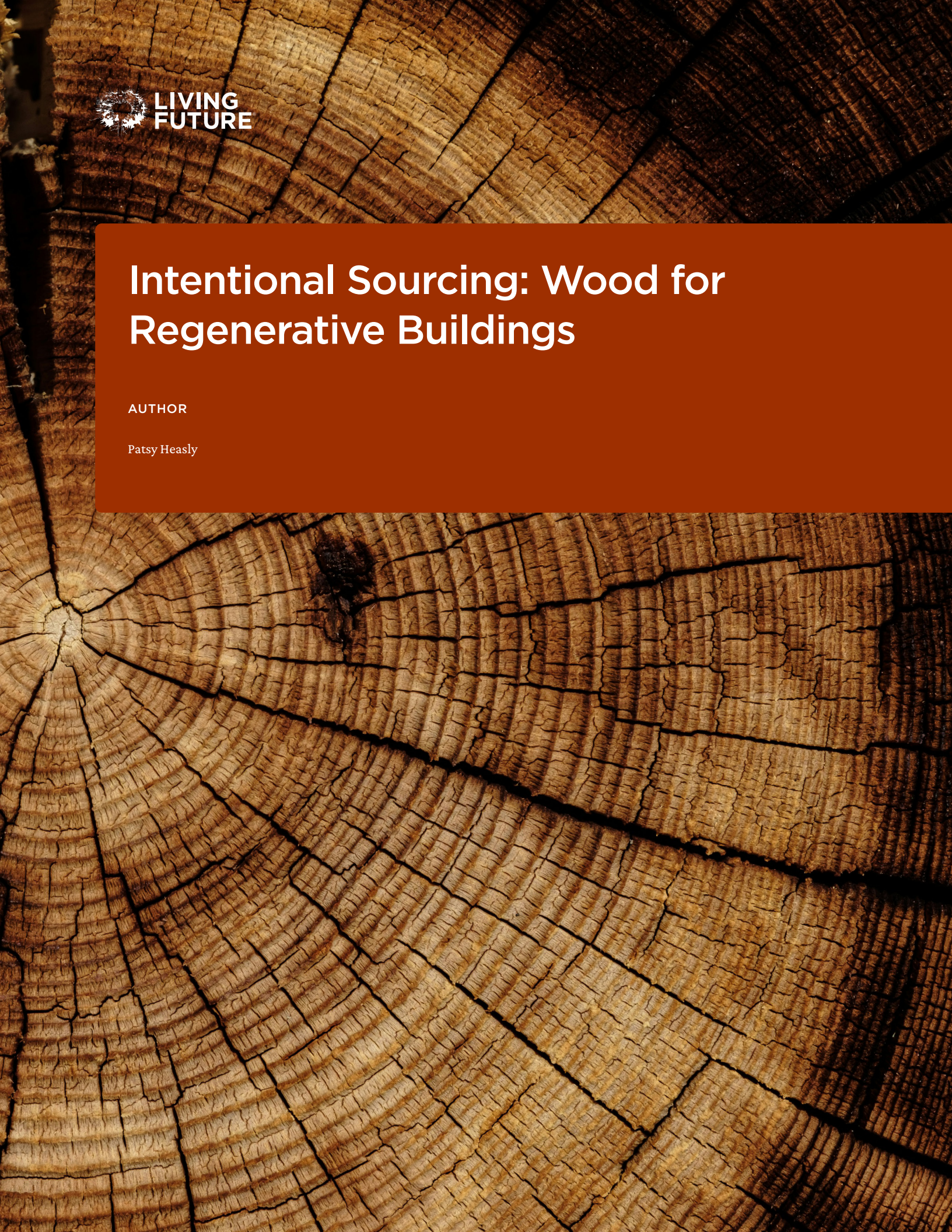

LIVING FUTURE

Intentional Sourcing: Wood for Regenerative Buildings

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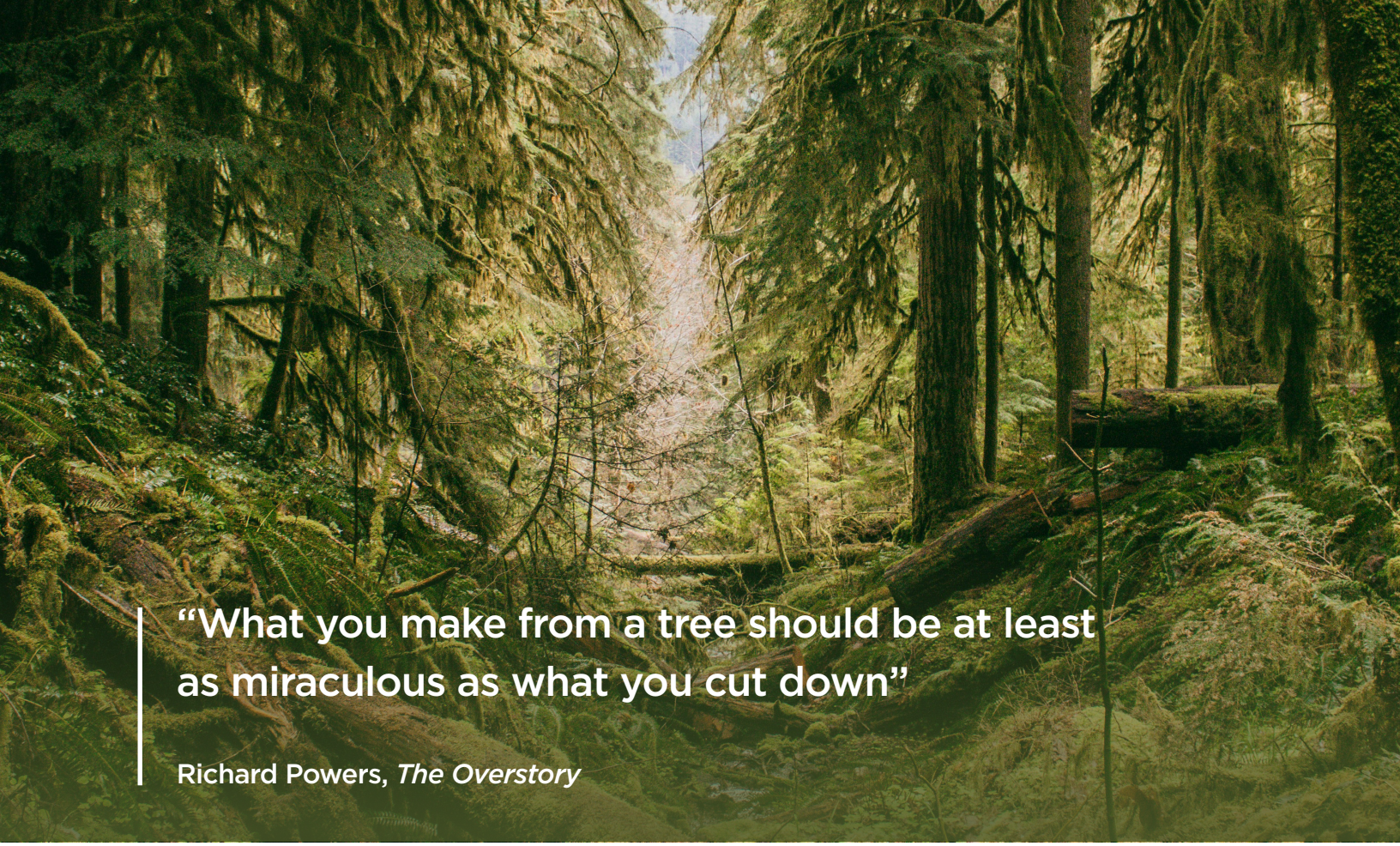

> "What you make from a tree should be at least as miraculous as what you cut down"
>
> Richard Powers, *The Overstory*

The Challenge

Wood is increasingly being offered as a climate change solution that has the potential to both lower a building's embodied carbon and provide carbon storage—two key strategies for limiting carbon emissions. As a long-standing leader in advancing low-carbon building practices, Living Future recognizes the important role wood can play in creating climate-responsive structures. But it also recognizes that wood products come from living forests that provide an array of vital ecosystem services, and that

> **focusing only on the value of wood as part of the built environment risks leaving out critical parts of the picture.**

Reflecting on how to ensure that a comprehensive view of wood's ecological and social benefits holds prominence amid a heightened emphasis on its value as a climate solution, Living Future looked to its primary building standard, the Living Building Challenge (LBC), and the role it plays for the building industry as a whole. In describing the endpoints and paths to meaningful, credible regenerative impact, LBC simultaneously provides mechanisms for tangible action, education, and advocacy. Both its formative ecological, cultural, and social objectives and its current wood sourcing pathways, which allow Forest Stewardship Council (FSC) certification, reclaimed materials, and locally salvaged wood, reflect a holistic perspective. Yet, Living Future recognized that there are other potential sources—such as those associated with Tribal stewardship, ecological restoration,

or improved retention on the landscape—that similarly exemplify the multifaceted contributions of wood to human and ecosystem well-being, but remain outside the existing LBC framework.

Acting on that knowledge, and a generous grant from the Clif Family Foundation, Living Future undertook a process of research, consultation, and collaboration to establish a set of criteria that could expand the way wood for regenerative buildings is reflected in its standards. This white paper explains the approach, rationales, and resulting strategies that promote ecosystem function, indigenous stewardship, forest carbon storage, and supply chain transparency.

Why Management Matters

Trees anchor processes that are fundamental to our welfare. Intact forests provide clean drinking water for more than 150 million people across the United States.1 They provide vital habitat for fish and pollinators, moderate flood waters, stabilize soils and climate, and sustain biodiversity. And, in addition to removing carbon from the atmosphere and storing it, they clean the air of pollutants like nitrogen dioxide and carbon monoxide, and generate the oxygen we need to breathe.

To provide this array of services, forests need to sustain the complex, dynamic interactions that exist in a functioning ecosystem. Trees are a defining element of the forest not only because of their part in converting light, water, and nutrients into the compounds that sustain life, but also due to their fundamental structures, which from root to crown provide habitats and microconditions that support a wealth of interconnected organisms both within and beyond the forest. The spatial and species characteristics of these structures are also critical for maintaining forests' resilience to disturbances like wildfire, drought, and disease, all of which are expected to continue to worsen with climate change.[2, 3]

Harvesting trees and transforming them into wood building products serves an important function. That said,

> **forest management for wood production exists along a spectrum, and depending on the objectives for the source forest, the outcomes for the other ecosystem services we rely on—including carbon sequestration—can vary widely.[4, 5]**

At one end of the spectrum are the most intensive forms of production forestry. Under extensive short-rotation clearcuts, once-complex forests* are managed as monoculture plantations, with diminished biodiversity, altered soil and water processes, and constrained resilience.[6, 7, 8, 4] On the other end of the spectrum is ecological forestry, which aims to retain the structures and species fundamental to the intricate relationships and processes that forest ecosystems need to thrive.[5] Between these is a range of management strategies that might include extending the time between clearcuts to allow both increased carbon removal and establishment of a biodiverse understory, or keeping a continuous multi-aged cover of trees to generate a consistent supply of timber while leaving many forest processes intact.

The Supply Chain

So what does this management continuum mean for specifiers who want to align procurement in support of ecosystem integrity? Currently, the prevailing supply chain creates a disconnect that makes that a challenging prospect. Throughout the typical wood production process, sorting and mixing from multiple sources means that the forest of origin of a given piece of wood is quickly lost. This makes understanding the forest conditions associated with that material, and aligning purchases to support ecosystem or other place-centered objectives, extremely challenging.



These challenges are addressed to an extent by the major wood certification systems, which account for approximately 20% of working forest area in the US.[9, 10] These systems publish the management requirements for their certified forests and employ

chain of custody (COC) processes that provide a level of tracking not typically available for non-certified sources. However, these COCs largely focus on ensuring certified volumes of wood are accurately accounted for at each step in the supply chain rather than tracing the original source. This means that while certified products represent a quantity of wood managed under certain criteria, the buyer is ultimately unable to identify, or indicate a preference for, a specific source forest.

Without a transparent process that values the connection to the source forest, buyers are left with little awareness of how their purchases affect a given landscape. And while certifications do provide insight into forest management, they do not currently provide a transparent link to the forest of origin.

That lost connection represents a vital missing piece for project teams wanting to promote not only healthy forest ecosystems, but also place-based priorities like regional forest restoration or the community benefits provided by Tribal and locally-owned operations.



*Living Future recognizes that the preponderance of plantation forestry in the US is occurring on forestlands converted in the 19th and 20th centuries; however, the impacts to ecosystem function and services, as well as the potential for future conversions, remain.



The Response

In response to these challenging dynamics, Living Future initiated development of an expanded wood sourcing framework for LBC, with an initial focus on the US. The intent is not to create another wood certification system, but rather to augment rigorous sourcing options in a way that both recognizes wood sourced with positive ecological, cultural, and social impacts and strengthens supply chain transparency. Specifically, the work (1) broadens the definition of wood aligned with regenerative construction practices, and (2) identifies criteria to inform three new sourcing possibilities, supported by a companion supply chain protocol that traces the connection from source to project.

> **Developed with input from industry experts and building on the efforts of individual pioneering project teams, the framework introduces standardized metrics, thresholds, and verification processes, including third-party audits and supporting documentation.**

Together, these elements create a clear and credible demand signal to accelerate the procurement of responsibly sourced wood for regenerative buildings—amplifying both market transformation and ecological impact.

The Process

To lay the groundwork for this expanded approach, Living Future reviewed scientific literature, researched forest ownership, analyzed standards for certification systems, evaluated existing wood certifications, and connected with allied efforts working to highlight transparency and exemplary forestry. It then convened advisors representing a broad range of stakeholders and industry experts, including forest ecologists and modelers; forest landowners, managers, and advisors; third-party verification experts; Tribal members; wood product manufacturers; and architects. These experts provided technical input at each phase of development.

Creating a Definition of Wood for Regenerative Buildings

In the past, Living Future programs have narrowly defined compliant wood sources as either FSC-certified, reclaimed building material, or harvested from the project site. An essential element of the current effort has been developing the following definition of wood for regenerative buildings that both encompasses existing approved sources, but also captures more broadly the stewardship practices that reflect trees not only as potential wood products, but as components of a complex natural system.

THE DEFINITION

> **Wood for regenerative buildings must be reclaimed building material or verified to be from localized tree salvage, forests managed and harvested for improved ecological or forest carbon outcomes, or generated by indigenous stewardship.**

The Key Sources

The sources embraced by this definition further the positive intent of regenerative building by encouraging circularity and resource conservation, promoting forest restoration and multi-attribute ecological performance, and supporting social justice. They open the door to more wood-sourcing pathways that can both inspire and offer designers a means for turning every project into a powerful catalyst for climate action, forest health and resilience, and honoring cultural knowledge.

- **Reclaimed Building Material:** Recovering and repurposing wood building material, as well as recycling, keeps valuable resources out of the waste stream and reduces the demand for virgin wood. It also extends the length of time that component carbon stays contained. Reuse of building materials in their original form constitutes one of the lowest embodied carbon strategies available.

- **Localized Tree Salvage:** Trees felled for purposes other than direct income—such as for example, hazard removal—are commonly chipped, burned, or landfilled. Using that wood instead to make durable building products extends carbon storage, conserves resources, and represents a more fit-for-purpose use.

- **Improved Ecological Outcome:** An improved ecological outcome is indicated by harvests and ongoing management that yield ecological conditions well above those resulting from common practice. It can represent a range of forestry approaches, from those meeting the explicit ecological thresholds of the highest-performing management standard to harvests undertaken to restore the structural foundation underpinning forest ecosystem processes, biodiversity, and natural resilience.

- **Improved Forest Carbon Storage:** Carbon removal from the atmosphere and integration into all parts of the tree is an ecosystem function Living Future chose to single out both because it is a high priority for the building industry, and because whether a forest owner is growing plantations or managing for multiple age classes and the full complement of native species, there are practices each can adopt to increase forest carbon storage. Further, increasing carbon capture and storage in the forest is an established low tech approach for climate mitigation.[11]

- **Indigenous Stewardship:** Tribes stewarded the North American landscape for millennia using practices intimately tied to the land until the forcible displacement, dispossession, and broadscale assaults imposed by colonization.[12] Tribes today confront a radically altered environment with inconsistent access and ownership constraining their ability to manage traditional territories for the long-term health of their culture and communities. While many have been able to re-establish land sovereignty, others must continue working for recognition of treaty rights or to fund direct purchases of ancestral ground. Recognizing Tribal wood is one way that the building industry can bring visibility and support to Tribes' rightful sovereignty and stewardship of their lands.

Creating the Sourcing Criteria

Creating a broader definition based on the stewardship practices that reflect regenerative building is an important step, but to enable an assessment of compliance for wood sourced outside of existing approved pathways, more specific criteria with metrics and thresholds are needed. For this initial suite of specific criteria, Living Future focused on ecosystem function, forest carbon storage, and Tribal forestry. While this group does not encompass all sources that align with regenerative building, it does represent a starting point with far-reaching potential—applicable to millions of acres of forest, it marks a significant step in recognizing exceptional forestry on public, private, and Tribal lands that is not captured by certification.

The following section addresses the rationale for key structural decisions reflected in the sourcing criteria and supply chain protocol. The criteria and protocols themselves are presented in Appendix A.

GEOGRAPHIC FOCUS

Wood sourcing has a global reach with many regional nuances. Given the complexity of the undertaking, Living Future limited the geographic scope of this first effort to the United States. With feedback from implementation of these criteria and additional research, it is our intent to develop guidance for other regions in the future.

HARVEST-SPECIFIC FOCUS

The three new sourcing criteria and supply chain protocol are built around discrete harvests. This is a departure from the dominant wood certification programs, which are based on annual audits of an operation's ongoing forest management and supply chain tracking. That process-based approach and the long-term engagement it involves provides clear value, but there are regenerative-aligned sources that it has not captured. A concentrated focus on the outcomes of each specific harvest, coupled with verification of the material's transit through the supply chain, offers a complementary structure to address sourcing gaps while providing authenticity and a clear market signal.

SUPPLY CHAIN TRANSPARENCY

Developed in conjunction with the sourcing criteria, the supply chain protocol is an essential element designed to support key aspects of transparency that the prevailing sourcing processes are not set up for: tracking specified material from the source forest to the final product with disclosure of the source forest to the end user. Knowledge of the source forest provides assurance for the end user regarding the practices that generated the wood and alignment with attributes they value, and creates an opportunity to celebrate and bring value to the forest owner.

THIRD-PARTY VERIFICATION

The approach to both the sourcing criteria and the supply chain protocol retain Living Future's emphasis on third-party verification. Both the harvest outcome on the ground and the subsequent passage through the supply chain will require third-party audits providing independent review and documentation of performance relative to the criteria.





Next Steps

Building on this foundational work to expand and clarify what it means to source wood for regenerative buildings, Living Future is poised to move into the next phase of our larger program update. The next steps will focus on integrating the expanded definition and framework into the upcoming version of the Living Building Challenge while maintaining FSC-certified wood, reclaimed materials, and intentionally harvested on-site wood as approved sources. This integration will be shaped by the broader structure of the LBC update as it evolves over the coming months. Additional supporting guidance and tools to assist teams in operationalizing this work and potential pilot project feedback will further refine this guidance and accelerate the industry's creation of regenerative buildings.

In creating this wood sourcing framework, Living Future sought to form a new structure for qualifying wood that supports the climate, improves forest health and resiliency, and reflects a restorative sense of equity. Its development involved a considerable amount of learning, listening, and collaboration to balance a host of variables and produce a suite of parameters that furthered the end goal in a way that was feasible, meaningful, and credible. And there is more work to be done. To create a meaningful shift in the wood marketplace that rewards forestry managing for multiple ecological values will require the active engagement of architects, non-governmental and scientific communities, certification systems, suppliers, wood product manufacturers, and forest owners. This framework is a first step in recognizing more of the landowners and actors along the supply chain whose practices are already aligned with that vision. We hope that it will not only build momentum for wood procurement that prioritizes transparency, ecological health, and social equity, but also provide the impetus for further evolution of the tools, systems, and relationships needed for a regenerative future.

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Appendices

Appendix A and B provide the principal elements of the harvest- and transparency-focused wood sourcing framework proposed by Living Future to reflect exceptional ecological and social outcomes. When fully formulated as part of an update to the Living Building Challenge, specific verification and documentation requirements, along with additional implementation guidance, will be provided. Appendix C contains a glossary of terms.

APPENDIX A

WOOD SOURCING CRITERIA

Requirements Common to All Sourcing Criteria

LEGAL COMPLIANCE

Use of these sourcing pathways carries an expectation of compliance with all applicable laws and regulations, including those related to historic preservation, endangered species, wetlands, and worker safety. Evidence of compliance with national historic preservation laws as applicable to timber harvest in the region will be required, and attestations or reference to compliant documentation will be required for the remaining regulations listed above.

VERIFICATION

As part of the criteria development process, the verification audit and documentation requirements were sufficiently elaborated to ensure the feasibility and integrity of the criteria and they will be finalized as part of integrating the criteria into LBC as compliance pathways. Source verification involves an onsite audit as well as review of required documentation, which includes management plans, harvest prescriptions, characterizations of existing and reference conditions, and evidence or attestations of legal compliance. The criteria descriptions below highlight additional areas of emphasis that are key to assessing and substantiating conformance with each set of criteria. Audit team qualifications will be detailed in the LBC compliance pathways.

ECOSYSTEM FUNCTION CRITERIA

Ecosystem Function - Approach

The primary evaluation basis for ecosystem function is the overstory structure that would be expected for the forest type under historical conditions. Overstory structure refers to characteristics of the trees comprising the forest canopy including such factors as spatial distribution and density of cover, size and species composition, and the amount and distribution of dead and dying trees. Overstory structure is a fundamental component of ecosystem function and is directly affected by the trees removed or retained during a harvest (Johnson, 2018). When the structure reflects the range of historical conditions, the forest has core elements essential to its characteristic expression of biodiversity and resilience.

The reference for historical conditions is the Historical Range of Variation (HRV), which for purposes of the Living Building Challenge means the ecological conditions that existed prior to settlement, including the spatial and temporal variation in these conditions, as driven by factors including disturbance regimes. Within North America, this means the conditions prior to settlement by Europeans and explicitly includes the effects of Tribal cultural and subsistence activities. “Disturbance regimes” refers to structure-altering events such as wildfire and windstorms and their characteristic frequency and intensity.

Living Future recognizes that in some regions of the country, such as the Northeast and Great Lakes, conditions have been so altered that management and harvests cannot meaningfully improve the trajectory for some tree species characteristic of the HRV (e.g. blighted American chestnut). In these cases, a modified HRV may be proposed in a detailed justification that names and substantiates the specific change as well as the new expected condition.

Ecosystem Function - Harvest Criteria

METRICS AND THRESHOLDS

The criteria listed below apply to all forest ecosystems within the area covered by the timber sale, including riparian areas and other areas of special ecological significance. The evaluation basis is the pre-harvest condition of the stand(s) within the timber sale area and all criteria must be met.

1. Overstory Complexity: The harvest must not move the forest ecosystem away from the overstory conditions that would be expected for the successional stage of the stand(s) based on the historical range of variation (HRV) on any of the parameters a-c below, and must improve the stand's condition for evolving to the next successional stage on at least one.
    a. Age Complexity: Harvest maintains the age complexity of the stand(s) overstory or improves it relative to what would be expected by the HRV for the stand's current successional stage and trajectory towards the next successional stage, including the retention of legacy trees.
    b. Species Complexity: Harvest maintains or moves representation of the stand's overstory trees towards what would be expected for the current successional stage and trajectory for developing into later successional stages of HRV.
    c. Structural Complexity: Harvest maintains the spatial and structural heterogeneity of the overstory trees in the stand(s) or moves it towards what would be expected for the current or later successional stages of HRV, including retention of defective trees and structures (e.g., snags, logs, cavities, and brooms) where this is reflective of HRV.
2. Successional Stages: Maintains or advances the trajectory of the stand(s) towards later successional stages of the HRV. Provides for continuity in structure, function, and biota between forest generations.
3. Resistance to natural disturbances: Harvest manages stand(s) and forest to absorb the impacts of natural disturbances and to persist into the future, with reference to HRV. Management should account for climate change stressors in the region, such as extended drought or higher severity of other disturbances than experienced in the past.
4. Aquatic Habitats: Where aquatic habitats, including wetlands, exist in the timber sale area, whether seasonal or perennial, state best management practices (BMP's) and applicable local, state, and federal regulations are met or exceeded during harvest, road construction, and all other mechanical disturbance. The objective is to maintain or improve soil structure and stability in riparian areas, minimize siltation, and provide for both water temperatures and in-stream structure/habitat, including woody debris, towards the range of natural variation.
5. Sensitive Species Habitat: Harvest protects state and federally listed species and maintains or improves the functional integrity of their habitat in the area within the timber sale, through, at a minimum, compliance with all state and federal endangered species laws.
6. Soil Integrity: Forest management activities and equipment selection protect soils from compaction, rutting and erosion, including: implementation of BMPs to protect soil; implementation of wet weather shut down procedures; seeding with native species where available and/or covering temporary roads, harvest trails and other disturbed areas; and brushing trails to minimize compaction and rutting.
7. Pesticide Use:
    a. No aerial application of pesticides (insecticides, rodenticides, acaricides, molluscicides, larvaecides, nematicides, fungicides and herbicides) by means other than drone, which must be targeted from a low altitude, not broadcast, and comply with all Federal Aviation Administration and state requirements, including drone pilot and agricultural aircraft operator certifications and drone registration (14 CFR parts 107 and 137).
    b. No use of chemicals identified as Prohibited or Highly Restricted by FSC in its list of Highly Hazardous Pesticides (FSC-POL-30-001a V1-1).
    c. Use of chemicals identified as Restricted in the FSC

list of Highly Hazardous Pesticides only when use is documented as the lowest risk option to control a pest, weed or disease problem that is outside of the natural disturbance regime. The lowest risk option must be supported by an environmental and social risk assessment examining exposure risk and hazard to people and the environment and after any risks have been mitigated to the extent practicable.

8. Roads and Culverts: Alterations to the transportation system associated with the harvest, including design and placement of permanent and temporary haul roads, skid trails, recreational trails, water crossings and landings, are designed, constructed, maintained, and/or reconstructed to reduce short and long-term environmental impacts, habitat fragmentation, soil and water disturbance and cumulative adverse effects, while allowing for customary uses and use rights.

9. Genetically Modified Trees: Harvesting or planting genetically modified trees is prohibited.

10. Historic Preservation: Harvest must demonstrate compliance with all requirements related to preservation of historic and archaeological resources, including those provided in the National Historic Preservation Act (where federal funding is involved) and state regulations.

Ecosystem Function - Verification

Site verification for compliance with these criteria emphasizes pre- and post- harvest conditions relative to the performance criteria as evidenced on the ground. A key component is the description of HRV, which must be based on peer-reviewed scientific journals or technical reports from government or academic research stations that include research that cites or investigates historical reference sites.

Auditor team qualifications include field experience and local ecological knowledge sufficient to interpret the representative HRV and evaluate the harvest outcome.

FOREST CARBON STORAGE CRITERIA

Forest Carbon Storage - Approach

The intent of the Forest Carbon Storage criteria is to increase the standing volume of trees that is actively sequestering carbon on the landscape. This initial set of criteria were developed under the explicit assumption that for purposes of wood sourcing compliance within LBC, a quantitative accounting of carbon storage increase for each harvest would not be required. Linked to carbon storage benefits, the eligible harvest practices involve either leaving more healthy live trees in the stand or allowing trees to grow longer than would occur according to common practice for the region.[2, 4, 12] In addition, there must be evidence that over time, within the area covered by the management plan (which in many cases will be greater than the area of a given timber sale), more live biomass is being retained than harvested.

Public lands have been excluded from use of this criteria because, as exemplified by the mission of the US Forest Service, "to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations", public lands should be managed to provide a wider range of ecosystem services.

Forest Carbon Storage - Harvest Criteria

GENERAL

1. This criteria is available to private forestlands; it is not available to public forestlands.
2. Harvest must provide protection to aquatic habitats, soils, and riparian zones per state BMP's or better;
3. The harvest cannot contain genetically modified trees
4. Harvest cannot constitute any of the following:
    a. Conversion of a non-plantation forest to plantation or conversion of any forest type to non-forest use;
    b. Cutting of old-growth trees

HARVEST

Metrics and Thresholds

Both the criteria for the chosen Forest Practice and the Carbon Stock Stability criteria must be met.

Forest Practice

Any of the following forest practices may be used according to the specified criteria and scale:

1. Commercial Thinning - Harvest Unit Scale
    a. Overstory retention meeting any of the thresholds listed below, in a harvest unit at the "financial rotation age" for a clearcut of sawtimber according to

common practice in the region for the forest type and site quality (as indicated by site class or site index):

ii. Retention Relative to Pre-harvest

1. Minimum 65% of overstory canopy; or
2. Minimum 65% of basal area; or

iii. Post-harvest Density

1. .35 or greater Relative Density

b. The harvest prescription and outcome must not reflect a targeted removal of the site's highest quality and economically valuable trees to the detriment of the stand's long-term genetic diversity and health.

c. An intent to retain threshold levels of residual cover until the stand has met the stand age threshold for Extended Rotation must be reflected in management planning documentation that has been demonstrably adopted and operationalized by the landowner.

2. Extended Rotation - Harvest Unit Scale

a. Harvest occurs when the stand is at least 50% older than the financial rotation age for clearcut harvest of sawtimber according to common practice in the region for the forest type and site quality (as indicated by site class or site index).

3. Continuous Cover - Management Plan Scale

a. No evidence of clearcutting within the area of the management plan covering the harvested unit over the past 10 years, inclusive of the harvest of interest. The existence of any opening larger than 5 contiguous acres with less than 10% canopy cover (on areas that previously had greater than 10% canopy cover) is evidence of clearcutting.

b. The harvest prescription and outcome must not reflect a targeted removal of the site's highest quality and economically valuable trees to the detriment of the stand's long-term genetic diversity and health.

c. Provisions for regeneration and an intent to retain threshold levels of residual cover must be reflected in management planning documentation that has been demonstrably adopted and operationalized by the landowner.

Carbon Stock Sustainability

The following is required in addition to use of any of the forest practice metrics and is applied at the scale of the entire area covered by the management plan that includes the harvest unit:

1. Demonstration that inclusive of the harvest of interest, either:

a. Less than 30% of the total overstory area of historically forested acreage (i.e., area that has been forested within the past 10 years) is bare ground/ recent harvest within the past 10 years.
OR

b. Carbon stocks are non-declining over the past 10 years.

Historic Preservation

Harvest must demonstrate compliance with all requirements regarding preservation of historic and archaeological resources, including the National Historic Preservation Act (where federal funding is involved) and state regulations.

Forest Carbon Storage - Verification

Verification for Forest Carbon Storage emphasizes site assessment of the quality of retained vs. harvested trees, as well as tree age or the amount of residual cover against thresholds. It also involves reviewing harvest and management area delineations and documentation addressing non-declining harvest volumes over time and maintenance of standing cover. Where references are not already provided by Living Future, it also includes review of the characterization of common practice, which must be substantiated by a peer-reviewed or academic publication; a publication, statement, or attestation from a state or federal agency with responsibilities related to the industry; published forest industry trade research; or attestation from a member in good standing of the Association of Consulting Foresters.

Auditor team qualifications will include field familiarity with forestry best practices, local species, and common harvest practices of the region.

TRIBAL FORESTRY CRITERIA

Tribal Forestry - Approach

The structure of this criteria is intended to support Tribal sovereignty and management of their forestlands while providing a baseline threshold that accommodates both cultural and ecological benefit. This reflects a recognition that many Tribes are

intentionally practicing forestry that results in significantly healthier ecological conditions than the legal "floor" applicable to other landowners, and that at the same time, unique cultural identities and community goals may lead to a variety of forest management practices across Tribes.

Tribal Forestry - Harvest Criteria

GENERAL

1. Tribal Organization

    a. For purposes of LBC wood sourcing criteria, "Tribe" represents groups present at any time on the list of Indian Entities Recognized by and Eligible To Receive Services From the United States Bureau of Indian Affairs

2. Tribe Connection to the Forest Site

    a. To be considered a Tribal source, the harvest can be undertaken on forests representing either one of the following relationships:

        i. Land held in fee by the Tribe;

        ii. Trust lands or lands on which the Tribe has a stewardship or management agreement.

HARVEST

Harvest is conducted in accordance with the following. Where a documented plan is referenced, an existing plan approved by the Tribal government that provides the specified content is sufficient:

1. A plan, documented and implemented that specifies measures to:

    a. Maintain or improve the health and resilience of riparian plant communities, protect water quality and in-stream habitat, and protect soil structure and stability throughout the unit during harvest, road construction, and all other mechanical disturbance. The plan may not provide lesser protection than would be achieved through implementation of State best management practices (BMP's), which are considered the minimum acceptable standard. Harvest and timber management may occur within riparian zones where the plan clearly ties the activities to Tribal traditional cultural practices and/or the historical range of variation (HRV) for the forest type.

    b. Provide for worker safety;

    c. Protect any federally listed species and maintain or improve the functional integrity of their habitat in the area within the timber sale;

    d. Maintain or improve the functional integrity of any non-riparian wetlands within the area of the timber sale;

    e. Provide for post-harvest reforestation, which may include natural regeneration, with specific measures that promote healthy soil structure, discourage establishment of and do not incorporate exotic species, and rely on species reflective of the HRV for the forest type.

2. Any of the practices listed under a-c below are undertaken only as part of a documented plan to improve site conditions for specified Tribal traditional cultural practices and/or for ecological purposes. Measures identified as ecological improvement must be developed with reference to the HRV (or conditions reflective of HRV) for the forest type and site.

    The improvement plan must be rooted in established Traditional Ecological Knowledge or credible western science and include a description of the desired future condition. Examples of cultural or ecological purposes include but are not limited to removal of exotic species, controlled burning, thinning from below when and where restoration is appropriate, re-establishing vegetative mosaics historically maintained by Tribal stewardship, including for support of first foods and medicines.

    a. Harvest and other timber management within areas of old-growth;

    b. An area of clearcut totaling more than 60 acres within any single timber sale; or

    c. Application of chemicals identified as "Restricted" in the FSC list of Highly Hazardous Pesticides (FSC-POL-30-001a V1-1). Use must be documented as the lowest risk option to effectively control a pest, weed or disease problem as identified through an environmental and social risk assessment examining exposure risk and hazard to people and the environment, and measures to mitigate the risk to the extent practicable must be documented and implemented.

3. Prohibition of all of the following:

    a. Aerial spraying of permitted pesticides (which includes insecticides, rodenticides, acaricides, molluscicides, larvaecides, nematicides, fungicides and herbicides) by means other than drone, which must be which must be targeted from a low altitude, not broadcast, and comply with all Federal Aviation Administration and state requirements, including drone pilot and agricultural aircraft operator certifications and drone registration (14 CFR parts 107 and 137).

    b. Application of chemicals identified as "Prohibited" or "Highly Restricted" by FSC in its list of Highly Hazardous Pesticides (FSC-POL-30-001a V1-1);

    c. Conversion of non-plantation forest to plantation; and

    d. Harvest or planting genetically modified trees

Verification

In addition to compliance with base criteria, the site verification for Tribal sourcing emphasizes assessment of ecological or cultural improvement outcomes where conditionally permitted practices are used.

Auditor team qualifications include field experience and local ecological knowledge sufficient to interpret ecological and cultural objectives and evaluate the harvest outcome.

APPENDIX B

THE SUPPLY CHAIN PROTOCOL

Use of any of the sourcing criteria requires application of the harvest-specific supply chain protocol. The main elements of the protocol are presented below.

Supply Chain - Approach

The intent of the supply chain protocol is to ensure that the forest providing the threshold ecological function, forest carbon storage, or Tribal forestry is disclosed and that a traceable connection is retained from there through the supply chain to the end user.

The criteria include an allowance to mix sources at the primary processing facility which, combined with downstream segregation and a defined window for processing material for the project, is intended to strike a balance between the particular challenges of segregation at the primary facility and retaining a clear market signal connecting back to the source forest. The approach taken to address the risk that wood mixed in at the mill under this allowance could come from sources engaged in illegal or damaging practices is meant to balance the assessed likelihood of those occurrences for a given region against the documentation burden associated with an individual supply contract.

PROTOCOL

This chain of custody protocol must be used for wood pursuing qualification through the LBC Ecological Function, Forest Carbon Storage, or Tribal Wood sourcing criteria. It is a harvest-specific audited tracing of the supply chain in which both the source forest and each actor in the supply chain is disclosed to the end purchaser. It provides either a segregated or mass balance/mixed approach as detailed below.

1. **Prerequisites**

    a. Verified Wood

        i. Verified Wood has been confirmed to have met Ecosystem Function, Forest Carbon Storage, or Tribal Wood sourcing criteria according to the terms laid out in each criteria.

    b. Non-verified Wood (for Mass Balance approach only)

        ii. Non-Verified Wood must come with an attestation from the primary mill or processing facility that the wood is not in any of the categories considered unacceptable in Requirements for Sourcing FSC®

Controlled Wood (FSC-STD-40-005 V3-1):

1. Illegally harvested wood;
2. Wood harvested in violation of traditional and human rights;
3. Wood from forests in which high conservation values are threatened by management activities;
4. Wood from forests being converted to plantations or non-forest use; and
5. Wood from forests in which genetically modified trees are planted;

iii. The primary mill or processing facility must send to the source forest operation either:

1. The FSC US National Risk Assessment maps (as updated) that identify areas where there is risk of unacceptable sources;
   OR
2. Education materials such as those used in connection with the FSC Controlled Wood standard, addressing specified risks applicable to the region.

2. Tracking Methods

Tracking of wood products through the supply chain for all vendors that supply and take legal ownership of the wood products prior to their arrival on the construction site must be conducted as follows:

a. Identity Preservation and Mass Balance Method

The name of the building project being supplied with material carrying either an Identity Preservation or Mass Balance claim must be indicated on documentation for all project shipments beginning with shipments leaving the primary mill or processing facility and including all intervening shipments through delivery to the project site.

b. Identity Preservation (Segregation)

Under this pathway, all of the Verified wood delivered to the project site is the same fiber that physically grew at the forest/s of origin. Verified Wood must be segregated from Non-verified Wood at each step in the supply chain, beginning with the Verified logs delivered to the primary processing facility and including each succeeding facility through to the site of the final shipment to the project. The segregated material may contain wood from a single source or a deck combining more than one source as long as all of it has been verified as meeting the wood sourcing criteria, and the volume from each source is specified.

c. Mass Balance

Under this pathway, a tracked volume of Verified Wood may be mixed with Non-verified Wood, constituting a Mass Balance claim if all of the following requirements are met. Requirements applicable to a primary mill or processing facilities apply to all that provide material contributing to a Mass Balance claim:

i. The Mass Balance protocol is applied only at primary processing facilities and all downstream parties in the supply chain demonstrate compliance with the segregation protocol;

ii. Verified Logs must be physically present at the primary mill or processing facility (i.e. in the log deck) within the time window of production and shipment for the project. This is the Log Source Timeline (LST), which begins six (6) weeks prior to the first shipment of product for the project and ends with the last shipment.

1. The LST time bounds the Verified log volume that can contribute to the Mass Balance claim for the project;
2. The LST also defines the time period during which all non-verified logs that are physically present at the primary processing facility must meet tracking and reporting requirements for non-verified wood inputs.

iii. For any primary processing facility supplying material with a Mass Balance claim, the total volume claimed must be equal to or less than the total volume of Verified logs (accounting for conversion) present and processed by that facility within the LST.

iv. When multiple processing facilities are supplying material for production of the final product, the total volume of inputs (e.g. lumber, veneer, etc.) carrying a Mass Balance claim from all sources must be greater than or equal to the volume of the final product carrying the Mass

Balance claim, factoring in conversion.

v. Volumes for Verified wood must factor in unit conversions and changes in quantity (e.g. losses processing log to lumber BF), and conversion factors must be shown in calculations.

Verification

The verification and documentation requirements for the supply chain protocol emphasize source disclosure, procurement timelines and transaction sequence, calculations, volumes, demonstration of segregation, attestation of single attribution, and non-verified wood source requirements. The audit consists of document review without the necessity of a site visit.

Auditor team qualifications include professional experience in the forestry or timber products industry with knowledge of wood processing and fabrication processes.

APPENDIX C

Glossary

CREDIBLE WESTERN SCIENCE

Scientific analyses supported by data and explanations in articles published by peer-reviewed professional journals relevant to the matter in question. Credible western science may also include non-peer reviewed studies when conducted by qualified professionals in accordance with accepted scientific methods. Scientific credibility is based on a body of scientific work and on the judgment of experienced professionals. Adapted from FSC-US (2018).

GENETICALLY MODIFIED TREES

Trees whose genetic structures or material have been altered through genetic modification which includes use of any of the following:

1. recombinant nucleic acid techniques involving the formation of new combinations of genetic material by the insertion of nucleic acid molecules produced by whatever means outside an organism, into any virus, bacterial plasmid or other vector system and their incorporation into a host organism in which they do not naturally occur but in which they are capable of continued propagation;
2. techniques involving the direct introduction into an organism of heritable material prepared outside the organism including micro-injection, macro-injection and micro-encapsulation;
3. cell fusion (including protoplast fusion) or hybridization techniques where live cells with new combinations of heritable genetic material are formed through the fusion of two or more cells by means of methods that do not occur naturally.

Techniques not considered to result in genetic modification, on condition that they do not involve the use of recombinant DNA molecules or organisms that have been genetically modified as recipient or parental organisms:

1. in vitro fertilization,
2. natural processes such as: conjugation, transduction, transformation,
3. polyploidy induction;
4. mutagenesis,

5. cell fusion (including protoplast fusion) of plant cells where the resultant organisms can also be produced by traditional breeding methods.

Clones, hybrids formed by natural processes, or the products of traditional tree breeding, selection, grafting, vegetative propagation or tissue culture are not considered products of genetic modification unless they are produced through genetic modification techniques.

Adapted from European Union Directive 2001/18/EC ANNEX I A Parts 1 and 2, and FSC Interpretation on Gmos: Genetically Modified Organisms (FSC-POL-30-602 (2000).

FINANCIAL ROTATION AGE

The financial rotation age is the harvest age determined by management objectives that include, but are not necessarily limited to, maximizing net present value of perpetual wood harvests.

HISTORICAL RANGE OF VARIATION (HRV)

For purposes of the Living Building Challenge, historical range of variation means the ecological conditions, and the spatial and temporal variation in these conditions, that existed prior to settlement. Within North America, this means prior to settlement by Europeans and explicitly includes the effects of Tribal cultural and subsistence activities. Adapted from Aplet and Keeton (2009) and Landres et al. (1999).

LOCALIZED TREE SALVAGE

Wood from trees harvested for reasons other than generating income, land use conversion, or clearing for development beyond on-site harvest. In addition, harvests needed for utility work, or to avoid or remove a public safety hazard or infestation, must cover less than 1 contiguous acre.

OLD-GROWTH

Modified FSC
This is based on the definition in FSC-US (2018) but modified in that it has no minimum acreage
"(1) the oldest seral stage in which a plant community is capable of existing on a site, given the frequency of natural disturbance events, or (2) a very old example of a stand dominated by long-lived early- or mid-seral species. The onset of old growth varies by forest community and region. Depending on the frequency and intensity of disturbances, and site conditions, old-growth forest will have different structures, species compositions, and age distributions, and functional capacities than younger forests".

US Forest Service
Working regional definitions described in Appendix 1, of Mature and Old-Growth Forests: Definition, Identification, and Initial Inventory on Lands Managed by the Forest Service and Bureau of Land Management; April 2023.

PLANTATION

A tree plantation is an area planted with a single species planted in a uniform density and arrangement and managed as a single age class. This definition reflects the traditional conception of a plantation forest as characterized by Zhang and Stanturf (2008).

PRIMARY MILL OR PROCESSING FACILITY

The primary mill or processing facility is the operation that processes the raw logs regardless of the form of the resulting product (board, chips, veneer, etc).

TRADITIONAL ECOLOGICAL KNOWLEDGE

A cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment. It tends to provide a holistic view of managing for multiple resources that offers a model for sustainable use based on principles of respect, reciprocity, and cooperation. Derived from Hoagland (2017).

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