



Old growth forests: *How much is enough?*

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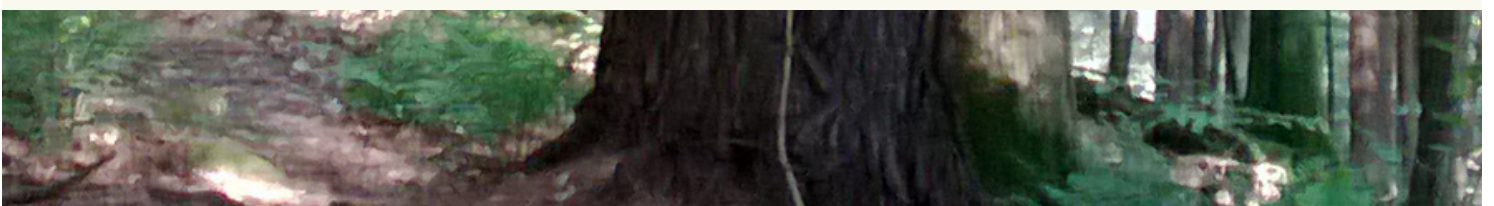


Table of Contents

I. Executive Summary	3
II. What is “old growth”?	4
III. Where are the world’s primary forests and old growth?	9
IV. Why do we need old growth?	10
V. Why don’t we need old growth?!	11
VI. How much old growth is enough? How can we make more old growth?	12
VII. Protection of old growth	13
VIII. The Bottom line	14
IX. References	15



I. Executive Summary

Many of us have an emotional or even spiritual connection to old growth forests. This is not just because we like to see big old trees, but because of the multitude of ecosystem services and diverse values they provide.¹ The Forest Stewards Guild lists those services as including wildlife habitat, carbon storage, stabilization of watersheds, nutrient recycling, and biodiversity, amongst others.² Old growth forests have also historically had economic and social value by providing timber products and supporting forest based businesses and communities. These forests have cultural and social value to Indigenous peoples, First Nations, and Tribes.

In this report, we explore the different definitions of “old growth” applied globally and in regions of North America and Europe, including their scientific basis. From these definitions, we examine where old growth forests exist in the world, with a focus on the United States (US) and the European Union (EU). The report considers why we need old growth forests, and conversely, why we do not, and includes a discussion of old growth forest protection and management. We conclude with a discussion of how much old growth is ‘enough’, how we can create more, and how our understanding of the relationship between people and forests is evolving.

The question of “*What is old growth?*” holds many definitions depending upon the scientific, cultural, and policy lenses that are applied. The variety in these definitions is a recognition that tree species, climate, soil productivity, human interaction, and disturbance history all influence the development of forests. Thus, the question of “*How much old growth forest is enough?*” is contextual and there are many answers. There are forests that previous generations chose to protect, which current generations will also say deserve protection, and that future generations will wrestle with in their own debates. With proper management, creation of secondary old growth forests is possible, and can eventually provide the attributes and benefits of old growth forests. The emerging practice of managing maturing forests to provide old growth characteristics is a strategy deserving of increased attention.

Intact old growth forests provide multiple benefits, but the type of wood provided from these forests is no longer essential to meeting our raw material needs. Today’s engineered wood products can produce dimensionally stable beams that are structurally superior to equally large beams from large-diameter trees. Consequently, the value of old growth timber has fundamentally changed, and new approaches for management need to be considered. A new relationship with old growth forests that respects and honors the role of people as part of nature and elevates our capacity to care for forests and engage in these practices is needed.

¹ Note that not all old growth equates to tall, large-diameter trees – some old trees growing in harsh conditions never get big.

² Evans, Z. and Allbee, R. The Guild’s role in old growth policy.

<https://foreststewardsguild.org/enews/the-guilds-role-in-old-growth-policy/?fbclid=IwAR3cbNlPlGi-TB7-kTQ5pyPmlrNpSuOH-u9UZ1BIT3LIUcNyx0eSD1Btm6Y>. 2023.



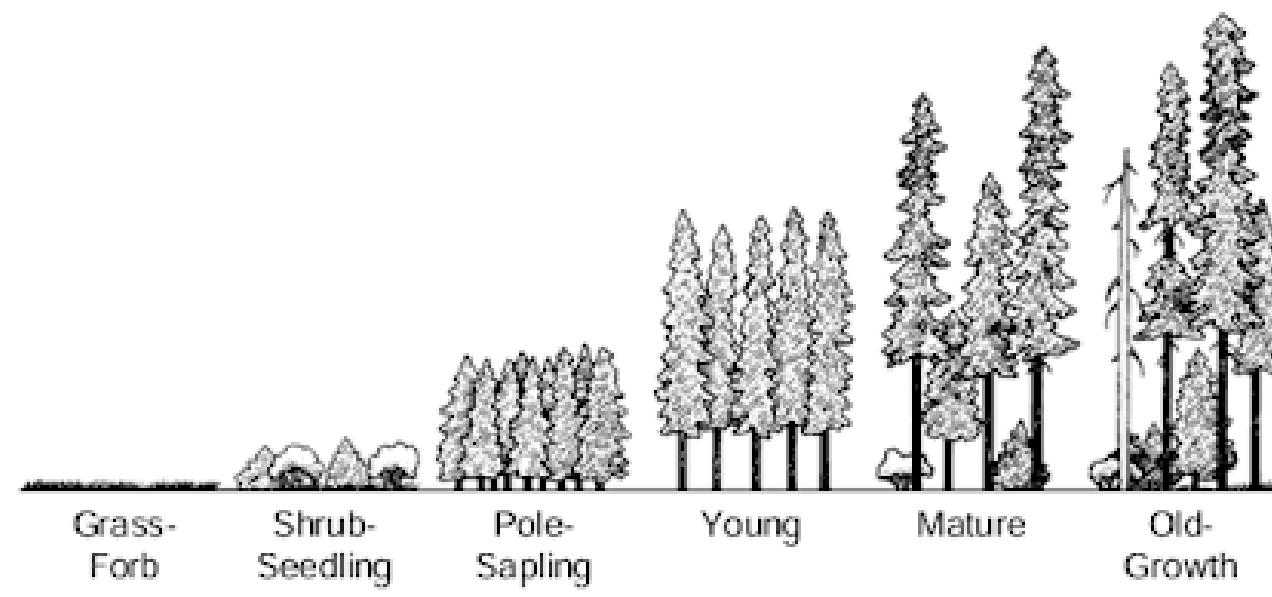
II. What is “old growth”?

There is no universally accepted definition for “old growth forests” because of the varied viewpoints on the topic, policy perspectives and impacts, and the diversity of forests themselves. Often cited when defining old growth is the research by Erik Buchwald on “A hierarchical terminology for more or less natural forests in relation to sustainable management and biodiversity conservation”.³ He used different levels of “naturalness” to distinguish 14 forest types: primeval, virgin, frontier, near-virgin, old growth, long untouched, newly untouched, specifically managed, exploited natural, plantation-like, partly planted, native plantation, exotic plantation and self-sown exotic. Gyde Lund is also frequently cited for his “Definitions of old growth, pristine, climax, ancient forests, degradation, desertification, forest fragmentation and similar terms.”⁴ To reach a definition of old growth, he lists 121 sources and concludes, “Most definitions of old growth forest suggest they are mature forests that are losing productivity. In a sense, old growth forests are “degraded” forests. They are also managed forests in the sense that a decision may have been made to spare the trees.”

Arriving at one scientific definition is difficult, but how we define old growth facilitates our understanding of how much there is and where those forests are located. At the same time, how we define old growth ultimately reflects our values and perspectives. Despite the challenges, indices to assess old growth are necessary to determine which forests are old growth in order to measure them, monitor them, and direct policies towards their uses and the extent of their protection.

From a forest ecology perspective, old growth most simply is a general term for forests in the late-successional stage. The following figure illustrates a simple linear example of successional stages for coniferous forest systems (Figure 1).

Figure 1. Successional stages for coniferous forest ecosystems



Source: (Powell, 2012) Adapted by Thomas et al. 1979.

https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd716456.pdf

³ Buchwald, E. 2005. [A hierarchical terminology for more or less natural forests in relation to sustainable management and biodiversity conservation.](#)

⁴ Lund, G. 2014. [Definitions of old growth, pristine, climax, ancient forests, degradation, desertification, forest fragmentation and similar terms.](#)

As shown in Figure 1, the successional stages in this example advance over time from vegetation dominated by grasses and forbs, to woody shrubs and seedlings, tree cover characterized by an even-height canopy, and then greater unevenness in the canopy, development of understory vegetation, and eventually, old growth forest conditions. In this example, the old growth stage is described as *“dominated by trees generally greater than 140 years old; understory vegetation well established; snags (dead trees) are present; heart rot (stem decay) and other signs of decadence are present; all tree ages and heights are represented; abundant decayed and undecayed logs are on the ground”* (Powell, 2012).

There is also the term *primary forest* that is frequently associated with old growth discussions. Primary forests are those which have *minimal or no evidence of human disturbance, including active forest management and silvicultural practices such as associated with timber harvesting*. Primary forests can vary in age and become old growth when they enter the late successional stages of ecology, at which time the distinction between the two categories disappears (see side bar).



When is Old Growth?

It is common to ask “what” or “where” is old growth, but how about “when” is old growth? One of the challenges and interesting facets of old growth is its relation to a ‘place in time’ within the dynamics of a changing ecosystem. An “old growth forest” describes a condition or ecological phase that exists in a defined place and time, and it is not permanent, but is subject to change in response to a variety of ecological influences. In other words, at some point in time, old growth forest will naturally evolve to some other condition, typically as a result of one or more major disturbance events and even without direct human influence.

In contrast, a consideration of “primary” forest landscapes is not defined by and does not place value on any one ecological phase over another. At a landscape scale, an emphasis on retaining “primary forests” can reduce the risk of individual forest types and conditions becoming so rare as to jeopardize species and communities. In general, if there is ample “primary forest” retained then in theory, a representative spectrum of forest ecosystem types, including old growth, will also be present.

To an extent, and lending to its iconic status and importance, by narrowly focusing on old growth forests we’re set up for failure in the long term by striving to “protect” a somewhat singular condition that exists at a specific time and place in a dynamic system. Such an approach dangerously ignores ecological processes, narrows options, and inherently increases risks. We can move beyond this paradigm by acknowledging that both “managed old growth forests” that develop and are maintained through human influence, and “primary old growth forests” that develop and may change due to other ecological influences are complementary pieces of the solution to meeting social and ecological goals for forest values and habitats. That is, it doesn’t have to be a question of protection or management, it can be about both protection *and* management.

Definitions of *Primary Forest* and *Old Growth* used Globally, in the United States, and Europe

The UN Food and Agriculture Organization (FAO), Forestry Division, conducts and publishes periodic assessments of global forest resources. Their definitions of forest characteristics are specific and agreed to by the Member States of the United Nations (UN) in order to facilitate countries' reporting and global data aggregation. The Global Forest Resources Assessment (FRA) does not have a specific definition for "old growth", but rather defines *primary forests* as a subcategory of "naturally regenerating forests."⁵ The FAO FRA defines primary forests as: *naturally regenerating forest of native tree species where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed* (see sidebar for further explanatory notes).

In the late 20th century, the discovery of the spotted owl's nesting habits in mature forests of the Pacific Northwest region of the US brought to light the relationship between old growth forests and their role in wildlife habitat. Production of timber for wood and paper products dramatically decreased from US federal forestlands in the region and for many decades since there has been a national debate over old growth forests and federal policy. In 2022, US President Joe Biden signed an Executive Order (EO) on old growth and mature forests titled "Strengthening the Nation's Forests, Communities, and Local Economies."⁶ The policy aim is to pursue science-based, sustainable forest and land management and conserve America's mature and old growth forests on federal lands, among other goals. The EO has resulted in the US Department of Agriculture, Forest Service (USFS) and US Department of the Interior, Bureau of Land Management (BLM) defining and assessing "old growth" and "mature" forests on the lands they manage.⁷ Their definitions published in 2023 are dynamic and are considered "working definitions" that apply "quantitative measurement criteria reflecting structural characteristics". These definitions represent refinement from earlier agency direction and interim definitions developed in the 1980s and 1990s.

There is not a universal definition for either old growth or mature forests that applies across all US federal lands. Rather, there are multiple definitions: first, for each of the Forest Service's regions (Figure 2) and then for each different forest type within those regions. The variety in these definitions, over 200 in all, recognize that tree species, climate, soil productivity, human interaction, and disturbance history all influence the development of forests.

FAO Forest Resources Assessment explanatory notes to define *primary forests*

1. Includes both pristine and managed forests that meet the definition. Management practices in primary forests should imply minimum human intervention and aim for the long-term conservation of native vegetation and wildlife habitat.
2. Includes forests where Indigenous Peoples and local communities engage in traditional forest stewardship and management/use activities that meet the definition.
3. Includes forests with visible impacts of natural disasters (such as storms, snow, drought, wildfire or insects, pests and diseases outbreaks)
4. Excludes forests where hunting, poaching, trapping, or gathering have caused significant native species loss or disturbance to ecological processes.
5. Some key characteristics of primary forests:
 - i. they show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure, and natural regeneration processes;
 - ii. the area is large enough and retains a degree of connectivity such that its natural ecological processes are maintained; and
 - iii. there has been no known significant human intervention, or the last significant human intervention was long enough ago to have allowed natural ecosystem elements (including species diversity) and functions to have become re-established.

Source: FAO Global Forest Resources Assessment 2020. Terms and definitions. <https://www.fao.org/3/i8661en/i8661en.pdf>

⁵ FAO. Terms and definitions. FRA 2025. Forest resources assessment working paper 194. <https://www.fao.org/3/cc4691en/cc4691en.pdf>

⁶ Executive Order on Strengthening the Nation's forests, communities, and local economies. <https://www.whitehouse.gov/briefing-room/presidential-actions/2022/04/22/executive-order-on-strengthening-the-nations-forests-communities-and-local-economies/>

⁷ USDA Forest Service. Mature and old growth forests: Definition, identification and initial inventory on lands managed by the Forest Service and the Bureau of Land Management. 2023. <https://www.fs.usda.gov/sites/default/files/mature-and-old-growth-forests-tech.pdf>

Figure 2. The US Forest Service Regions



Source: [USDA Forest Service, 2021](https://www.fs.fed.us/forestmanagement/regions/).

The framework for the US assessment recognizes that *old growth forests* are “... dynamic systems distinguished by old trees and related structural attributes...encompass the later stages of stand development that typically differ from earlier stages in a variety of characteristics, which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function...[and] are distinguished by their ecosystem services and social, cultural, and economic values.” The framework further recognizes that *mature forests* are “...delineated ecologically as the stage of forest development immediately before old growth...and may contain some but not all the structural attributes in old growth forests.”

The regional definitions provided by the USFS account for the vast variation in forest character that occurs across the US, and these definitions are specific to vegetation types because even within a specific geographic area, no one definition represents the diversity of ecosystems. The definitions are based on the unique biophysical characteristics and can specify the tree ages, diameters, number of trees per acre, number of dead and broken trees per acre, and basal area (a measure of wood volume). For example, for the Eastern Region (Region 9) a listing of 10 old growth types (including “other”) have been defined with minimums for tree diameter ranging from 12 to 20 inches, trees per acre between 5 and 20, and stand age from 101 to 161 years (Table 1).

Table 1. USFS Eastern Region (Region 9) old growth community types, large tree diameter, density, and stand age minimums.

Old growth type	Tree diameter (inches)	Trees per acre	Stand age (years)
Beech maple basswood	16	10	141
Northern hardwood	16	10	141
Dry oak	16	10	141
Mesic northern oak	20	5	161
Wetland hardwood	18	10	121
Conifer northern hardwood	16	10	141
Northern pine	12	20	101
Montane spruce	15	10	141
Sub-boreal spruce/fir	12	10	141
Other	14	10	101

Source: [USDA Forest Service, 2023](#).

The European Union encountered the difficulty in defining old growth forests when it established the EU Biodiversity Strategy for 2030.⁸ One of the strategy's objectives is to define, map, monitor and strictly protect all of the EU's primary and old growth forests. To implement the strategy the EU defined *primary forests as naturally regenerated forest of native tree species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed*. According to the EU Strategy, the key characteristics of *primary forests* are:

- *They show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes;*
- *The area is large enough to maintain its natural ecological processes;*
- *There has been no known significant human intervention, or the last significant human intervention was sufficiently long ago to have allowed the natural species composition and processes to re-establish. (EU, 2020)*

The EU defines an *old growth forest* as *a forest stand or area consisting of native tree species that have developed, predominantly through natural processes, structures and dynamics normally associated with late-seral development phases in primary or undisturbed forests of the same type. Signs of formal human activities may be visible, but they are gradually disappearing or too limited to significantly disturb natural processes*. Key characteristics of old growth forests defined in the EU Strategy include:

- *They contain structural features and dynamics such as natural regeneration, gap dynamics, large and diverse dead wood, structural complexity, and the presence of old trees, or trees reaching senescent stage and tree-related microhabitats;*
- *They have acquired these structural features and dynamics through several decades of natural development without significant human intervention. (EU, 2020)*

⁸ EU Biodiversity Strategy for 2030. 2020.

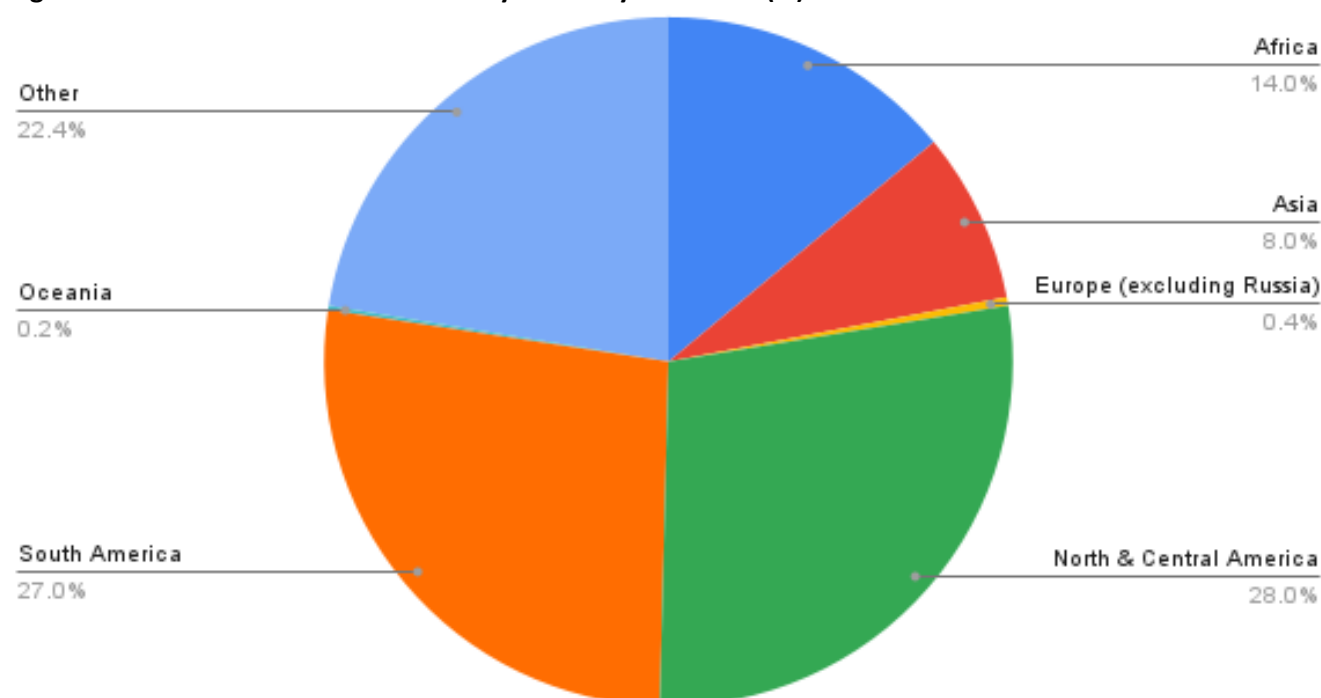
To accomplish the objectives of the EU Biodiversity Strategy for 2030 to identify, map, and protect these forest types, the main indicators for identifying old growth are native species, presence of deadwood, and old or large trees. In addition, complementary indicators include stand origin from natural regeneration, structural complexity, existence of habitat trees, and indicator species.

A number of other governmental and non-governmental organizations provide definitions and approaches to old growth forest identification and related policy actions, including [Forest Europe](#), the [Convention on Biological Diversity](#), the [Old Growth Forest Network](#), the [Ancient Forest Alliance](#), and work done by [WWF](#).

III. Where are the world's primary forests and old growth?

As noted earlier, the FAO and the Member States of the UN do not apply an old growth forest definition and no estimate of global old growth forest area is provided by the FAO Global Forest Resources Assessment (FRA). According to the FRA there are 1.1 billion hectares (2.7 billion acres) of primary forests in the world (FAO, 2020). That equals 27% of the world's forest area.

Figure 3. Share of Global Area of Primary Forest by Continent (%)



Note: Not all countries reported primary forests. The Russian Federation did not report on primary forests which skews the data since Russia has the largest area of forests.

Source: FAO Global Forest Resources Assessment, 2020.

Globally, 61% of primary forests are found across 3 countries: the Russian Federation (255 million ha), Brazil (216 million ha) and Canada (205 million ha). The US ranks fifth with 75 million hectares, equal to 7% of the world's total of primary forests (the Democratic Republic of Congo is fourth with 83 million ha) (Table 2).

Table 2. Global Primary Forests, Top 5 Countries by Area (hectares, acres, %)

Country	Primary Forest Area (ha)	Primary Forest Area (acres)	Global Percentage %
Russian Federation	255 million	630 million	23%
Brazil	216 million	534 million	20%
Canada	205 million	507 million	18%
Democratic Republic of Congo	83 million	205 million	8%
United States	75 million	185 million	7%

Source: FAO, 2020.

The FAO assessment finds that the global extent of primary forests is declining. From 1990 to 2020, 81 million hectares of primary forests around the world have been impacted in ways that make them incompatible with the FAO FRA definition. FAO cautions that the statistics of area and status of primary forests are based on incomplete and inconsistent data. Threats to old growth and primary forests include the effects of climate change, including rising temperatures, changing precipitation patterns, wildfire, insects, and disease, and deforestation. According to the World Resources Institute’s Global Forest Review, deforestation is largely due to the conversion of forestland to agricultural production (mainly cattle, oil palm, and soybeans) and negatively impacts all forests, not only old growth.⁹

In the United States, the recent analysis of old growth and mature forests found a total of 33 million acres of old growth and 80 million acres of mature forest on the federal lands managed by the USFS and BLM. These acreages represent 18 and 45%, respectively, of the total forestland of the two agencies (Table 3). The combined total of 113 million acres identified by the analysis represents approximately 15% of all forestlands in the US today and perhaps about 10% of the forest area present in the 1600s.¹⁰

Table 3. Area of old growth and mature forests on Federal lands in the United States (acres, %).

Agency	Old growth (acres, % of lands)	Mature forest (acres, % of lands)	Total (acres)
Forest Service	25 million, 17%	67 million, 47%	92 million
Bureau Land Mgt.	8 million, 24%	13 million, 37%	21 million
Total	33 million, 18%	80 million, 45%	113 million

Source: USDA Forest Service. Mature and old growth forests: Definition, identification and initial inventory on lands managed by the Forest Service and the Bureau of Land Management, 2023.

In Europe, the remaining primary and old growth forests make up approximately 3% of EU forests. Primary and old growth forests account for approximately 5 million hectares (12 million acres) of which 90% is located in Bulgaria, Finland, Romania, and Sweden.¹¹

IV. Why do we need old growth?

Old growth forests tend to be structurally and functionally complex forests and their presence supports research and experiences that enable us to understand the ecological potential of trees and their environments. In other words, the plants and animals within an old forest have much to teach us. These forests can safeguard unique biodiversity, plant and animal habitats, and associated genetic diversity.¹² Therefore these forests merit consideration within policies and management actions regarding their level of use and protection.

From the recreational aspect, people (including foresters) enjoy being in old growth forests. Big trees stir our emotions. Sometimes these forests are accessible for hiking and camping. Other times they are too remote or, for their protection, recreational uses of these forests are often limited. As noted earlier, many definitions of old growth specify that the impact and presence of humans is limited or insignificant. The aura of the old growth ecosystem lends itself to the practice of forest and nature therapy, i.e. the immersion in the forest

⁹ World Resources Institute. [Deforestation linked to agriculture](#). For further discussion of deforestation trends, see the Dovetail 2023 report on the topic available at: [Deforestation: definitions, trends, and policies for forests and forest products](#).

¹⁰ Based on an estimated 750 million acres today and approximately 1 billion acres of forest in the 1600s.

¹¹ European Commission. 2020. [Mapping and assessment of primary and old growth forests in Europe](#).

¹² National Geographic. Why old growth forests matter. 2022.

setting for mental, physical, emotional and spiritual health benefits.¹³ The recreational benefits of diverse forest types, including old growth forests that offer highly-valued experiences, can help support local rural economies and communities.

An increasingly recognized and valued ecosystem service that old growth forests provide is storing carbon and the associated climate change mitigation benefits. Through their natural respiration, trees are absorbing carbon dioxide and assimilating it from the roots to the crowns. Trunks of mature trees lock-up atmospheric carbon that continues to accumulate as long as the trees are alive. The forest soils usually are covered with a dense layer of organic matter which prevents erosion, builds soils, cycles nutrients, protects water resources, and enables retention of carbon underground. Old growth forests serve as a global carbon dioxide sink, meaning they remove carbon dioxide from the atmosphere and store more carbon than they release.¹⁴ While young trees and forests absorb (i.e., “sequester”) carbon dioxide more rapidly because they are experiencing more rapid growth and wood formation, an old growth forest stores many, many decades of accumulated carbon and represents significant volumes of storage. Both carbon sequestration and storage strategies provide important climate benefits.



Old growth forests are also socially and culturally important. In some cases old growth forests are cultural icons serving as symbols of nature's beauty or enduring portals to the past. Maintaining and protecting these forests allows people to continue to visit them and draw spiritual and emotional strength and comfort from knowing they are there and having the opportunity to experience a therapeutic effect of ‘being among the ancients’. Old growth forests have intrinsic value to the ongoing health of Earth’s biosphere, inclusive of us humans, as well as unique spiritual values.

V. Why don’t we need old growth?!

Big diameter trees (for example trees greater than 30 or 40 inches in diameter) were historically sought to produce massive beams for building construction and, in earlier times, for ships’ masts. Nowadays non-wood materials or engineered wood products can be manufactured to provide more consistent performance than solid, large dimension timber from old growth. Non-wood materials have replaced wood in many applications where wood beams were once used, and innovative engineered wood products are made from smaller diameter and younger trees. For example, [glulam](#) is produced by gluing boards together to achieve the desired dimension. The boards are sawn from smaller diameter logs (i.e., 14 to 18 inches), and can be spliced together with finger joints and reinforced with adhesives. Glulam beams are more dimensionally stable than solid wooden beams. These innovations provide a more technically consistent engineered product, reduce the waste of wood, and improve the economic competitiveness of forest management. Additionally, the forest products industry (e.g., lumber mills, logging systems, trucking and transportation) have all adapted to smaller diameter trees and logs. In many cases, mills can no longer accept larger diameter logs for processing. That is, the industry by and large doesn't have the ability to manufacture products from old growth trees. Finally, with forest management it is possible to grow big diameter trees in much shorter time periods and so wood with these dimensions does not have to come from old growth forest habitats (i.e., trees greater than 20 inches in diameter can be grown in less than fifty years).

¹³ Dovetail Partners. 2022. [An introduction to forest & nature therapy : Opportunities for human and forest health, green jobs and social benefits.](#)

¹⁴ Nature. [Old growth forests as global carbon sinks.](#) 2008.

The carbon storage benefits of trees extend beyond the forest. When harvested for making products, the carbon from the tree is stored in the wood and products made from those trees. Some amounts of carbon are released when the lower-value parts of the harvested trees (i.e., tops and branches) are left to decay in the forest, or are burned for heat and energy or in the production of biochar. Moving stored carbon from the forest into storage in the built environment through wood product use can also contribute to a goal of reducing the risk of carbon dioxide being released through wildfires or other forest disturbances.

When the goal is to produce wood fiber economically, intensively managed and faster growing forests provide more benefits and greater returns than old growth forests. Forestland owners seeking the best return on their investments may choose to manage younger forests intensively. These opportunities to make a good return on growing trees reduces the risk of forestland being converted to agriculture production. Many landowners have a range of objectives and may apply a system of management that ranges from intensive to more basic systems and even includes natural and reserved areas.

VI. How much old growth is enough? How can we make more old growth?

Given their limited and declining area, continuing consideration needs to be given to maintaining or increasing the amount of old growth forest and to saving existing old growth forests. There are ongoing efforts in the US, EU, and other regions to identify primary, old growth, and mature forests with consideration of their sustainability and protection. Global assessments show that there are vast areas of primary forests in some countries, e.g., the Russian Federation, Brazil, and Canada. However, it is unclear how to best protect these regions. For example, the boreal forests of Canada have been experiencing the devastating effects of wildfires that may be further exacerbated by climate change. Maintaining primary forest or old growth forest conditions given these pressures is a growing challenge for many regions.

In terms of the potential to manage for more old growth, there has been insightful research into what makes old growth ecologically unique and how those characteristics can be created or maintained through intentional strategies in young and maturing forests. Old growth forests are unique in several ways – by definition, the greater presence of old trees and deadwood, and the structural complexity of gap-disturbance dynamics. Management actions can favor the development of these structures and components through retention of older trees (i.e., legacy trees), reducing the impact of roads and other human impacts, and retaining logs and other forms of deadwood in the forest. A variety of researchers continue to explore the possibilities, including for example, Dr. Bill Keeton of the University of Vermont has researched the possibility of managing for old growth (including work in North America and Europe), and presented [a webinar](#) on the topic to the Forest Stewards Guild, for those interested in exploring the topic further.

Finally, in examining the definitions of old growth and primary forests one apparent strategy for having more of these forest types is to diminish the presence of people. Embedded in most definitions is the presumption that people are not a desired part of nature and old growth develops when people are absent, with some accommodation provided for Indigenous cultures and traditional practices. This definition needs to be challenged and deeply questioned for a variety of reasons. On the one hand, given the extent of human influence on the planet, including through the ecological pressures associated with climate change, it is increasingly difficult to define any area of the Earth as not showing the influence of humans. More philosophically, and perhaps more meaningfully, is the impact of the negative connotations of these definitions and the ways they work to limit our engagement and relationship with forests. A continued use of old growth definitions that include a requirement that human impacts are not evidenced, means that by definition there is no possibility of increasing old growth areas through human actions.

The growing recognition of opportunities to integrate academic research understanding with Traditional Ecological Knowledge (TEK)¹⁵ creates an emerging space for honoring and uplifting Indigenous practices while moving towards a future in which all people are culturally supported in the care of natural systems. Through this lens, human involvement in many ecosystems is the baseline and a key strategy for ecosystem health and resilience. Examples of this positive relationship include many fire-dependent ecosystems created and maintained through the cultural use of fire and that declined in measures of health and resiliency when fire exclusion became the dominant practice.¹⁶ A new relationship with old growth forests that respects and honors the role of people as part of nature and elevates our capacity to care for forests and engage in these practices is needed.

A step towards embracing the role of people in the care of forests, may be to expand the space for “managed old growth”.¹⁷ Much of the debate to date has focused on identifying and protecting primary old growth — forests where the impact of humans is not evidenced and where the structures and characteristics of old growth developed without human intention. While these unique forests and their benefits can and perhaps should continue to be prioritized for protection, there is the opportunity to invite landowners, foresters, ecologists, and many others to contribute their practice to the development of more old growth that reflects our regenerative land stewardship capacities. As Aldo Leopold said, “The hope of the future lies not in curbing the influence of human occupancy - it is already too late for that - but in creating a better understanding of the extent of that influence and a new ethic for its governance.”

VII. Protection of old growth

Old growth forests deserve protection for many reasons, including: they are threatened by climate change and human actions; globally, they are rare and declining in area; they serve valuable ecosystem services; they provide habitat for special flora and fauna; they act as long-term carbon sinks; and they offer unique recreational experiences. The Forest Stewards Guild says old growth forests deserve protection because they “play essential roles in wildlife habitat, species diversity, hydrological regimes, nutrient cycles, carbon storage and numerous other ecological processes.”¹⁸ An amount of protection is necessary for existing old growth forests because of the threats by humans, and increasingly by wildfire, insects and disease.

But not all old growth forests require the same level of protection. Some old growth forests merit full protection through the exclusion of as much human influence as possible in order to enable research, provide biodiversity benefits, and as a “reference” of the late successional stages. Other forests need lower levels of restriction on human influences when some forest management is able to benefit forest health and resiliency or to maintain the old growth structures and functions (i.e., wildfire risk reduction actions, use of cultural burning to maintain ecosystems, etc.). Obviously the degree of protection and associated management limitations are controversial and can only be ascertained through a compromise following thorough discussion with all affected parties and concerned stakeholders.

¹⁵ Traditional Ecological Knowledge, also called by other names including Indigenous Knowledge or Native Science, (hereafter, TEK) refers to the evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment. This knowledge is specific to a location and includes the relationships between plants, animals, natural phenomena, landscapes and timing of events that are used for lifeways, including but not limited to hunting, fishing, trapping, agriculture, and forestry. <https://www.fws.gov/media/traditional-ecological-knowledge-fact-sheet>

¹⁶ For an example of this discussion, see: [How the Indigenous practice of ‘good fire’ can help our forests thrive](#) (University of California, 2022)

¹⁷ For an example of a Managed Old Growth Study, see: <https://dnr.wisconsin.gov/topic/WildlifeHabitat/research/moss.html> (Wisconsin Department of Natural Resources)

¹⁸ Forest Stewards Guild. [Old growth forests deserve protection](#). 2020.

Once the balance of protection and management actions is decided, the old growth forest requires monitoring and enforcement of the decision. Protecting and conserving forests requires partnership and participation of a wide range of people, communities, and interests. With proper management, creation of secondary old growth forests is possible and can eventually provide the attributes and benefits of old growth forests.

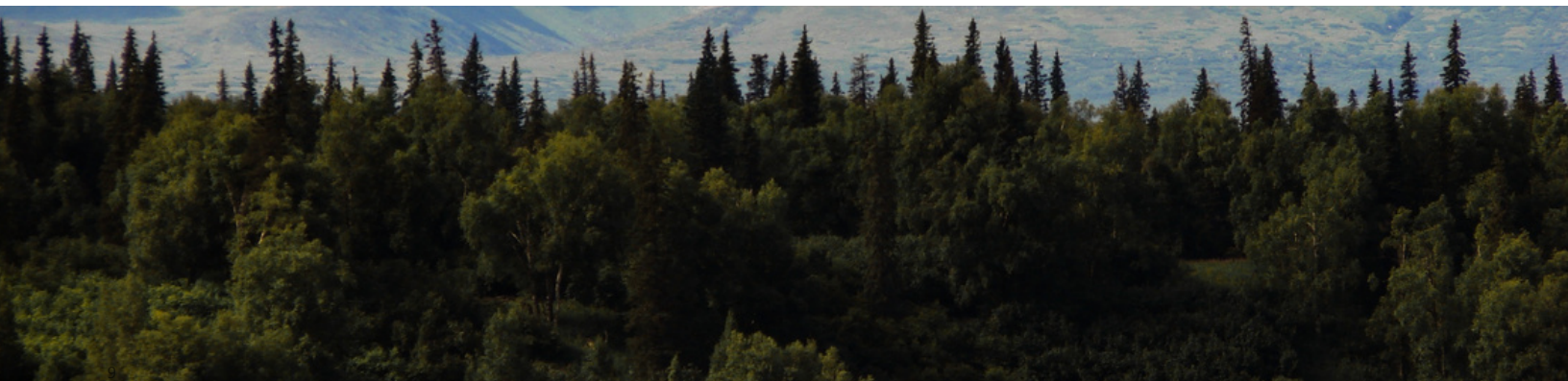
The American author and forester, Peter Bundy cites climate change as a threat which drives fire through storms, as well as insects and disease through drought which weakens trees' vigor.¹⁹ Bundy rightfully states that old growth forests are dynamic, and thus the changing forests cannot be preserved, but rather reserved.

VIII. The Bottom line

The question of "What is old growth?" holds many definitions depending upon the scientific, cultural, and policy lenses that are applied. The variety in these definitions is a recognition that tree species, climate, soil productivity, human interaction, and disturbance history all influence the development of forests. The question of "How much old growth forest is enough?" can seem almost unanswerable because it is contextual and there are many possible and often competing answers. There are forests that previous generations chose to protect, which current generations will also say deserve protection, and that future generations will wrestle with in their own debates

Old growth forests have historically had economic and social value by providing timber products and supporting forest based businesses and communities. These forests have cultural and social value to Indigenous peoples, First Nations, and Tribes. Intact old growth forests provide multiple benefits, but the type of wood provided from these forests is no longer essential to meeting our raw material needs. Today's engineered wood products can produce dimensionally stable beams that are structurally superior to equally large beams from large-diameter trees. Consequently, the value of old growth timber has fundamentally changed, and new approaches for management need to be considered. A new relationship with old growth forests that respects and honors the role of people as part of nature and elevates our capacity to care for forests and engage in these practices is needed. With proper management, creation of secondary old growth forests is possible, and can eventually provide the attributes and benefits of old growth forests. The emerging practice of managing maturing forests to provide old growth characteristics is a strategy deserving of increased attention.

¹⁹ Bundy, Peter. Beyond old growth.



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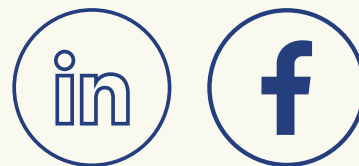
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