Old Growth Forest Management in British Columbia

Provincial Backgrounder

January 2024

BRITISH COLUMBIA

Ministry of Water, Land and Resource Stewardship

CEF Cumulative Effects Framework

Purpose

This document provides readers with key background information on how old growth forests and mature forests are managed in British Columbia. It is intended to support the interpretation of Old Growth Forest Current Condition Reports released under the provincial Cumulative Effects Framework (CEF). This document is written by provincial government staff for both technical and non-technical users, including First Nation governments, provincial government staff, interested members of public, industry, and non-governmental organizations.

This document should be read in conjunction with the *Old Growth Forests in British Columbia: Cumulative Effects Assessment Backgrounder* (WLRS, 2023), the *Interim Assessment Protocol for Old Growth Forest in British Columbia* (FLNRORD, 2017), and the *Cumulative Effects Framework Interim Policy for the Natural Resource Sector* (Province of B.C., 2016).

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List of Acronyms

AAC	Allowable Annual Cut
BCGW	B.C. Geographic Warehouse
BDG	Biodiversity Guidebook
BEC	Biogeoclimatic Ecosystem Classification
BEO	Biodiversity Emphasis Option
CEF	Cumulative Effects Framework
CFLB	Crown Forested Land Base
FAIB	Forest Analysis and Inventory Branch
FMLB	Forest Management Land Base
FOR	Ministry of Forests
FPC	*Forest Practices Code of British Columbia Act*
FRPA	*Forest and Range Practices Act*
FSP	Forest Stewardship Plan
LU	Landscape Unit
LUPG	Landscape Unit Planning Guide
NDT	Natural Disturbance Type
OGMA	Old Growth Management Area
OGAA	*Oil and Gas Activities Act*
PNOGO	Provincial Non-Spatial Old Growth Order
THLB	Timber Harvesting Land Base
TSR	Timber Supply Review
UWR	Ungulate Winter Range
VRI	Vegetation Resources Inventory
WHA	Wildlife Habitat Area
WLRS	Ministry of Water, Land and Resource Stewardship

Biogeoclimatic Ecosystem Classification (BEC) System

BEC Zones

BAFA	Boreal Altai Fescue Alpine
BG	Bunchgrass
BWBS	Black and White Boreal Spruce
CMA	Coastal Mountain-heather Alpine
CDF	Coastal Douglas-Fir
CWH	Coastal Western Hemlock
ESSF	Engelmann Spruce-Subalpine Fir
IDF	Interior Douglas-Fir
ICH	Interior Cedar-Hemlock
IMA	Interior Mountain-heather Alpine
MH	Mountain Hemlock
MS	Montane Spruce
PP	Ponderosa Pine
SBS	Sub-Boreal Spruce
SBPS	Sub-Boreal Pine and Spruce
SWB	Spruce Willow Birch

BEC Subzones

dc	Dry Cold
dcp	Dry Cold Parkland
dcw	Dry Cold Woodland
dh	Dry Hot
dk	Dry Cool
dkp	Dry Cool Parkland
dkw	Dry Cool Woodland
dm	Dry Maritime
	Dry Mild
ds	Dry Submaritime
dv	Dry Very Cold
dvp	Dry Very Cold Parkland
dvw	Dry Very Cold Woodland
dw	Dry Warm
mc	Moist Cold
mcp	Moist Cold Parkland
mcw	Moist Cold Woodland
mh	Moist Hot
mk	Moist Cool
mkp	Moist Cool Parkland
mks	Moist Cool Scrub
mkw	Moist Cool Woodland
mm	Moist Maritime
	Moist Mild
mmp	Moist Maritime Parkland
	Moist Mild Parkland
mmw	Moist Mild Woodland
ms	Moist Submaritime
mv	Moist Very Cold
mvp	Moist Very Cold Parkland
mw	Moist Warm
mwp	Moist Warm Parkland
mww	Moist Warm Woodland
un	Undifferentiated
unp	Undifferentiated parkland
uns	Undifferentiated scrub
vc	Very Wet Cold
vcp	Very Wet Cold Parkland
vcw	Very Wet Cold Woodland
vh	Very Wet Hypermaritime
vk	Very Wet Cool
vks	Very Wet Cool Scrub
vm	Very Wet Maritime
wc	Wet Cold
wcp	Wet Cold Parkland
wcw	Wet Cold Woodland
wh	Wet Hot
	Wet Hypermaritime
whp	Wet Hypermaritime Parkland
wk	Wet Cool
wm	Wet Maritime
	Wet Mild
wmp	Wet Mild Parkland
wmw	Wet Mild Woodland
ws	Wet Submaritime
wv	Wet Very Cold
wvp	Wet Very Cold Parkland
wvw	Wet Very Cold Woodland
ww	Wet Warm
xc	Very Dry Cold
xcp	Very Dry Cold Parkland
xcw	Very Dry Cold Woodland
xh	Very Dry Hot
xk	Very Dry Cool
xm	Very Dry Maritime
	Very Dry Mild
xv	Very Dry Very Cold
xvp	Very Dry Very Cold Parkland
xvw	Very Dry Very Cold Woodland
xw	Very Dry Warm
xx	Very Dry Very Hot

Glossary

The following glossary terms are provided for clarity and to aid in understanding the Cumulative Effects Framework. These terms are provided for all CE Assessments and are not specific to the land base identified in this report.

Biodiversity Emphasis Option (BEO)

A range of management alternatives that emphasize different levels of natural biodiversity within forested landscapes. There are three options for emphasizing biodiversity at the landscape level: high, intermediate, and low. Each option is designed to establish a level of natural biodiversity and a different risk of losing elements of natural biodiversity (Province of B.C., 1995). Overall, the BEO informs the amount of old growth to be retained.

Biogeoclimatic Ecosystem Classification (BEC) system (zone/subzone/variant)

A multi-scaled, hierarchical, ecosystem-based classification system that groups ecologically similar sites based on climate, site, soils, and vegetation, and is widely used as a framework for resource management and scientific research in B.C.

BEC zones have similar patterns of energy flow, vegetation, and soils as a result of a broadly homogeneous macroclimate. There are 16 zones in B.C. which are subdivided into subzones and variants (see List of Acronyms). Subzones reflect differences in regional climate, while variants recognize sub-regional variation (e.g., areas that are slightly drier, wetter, snowier, warmer, or colder than other areas in the subzone) (MFR, 2008).

Crown Forested Land Base (CFLB)

The forested area that the provincial government manages for a variety of natural resource values. This excludes non-vegetated areas (e.g., water, rock, ice), non-forested ecosystems (e.g., grasslands, wetlands), non-productive forest (e.g., alpine, areas with very low productivity), and non-commercial forest (e.g., shrub/brush areas). The CFLB includes provincially and federally protected areas (e.g., provincial and national parks), conservancies, wildlife habitat areas, wildlife management areas, etc., because of their contribution to biodiversity.

Crown Land

Land, whether it is covered by water or not, or an interest in land, recognized in Canadian law as vested in the provincial government of B.C. In B.C., all land categorized as Crown land is also the traditional territory of one or more First Nations (Land Act, RSBC, 1996).

Cumulative Effects

Changes to environmental, social, and economic values caused by the combined effect of past, present, and potential future human activities and natural processes (Province of B.C., 2016).

Cumulative Effects Framework (CEF)

A set of policies, procedures, and decision-support tools that help identify and manage cumulative effects consistently and transparently across B.C.'s natural resource sector.

Current Condition Assessment/Report (CCR)

An assessment/report on the current state or condition of individual CEF values in relation to selected state or pressure indicators (Province of B.C., 2016).

Forest Edge

The boundary between a primary forest and newly harvested areas, roads, or other permanently cleared areas where an edge environment is created. This affects the microclimatic conditions (i.e., temperature, wind, moisture) and other attributes (e.g., species composition; processes such as growth rates) and can impact forests up to 100 to 200 meters within the forested area (depending on topography and vegetation). Some plant and animal species can benefit from the microclimate edge effects, while plant and animal species dependent on the stable environmental condition of the interior forest may be impacted (Province of B.C., 1995, Ministry of Forests Research Branch, 1998b).

Forest Management Land Base (FMLB) Indicator

An attribute field in the Vegetation Resources Inventory (VRI) that indicates whether an inventory polygon is currently forested (or has been forested) and is capable of producing a stand of trees. The FMLB is a coarse-scale indicator of forested areas, whereas the CFLB is a finer-scale management tool (see CFLB definition above).

Fragmentation

The process of transforming large contiguous patches of forest into smaller and isolated patches surrounded by disturbed areas, either through human activities (e.g., roads, forestry cutblocks) or natural disturbances. Fragmentation may lead to a decline in biodiversity through loss of habitat (conversion of forests from natural to managed stands), increase in microclimatic and forest edge effects, and increase in isolation of the remaining forest patches (Province of B.C., 1995).

Incursion

Anthropogenic (human-caused) disturbance footprints within old growth management areas from resource development activities such as forest harvesting, road construction, or mining. It does not include impacts from natural disturbance, such as forest fires or insects.

Interior Forest Condition

The forest habitat beyond the influence of microclimatic conditions and forest edge effects that sustains the plant and animal communities that depend on stable environmental conditions. It is generally considered to be 100 to 200 meters from the forest edge and can occur in any forest type and forest age (Ministry of Forests Research Branch, 1998b).

Landscape Unit (LU)

An area used for long-term planning and monitoring of resource management activities. These units contain land and water and are typically at the scale of a watershed or a group of watersheds, with areas ranging from 5,000 to 400,000 hectares (MFR, 2008).

Landscape Unit Planning Guide (LUPG)

A guidance document published by the Ministry of Forests and Ministry of Environment, Lands and Parks (1999) that outlines procedures to implement landscape unit planning throughout B.C. (including the development of objectives and strategies). The guide focuses on the priority of forest biodiversity including the retention of old growth forest and guidance for stand-level biodiversity management through wildlife tree retention.

Mature Forest

Stands that have progressed through successional development stages including natural thinning. Vertical structure has developed, but stands lack the complex structure typical of old growth forests.

The time required for mature forests to develop varies by ecosystem. In B.C., the minimum age of mature forests is 80 years in productive coastal and cool, northern boreal forests, 120 years in high elevation forests, and 100 years in the remaining forests. Mature forest ages are determined by NDT and BEC zone.

Mature-plus-Old Forest

Biodiversity objectives for mature forest retention are set as a minimum requirement for mature-plus-old forest, meaning that retention targets include the minimum requirements for old growth forests plus additional targets that can be met by mature and/or old forest (Province of B.C., 1995). The additional targets for mature-plus-old forest can be met using mature and/or old forest, but the old forest portion of the target must be met using old growth forest (where available). When the mature-plus-old forest target is the same as the old growth forest target, there are no additional requirements for mature forest area. Mature-plus-old targets are specified in the Biodiversity Guidebook but are not required in many regional land use orders, including the Provincial Non-spatial Old Growth Order.

Natural Disturbance Type (NDT)

A coarse-level classification system that broadly describes disturbance regimes across B.C. based on the long-term average frequency of stand-initiating disturbances such as wildfires, insects, or wind. Five NDT categories form the basis for the old growth forest targets in the Biodiversity Guidebook (Province of B.C., 1995).

Non-Contributing Land Base

Areas on the land base that are excluded from the Timber Harvesting Land Base (THLB) and do not contribute to the allowable annual cut for a specified area. This includes Parks and Protected Areas, no harvest zones within wildlife management areas (e.g., ungulate winter ranges, wildlife habitat areas), riparian reserves, and inoperable forests.

Non-Spatial Old Growth Management

The percentage or amount (in hectares) of old growth forest to be retained within a specified area (i.e., by BEC subzone/variant in a landscape unit) as an alternative management approach from establishing spatial OGMAs. The amount of old growth forest present in forest stands may be noted by stand age using vegetation inventories, but patches of old growth are not delineated and mapped (FPB, 2012). Non-spatial is also referred to as aspatial.

Old Growth Forest

The Province of B.C. defines old growth forest based on age. Minimum ages for old growth forests are greater than 250 years old in ecosystems with infrequent stand-initiating disturbance (coastal, interior wet and moist climates, and dry, fire-maintained ecosystems; NDT 1, 2, 4) and greater than 140 years old in drier forests with frequent stand-initiating disturbance (NDT 3).

These age definitions are intended to capture forests dominated by old trees. Ecologically, old growth forests contain live and dead trees that vary by size, species, composition, and age class structure, which varies significantly by forest type and by BEC unit (BDG, 1995). They are communities of trees, plants, fungi, animals, and microbes that have lived together long enough to develop complex, interconnected relationships (Old Growth Technical Advisory Panel, 2021). Old growth characteristics vary by ecosystem and tree species, and typically have more large trees with unique characteristics such as forked, dead, or broken tops, cavities, or large lateral branches, and more large standing dead trees (snags) and decomposing wood than younger forests (FLNRORD, 2017). Trees are large for the ecosystem, and the forest canopy is often layered with openings that allow light and encourage the growth of understory vegetation.

For the purposes of the CEF, the term "old growth forests" is used to describe these ecosystems more broadly (i.e., considering stand attributes), with the awareness that it includes the "old forest" age-based definition currently used in forest management practices.

Old Growth Management Area (OGMA)

Defined areas that contain (or are managed to attain) specific structural old growth forest attributes. These are delineated and mapped as fixed areas (FPB, 2012). An OGMA may be defined as a legal OGMA or a draft (non-legal) OGMA:

Legal OGMA – OGMAs that have been declared in an old growth Ministerial Order. Forest licensees must incorporate the legal OGMAs into Forest Stewardship Plans (FSPs).

Draft (non-legal) OGMA – OGMAs that have been mapped but not declared in an old growth order. Forest licensees may choose to incorporate the non-legal OGMAs into FSPs as a way of achieving the non-spatial order that is in effect in the management area where they operate (FPB, 2012).

Primary Forest

A naturally regenerating forest of native species, where there are no visible indications of human activities, and the ecological processes of the forest are not significantly disturbed (FAO & UNEP, 2020). This can include forests across all seral stages, from young to old, and any stands remaining after a natural disturbance such as fire, wind, or extensive insect-caused mortality. Not all primary forests are old, but all old growth is primary forest (Old Growth Technical Advisory Panel, 2021).

Recruitment

The act of identifying stands (either spatially or non-spatially) that do not currently meet the requisite old growth characteristics but are intended to develop those characteristics in the future. In some circumstances, recruitment areas can contribute to old growth targets in landscapes where there is not enough old growth forest to meet targets.

Second-Growth Forest

Forested areas that have been harvested or disturbed by human activities. In general, it refers to successional forests that develop after clearing of the original forest. These forests display differences in forest structure and/or canopy species composition from nearby primary forests on similar sites. Secondary forests can also be referred to as "second growth forests" or "managed forests".

Seral Stage

Represents the different stages in the sequence of forest development, from early to mid, mature, and old forests, including successional shifts in species composition and vegetation structure (e.g., see definitions for mature forest and old growth forest above). Stand age, as reported in the provincial Vegetation Resources Inventory, is used to estimate seral stage.

Site Association/ Site Series

A site association can contain ecosystems from several different climates and therefore be variable in actual site conditions. Dividing the association into site series using subzones and variants produces site units that are climatically, and therefore usually edaphically (i.e., influenced by the soil), more uniform (Meidinger & Pojar, 1991).

Spatial Old Growth Management

The process of identifying and delineating areas containing old growth forest attributes. Spatially identifying (i.e., mapping) these areas can lead to their designation as legal or non-legal OGMAs (FPB, 2012).

Stand-Initiating Disturbance

Disturbances that significantly alter the ecosystem and largely terminate the existing forest stand and initiate secondary succession to produce a new stand. This may occur through wildfires, windstorms, insects, and landslides (Province of B.C., 1995).

Stand-Maintaining Disturbance

Fairly frequent disturbances that maintain an ecosystem and keep successional processes stable. This typically occurs through understory surface fires that remove some but not all trees and maintain open forests of old trees (Province of B.C., 1995).

Timber Harvesting Land Base (THLB)	A spatial (mapped) estimate of the forested land area where timber harvesting is considered both acceptable and economically feasible given the objectives for all relevant forest values, existing timber quality, market values, and applicable technology. The THLB is derived from an assessment of forest management practices and assumptions described in a Timber Supply Review (TSR).
Timber Supply Review (TSR)	A process that evaluates all forests within a timber supply area for their contribution to the THLB. At the end of the TSR process, the Chief Forester determines an allowable annual cut (AAC) (i.e., the harvest volume appropriate for an area) based on the amount of timber that is forecast to be available for harvesting over a specified time and under a particular management regime.
Values	The things that the people and government of British Columbia care about and see as important for assuring the integrity and well-being of the province's people and communities, economies, and ecological systems, defined in policy, legislation, or agreements with First Nations (Province of B.C., 2016).

1 Introduction

1 Introduction

Old growth forests have ecological, economic, social, and cultural **value** to the people of British Columbia (B.C.). Their importance is reflected in provincial legislation, regulations, and policies, and their selection for priority assessment under the provincial **Cumulative Effects Framework (CEF)**.

Old growth forests have unique structural and biological diversity not found in younger forests, provide habitat for many plant and animal species, and support uncommon species and species-at-risk. They also provide various ecosystem services such as removing carbon from the atmosphere and storing it as above-ground and below-ground organic matter, providing water interception and storage, and contributing to wildfire resiliency.

Many Indigenous people express strong cultural and spiritual connections to forests located within their territories (including old growth forests) and use those areas to hunt, trap, gather foods and medicines, and take part in cultural and spiritually important practices (e.g., ceremonies, harvesting monumental cedar, bark stripping). During engagement with the Province, many First Nations have expressed interest in managing old growth forests in their territories to support biodiversity and broader related values such as wildlife habitat, clean water, preserving and rebuilding healthy salmon populations, and protecting species-at-risk. All these intrinsic values that unaltered **primary forests,** including old growth forests, provide are difficult to substitute in **second-growth forests** or managed forests.

Logging of old growth forests is economically important to the people of B.C., many communities, and forest licensees. Old growth forest makes up a portion of forest harvesting in B.C.[1] with the wood used to make a range of products for domestic use and export, including high-end and specialty products, shakes and shingles, lumber for construction, and resulting wood waste supplying the pulp and paper industry and pellet plants for energy and heat production. In addition, old growth forests and iconic large trees are valued by many British Columbians and visitors alike for their beauty, environmental, social, and cultural significance. Old growth-related ecotourism is also a growing source of revenue in many communities.

For many years, old growth forests have been impacted by human activities such as logging for timber, road construction, and other developments. They have also been impacted by natural events, such as wildfires. Together, these activities have reduced the amount of old growth forest in the province. Cumulative impacts on old growth forests may continue to occur in the future if not managed to reduce impacts.

This backgrounder is intended to serve as a supplemental reference resource for readers of CEF Old Growth Forest **Current Condition Reports**. It provides a high-level description of the ecological importance of old and **mature forests**, a detailed summary of how old growth forests are protected and managed in B.C. and summarizes how the combined effects of human activities and natural processes can adversely impact old growth forests. It also includes a summary of both legal and non-legal management mechanisms for both old growth forest and mature forests and **old growth management areas (OGMAs)**, describes several policy limitations that impact how old growth forests are managed today, and outlines how B.C. is working to improve old growth management in the future.

[1] Logging of old growth has declined by 42%, from an estimated 65,500 hectares in 2015 to 38,300 hectares in 2021. The area logged in 2021 represents 0.3% of the estimated 11.1 million hectares of old growth in the province (MOF, 2022).

2 Old Growth Forest Overview

2 Old Growth Forest Overview

Old growth forests develop over centuries and are shaped by disturbances and successional development. These processes contribute to their structural and compositional diversity, which maintains their ecosystem function and landscape resilience (Figure 1).

Old growth forests are characterized by complex compositional, structural, and functional attributes, including large standing and fallen dead trees, layered canopies, and openings that allow the growth of diverse understory species. These forests often have more large trees with unique characteristics such as forked, dead, broken tops, cavities, and large lateral branches than younger forests (FLNRORD, 2017). They consist of communities of trees, plants, fungi, animals, and microbes that have lived together long enough to develop complex, interconnected relationships (Old Growth Technical Advisory Panel, 2021).

In contrast, many mid-seral and mature forests have higher densities of smaller trees with few or no canopy gaps and have less understory diversity. Stands initiated by forest harvesting techniques like clearcutting have simplified stand structure where individual trees have similar height and girth, and large-sized snags and downed logs are absent or uncommon (see section 2.2). B.C. has a diverse array of forested ecosystems, and the age and structure of old growth varies significantly by forest type and from one biogeoclimatic unit to another. In ecosystems with frequent **stand-initiating disturbances**, old growth forests may not contain all of the features described above. Forest ages are younger (>140 years old), and trees are large for those ecosystems but small compared to old growth trees in B.C.'s coastal and interior rainforests. Many species rely on these old growth forests with their relatively smaller, younger trees to provide structures and functions that are important for their habitat needs.

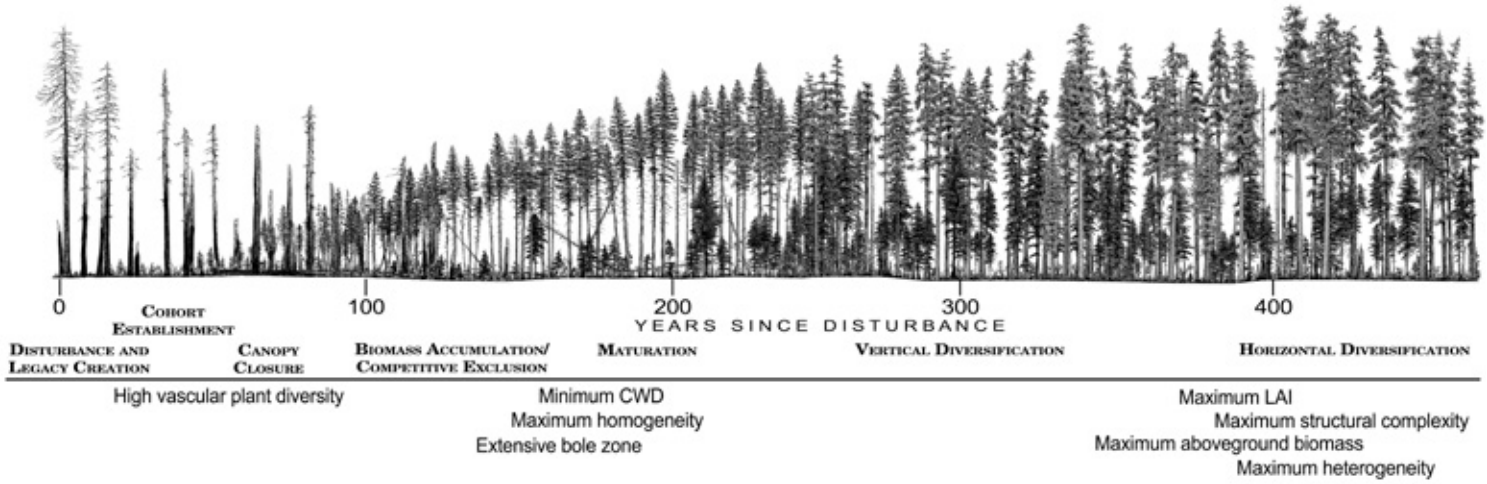


Figure 1: *Forest seral stages representing natural succession of the development of an old growth Douglas fir forest stand following natural disturbance. Timelines will vary depending on natural disturbance regimes. Figure used with permissions from "Ecological Forest Management" by Franklin et al. (2018). Illustration by Robert Van Pelt.*

2.1 Ecological Importance of Old Growth Forest

B.C.'s biodiversity depends on old growth forests.[2] Over 400 species of vascular and non-vascular plants and animals in B.C. rely on old growth forests for at least part of their life cycle (Bunnell et al., 1999). The structural complexity of old growth forests creates a myriad of habitats and microclimates that provide habitat for multiple species and broader communities of specialists and generalists— from a rich soil micro-fauna to unique canopy epiphyte communities, from moss carpets to devil's club, from marten to caribou. Old growth trees can also exist in various stages of senescence and decay, providing valuable habitat for denning, roosting, and nesting by wildlife such as bats, fishers, wolverine, black bears, owls, and pileated woodpeckers.

Old growth forests can persist over very long timeframes. Ancient forests in some ecosystems contain trees that can be 500 to 1,000 years old. Some of these forests may have persisted without stand-initiating disturbances for much longer than the age of the oldest trees. Ancient forests often have very large trees, complex structures, deep soil and duff layers, and contain unique genetic materials that have survived many centuries.

Old growth forests also have critical ecological functions including storing large amounts of carbon in large live and dead trees (including roots and soils), filtering and transporting water, sequestering nutrients from the atmosphere (e.g., nitrogen by way of epiphytic lichens), providing nurse logs for the next generation of trees, and building soil over time. All of these functions play a critical role in mitigating climate change.

The natural spatial pattern and distribution of old growth forests also varies across ecosystems throughout B.C. Where stand-initiating disturbances are most rare (e.g., coast and interior wet belt), old growth forests historically covered most of the area. In areas where disturbances are more frequent, old growth forests occur in variable-sized patches of different **seral stages** across the landscape. Natural disturbance processes create large contiguous areas of old and mature forest that provide **interior forest** habitat conditions and stable microclimate conditions to which several animal and plant species are adapted.

Figure 2. *Old growth spruce forest with lichen, Robson Valley. Photo credit: Traci Van Spengen.*

[2] The Biodiversity Guidebook (BDG) (Province of B.C., 1995) defines biodiversity as the diversity of plants, animals and other living organisms in their form and level of organization and includes the diversity of genes, species, and ecosystems, as well as the evolutionary and functional processes that link them. The BDG remains current provincial policy that outlines broad biodiversity objectives to manage old growth forests on the landscape.

Overall, the complex compositional, structural, and functional attributes of old growth forests take many years to develop and are non-renewable under current management of the forest landscape in B.C. Therefore, it is important to acknowledge that **cumulative effects** from human activities and natural disturbances may threaten the existence and functionality of old growth forests. Human activities such as forestry, road development, Crown land conversion, and private land ownership have affected old growth and mature forests in the past, present, and may continue to impact them in the future if these activities are not managed to reduce human impacts. Natural disturbances events such as droughts, wildfires, extreme weather, and insect or pest outbreaks may become more pronounced with climate change, interacting with management regimes and affecting these old forests in novel ways (see section 2.3).

For the purposes of this document, **Crown land** refers to land (or land covered by water like rivers or lakes) that is managed by the provincial government. Crown land also intersects and overlaps with many traditional territories for First Nations and Indigenous Peoples communities.

2.2 Ecological Importance of Mature Forests

Mature forests are an important component of old growth forest management as they are developing the structural and compositional features of old growth forests to become the next cohort of old growth forest. Mature forests have not yet reached the structural and functional complexity of old growth forests, but will over time as trees grow, age, die, and decompose.

In areas where the amount of old growth forest has been reduced by harvesting and other developments, maintaining primary mature forest is the best strategy to recruit old growth forest over time. Second-growth forests at various ages and developmental stages after harvesting, may not have the structural and compositional complexity to be characteristic of old growth forest, whereas mature forests initiated by natural disturbances are more likely to have the structural diversity and ecological complexities suitable of old growth forests. This is particularly important in ecosystems with frequent stand-initiating disturbances (e.g., NDT 3) where replacement of disturbed old growth forests is expected to occur more frequently.

In addition to recruitment, mature stands are valued for their ability to contribute towards broader biodiversity of B.C.'s forests. The amount of mature forest expected in an ecosystem will vary by **biogeoclimatic ecosystem classification (BEC) unit** and **natural disturbance types** (NDTs).[3]

Mature forests can contribute to maintaining landscape connectivity. As such, it is important to review the current condition of both mature and old growth forests on the land base to understand and support long-term old growth forest management.

Figure 3: *Forest stand demonstrating gap dynamics and multistory age structure, Robson Valley. Photo credit: Traci Van Spengen.*

Similar to old growth forests, it is important to acknowledge that cumulative effects from human activities and natural disturbances have or may potentially threaten the existence and functionality of mature forests over time.

[3] Additional technical information on NDTs is presented in section 3.1.1.

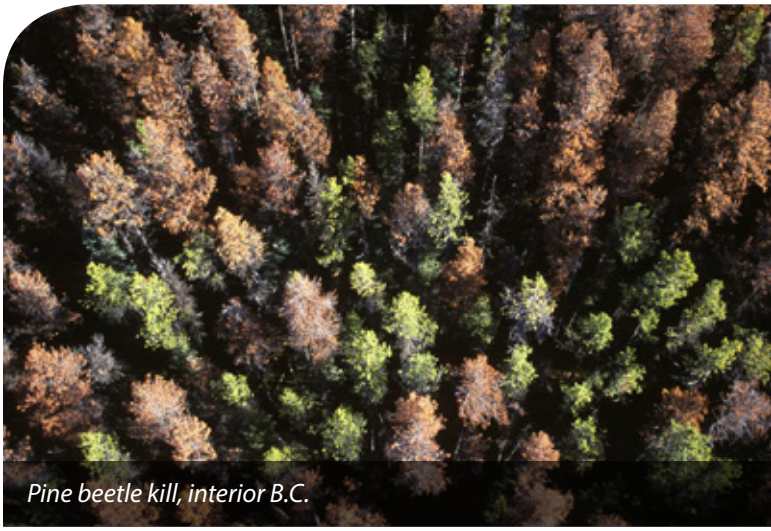
2.3 Cumulative Effects on Old Growth Forests

Over time, human activities and natural processes have resulted in cumulative effects on old growth forests across the province. The amount of old growth forest in B.C. has been impacted by commercial logging, resource extraction (mining, oil and gas), clearing for rural and urbans settlement, and the effects of natural disturbance events like wildfires, wind events, and insect infestations (e.g., bark beetle, mountain pine beetle).

In many areas of B.C., human activities and natural disturbances have also resulted in **fragmentation** of the landscape. This increases **forest edge** conditions, which have different characteristics than forest interior. Contiguous areas of old growth forests and mature forests provide connectivity, facilitating movement of some species and organisms across the land base under forest cover and reducing isolation. However, fragmentation may isolate some species in fragmented patches of forest, increase predation, or limit habitat and breeding opportunities due to ongoing disturbance.

The main drivers of cumulative effects on old growth forests are outlined below. For more information on cumulative effects on old growth forests, refer to the *Old Growth Forests in British Columbia: Provincial Cumulative Effects Assessment Backgrounder* (WLRS, 2023).

Natural Disturbances – Old growth forests are continually evolving and going through the process of establishment, aging, disturbance, and regeneration. During this process, forests may be impacted by natural events such as disease (pathogens), insect infestations, wind (blowdown), geomorphic movement (landslides), and wildfires. These events can cause numerous changes across the landscape and some may impact old growth forests.



Pine beetle kill, interior B.C.

Land Use – All land use activities have the potential to impact old growth forests where human-caused disturbances occur within old growth forests, OGMAs, or other areas managed specifically for old growth biodiversity values. For example, roads, rights-of-ways, utility lines, and other linear corridors are common disturbances. In some areas, Crown land conversion to private land (or other types of long-term leases) has impacted old growth forests by changing the land use of certain areas to support community economies, housing, urban and residential developments, and infrastructure, along with other societal goals such as outdoor recreation and tourism.

Road development and forest removal

Forest Harvesting – Harvesting timber within or adjacent to old growth forests can have a direct impact on the structure and function of these forests. Harvesting activities remove old forests from the land base, resulting in habitat loss, fragmentation, and isolation of remaining old forest habitat on the landscape. This can reduce the resilience of these ecosystems to natural disturbances, such as wildfire or insect outbreaks, in the near term, and impact the long-term resiliency of the forest in response to climate change.

Forest harvesting

Climate Change – Climate change is expected to alter the structure, composition, and function of many old growth forests (and other forested ecosystems) across the province. Climate change projections indicate that there will be a general warming trend, with shifts in the timing and amount of precipitation dependent on geographic location, topography, and ecosystem. Changes in the type, frequency, and severity of natural disturbances like wildfires, droughts, and floods are also projected.

Tyaughton Lake wildfire, Lillooet, B.C.

2.4 Age Definitions

The management of old growth forests in B.C. is guided by age-based definitions set out in provincial and regional legal orders. The CEF current condition assessments follow the applicable regional legal land use orders, the Provincial Non-Spatial Old Growth Objectives Order (PNOGO), or the BDG, depending on how regions have chosen to manage old growth forests.

In most cases, stand age from the provincial forest inventory is used as the primary approach to identify old forests. This method may be efficient for coarse scale management of old growth forest at the landscape level; however, it is limited in application at finer scales because it does not ensure the structural and ecological complexity and diversity of old growth ecosystems are captured and maintained through current management practices.

Age-based definitions are designed to identify the age at which most forests in an ecosystem have characteristics of old growth forests (e.g., structure, function, composition). In ecosystems with rare or infrequent stand-initiating disturbances (e.g., most coastal and moister interior ecosystems) and frequent **stand-maintaining disturbances** (e.g., dry, open-forested ecosystems), old growth forests are defined as greater than 250 years old (Province of B.C., 1995). In ecosystems with frequent stand-initiating disturbances (e.g., drier ecosystems in the interior), forests that are greater than 140 years old are defined as old growth forests. In some regions, there are variations to these age-based definitions.

Age Definitions

Old growth forests are described as greater than 250 years old in ecosystems in NDT 1,2, and 4, and greater than 140 years old in ecosystems in NDT 3.

Mature forests are described as greater than 80 years old in coastal (CWH/CDF) and boreal (BWBS) ecosystems, greater than 120 years old in high elevation (ESSF/MH) and cold, shrub-dominated boreal ecosystems (SWB), and greater than 100 years old in the rest of B.C.'s ecosystems. Once mature forests reach the old growth forest age definitions, they are classified as old growth forest.

Age thresholds for mature forests are defined as greater than 80 years old in low elevation coastal (CWH/CDF) and boreal (BWBS) ecosystems, greater than 120 years old in high elevation (ESSF/MH) and shrub-dominated boreal (SWB) ecosystems, and greater than 100 years old in the remaining ecosystems (BG, ICH, IDF, MS, PP, SBS, SBPS). The specific age at which a stand is considered old or mature is dependent on the combination of BEC and NDT for the stand as described in the Biodiversity Guidebook (BDG). Old and mature forests are identified for management purposes by their age class in the provincial forest inventory, which is primarily the **Vegetation Resources Inventory** (VRI) dataset maintained by Forest Analysis and Inventory Branch (FAIB) and available on the B.C. Geographic Warehouse (BCGW).

3 Old Growth Forest Management in B.C.

3 Old Growth Forest Management in B.C.

This section provides an overview of how old growth forests are managed in B.C. and describes the legal and policy tools that are used to manage old growth forests and **mature-plus-old forests**.

3.1 Regulatory Context and Key Documents

The importance of conserving old growth forests in B.C. is reflected in legislation, regulations, and policies. The legislative framework for old growth forest management is established under four legal Acts in B.C.:

1. The ***Forest Practices Code of British Columbia Act (FPC Act)*** – made old growth objectives from land use plans legally binding as higher-level plan orders. The *FPC Act* was replaced by the Forest and Range Practices Act (FRPA) in 2004. Old growth orders established through the *FPC Act* included stand level objectives. Stand-level objectives are now enshrined in FRPA and are no longer utilized in old growth orders established through the *Land Act*, Land Use Objectives Regulation (LUOR).
2. The ***Forest and Range Practices Act*** **(FRPA)** – establishes broad objectives for stand-level and landscape-level old growth forest management and retention but relies on regional land use orders for specific objectives such as legal targets (both spatial and **non-spatial**) for old forest conservation. Within FRPA, forest licensees must develop results and strategies that are consistent with regional land use orders and enforceable through a Forest Stewardship Plan (FSP). Since enactment of FRPA, new regional land use objectives are established through the Land Use Objectives Regulation (*Land Act* s93.4).
3. The ***Land Act*** – establishes legal objectives for landscape-level biodiversity through the LUOR to manage old growth forest for the purposes of FRPA, and allows for OGMA amendments.
4. The ***Oil and Gas Activities Act*** **(*OGAA*)** – provides for the responsible Minister to recognize existing OGMAs to ensure their protection from the impacts of oil and gas activities. This is done through the Environmental Protection and Management Regulation under *OGAA*.

The application and implementation of legally binding objectives is determined through regional land use planning processes and written as regional land use orders, higher level plan orders, land and resource management plans, etc.[4,5] In areas where a land use order addressing old growth forests has not been established, the PNOGO serves as a default requirement. The PNOGO also includes appendices specifying exceptions to the default for areas within the Thompson-Okanagan Region. Regional land use orders, where established, supersede the PNOGO.

Policy targets for the management of old (and mature) forests are derived from the BDG with process support for implementation from the **Landscape Unit Planning Guide (LUPG)**, the Forest Planning and Practices Regulation, and may be implemented through the LUOR (*Land Act* s.93.4) with support from the approved LUOR Policy and Procedures (2008).

[4] Land use orders under regionally specific Legislative Acts (e.g., Great Bear Rainforest) are not included/described in this document. For more information, visit the Province of B.C.'s Land Use Planning website.

[5] Legal objectives, directions, and Orders for old growth can supersede these four legal Acts in certain cases.

3.1.1 Biodiversity Guidebook

The Biodiversity Guidebook (Province of B.C., 1995) provides policy direction for managing old growth forests. It provides targets for the percent and/or amount of old growth forest and mature-plus-old forest to retain across the province.

Targets are defined based on biogeoclimatic ecosystem classification (BEC) subzone/variant and NDT and implemented within **landscape units (LUs)** by **biodiversity emphasis option (BEO)** and BEC subzone/variant. There are five classes of NDT in B.C. that vary based on disturbance type (stand-initiating or stand-maintaining) and frequency (rare, infrequent, or frequent) and climate (Table 1). These disturbances shape the attributes and abundance of old growth forests within an area, and the BDG provides descriptions of seral stage and patch size distributions by BEC unit for each NDT.

Table 1. *Natural Disturbance Types in B.C.*

Acronym	Description
NDT1	Ecosystems with rare stand-initiating events
NDT2	Ecosystems with infrequent stand-initiating events
NDT3	Ecosystems with frequent stand-initiating events
NDT4	Ecosystems with frequent stand-maintaining fires
NDT5	Alpine Tundra and Subalpine Parkland ecosystems

The BEO designation determines the minimum amount of old growth forest (and other seral stages) identified to maintain biodiversity values in each LU by balancing socio-economic interests with the risk of losing elements of natural biodiversity. BEOs categorize the importance of biodiversity at the landscape level and are classified as Low, Intermediate, and High. Each option is designed to result in a different level of natural biodiversity within a given area and a different risk of losing elements of natural biodiversity (e.g., High BEO = higher levels of natural biodiversity, Low BEO = lower levels of natural biodiversity).

Table 2. *Recommended seral stage distribution for NDT1 (% forest area within the LU). Table recreated from the BDG (1995).*

BEC Unit	Seral Stage								
	Early			Mature + Old[a]			Old		
	L[b]	I[b]	H[b]	L	I	H	L	I	H
CWH	n/a	<30	<23	>18	>36	>54	>13	>13	>19
ICH	n/a	<30	<23	>17	>34	>51	>13	>13	>19
ESSF	n/a	<22	<17	>19	>36	>54	>19	>19	>28
MH	n/a	<22	<17	>19	>36	>54	>19	>19	>28

[a] The minimum requirement for the old seral stage is included in the "Mature + Old" category.

[b] L designates the Low biodiversity emphasis option; I designates the Intermediate biodiversity emphasis option; H designates the High biodiversity emphasis option.

Note: The lower biodiversity emphasis option was established based on the assumption that it would not be applied to more than approximately half of the area of any BEC subzone within a subregional plan or forest district. Further, PNOGO and some regions allow for a draw-down to one third of the old forest target in LUs where the BEO is rated Low, and where undue timber supply impacts are expected with application of the full target amount.

3.1.2 Landscape Unit Planning Guide

Like the BDG, the LUPG (Province of BC, 1999) provides policy direction for managing old growth forests. The LUPG supports the implementation of the BDG by providing methods and procedures to identify, establish, and implement landscape-level biodiversity management for old growth forest retention and wildlife tree retention. The LUPG provides more detailed technical direction for these biodiversity objectives than identified in previous guidance documents like the BDG.

The LUPG provides a process for meeting old growth forest retention objectives through OGMA establishment and associated LU objectives to ensure retention and/or recruitment of old growth forest structure is present over time. It also provides direction for when **non-spatial old forest management** is suitable in the short term, as a time-limited approach to meeting old growth forest requirements, with the intention that non-spatial amounts/targets are eventually replaced with spatially defined OGMAs.

The LUPG defines the land base to which old growth forest retention targets apply on the **Crown Forested Land Base (CFLB),** and provides a process for how old growth forest will be managed on the CFLB by prioritizing old growth forest retention in forests outside the **timber harvesting land base (THLB)** (including parks).[6]

The LUPG uses the targets from the BDG and introduced policy to allow old growth forest targets to be reduced by up to 2/3 in LUs designated as Low BEO. Full (or partially expanded) targets could be met where it was determined (through a timber supply analysis) that implementing these targets would not cause additional timber supply impacts (see section 3.1.3 for further information). The full target must be met by the end of the third rotation, where a rotation is defined as 80 years.

The LUPG also provides a "rules-based" approach for how OGMAs are designed and mapped to mitigate impacts on timber supply. The first step in this approach requires that all old growth retention targets be met (i.e., co-located) in areas where harvesting is prohibited (e.g., parks, ecological reserves, riparian reserve zones, wildlife habitat areas (WHAs) and ungulate winter range (UWR) no harvest zones). If the entire old growth forest target cannot be met in the **non-contributing land base** (i.e., forests outside the THLB), areas with timber harvesting constraints (e.g., visual management areas, UWR partial harvest polygons, riparian management zones) must be used. If old forest targets are still not met, the remaining area can be met within the THLB. If there is not enough old growth forest in a LU/BEC to meet the target, the LUPG provides direction to meet old forest targets in the shortest timeframe possible through **recruitment**. This is typically achieved by selecting the next oldest available forest (generally the mature forest seral stage) to be recruited to old growth forest over time.

[6] The amount (hectares) of CFLB is subject to change as the provincial inventory information is updated over time. Additionally, there can be various methods to define and calculate the CFLB and this is dependent on the management objective (e.g., timber supply review, cumulative effects assessment). The amount of CFLB will determine how much old growth forest is to be retained in a Landscape Unit and BEC.

The requirement to manage for seral stage distributions was also modified in the LUPG. Requirements to manage for maximum amounts of early seral and minimum amounts of mature forest were removed from NDT 1 and 2 except where additional analysis (e.g., **Timber Supply Review**) demonstrated there would not be an impact to timber supply. In the LUPG, mature targets were maintained in NDT 3 and 4 ecosystems until a timber supply review demonstrated that this would not constrain timber supply. Note that some regional land use orders retained some level of mature forest retention requirements.

3.1.3 Provincial Non-Spatial Old Growth Order

Default legal targets for management of old growth forests in B.C. are specified in the PNOGO (Province of BC, 2004a). Targets are the same as those in the LUPG (with 2/3 draw-down) and are non-spatial (e.g., based on a percentage of the CFLB to be maintained for old growth forest management by NDT, BEC zone, and BEO). Like the BDG and LUPG, targets are provided for each BEC subzone/variant within each LU (LU/BEC).[7] The objectives defined in PNOGO apply in areas where a regional land use order has not been established.

Key Message

The PNOGO is the default Order used where a regional land use order is not established. In areas where a regional land use order is established, the PNOGO does not apply, and the regional Order is followed.

The PNOGO and PNOGO Implementation Policy (Province of BC, 2004b) contain provisions that permit use of younger forests to meet old growth forest objectives where equal or better conservation benefits would result. Like the LUPG, the PNOGO Implementation Policy states that where insufficient old forest is present, a recruitment strategy is required that meets old growth forest targets in the shortest time frame possible, or where it maintains or improves benefits for old growth forest conservation. The PNOGO also includes the option to reduce old growth forest retention in LUs with low BEO by up to 2/3 to the extent necessary to address timber supply impacts, and full targets do not need to be met for three rotations (e.g., 240 years). Requirements for mature forest management were removed for all NDTs.

The PNOGO applies only where an approved regional land use order has not been established. Where a regional land use order has been enacted, it supersedes the PNOGO. Many regions already had approved regional land use orders,[8] and some have established new plans since the release of the PNOGO.

[7] No targets are established in the bunchgrass (BG), alpine BEC zones (IMA, CMA, BAFA), and ESSF parkland (non-forested subalpine).

[8] Earlier orders were established under the *FPC Act*, but newer orders are established under section 93.4 of the *Land Act*.

3.2 Approaches to Meeting Old Growth Forest Management Targets

Provincial policy sets targets that are expressed as a percentage or amount of the forested area that must be retained for old forest management (e.g., BDG, LUPG, PNOGO, and most regional land use orders) in a specific reporting unit (e.g., LU/BEC). In general, old growth forests are managed in the province using several approaches to achieve these targets. The main approaches are outlined below and presented in Figure 4. Some regions use a combination of two or more of these mechanisms.

1. **Non-spatial old growth forest retention** – Non-spatial approaches to old growth forest management rely on the provincial forest inventory to calculate the amount of old growth forest in a specific reporting unit (e.g., LU/BEC). In this approach, the location, size, and configuration of old forest polygons is not mapped but is tracked through a tabular summary. As a result, the location of old growth forest retention may change over time.
2. **Legal OGMAs** – Many regions have spatially mapped areas that contain or are managed for old growth forest retention and have enacted the boundaries through an order under the *FPC Act*, *Land Act*, or *OGAA*. These orders legally establish the boundaries of mapped OGMAs and generally include objectives for management activities within the OGMA (e.g., allowances for roads, trails, and forest health management). Forest tenure holders must apply results and/or strategies to meet legally defined objectives in their Forest Stewardship Plans (FSPs) and must abide by the direction in the order with respect to incursion limits and requirements for old growth forest replacement.
3. **Non-legal (draft) OGMAs** – Some regions have spatially defined OGMAs that are either: (a) in draft form awaiting legal establishment, or (b) will not be made legally binding. Where they are not intended for legal establishment, forest tenure holders can choose whether to use these OGMAs or chose another approach to meet objectives for old growth forest retention. Once a tenure holder references non-legal OGMAs in an approved FSP they become legal for the duration of that FSP.

Landscape reserve design approaches are additional tools for old growth forest management that are applied in areas where an ecosystem-based management regime is used. Ecosystem-based management areas in B.C. include Haida Gwaii, Great Bear Rainforest, Clayoquot Sound, and the Cheakamus Community Forest, which have specific legislation, objectives and/or management regimes for old growth forest differ substantially from policy direction in the LUPG, BDG, and the default PNOGO (Figure 4).

For additional information on how specific areas are managed, visit the Province of British Columbia's Land Use Planning website.

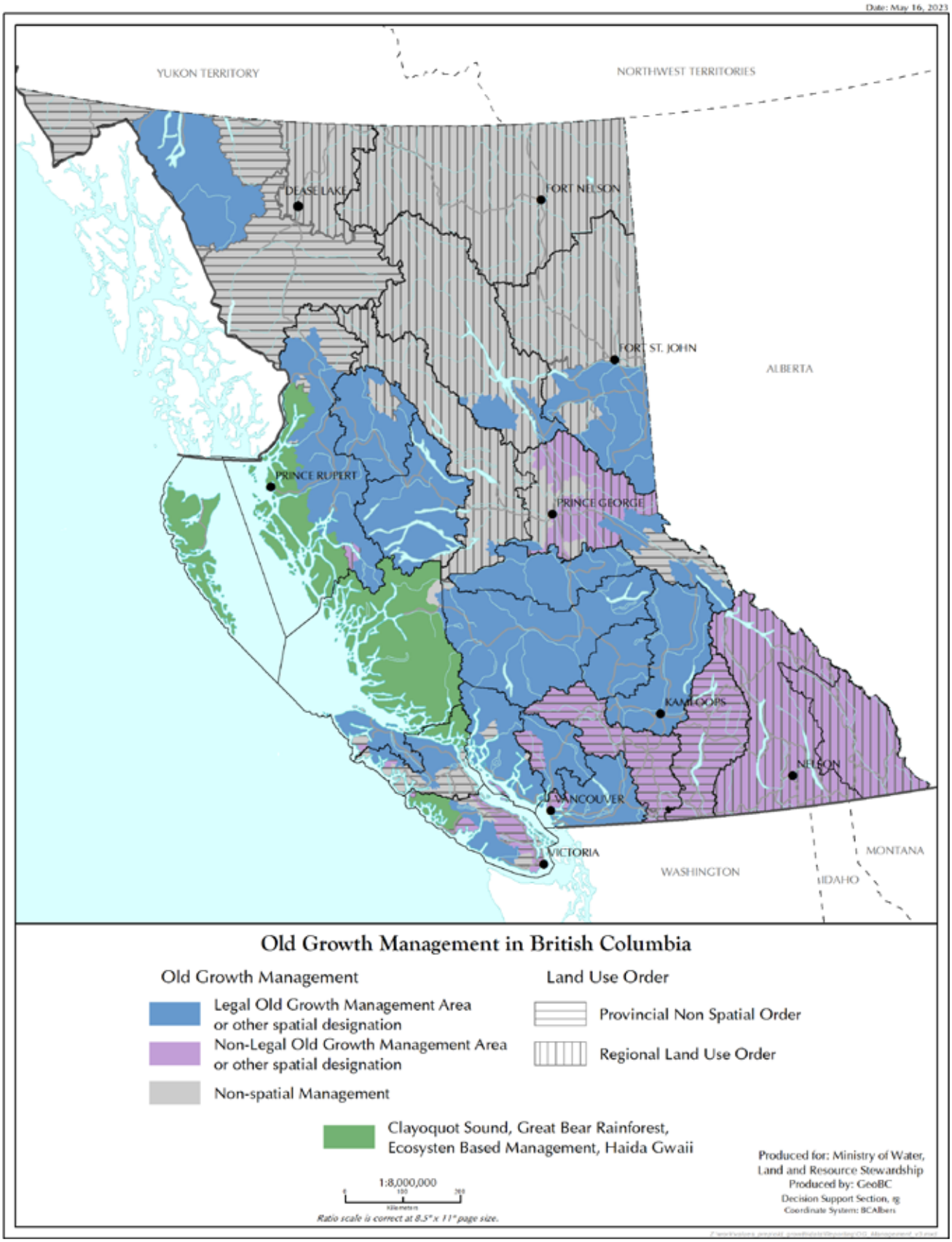


Figure 4. *Map of Old Growth Management in B.C.*

Summary:

- The BDG (1995) outlines policy targets for managing old forests. It sets a minimum target for the amount of old forest across the province by setting specific targets based on BEC zone and NDT to be met at the LU scale by BEC subzone/variant.
- The LUPG (1999) provides policy direction for managing old forests by focusing old growth forest retention in the non-contributing land base (forests outside the THLB which incudes parks). The LUPG provides a "rules-based" approach for reducing impacts on timber supply in this process. Targets for old growth forest follow the BDG but are modified to allow for a reduction by 2/3 in LUs with a Low BEO and to exclude mature forest management from NDT1 and 2.
- The PNOGO (2004) outlines legal targets for managing old forests in areas that do not have an established land use order. It provides targets that have been modified from the BDG to allow for reduction of targets by 2/3 in LUs with a Low BEO and to exclude mature forest management.
- Regional land use orders (various dates) exist for many areas of the province. These provide legal targets for managing old growth forests (and seral stage distribution in some legal orders). Targets frequently follow those established in the BDG and modified in the LUPG, but there is high variability across the province.

3.3 Mature-Plus-Old Targets

Mature-plus-old targets were originally defined in the BDG. Similar to old growth forest targets, they are expressed as a percentage of the forested area required for retention. Mature-plus-old targets are a combination of the targets for old forest and those for mature forest. They are expressed in combination because while the minimum old forest component must be met, the mature portion of the target can be met by either old or mature forest.

Where available, additional old forest can be substituted for the mature forest portion of the target.[9] However, mature forest cannot be substituted for the old forest portion unless a deficit of old requires a recruitment strategy. Management of mature-plus-old forest is not legally required in many areas of the province; however, an assessment of the mature-plus-old seral stage is reported by the provincial government in the Cumulative Effects Current Condition Reports to provide information about the current state of mature forests across B.C.

In the absence of disturbances, mature forests are expected to become old forests over time. Assessing the current amount of mature forest is important to understand where forests may be available to recruit towards old forest targets, particularly where old forest is currently under-represented.

The BDG identifies mature-plus-old targets by BEC zone, NDT, and BEO for application at the LU/BEC scale. However, they are not included in the legal targets outlined in the PNOGO. Some regional Land Use Orders include objectives for mature-plus-old forest management (e.g., Cariboo, Skeena, and Kootenay-Boundary Regions), but most of the province is not required to manage mature forests.

[9] The mature forest portion is not shown in the mature-plus-old targets, but is calculated by subtracting the old target from the mature-plus-old target.

3.4 Old Growth Management Areas

Throughout most of B.C., OGMAs have been spatially identified and mapped to inform management activities and coordinate the retention and conservation of old forest biodiversity values. OGMAs are intended to capture old growth forest characteristics across landscapes. The methods for spatially locating OGMAs are outlined in the LUPG and regional land use orders relevant to specific areas (see Section 3.2 above). The targets for how much area should be captured in OGMAs are based on the PNOGO or regional land use orders.

OGMAs are legally established through the LUOR and enacted under section 93.4 of the *Land Act* for the purposes of the *Forest and Range Practices Act*. **Legal OGMAs** that were established under the *FPC Act* maintain their status under *FRPA* and the *Land Act*. For the purposes of *OGAA* and consideration in all oil and gas exploration and/or development, OGMAs can also be legally established under the *Environmental Protection and Management Regulation*.

The objectives of OGMAs are to manage and conserve biodiversity associated with old growth forests at a coarse filter scale; they are not intended to conserve all biodiversity values on the landscape.[10] While there are opportunities for addressing multiple values within an OGMA (e.g., riparian, ungulate winter range, visual quality objectives, or wildlife habitat areas), these values should be compatible with the objective of old growth forest retention.

Not all OGMAs are legally designated. Spatially identified, non-legal (draft) OGMAs are used across different areas of the province (Figure 3; Section 3.2). These OGMAs can be referenced in FSPs as a strategy to meet old forest biodiversity objectives. Once a forest licensee references non-legal OGMAs in an approved FSP, those non-legal OGMAs have legal standing for the duration of that FSP.

[10] Refer to the BDG for additional tools on managing landscape and site level biodiversity.

3.4.1 OGMA Incursions and Disturbances

Disturbance, whether natural or anthropogenic may occur within OGMA boundaries. Draft policy and guidance were developed by the Province in late 1990's and mid-2000s to outline acceptable reasons for OGMA incursions, including guidance when OGMAs should be considered for replacement if impacted by natural disturbance and the process for amendments (see the Province of British Columbia's Land Use Planning website). Some Regions and/or Natural Resource Districts have developed their own policy guidance on OGMA amendments and replacements from natural disturbance or anthropogenic incursions causes.

3.4.1.1 Natural Disturbances in OGMAs

Natural disturbances such as fires, insects, pathogens, landslides, and wind can alter forest stand composition within OGMAs. Where disturbances are partial rather than stand-replacing, these are considered representative of old forest biodiversity processes and natural succession within primary old growth forests.

The management of bark beetles within OGMAs varies across the province depending on regional policies or management objectives within OGMA orders. For areas where catastrophic wildfire events have occurred, current provincial policy recommends a landscape assessment to determine whether replacement OGMAs are required dependent on the extent of impact to OGMAs and post-disturbance ecological function. Some OGMAs or portions of OGMAs can be left for natural succession.

It has been a trend in the province that the application of the OGMA amendment and replacement policies is directed towards incursions from anthropogenic/human disturbance reasons, rather than natural disturbances.

Fire Scarred Snag. Photo credit: Leslie McKinley

3.4.1.2 Anthropogenic Incursions in OGMAs

It is common for OGMAs to have historic incursions from human (anthropogenic) development such as forestry roads or cutblocks at the time of establishment.

There are several reasons why anthropogenic incursions into OGMAs may occur as permitted by an OGMA Land Use Order or through provincial or regional guidance. These include:

- Modifying the original extent to allow for recreation sites, facilities and/or recreation trails;
- Facilitating range development, or conducting maintenance for range and range-related activities;
- Allowing road construction and maintenance to access timber beyond the OGMA;
- Managing for forest health where trees within the OGMA pose a significant health risk to forests outside the OGMA, and where harvesting constitutes an appropriate and effective control action; and,
- Addressing a public or industrial safety hazard (e.g., danger tree, fire hazard).

In these cases, where the incursion is above the allowable limit defined in the regional OGMA order, an amendment to the OGMA should be made, and replacement area may be required.

3.4.2 OGMA Amendments

There are several provincial policy documents that guide amendments, adjustments, and replacements of legal OGMAs. These policies classify changes to OGMAs either as minor or major/significant amendment processes based on the size and type of incursion, while specifying that replacement areas must be ecologically equivalent (or better) and there is no net loss of OGMAs. Attributes that are considered when assessing ecological equivalence include BEC subzone, size, shape, age, connectivity, and interior habitat quality that is equivalent or an improvement from the original OGMA. Some regions have replaced this provincial policy with regionally specific policy or provided additional direction within the legal orders. Amendment proposals that change OGMA objectives (or the means of achieving those old forest objectives) represent a significant land use change and require considerations that are outside the scope of the provincial policy documents for OGMA amendments, adjustments, and replacements.

In addition to amendments or replacements required as a result of incursions described above, amendments may also be permitted for the following reasons:

- Changing the OGMA boundary to improve the OGMA and adjacent timber management, or to better reflect logical, on-the-ground physical features such as streams, timber types, and roads; Improving timber harvest boundary alignment in a way that will contribute to the maintenance of the OGMA (e.g., create a more wind-firm boundary within the OGMA);
- Shifting the location of the contiguous area of the OGMA to improve the retention of old forest attributes as identified through a field assessment;
- Relocating the OGMA to better capture old growth and/or biodiversity values (e.g., where biodiversity values outside of the OGMA exceed those currently within the OGMA); and
- Accepting a compelling rationale to harvest where the incursion is minimal, or an ecologically equivalent (equal or better old seral and biodiversity values) replacement opportunity exists.

Approved amendments to legal OGMAs are submitted and updated in the BCGW when required.

Guidance for amendments to legal OGMAs is considered best practice for amending non-legal OGMAs. However, acceptable reasons for incursions into non-legal OGMAs are outlined in individual forest licensees' Forest Stewardship Plans. In many cases forest licensees maintain their own internal tracking processes to account for incursions, amendments, adjustments, and replacements, and submit these changes to FOR when requested. This presents a challenge because the most up-to-date OGMA information is not readily available in the BCGW for all users. In addition, there are similar issues with information not being readily available from monitoring incursions and impacts to OGMAs from non-forest sectors like oil and gas, mining, and *Land Act* tenures. Ongoing management of OGMAs is made more difficult due to the regular updates to the VRI and BEC which cause differences in the land base definitions and designations between the year of assessment and the establishment of orders, making it hard to compare values and attributes over time.

4 Policy Limitations

4 Policy Limitations

Old growth forest management in B.C. is highly complex and regionally specific, and it is important to acknowledge that there are existing policy limitations that may impact how old growth forest is allocated, protected, defined, identified, and quantified on the land base. Brief descriptions of these policy limitations are provided below.

4.1 Old Growth Age Definition

Within the provincial (VRI) forest inventory data, forest age is estimated by experienced forest interpreters using a combination of air photo interpretation and ground plots. Ground verification shows that the age of forests more than 200 years old is consistently underestimated through photo interpretation, and as stands get older, it becomes increasingly difficult to estimate age of forests (Old Growth Technical Advisory Panel, 2021). This is common in low productivity forests where old trees may be misclassified as younger stands,[11] but it also occurs in productive forests. The age assigned to a VRI polygon is based on the average age of the co-dominant trees, and this may not accurately reflect the true age of the stand considering the time since the last stand-initiating disturbance. This likely leads to underestimation of ages of ancient (very old) forests, particularly in ecosystems with very infrequent stand-initiating disturbances (NDT 1 coastal and interior wet belt) where forests have unique attributes and support high levels of structural and functional complexity.

Additionally, the current age class system includes all forests greater than 250 years old in age class 9 without differentiating amongst stands older than this threshold age. There are practical reasons for simplifying age class estimates given the difficulties in using remote sensing techniques (e.g., air photo interpretation) to estimate forest ages. However, using age by NDT as the sole criterion to identify old growth forest oversimplifies the definition; complex structural and functional attributes and makes the management of these forests (and values they provide) more challenging.

4.2 Old Growth Forest Variation within BEC Subzones/Variants

Forest policy in B.C. sets old growth forest targets using minimum forest ages for BEC unit by NDT. However, old growth forests vary significantly within BEC subzones/variants. Productivity, composition, and structure of stands within a single variant can vary greatly by **site series**, as defined by moisture and nutrient conditions, from highly productive forests to unproductive ecosystems with slow growing trees.

Even though the variety of old growth forests at the site series level contributes to biodiversity in different ways and provides a different set of values, in most parts of the province stands within the same BEC subzone/variant contribute equally to meeting old growth forest targets.[12] Although representation by site series was originally recommended in the Biodiversity Guidebook, ecosystem representation is not applied at a scale finer than BEC subzone/variant across most of the province.

[11] For example, if tree stand height is shorter due to lower productivity (from site limiting factors such as water or nutrients), they may appear as younger stands when aerial photos are reviewed, when in reality, the trees still old trees in a low productivity site.

[12] Management of old growth forest is by site series for the Great Bear Rainforest, Haida Gwaii, and Clayoquot Sound.

4.3 Forest Productivity

High productivity forests and sites are structurally complex ecosystems that support many species, accumulate biomass quickly, and store large amounts of carbon, making them critical in our efforts to mitigate climate change. However, these areas have historically been the focus of forest harvesting due to the potential for high volume timber and fast-growing regeneration. These highly productive forests tend to be in the THLB, and old growth forest policy (e.g., LUPG) has directed that OGMAs be established first in areas outside of the THLB then in partially constrained areas before considering areas in the THLB. As such, higher productivity forests tend to be poorly represented in OGMAs (Price, Holt & Daust, 2021).

Lower productivity forests, including those on steep slopes, tend to be used to meet old growth forest objectives due to their lower timber value; however, the cumulative effects of other industrial disturbances in these areas are becoming more prominent (e.g., fragmentation by gas development in the northeast). In addition, rare forests, those that are limited in extent and location and as such are unique to an area, are also valued for their structural complexity and value for carbon storage. However, in the current model, rare forests are not differentiated from other old growth forest types.

Current old growth policy does not sufficiently consider the ecological diversity and the function of old growth forests (Price, Holt & Daust, 2020). As a result, the impacts to remaining old growth patch size, elevational and landscape connectivity, interior forest conditions, and functional habitat value of old growth forest are often not considered or required in old growth management decisions. This can result in small, fragmented, and isolated patches of old growth forest across the landscape, which are then further impacted by industrial footprints and development pressures.

4.4 Definition and Application of the Crown Forested Land Base

Consistently defining the CFLB across the Province is a challenging component to assessing, reporting, and managing old growth forest targets. Although a process for mapping CFLB is outlined in the LUPG, CFLB definitions can vary based on the analysis objectives or program initiative (e.g., timber supply review, risk assessments, current condition reporting). The process in the LUPG is also based on an older model of forest inventory than is used now. The older Forest Inventory Program (FIP) data were separated on productive and non-productive (NPBr) forest, which was a key part of the CFLB definition in the LUPG. Defining the CFLB is more complex with the more detailed Vegetation Resource Inventory (VRI). Crown forest ownership also changes with new private land exclusions, updates to VRI that define non-forested areas, and accommodations for First Nations' treaty lands.

The most common definitions of CFLB will typically exclude private lands, roads (using a set buffer width) and most woodlot license areas, as well as non-forested areas (e.g., grasslands and wetlands), and low productivity sites that may contain trees but are not likely to produce a productive forest. The VRI includes a field for the **Forest Management Land Base (FMLB)** that attempts to define the "forested land base" at a coarse scale, although it includes more area than the LUPG definition of CFLB. Since the CFLB sets the denominator for applying old forest targets, differences between regional and provincial analyses can lead to different results. Overall, the compilation of CFLB is simpler across smaller areas, and provincial data assessments tend to use a coarser approach to quantifying the CFLB.

4.5 Socio-Economic Trade-Offs

For decades, the management of old growth forest has involved socio-economic trade-offs to achieve a socially acceptable balance between retention of old growth forest ecosystems and minimizing impacts to timber supply. Until February 2023, the *FRPA* was clear that objectives set by government for biodiversity must, to the extent practicable, not unduly reduce the supply of timber from B.C. forests. The prevailing provincial policy (the LUPG) states that old forest retention areas are located in forests outside the THLB and areas that have constraints on forest harvesting before identifying areas within the THLB.

The development of OGMAs and regionally specific non-spatial legal orders (e.g., Prince George TSA, Dawson Creek TSA, Fort St. John TSA, Morice TSA) were multi-year processes completed in cooperation with the Province, forest licensees, and other stakeholders to ensure a negotiated outcome. Strategies to limit impact to timber supply can result in the old growth forest conservation being over-represented by forested stands outside the THLB and constrained land bases, which often include low productivity forests. Some of the assumptions around existing OGMAs and old growth forest management are being re-evaluated as B.C. continues to implement the *Declaration of the Rights of Indigenous Peoples Act*, Forest Landscape Plans, modernized land use planning, and the recommendations from the Old Growth Strategic Review.

5 B.C.'s New Approach to Managing Old Growth Forests

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5.1 Old Growth Strategic Review Commitments

An independent strategic review of old growth policy and management was commissioned by B.C.'s Cabinet Ministers, which resulted in *A New Future for Old Forests: A Strategic Review of How British Columbia Manages for Old Forests within its Ancient Ecosystems* (Gorley & Merkel, 2020) report (referred to as the Old Growth Strategic Review). The report highlights concern that recommendations, initiatives, provincial policies, and land use plans have not been fully implemented or monitored historically, and that a paradigm shift on old growth forest management is required to emphasize ecological health and biodiversity. The report provides 14 recommendations for government consideration and highlights specific limitations in the areas of forest management, ecosystem health, and public support.

In 2021, B.C. committed to implementing all 14 recommendations from the Old Growth Strategic Review. This includes pursuing an approach to protecting and managing old growth forests that prioritizes ecosystem health and biodiversity, community resiliency, and reconciliation with Indigenous Peoples. This approach to managing old growth includes:

- developing more inclusive and collaborative governance mechanisms;
- setting clear and measurable forest-related targets and objectives;
- continuing to manage for healthy multi-valued old forests;
- undertaking effective and inclusive planning that provides clear direction; and
- enhancing understanding and awareness of old growth management by making information more accessible.

For updates on how the Province of B.C. is managing old growth forests, please visit the Province of B.C.'s Old Growth Forest website.

5.2 Old Growth Reporting through the Cumulative Effects Framework

Old growth forest is a value that is assessed under the CEF. The assessment follows the methodology outlined in the Interim Assessment Protocol for Old Growth Forest in British Columbia (FLNRORD, 2017) and aims to provide information on: (1) current condition information of old growth forests and old-plus-mature forest compared to legal and policy targets, (2) the amount of old growth within OGMAs, and (3) the amount of incursions within legal and non-legal OGMAs. This information aims to inform collaborative discussions amongst the provincial government, First Nations, natural resource industries, and other community stakeholders to ensure that cumulative effects are identified, considered, and managed appropriately.

This work under the CEF directly supports the Old Growth Strategic Review, specifically Recommendation 5 to provide the public with timely and objective information about forest conditions and trends. This work also helps to inform Recommendation 7 to meet compliance with existing requirements.

Additional information on these Old Growth Forest Current Condition Reports, assessment methodology and limitations, and data inputs can be found in the *Old Growth Forests in British Columbia: Provincial Cumulative Effects Assessment Backgrounder* (WLRS, 2023). Old Growth Forest Current Condition Reports will be published to the Province of B.C.'s CEF website.

6 References

6 References

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CEF Cumulative Effects Framework