanan	04 Prairie	1.25
Missouri	Caldwell	04 Prairie	1.25
Missouri	Carroll	04 Prairie	1.25
Missouri	Cass	04 Prairie	1.25
Missouri	Chariton	04 Prairie	1.25
Missouri	Clark	04 Prairie	1.25
Missouri	Clay	04 Prairie	1.25
Missouri	Clinton	04 Prairie	1.25
Missouri	Cooper	04 Prairie	1.25
Missouri	Dade	04 Prairie	1.25
Missouri	Daviess	04 Prairie	1.25
Missouri	DeKalb	04 Prairie	1.25
Missouri	Gentry	04 Prairie	1.25
Missouri	Greene	04 Prairie	1.25

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Missouri	Grundy	04 Prairie	1.25
Missouri	Harrison	04 Prairie	1.25
Missouri	Henry	04 Prairie	1.25
Missouri	Holt	04 Prairie	1.25
Missouri	Jackson	04 Prairie	1.25
Missouri	Jasper	04 Prairie	1.25
Missouri	Johnson	04 Prairie	1.25
Missouri	Knox	04 Prairie	1.25
Missouri	Lafayette	04 Prairie	1.25
Missouri	Lawrence	04 Prairie	1.25
Missouri	Lewis	04 Prairie	1.25
Missouri	Lincoln	04 Prairie	1.25
Missouri	Linn	04 Prairie	1.25
Missouri	Livingston	04 Prairie	1.25
Missouri	Macon	04 Prairie	1.25
Missouri	Marion	04 Prairie	1.25
Missouri	Mercer	04 Prairie	1.25
Missouri	Monroe	04 Prairie	1.25
Missouri	Nodaway	04 Prairie	1.25
Missouri	Pettis	04 Prairie	1.25
Missouri	Pike	04 Prairie	1.25
Missouri	Platte	04 Prairie	1.25
Missouri	Putnam	04 Prairie	1.25
Missouri	Ralls	04 Prairie	1.25
Missouri	Randolph	04 Prairie	1.25
Missouri	Ray	04 Prairie	1.25
Missouri	Saline	04 Prairie	1.25
Missouri	Schuyler	04 Prairie	1.25
Missouri	Scotland	04 Prairie	1.25

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Missouri	Shelby	04 Prairie	1.25
Missouri	Sullivan	04 Prairie	1.25
Missouri	Vernon	04 Prairie	1.25
Missouri	Worth	04 Prairie	1.25
Missouri	Boone	05 Riverborder	3.15
Missouri	Callaway	05 Riverborder	3.15
Missouri	Cape Girardeau	05 Riverborder	3.15
Missouri	Cole	05 Riverborder	3.15
Missouri	Dunklin	05 Riverborder	3.15
Missouri	Franklin	05 Riverborder	3.15
Missouri	Gasconade	05 Riverborder	3.15
Missouri	Howard	05 Riverborder	3.15
Missouri	Jefferson	05 Riverborder	3.15
Missouri	Mississippi	05 Riverborder	3.15
Missouri	Moniteau	05 Riverborder	3.15
Missouri	Montgomery	05 Riverborder	3.15
Missouri	New Madrid	05 Riverborder	3.15
Missouri	Osage	05 Riverborder	3.15
Missouri	Pemiscot	05 Riverborder	3.15
Missouri	Perry	05 Riverborder	3.15
Missouri	Scott	05 Riverborder	3.15
Missouri	St. Charles	05 Riverborder	3.15
Missouri	St. Louis	05 Riverborder	3.15
Missouri	St. Louis city	05 Riverborder	3.15
Missouri	Ste. Genevieve	05 Riverborder	3.15
Missouri	Stoddard	05 Riverborder	3.15
Missouri	Warren	05 Riverborder	3.15
North Carolina	Bladen	01 Southern Coastal Plain	0
North Carolina	Brunswick	01 Southern Coastal Plain	0

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
North Carolina	Columbus	01 Southern Coastal Plain	0
North Carolina	Cumberland	01 Southern Coastal Plain	0
North Carolina	Duplin	01 Southern Coastal Plain	0
North Carolina	Greene	01 Southern Coastal Plain	0
North Carolina	Harnett	01 Southern Coastal Plain	0
North Carolina	Hoke	01 Southern Coastal Plain	0
North Carolina	Johnston	01 Southern Coastal Plain	0
North Carolina	Jones	01 Southern Coastal Plain	0
North Carolina	Lee	01 Southern Coastal Plain	0
North Carolina	Lenoir	01 Southern Coastal Plain	0
North Carolina	Moore	01 Southern Coastal Plain	0
North Carolina	New Hanover	01 Southern Coastal Plain	0
North Carolina	Onslow	01 Southern Coastal Plain	0
North Carolina	Pender	01 Southern Coastal Plain	0
North Carolina	Richmond	01 Southern Coastal Plain	0
North Carolina	Robeson	01 Southern Coastal Plain	0
North Carolina	Sampson	01 Southern Coastal Plain	0
North Carolina	Scotland	01 Southern Coastal Plain	0
North Carolina	Wayne	01 Southern Coastal Plain	0
North Carolina	Beaufort	02 Northern Coastal Plain	1.46
North Carolina	Bertie	02 Northern Coastal Plain	1.46
North Carolina	Camden	02 Northern Coastal Plain	1.46
North Carolina	Carteret	02 Northern Coastal Plain	1.46
North Carolina	Chowan	02 Northern Coastal Plain	1.46
North Carolina	Craven	02 Northern Coastal Plain	1.46
North Carolina	Currituck	02 Northern Coastal Plain	1.46
North Carolina	Dare	02 Northern Coastal Plain	1.46
North Carolina	Edgecombe	02 Northern Coastal Plain	1.46
North Carolina	Gates	02 Northern Coastal Plain	1.46

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
North Carolina	Halifax	02 Northern Coastal Plain	1.46
North Carolina	Hertford	02 Northern Coastal Plain	1.46
North Carolina	Hyde	02 Northern Coastal Plain	1.46
North Carolina	Martin	02 Northern Coastal Plain	1.46
North Carolina	Nash	02 Northern Coastal Plain	1.46
North Carolina	Northampton	02 Northern Coastal Plain	1.46
North Carolina	Pamlico	02 Northern Coastal Plain	1.46
North Carolina	Pasquotank	02 Northern Coastal Plain	1.46
North Carolina	Perquimans	02 Northern Coastal Plain	1.46
North Carolina	Pitt	02 Northern Coastal Plain	1.46
North Carolina	Tyrrell	02 Northern Coastal Plain	1.46
North Carolina	Washington	02 Northern Coastal Plain	1.46
North Carolina	Wilson	02 Northern Coastal Plain	1.46
North Carolina	Alamance	03 Piedmont	0.95
North Carolina	Alexander	03 Piedmont	0.95
North Carolina	Anson	03 Piedmont	0.95
North Carolina	Cabarrus	03 Piedmont	0.95
North Carolina	Caswell	03 Piedmont	0.95
North Carolina	Catawba	03 Piedmont	0.95
North Carolina	Chatham	03 Piedmont	0.95
North Carolina	Cleveland	03 Piedmont	0.95
North Carolina	Davidson	03 Piedmont	0.95
North Carolina	Davie	03 Piedmont	0.95
North Carolina	Durham	03 Piedmont	0.95
North Carolina	Forsyth	03 Piedmont	0.95
North Carolina	Franklin	03 Piedmont	0.95
North Carolina	Gaston	03 Piedmont	0.95
North Carolina	Granville	03 Piedmont	0.95
North Carolina	Guilford	03 Piedmont	0.95

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
North Carolina	Iredell	03 Piedmont	0.95
North Carolina	Lincoln	03 Piedmont	0.95
North Carolina	Mecklenburg	03 Piedmont	0.95
North Carolina	Montgomery	03 Piedmont	0.95
North Carolina	Orange	03 Piedmont	0.95
North Carolina	Person	03 Piedmont	0.95
North Carolina	Polk	03 Piedmont	0.95
North Carolina	Randolph	03 Piedmont	0.95
North Carolina	Rockingham	03 Piedmont	0.95
North Carolina	Rowan	03 Piedmont	0.95
North Carolina	Rutherford	03 Piedmont	0.95
North Carolina	Stanly	03 Piedmont	0.95
North Carolina	Stokes	03 Piedmont	0.95
North Carolina	Surry	03 Piedmont	0.95
North Carolina	Union	03 Piedmont	0.95
North Carolina	Vance	03 Piedmont	0.95
North Carolina	Wake	03 Piedmont	0.95
North Carolina	Warren	03 Piedmont	0.95
North Carolina	Yadkin	03 Piedmont	0.95
North Carolina	Alleghany	04 Mountains	2.03
North Carolina	Ashe	04 Mountains	2.03
North Carolina	Avery	04 Mountains	2.03
North Carolina	Buncombe	04 Mountains	2.03
North Carolina	Burke	04 Mountains	2.03
North Carolina	Caldwell	04 Mountains	2.03
North Carolina	Cherokee	04 Mountains	2.03
North Carolina	Clay	04 Mountains	2.03
North Carolina	Graham	04 Mountains	2.03
North Carolina	Haywood	04 Mountains	2.03

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
North Carolina	Henderson	04 Mountains	2.03
North Carolina	Jackson	04 Mountains	2.03
North Carolina	Macon	04 Mountains	2.03
North Carolina	Madison	04 Mountains	2.03
North Carolina	McDowell	04 Mountains	2.03
North Carolina	Mitchell	04 Mountains	2.03
North Carolina	Swain	04 Mountains	2.03
North Carolina	Transylvania	04 Mountains	2.03
North Carolina	Watauga	04 Mountains	2.03
North Carolina	Wilkes	04 Mountains	2.03
North Carolina	Yancey	04 Mountains	2.03
Ohio	Adams	01 South-Central	-3.09
Ohio	Brown	01 South-Central	-3.09
Ohio	Clermont	01 South-Central	-3.09
Ohio	Gallia	01 South-Central	-3.09
Ohio	Highland	01 South-Central	-3.09
Ohio	Jackson	01 South-Central	-3.09
Ohio	Lawrence	01 South-Central	-3.09
Ohio	Pike	01 South-Central	-3.09
Ohio	Ross	01 South-Central	-3.09
Ohio	Scioto	01 South-Central	-3.09
Ohio	Athens	02 Southeastern	3.23
Ohio	Hocking	02 Southeastern	3.23
Ohio	Meigs	02 Southeastern	3.23
Ohio	Morgan	02 Southeastern	3.23
Ohio	Perry	02 Southeastern	3.23
Ohio	Vinton	02 Southeastern	3.23
Ohio	Washington	02 Southeastern	3.23
Ohio	Belmont	03 East-Central	-6.01

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Ohio	Carroll	03 East-Central	-6.01
Ohio	Coshocton	03 East-Central	-6.01
Ohio	Guernsey	03 East-Central	-6.01
Ohio	Harrison	03 East-Central	-6.01
Ohio	Holmes	03 East-Central	-6.01
Ohio	Jefferson	03 East-Central	-6.01
Ohio	Monroe	03 East-Central	-6.01
Ohio	Muskingum	03 East-Central	-6.01
Ohio	Noble	03 East-Central	-6.01
Ohio	Tuscarawas	03 East-Central	-6.01
Ohio	Ashland	04 Northeastern	-8.39
Ohio	Ashtabula	04 Northeastern	-8.39
Ohio	Columbiana	04 Northeastern	-8.39
Ohio	Cuyahoga	04 Northeastern	-8.39
Ohio	Erie	04 Northeastern	-8.39
Ohio	Geauga	04 Northeastern	-8.39
Ohio	Huron	04 Northeastern	-8.39
Ohio	Lake	04 Northeastern	-8.39
Ohio	Lorain	04 Northeastern	-8.39
Ohio	Mahoning	04 Northeastern	-8.39
Ohio	Medina	04 Northeastern	-8.39
Ohio	Portage	04 Northeastern	-8.39
Ohio	Richland	04 Northeastern	-8.39
Ohio	Stark	04 Northeastern	-8.39
Ohio	Summit	04 Northeastern	-8.39
Ohio	Trumbull	04 Northeastern	-8.39
Ohio	Wayne	04 Northeastern	-8.39
Ohio	Butler	05 Southwestern	-3.08
Ohio	Clark	05 Southwestern	-3.08

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Ohio	Clinton	05 Southwestern	-3.08
Ohio	Darke	05 Southwestern	-3.08
Ohio	Fairfield	05 Southwestern	-3.08
Ohio	Fayette	05 Southwestern	-3.08
Ohio	Franklin	05 Southwestern	-3.08
Ohio	Greene	05 Southwestern	-3.08
Ohio	Hamilton	05 Southwestern	-3.08
Ohio	Licking	05 Southwestern	-3.08
Ohio	Madison	05 Southwestern	-3.08
Ohio	Miami	05 Southwestern	-3.08
Ohio	Montgomery	05 Southwestern	-3.08
Ohio	Pickaway	05 Southwestern	-3.08
Ohio	Preble	05 Southwestern	-3.08
Ohio	Warren	05 Southwestern	-3.08
Ohio	Allen	06 Northwestern	-4.17
Ohio	Auglaize	06 Northwestern	-4.17
Ohio	Champaign	06 Northwestern	-4.17
Ohio	Crawford	06 Northwestern	-4.17
Ohio	Defiance	06 Northwestern	-4.17
Ohio	Delaware	06 Northwestern	-4.17
Ohio	Fulton	06 Northwestern	-4.17
Ohio	Hancock	06 Northwestern	-4.17
Ohio	Hardin	06 Northwestern	-4.17
Ohio	Henry	06 Northwestern	-4.17
Ohio	Knox	06 Northwestern	-4.17
Ohio	Logan	06 Northwestern	-4.17
Ohio	Lucas	06 Northwestern	-4.17
Ohio	Marion	06 Northwestern	-4.17
Ohio	Mercer	06 Northwestern	-4.17

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Ohio	Morrow	06 Northwestern	-4.17
Ohio	Ottawa	06 Northwestern	-4.17
Ohio	Paulding	06 Northwestern	-4.17
Ohio	Putnam	06 Northwestern	-4.17
Ohio	Sandusky	06 Northwestern	-4.17
Ohio	Seneca	06 Northwestern	-4.17
Ohio	Shelby	06 Northwestern	-4.17
Ohio	Union	06 Northwestern	-4.17
Ohio	Van Wert	06 Northwestern	-4.17
Ohio	Williams	06 Northwestern	-4.17
Ohio	Wood	06 Northwestern	-4.17
Ohio	Wyandot	06 Northwestern	-4.17
Oklahoma	Atoka	01 Southeast	-7.78
Oklahoma	Bryan	01 Southeast	-7.78
Oklahoma	Choctaw	01 Southeast	-7.78
Oklahoma	Coal	01 Southeast	-7.78
Oklahoma	Haskell	01 Southeast	-7.78
Oklahoma	Latimer	01 Southeast	-7.78
Oklahoma	Le Flore	01 Southeast	-7.78
Oklahoma	McCurtain	01 Southeast	-7.78
Oklahoma	Pittsburg	01 Southeast	-7.78
Oklahoma	Pushmataha	01 Southeast	-7.78
Oklahoma	Adair	02 Northeast	-7.52
Oklahoma	Cherokee	02 Northeast	-7.52
Oklahoma	Delaware	02 Northeast	-7.52
Oklahoma	Mayes	02 Northeast	-7.52
Oklahoma	McIntosh	02 Northeast	-7.52
Oklahoma	Muskogee	02 Northeast	-7.52
Oklahoma	Ottawa	02 Northeast	-7.52

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Oklahoma	Sequoyah	02 Northeast	-7.52
Oklahoma	Craig	03 North Central	31.91
Oklahoma	Creek	03 North Central	31.91
Oklahoma	Nowata	03 North Central	31.91
Oklahoma	Osage	03 North Central	31.91
Oklahoma	Pawnee	03 North Central	31.91
Oklahoma	Payne	03 North Central	31.91
Oklahoma	Rogers	03 North Central	31.91
Oklahoma	Tulsa	03 North Central	31.91
Oklahoma	Wagoner	03 North Central	31.91
Oklahoma	Washington	03 North Central	31.91
Oklahoma	Carter	04 South Central	60.32
Oklahoma	Cleveland	04 South Central	60.32
Oklahoma	Garvin	04 South Central	60.32
Oklahoma	Hughes	04 South Central	60.32
Oklahoma	Johnston	04 South Central	60.32
Oklahoma	Lincoln	04 South Central	60.32
Oklahoma	Logan	04 South Central	60.32
Oklahoma	Love	04 South Central	60.32
Oklahoma	Marshall	04 South Central	60.32
Oklahoma	McClain	04 South Central	60.32
Oklahoma	Murray	04 South Central	60.32
Oklahoma	Okfuskee	04 South Central	60.32
Oklahoma	Oklahoma	04 South Central	60.32
Oklahoma	Okmulgee	04 South Central	60.32
Oklahoma	Pontotoc	04 South Central	60.32
Oklahoma	Pottawatomie	04 South Central	60.32
Oklahoma	Seminole	04 South Central	60.32
Oklahoma	Beckham	05 Southwest	-22.22

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Oklahoma	Blaine	05 Southwest	-22.22
Oklahoma	Caddo	05 Southwest	-22.22
Oklahoma	Canadian	05 Southwest	-22.22
Oklahoma	Comanche	05 Southwest	-22.22
Oklahoma	Cotton	05 Southwest	-22.22
Oklahoma	Custer	05 Southwest	-22.22
Oklahoma	Dewey	05 Southwest	-22.22
Oklahoma	Grady	05 Southwest	-22.22
Oklahoma	Greer	05 Southwest	-22.22
Oklahoma	Harmon	05 Southwest	-22.22
Oklahoma	Jackson	05 Southwest	-22.22
Oklahoma	Jefferson	05 Southwest	-22.22
Oklahoma	Kingfisher	05 Southwest	-22.22
Oklahoma	Kiowa	05 Southwest	-22.22
Oklahoma	Roger Mills	05 Southwest	-22.22
Oklahoma	Stephens	05 Southwest	-22.22
Oklahoma	Tillman	05 Southwest	-22.22
Oklahoma	Washita	05 Southwest	-22.22
Oklahoma	Beaver	06 High Plains	NA
Oklahoma	Cimarron	06 High Plains	NA
Oklahoma	Ellis	06 High Plains	NA
Oklahoma	Harper	06 High Plains	NA
Oklahoma	Texas	06 High Plains	NA
Oklahoma	Alfalfa	07 Great Plains	50.00
Oklahoma	Garfield	07 Great Plains	50.00
Oklahoma	Grant	07 Great Plains	50.00
Oklahoma	Kay	07 Great Plains	50.00
Oklahoma	Major	07 Great Plains	50.00
Oklahoma	Noble	07 Great Plains	50.00

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Oklahoma	Woods	07 Great Plains	50.00
Oklahoma	Woodward	07 Great Plains	50.00
South Carolina	Aiken	01 Southern Coastal Plain	-0.59
South Carolina	Allendale	01 Southern Coastal Plain	-0.59
South Carolina	Bamberg	01 Southern Coastal Plain	-0.59
South Carolina	Barnwell	01 Southern Coastal Plain	-0.59
South Carolina	Beaufort	01 Southern Coastal Plain	-0.59
South Carolina	Calhoun	01 Southern Coastal Plain	-0.59
South Carolina	Colleton	01 Southern Coastal Plain	-0.59
South Carolina	Dorchester	01 Southern Coastal Plain	-0.59
South Carolina	Hampton	01 Southern Coastal Plain	-0.59
South Carolina	Jasper	01 Southern Coastal Plain	-0.59
South Carolina	Lexington	01 Southern Coastal Plain	-0.59
South Carolina	Orangeburg	01 Southern Coastal Plain	-0.59
South Carolina	Berkeley	02 Northern Coastal Plain	-2.16
South Carolina	Charleston	02 Northern Coastal Plain	-2.16
South Carolina	Chesterfield	02 Northern Coastal Plain	-2.16
South Carolina	Clarendon	02 Northern Coastal Plain	-2.16
South Carolina	Darlington	02 Northern Coastal Plain	-2.16
South Carolina	Dillon	02 Northern Coastal Plain	-2.16
South Carolina	Florence	02 Northern Coastal Plain	-2.16
South Carolina	Georgetown	02 Northern Coastal Plain	-2.16
South Carolina	Horry	02 Northern Coastal Plain	-2.16
South Carolina	Kershaw	02 Northern Coastal Plain	-2.16
South Carolina	Lee	02 Northern Coastal Plain	-2.16
South Carolina	Marion	02 Northern Coastal Plain	-2.16
South Carolina	Marlboro	02 Northern Coastal Plain	-2.16
South Carolina	Richland	02 Northern Coastal Plain	-2.16
South Carolina	Sumter	02 Northern Coastal Plain	-2.16

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
South Carolina	Williamsburg	02 Northern Coastal Plain	-2.16
South Carolina	Abbeville	03 Piedmont	-3.50
South Carolina	Anderson	03 Piedmont	-3.50
South Carolina	Cherokee	03 Piedmont	-3.50
South Carolina	Chester	03 Piedmont	-3.50
South Carolina	Edgefield	03 Piedmont	-3.50
South Carolina	Fairfield	03 Piedmont	-3.50
South Carolina	Greenville	03 Piedmont	-3.50
South Carolina	Greenwood	03 Piedmont	-3.50
South Carolina	Lancaster	03 Piedmont	-3.50
South Carolina	Laurens	03 Piedmont	-3.50
South Carolina	McCormick	03 Piedmont	-3.50
South Carolina	Newberry	03 Piedmont	-3.50
South Carolina	Oconee	03 Piedmont	-3.50
South Carolina	Pickens	03 Piedmont	-3.50
South Carolina	Saluda	03 Piedmont	-3.50
South Carolina	Spartanburg	03 Piedmont	-3.50
South Carolina	Union	03 Piedmont	-3.50
South Carolina	York	03 Piedmont	-3.50
Tennessee	Carroll	01 West	-0.88
Tennessee	Chester	01 West	-0.88
Tennessee	Crockett	01 West	-0.88
Tennessee	Dyer	01 West	-0.88
Tennessee	Fayette	01 West	-0.88
Tennessee	Gibson	01 West	-0.88
Tennessee	Hardeman	01 West	-0.88
Tennessee	Haywood	01 West	-0.88
Tennessee	Henderson	01 West	-0.88
Tennessee	Henry	01 West	-0.88

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Tennessee	Lake	01 West	-0.88
Tennessee	Lauderdale	01 West	-0.88
Tennessee	Madison	01 West	-0.88
Tennessee	McNairy	01 West	-0.88
Tennessee	Obion	01 West	-0.88
Tennessee	Shelby	01 West	-0.88
Tennessee	Tipton	01 West	-0.88
Tennessee	Weakley	01 West	-0.88
Tennessee	Benton	02 West Central	-2.26
Tennessee	Decatur	02 West Central	-2.26
Tennessee	Hardin	02 West Central	-2.26
Tennessee	Hickman	02 West Central	-2.26
Tennessee	Houston	02 West Central	-2.26
Tennessee	Humphreys	02 West Central	-2.26
Tennessee	Lawrence	02 West Central	-2.26
Tennessee	Lewis	02 West Central	-2.26
Tennessee	Perry	02 West Central	-2.26
Tennessee	Stewart	02 West Central	-2.26
Tennessee	Wayne	02 West Central	-2.26
Tennessee	Bedford	03 Central	0.38
Tennessee	Cannon	03 Central	0.38
Tennessee	Cheatham	03 Central	0.38
Tennessee	Clay	03 Central	0.38
Tennessee	Coffee	03 Central	0.38
Tennessee	Davidson	03 Central	0.38
Tennessee	DeKalb	03 Central	0.38
Tennessee	Dickson	03 Central	0.38
Tennessee	Giles	03 Central	0.38
Tennessee	Jackson	03 Central	0.38

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Tennessee	Lincoln	03 Central	0.38
Tennessee	Macon	03 Central	0.38
Tennessee	Marshall	03 Central	0.38
Tennessee	Maury	03 Central	0.38
Tennessee	Montgomery	03 Central	0.38
Tennessee	Moore	03 Central	0.38
Tennessee	Robertson	03 Central	0.38
Tennessee	Rutherford	03 Central	0.38
Tennessee	Smith	03 Central	0.38
Tennessee	Sumner	03 Central	0.38
Tennessee	Trousdale	03 Central	0.38
Tennessee	Williamson	03 Central	0.38
Tennessee	Wilson	03 Central	0.38
Tennessee	Bledsoe	04 Plateau	-4.44
Tennessee	Campbell	04 Plateau	-4.44
Tennessee	Cumberland	04 Plateau	-4.44
Tennessee	Fentress	04 Plateau	-4.44
Tennessee	Franklin	04 Plateau	-4.44
Tennessee	Grundy	04 Plateau	-4.44
Tennessee	Marion	04 Plateau	-4.44
Tennessee	Morgan	04 Plateau	-4.44
Tennessee	Overton	04 Plateau	-4.44
Tennessee	Pickett	04 Plateau	-4.44
Tennessee	Putnam	04 Plateau	-4.44
Tennessee	Scott	04 Plateau	-4.44
Tennessee	Sequatchie	04 Plateau	-4.44
Tennessee	Van Buren	04 Plateau	-4.44
Tennessee	Warren	04 Plateau	-4.44
Tennessee	White	04 Plateau	-4.44

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Tennessee	Anderson	05 East	-1.07
Tennessee	Blount	05 East	-1.07
Tennessee	Bradley	05 East	-1.07
Tennessee	Carter	05 East	-1.07
Tennessee	Claiborne	05 East	-1.07
Tennessee	Cocke	05 East	-1.07
Tennessee	Grainger	05 East	-1.07
Tennessee	Greene	05 East	-1.07
Tennessee	Hamblen	05 East	-1.07
Tennessee	Hamilton	05 East	-1.07
Tennessee	Hancock	05 East	-1.07
Tennessee	Hawkins	05 East	-1.07
Tennessee	Jefferson	05 East	-1.07
Tennessee	Johnson	05 East	-1.07
Tennessee	Knox	05 East	-1.07
Tennessee	Loudon	05 East	-1.07
Tennessee	McMinn	05 East	-1.07
Tennessee	Meigs	05 East	-1.07
Tennessee	Monroe	05 East	-1.07
Tennessee	Polk	05 East	-1.07
Tennessee	Rhea	05 East	-1.07
Tennessee	Roane	05 East	-1.07
Tennessee	Sevier	05 East	-1.07
Tennessee	Sullivan	05 East	-1.07
Tennessee	Unicoi	05 East	-1.07
Tennessee	Union	05 East	-1.07
Tennessee	Washington	05 East	-1.07
Texas	Angelina	01 Southeast	-0.99
Texas	Chambers	01 Southeast	-0.99

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Grimes	01 Southeast	-0.99
Texas	Hardin	01 Southeast	-0.99
Texas	Harris	01 Southeast	-0.99
Texas	Houston	01 Southeast	-0.99
Texas	Jasper	01 Southeast	-0.99
Texas	Jefferson	01 Southeast	-0.99
Texas	Leon	01 Southeast	-0.99
Texas	Liberty	01 Southeast	-0.99
Texas	Madison	01 Southeast	-0.99
Texas	Montgomery	01 Southeast	-0.99
Texas	Newton	01 Southeast	-0.99
Texas	Orange	01 Southeast	-0.99
Texas	Polk	01 Southeast	-0.99
Texas	Sabine	01 Southeast	-0.99
Texas	San Augustine	01 Southeast	-0.99
Texas	San Jacinto	01 Southeast	-0.99
Texas	Trinity	01 Southeast	-0.99
Texas	Tyler	01 Southeast	-0.99
Texas	Walker	01 Southeast	-0.99
Texas	Waller	01 Southeast	-0.99
Texas	Anderson	02 Northeast	0.19
Texas	Bowie	02 Northeast	0.19
Texas	Camp	02 Northeast	0.19
Texas	Cass	02 Northeast	0.19
Texas	Cherokee	02 Northeast	0.19
Texas	Franklin	02 Northeast	0.19
Texas	Gregg	02 Northeast	0.19
Texas	Harrison	02 Northeast	0.19
Texas	Henderson	02 Northeast	0.19

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Marion	02 Northeast	0.19
Texas	Morris	02 Northeast	0.19
Texas	Nacogdoches	02 Northeast	0.19
Texas	Panola	02 Northeast	0.19
Texas	Red River	02 Northeast	0.19
Texas	Rusk	02 Northeast	0.19
Texas	Shelby	02 Northeast	0.19
Texas	Smith	02 Northeast	0.19
Texas	Titus	02 Northeast	0.19
Texas	Upshur	02 Northeast	0.19
Texas	Van Zandt	02 Northeast	0.19
Texas	Wood	02 Northeast	0.19
Texas	Austin	03 North Central	-33.33
Texas	Bastrop	03 North Central	-33.33
Texas	Brazos	03 North Central	-33.33
Texas	Burleson	03 North Central	-33.33
Texas	Caldwell	03 North Central	-33.33
Texas	Clay	03 North Central	-33.33
Texas	Collin	03 North Central	-33.33
Texas	Colorado	03 North Central	-33.33
Texas	Cooke	03 North Central	-33.33
Texas	Dallas	03 North Central	-33.33
Texas	De Witt	03 North Central	-33.33
Texas	Delta	03 North Central	-33.33
Texas	Denton	03 North Central	-33.33
Texas	Ellis	03 North Central	-33.33
Texas	Falls	03 North Central	-33.33
Texas	Fannin	03 North Central	-33.33
Texas	Fayette	03 North Central	-33.33

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Freestone	03 North Central	-33.33
Texas	Goliad	03 North Central	-33.33
Texas	Gonzales	03 North Central	-33.33
Texas	Grayson	03 North Central	-33.33
Texas	Guadalupe	03 North Central	-33.33
Texas	Hill	03 North Central	-33.33
Texas	Hopkins	03 North Central	-33.33
Texas	Hunt	03 North Central	-33.33
Texas	Jack	03 North Central	-33.33
Texas	Johnson	03 North Central	-33.33
Texas	Kaufman	03 North Central	-33.33
Texas	Lamar	03 North Central	-33.33
Texas	Lavaca	03 North Central	-33.33
Texas	Lee	03 North Central	-33.33
Texas	Limestone	03 North Central	-33.33
Texas	Milam	03 North Central	-33.33
Texas	Montague	03 North Central	-33.33
Texas	Navarro	03 North Central	-33.33
Texas	Parker	03 North Central	-33.33
Texas	Rains	03 North Central	-33.33
Texas	Robertson	03 North Central	-33.33
Texas	Rockwall	03 North Central	-33.33
Texas	Tarrant	03 North Central	-33.33
Texas	Washington	03 North Central	-33.33
Texas	Wise	03 North Central	-33.33
Texas	Young	03 North Central	-33.33
Texas	Aransas	04 South	-89.13
Texas	Atascosa	04 South	-89.13
Texas	Bee	04 South	-89.13

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Brazoria	04 South	-89.13
Texas	Brooks	04 South	-89.13
Texas	Calhoun	04 South	-89.13
Texas	Cameron	04 South	-89.13
Texas	Dimmit	04 South	-89.13
Texas	Duval	04 South	-89.13
Texas	Fort Bend	04 South	-89.13
Texas	Frio	04 South	-89.13
Texas	Galveston	04 South	-89.13
Texas	Hidalgo	04 South	-89.13
Texas	Jackson	04 South	-89.13
Texas	Jim Hogg	04 South	-89.13
Texas	Jim Wells	04 South	-89.13
Texas	Karnes	04 South	-89.13
Texas	Kenedy	04 South	-89.13
Texas	Kleberg	04 South	-89.13
Texas	La Salle	04 South	-89.13
Texas	Live Oak	04 South	-89.13
Texas	Matagorda	04 South	-89.13
Texas	Maverick	04 South	-89.13
Texas	McMullen	04 South	-89.13
Texas	Nueces	04 South	-89.13
Texas	Refugio	04 South	-89.13
Texas	San Patricio	04 South	-89.13
Texas	Starr	04 South	-89.13
Texas	Victoria	04 South	-89.13
Texas	Webb	04 South	-89.13
Texas	Wharton	04 South	-89.13
Texas	Willacy	04 South	-89.13

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Wilson	04 South	-89.13
Texas	Zapata	04 South	-89.13
Texas	Zavala	04 South	-89.13
Texas	Bandera	05 West Central	-73.91
Texas	Bell	05 West Central	-73.91
Texas	Bexar	05 West Central	-73.91
Texas	Blanco	05 West Central	-73.91
Texas	Bosque	05 West Central	-73.91
Texas	Brown	05 West Central	-73.91
Texas	Burnet	05 West Central	-73.91
Texas	Callahan	05 West Central	-73.91
Texas	Coleman	05 West Central	-73.91
Texas	Comal	05 West Central	-73.91
Texas	Comanche	05 West Central	-73.91
Texas	Concho	05 West Central	-73.91
Texas	Coryell	05 West Central	-73.91
Texas	Crockett	05 West Central	-73.91
Texas	Eastland	05 West Central	-73.91
Texas	Edwards	05 West Central	-73.91
Texas	Erath	05 West Central	-73.91
Texas	Gillespie	05 West Central	-73.91
Texas	Hamilton	05 West Central	-73.91
Texas	Hays	05 West Central	-73.91
Texas	Hood	05 West Central	-73.91
Texas	Kendall	05 West Central	-73.91
Texas	Kerr	05 West Central	-73.91
Texas	Kimble	05 West Central	-73.91
Texas	Kinney	05 West Central	-73.91
Texas	Lampasas	05 West Central	-73.91

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Llano	05 West Central	-73.91
Texas	Mason	05 West Central	-73.91
Texas	McCulloch	05 West Central	-73.91
Texas	McLennan	05 West Central	-73.91
Texas	Medina	05 West Central	-73.91
Texas	Menard	05 West Central	-73.91
Texas	Mills	05 West Central	-73.91
Texas	Palo Pinto	05 West Central	-73.91
Texas	Real	05 West Central	-73.91
Texas	Runnels	05 West Central	-73.91
Texas	San Saba	05 West Central	-73.91
Texas	Schleicher	05 West Central	-73.91
Texas	Somervell	05 West Central	-73.91
Texas	Stephens	05 West Central	-73.91
Texas	Sutton	05 West Central	-73.91
Texas	Travis	05 West Central	-73.91
Texas	Uvalde	05 West Central	-73.91
Texas	Val Verde	05 West Central	-73.91
Texas	Williamson	05 West Central	-73.91
Texas	Andrews	06 Northwest	-100
Texas	Archer	06 Northwest	-100
Texas	Armstrong	06 Northwest	-100
Texas	Bailey	06 Northwest	-100
Texas	Baylor	06 Northwest	-100
Texas	Borden	06 Northwest	-100
Texas	Briscoe	06 Northwest	-100
Texas	Carson	06 Northwest	-100
Texas	Castro	06 Northwest	-100
Texas	Childress	06 Northwest	-100

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Cochran	06 Northwest	-100
Texas	Coke	06 Northwest	-100
Texas	Collingsworth	06 Northwest	-100
Texas	Cottle	06 Northwest	-100
Texas	Crosby	06 Northwest	-100
Texas	Dallam	06 Northwest	-100
Texas	Dawson	06 Northwest	-100
Texas	Deaf Smith	06 Northwest	-100
Texas	Dickens	06 Northwest	-100
Texas	Donley	06 Northwest	-100
Texas	Fisher	06 Northwest	-100
Texas	Floyd	06 Northwest	-100
Texas	Foard	06 Northwest	-100
Texas	Gaines	06 Northwest	-100
Texas	Garza	06 Northwest	-100
Texas	Glasscock	06 Northwest	-100
Texas	Gray	06 Northwest	-100
Texas	Hale	06 Northwest	-100
Texas	Hall	06 Northwest	-100
Texas	Hansford	06 Northwest	-100
Texas	Hardeman	06 Northwest	-100
Texas	Hartley	06 Northwest	-100
Texas	Haskell	06 Northwest	-100
Texas	Hemphill	06 Northwest	-100
Texas	Hockley	06 Northwest	-100
Texas	Howard	06 Northwest	-100
Texas	Hutchinson	06 Northwest	-100
Texas	Irion	06 Northwest	-100
Texas	Jones	06 Northwest	-100

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Kent	06 Northwest	-100
Texas	King	06 Northwest	-100
Texas	Knox	06 Northwest	-100
Texas	Lamb	06 Northwest	-100
Texas	Lipscomb	06 Northwest	-100
Texas	Lubbock	06 Northwest	-100
Texas	Lynn	06 Northwest	-100
Texas	Martin	06 Northwest	-100
Texas	Midland	06 Northwest	-100
Texas	Mitchell	06 Northwest	-100
Texas	Moore	06 Northwest	-100
Texas	Motley	06 Northwest	-100
Texas	Nolan	06 Northwest	-100
Texas	Ochiltree	06 Northwest	-100
Texas	Oldham	06 Northwest	-100
Texas	Parmer	06 Northwest	-100
Texas	Potter	06 Northwest	-100
Texas	Randall	06 Northwest	-100
Texas	Reagan	06 Northwest	-100
Texas	Roberts	06 Northwest	-100
Texas	Scurry	06 Northwest	-100
Texas	Shackelford	06 Northwest	-100
Texas	Sherman	06 Northwest	-100
Texas	Sterling	06 Northwest	-100
Texas	Stonewall	06 Northwest	-100
Texas	Swisher	06 Northwest	-100
Texas	Taylor	06 Northwest	-100
Texas	Terry	06 Northwest	-100
Texas	Throckmorton	06 Northwest	-100

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Texas	Tom Green	06 Northwest	-100
Texas	Wheeler	06 Northwest	-100
Texas	Wichita	06 Northwest	-100
Texas	Wilbarger	06 Northwest	-100
Texas	Yoakum	06 Northwest	-100
Texas	Brewster	07 West	NA
Texas	Crane	07 West	NA
Texas	Culberson	07 West	NA
Texas	Ector	07 West	NA
Texas	El Paso	07 West	NA
Texas	Hudspeth	07 West	NA
Texas	Jeff Davis	07 West	NA
Texas	Loving	07 West	NA
Texas	Pecos	07 West	NA
Texas	Presidio	07 West	NA
Texas	Reeves	07 West	NA
Texas	Terrell	07 West	NA
Texas	Upton	07 West	NA
Texas	Ward	07 West	NA
Texas	Winkler	07 West	NA
Virginia	Accomack	01 Coastal Plain	-2.2
Virginia	Brunswick	01 Coastal Plain	-2.2
Virginia	Caroline	01 Coastal Plain	-2.2
Virginia	Charles City	01 Coastal Plain	-2.2
Virginia	Chesapeake city	01 Coastal Plain	-2.2
Virginia	Chesterfield	01 Coastal Plain	-2.2
Virginia	Colonial Heights city	01 Coastal Plain	-2.2
Virginia	Dinwiddie	01 Coastal Plain	-2.2

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Virginia	Emporia city	01 Coastal Plain	-2.2
Virginia	Essex	01 Coastal Plain	-2.2
Virginia	Franklin city	01 Coastal Plain	-2.2
Virginia	Gloucester	01 Coastal Plain	-2.2
Virginia	Greensville	01 Coastal Plain	-2.2
Virginia	Hampton city	01 Coastal Plain	-2.2
Virginia	Hanover	01 Coastal Plain	-2.2
Virginia	Henrico	01 Coastal Plain	-2.2
Virginia	Hopewell city	01 Coastal Plain	-2.2
Virginia	Isle Of Wight	01 Coastal Plain	-2.2
Virginia	James City	01 Coastal Plain	-2.2
Virginia	King And Queen	01 Coastal Plain	-2.2
Virginia	King George	01 Coastal Plain	-2.2
Virginia	King William	01 Coastal Plain	-2.2
Virginia	Lancaster	01 Coastal Plain	-2.2
Virginia	Mathews	01 Coastal Plain	-2.2
Virginia	Middlesex	01 Coastal Plain	-2.2
Virginia	New Kent	01 Coastal Plain	-2.2
Virginia	Newport News city	01 Coastal Plain	-2.2
Virginia	Norfolk city	01 Coastal Plain	-2.2
Virginia	Northampton	01 Coastal Plain	-2.2
Virginia	Northumberland	01 Coastal Plain	-2.2
Virginia	Petersburg city	01 Coastal Plain	-2.2
Virginia	Petersburg city	01 Coastal Plain	-2.2
Virginia	Poquoson city	01 Coastal Plain	-2.2
Virginia	Portsmouth city	01 Coastal Plain	-2.2
Virginia	Prince George	01 Coastal Plain	-2.2
Virginia	Richmond	01 Coastal Plain	-2.2
Virginia	Richmond city	01 Coastal Plain	-2.2

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Virginia	Richmond city	01 Coastal Plain	-2.2
Virginia	Southampton	01 Coastal Plain	-2.2
Virginia	Suffolk city	01 Coastal Plain	-2.2
Virginia	Surry	01 Coastal Plain	-2.2
Virginia	Sussex	01 Coastal Plain	-2.2
Virginia	Virginia Beach city	01 Coastal Plain	-2.2
Virginia	Westmoreland	01 Coastal Plain	-2.2
Virginia	Williamsburg city	01 Coastal Plain	-2.2
Virginia	York	01 Coastal Plain	-2.2
Virginia	Amelia	02 Southern Piedmont	1.88
Virginia	Appomattox	02 Southern Piedmont	1.88
Virginia	Bedford	02 Southern Piedmont	1.88
Virginia	Bedford city	02 Southern Piedmont	1.88
Virginia	Buckingham	02 Southern Piedmont	1.88
Virginia	Campbell	02 Southern Piedmont	1.88
Virginia	Charlotte	02 Southern Piedmont	1.88
Virginia	Cumberland	02 Southern Piedmont	1.88
Virginia	Danville city	02 Southern Piedmont	1.88
Virginia	Franklin	02 Southern Piedmont	1.88
Virginia	Halifax	02 Southern Piedmont	1.88
Virginia	Henry	02 Southern Piedmont	1.88
Virginia	Lunenburg	02 Southern Piedmont	1.88
Virginia	Lynchburg city	02 Southern Piedmont	1.88
Virginia	Martinsville city	02 Southern Piedmont	1.88
Virginia	Mecklenburg	02 Southern Piedmont	1.88
Virginia	Nottoway	02 Southern Piedmont	1.88
Virginia	Patrick	02 Southern Piedmont	1.88
Virginia	Pittsylvania	02 Southern Piedmont	1.88
Virginia	Powhatan	02 Southern Piedmont	1.88

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Virginia	Prince Edward	02 Southern Piedmont	1.88
Virginia	South Boston city	02 Southern Piedmont	1.88
Virginia	Albemarle	03 Northern Piedmont	-2.62
Virginia	Alexandria city	03 Northern Piedmont	-2.62
Virginia	Amherst	03 Northern Piedmont	-2.62
Virginia	Arlington	03 Northern Piedmont	-2.62
Virginia	Charlottesville city	03 Northern Piedmont	-2.62
Virginia	Culpeper	03 Northern Piedmont	-2.62
Virginia	Fairfax	03 Northern Piedmont	-2.62
Virginia	Fairfax city	03 Northern Piedmont	-2.62
Virginia	Falls Church city	03 Northern Piedmont	-2.62
Virginia	Fauquier	03 Northern Piedmont	-2.62
Virginia	Fluvanna	03 Northern Piedmont	-2.62
Virginia	Fredericksburg city	03 Northern Piedmont	-2.62
Virginia	Goochland	03 Northern Piedmont	-2.62
Virginia	Greene	03 Northern Piedmont	-2.62
Virginia	Loudoun	03 Northern Piedmont	-2.62
Virginia	Louisa	03 Northern Piedmont	-2.62
Virginia	Madison	03 Northern Piedmont	-2.62
Virginia	Manassas city	03 Northern Piedmont	-2.62
Virginia	Manassas Park city	03 Northern Piedmont	-2.62
Virginia	Nelson	03 Northern Piedmont	-2.62
Virginia	Orange	03 Northern Piedmont	-2.62
Virginia	Prince William	03 Northern Piedmont	-2.62
Virginia	Rappahannock	03 Northern Piedmont	-2.62
Virginia	Spotsylvania	03 Northern Piedmont	-2.62
Virginia	Stafford	03 Northern Piedmont	-2.62
Virginia	Alleghany	04 Northern Mountains	10.96
Virginia	Augusta	04 Northern Mountains	10.96

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Virginia	Bath	04 Northern Mountains	10.96
Virginia	Botetourt	04 Northern Mountains	10.96
Virginia	Buena Vista city	04 Northern Mountains	10.96
Virginia	Clarke	04 Northern Mountains	10.96
Virginia	Clifton Forge city	04 Northern Mountains	10.96
Virginia	Covington city	04 Northern Mountains	10.96
Virginia	Craig	04 Northern Mountains	10.96
Virginia	Frederick	04 Northern Mountains	10.96
Virginia	Harrisonburg city	04 Northern Mountains	10.96
Virginia	Highland	04 Northern Mountains	10.96
Virginia	Lexington city	04 Northern Mountains	10.96
Virginia	Page	04 Northern Mountains	10.96
Virginia	Roanoke	04 Northern Mountains	10.96
Virginia	Roanoke city	04 Northern Mountains	10.96
Virginia	Rockbridge	04 Northern Mountains	10.96
Virginia	Rockingham	04 Northern Mountains	10.96
Virginia	Salem city	04 Northern Mountains	10.96
Virginia	Shenandoah	04 Northern Mountains	10.96
Virginia	Staunton city	04 Northern Mountains	10.96
Virginia	Warren	04 Northern Mountains	10.96
Virginia	Waynesboro city	04 Northern Mountains	10.96
Virginia	Winchester city	04 Northern Mountains	10.96
Virginia	Bland	05 Southern Mountains	2.81
Virginia	Bristol city	05 Southern Mountains	2.81
Virginia	Buchanan	05 Southern Mountains	2.81
Virginia	Carroll	05 Southern Mountains	2.81
Virginia	Dickenson	05 Southern Mountains	2.81
Virginia	Floyd	05 Southern Mountains	2.81
Virginia	Galax city	05 Southern Mountains	2.81

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
Virginia	Galax city	05 Southern Mountains	2.81
Virginia	Giles	05 Southern Mountains	2.81
Virginia	Grayson	05 Southern Mountains	2.81
Virginia	Lee	05 Southern Mountains	2.81
Virginia	Montgomery	05 Southern Mountains	2.81
Virginia	Norton city	05 Southern Mountains	2.81
Virginia	Pulaski	05 Southern Mountains	2.81
Virginia	Radford city	05 Southern Mountains	2.81
Virginia	Russell	05 Southern Mountains	2.81
Virginia	Scott	05 Southern Mountains	2.81
Virginia	Smyth	05 Southern Mountains	2.81
Virginia	Tazewell	05 Southern Mountains	2.81
Virginia	Washington	05 Southern Mountains	2.81
Virginia	Wise	05 Southern Mountains	2.81
Virginia	Wythe	05 Southern Mountains	2.81
West Virginia	Barbour	02 Northeastern	0.28
West Virginia	Berkeley	02 Northeastern	0.28
West Virginia	Braxton	02 Northeastern	0.28
West Virginia	Grant	02 Northeastern	0.28
West Virginia	Hampshire	02 Northeastern	0.28
West Virginia	Hardy	02 Northeastern	0.28
West Virginia	Harrison	02 Northeastern	0.28
West Virginia	Jefferson	02 Northeastern	0.28
West Virginia	Lewis	02 Northeastern	0.28
West Virginia	Mineral	02 Northeastern	0.28
West Virginia	Morgan	02 Northeastern	0.28
West Virginia	Pendleton	02 Northeastern	0.28
West Virginia	Pocahontas	02 Northeastern	0.28
West Virginia	Preston	02 Northeastern	0.28

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
West Virginia	Randolph	02 Northeastern	0.28
West Virginia	Taylor	02 Northeastern	0.28
West Virginia	Tucker	02 Northeastern	0.28
West Virginia	Upshur	02 Northeastern	0.28
West Virginia	Webster	02 Northeastern	0.28
West Virginia	Boone	03 Southern	0
West Virginia	Clay	03 Southern	0
West Virginia	Fayette	03 Southern	0
West Virginia	Greenbrier	03 Southern	0
West Virginia	Kanawha	03 Southern	0
West Virginia	Logan	03 Southern	0
West Virginia	McDowell	03 Southern	0
West Virginia	Mercer	03 Southern	0
West Virginia	Mingo	03 Southern	0
West Virginia	Monroe	03 Southern	0
West Virginia	Nicholas	03 Southern	0
West Virginia	Raleigh	03 Southern	0
West Virginia	Summers	03 Southern	0
West Virginia	Wyoming	03 Southern	0
West Virginia	Brooke	04 Northwestern	0.91
West Virginia	Cabell	04 Northwestern	0.91
West Virginia	Calhoun	04 Northwestern	0.91
West Virginia	Doddridge	04 Northwestern	0.91
West Virginia	Gilmer	04 Northwestern	0.91
West Virginia	Hancock	04 Northwestern	0.91
West Virginia	Jackson	04 Northwestern	0.91
West Virginia	Lincoln	04 Northwestern	0.91
West Virginia	Marion	04 Northwestern	0.91
West Virginia	Marshall	04 Northwestern	0.91

State	County	FIA Unit	Percent Timberland Area Change, Pre-2008 To Most Recent
West Virginia	Mason	04 Northwestern	0.91
West Virginia	Monongalia	04 Northwestern	0.91
West Virginia	Ohio	04 Northwestern	0.91
West Virginia	Pleasants	04 Northwestern	0.91
West Virginia	Putnam	04 Northwestern	0.91
West Virginia	Ritchie	04 Northwestern	0.91
West Virginia	Roane	04 Northwestern	0.91
West Virginia	Tyler	04 Northwestern	0.91
West Virginia	Wayne	04 Northwestern	0.91
West Virginia	Wetzel	04 Northwestern	0.91
West Virginia	Wirt	04 Northwestern	0.91
West Virginia	Wood	04 Northwestern	0.91

