1 PART E – GLOSSARY

CHAPTER E1 – GLOSSARY OF FORESTRY TERMS

Purpose

The purpose of this glossary is:

- To provide definitions for terms used in the standards; and
- To assist forest valuation practitioners to improve the clarity of valuation documents by providing generally accepted meanings and highlighting the potential for ambiguity.

It is not intended that this glossary be prescriptive as to the meaning of a term or to preclude the use of synonymous terms.

It is the responsibility of the valuer to ensure that terms used in valuation documents are well defined for the reader in the context where they are used.

CHAPTER E1 – GLOSSARY OF FORESTRY TERMS

Revision History

Original Standard	Released in May 1999
Revision in August 2023	Main changes are: • Addition/editing of – Confidence interval – Site productivity index – Stand – Top height

Term	Definition
Abbreviations	See 'Symbols'
Area (land)	The area of a parcel of land, e.g. a stand or forest, is generally defined against a projection of the earth's surface on to a flat, two-dimensional surface. The quantity of the area is sensitive to the projection that is used, which should be stated. Synonymous with plane area and map area. Less commonly, except for very large areas, land area can be defined in terms of the surface area of a projection of the earth's surface on to an ellipsoid. The projection is still important and should be stated.
Basal area	*Of a stem:* The cross-sectional area of a stem in a plane perpendicular to the long axis of the stem, measured at Breast Height and typically over-bark, with units of square metres (m^2). Calculated from DBH (cm) as $\frac{\pi}{40{,}000} DBH^2$ *Of a plot or stand:* The total cross-sectional area per hectare, at breast height, of all included stems ($\mathrm{m^2 ha^{-1}}$). Without qualification, and particularly in a mensuration context, basal area is typically measured over-bark and limited to live, standing trees where it is synonymous with "live" or "net" basal area. "Total production", sometimes "gross", basal area is used in a narrow, growth modelling context to include the basal area of live, standing trees, dead standing trees and the basal area, as at the time that they were removed, of all trees from the same rotation that have already been removed by thinning or mortality. Total production basal area cannot be measured by sampling.
Breast height	Refers to the usual point of measurement of standing tree diameter, i.e. 1.3m (**Australia**) or 1.4m (**New Zealand**) above ground level on the uphill side of the tree.
Clearfelling	The practice of felling all of the trees in a given area.
Clearwood	Wood showing no (or negligible) defects caused by knots, resin pockets or mechanical damage and usually displaying straight and even grain patterns. Clearwood in small amounts is found in all trees. Pruning is designed to grow additional amounts of clearwood, especially in long lengths.
Compartment	A mostly contiguous area within a forest defined and recorded on a map (or by recording noticeable boundary markers) used as a basic unit of forest record, description and management. In some cases, the smallest unit of forest description and in other cases, further subdivided into stands.

Confidence interval (Statistics)	The confidence interval associated with a mean or total estimated by sampling can, for practical purposes, be interpreted as the range of values within which the true mean or total of the population is "likely" to be found, provided that there are no other (non-sampling) sources of error. "Likely" implies probability and in forestry, confidence intervals are often, but not exclusively, calculated using a 5% probability of exclusion (95% probability of inclusion). Confidence intervals are only concerned with uncertainty arising because a sample has been used instead of complete enumeration. A non-exhaustive list of other potential sources of error that are not reflected in estimates of confidence intervals include: • Inventory design errors; e.g. not measuring poorly performing stands. • Biased plot locations; e.g. avoiding gaps. • Measurement errors; e.g. broken DBH tape. • Unmeasured plots; e.g. avoiding blackberry. • Recording and transcription errors. • Model errors; e.g. biased taper function or growth model. One should avoid making statements about the likely location of the true population mean without adequate consideration and disclosure of the potential for non-sampling errors.
Confidence limits	The upper and lower bounds of a confidence interval.
Crop	See 'tree crop'.
Crop tree	Depending on context: • A tree that was or will be retained after thinning. Opposite of cull tree and/or follower. • A tree that was or will be harvested for production of wood. Opposite of non-crop tree. Examples of non-crop trees are trees from non-merchantable species and trees too small to produce recoverable volume.
Crop type Croptype Crop-type	In a narrow, forest-planning sense, a group of stands that share the same yield table. The yield table for a crop type may be developed: • Specifically for the crop type; e.g. the crop type is a stratum in a sampling sense. • By aggregation of existing yield tables; See Chapter B4. In a broader sense, a crop type is a class of stands that share some characteristics that are important in the context in which the classification is made.
Crown forestry licence (NZ)	A licence granted by the Crown under the Crown Forest Assets Act 1989 in relation to Crown forest land.
Cubic metre (m^3)	An SI derived unit of volume. The unit most commonly used to define log and stem volumes.

Cull tree	A tree that is deliberately removed at some point during the rotation; typically at thinning. Cull trees may be harvested or wasted.
DBH	An acronym of 'Diameter at Breast Height' and now usually used in acronym form. A term used to describe a tree diameter measurement taken at the standard height of 1.3 metres (**Australia**) or 1.4 metres (**New Zealand**) above 'ground level'. Usually measured over-bark on the standing tree.
Defect core	The central core of a pruned tree outside of which clearwood is laid down and which contains the pith, branch stubs and any occlusion defects.
Diameter at Breast Height	See 'DBH'.
Diameter Over Stubs (DOS)	The diameter over the largest diameter whorl of branch stubs left on a tree stem immediately after pruning (the largest diameter circle of stubs is also called 'the largest pruned whorl').
DOS height	The distance from 'ground level' to the point at which DOS is defined, usually by the largest pruned whorl.
Dump	See 'Skid Site'.
Epicormics	Shoots coming from the stem of a tree too small to be classed as branches and not within a 'Whorl'. Also used for needles growing directly from the stem (`epicormic needles').
Exotic	A species not endemic to the site or (more usually) country. Used in Australia and New Zealand in the term `Exotic Forest'. Opposite to 'Indigenous'.
Final crop tree	A tree expected to remain in the stand until clearfelling time.
Follower tree	A tree which, although not being removed in the current thinning operation may not remain in the stand until clearfelling or may not receive the full silvicultural treatment. Often used to refer to unpruned trees in an otherwise pruned stand.
Forest	An area of land fully or partially stocked with live trees. See also plantation forest.
Forestry right	The right granted by the owner or lessee of land to another entity enabling that entity to establish, manage, protect and harvest, or simply to manage, protect and harvest, trees on the land. In **Australia** by s.87A Conveyancing Act 1919, a forestry right or profit à prendre is an interest in land in which the person having the benefit is entitled to enter the land, establish, maintain and harvest a crop of trees on the land and construct and use buildings, works and facilities as may be necessary for the above. In **New Zealand**, by the Forestry Rights Registration Act 1983, Forestry Rights may be registered under the Land Transfer Act 1952 against the Grantor's title to the land.
Framing timber	Grades of timber suitable for structural purposes in buildings and for other load bearing applications. Appearance is not a prime consideration and accordingly,

	subject to adequate or specified strength and stiffness 'framing timber' may show knots and other grain imperfections.
Freehold	An estate in fee simple in land.
Ground level (special sense in forest mensuration)	Ground-level is the datum against which breast height and tree height are defined. It is the surface of the firm or mineral soil, as distinct from the surface of the litter layer.
Hardwood	Tree species which are angiosperms (flowering trees) and whose wood structure contains vessels. Often broadleaved species. Also used for the wood from these species. (See 'Softwood' in comparison.)
Harvesting	The gathering of all or parts of the tree crop for utilisation. In a specific context may refer to a limited subset of the distinct operations that contribute to the overall process: • Tree felling • Log making • Transport of either whole trees or logs to the skid site • In forest processing, e.g. chipping • Loading on to trucks • Cartage from the forest. Understanding what is meant by "harvesting" becomes especially important in the context of knowing what is included in "harvesting" cost.
Hectare (ha)	A non-SI unit of area equal to 10,000 square metres. Commonly used as the unit of measure for land area.
Increment	The absolute change in a tree, forest or stand statistic between two points in time. In Australia and New Zealand, this is represented as 'I'. The time difference is usually annual, 'A' and unless otherwise specified the statistic is volume related. See 'Mean Annual Increment'.
Indigenous	Naturally occurring or native to a particular site or region. In a botanical sense generally relating to the natural situation prior to any human influence.
Indigenous forest	See 'Natural Forest'.
Landing	See 'Skid Site'.
Large end diameter (LED)	The diameter of a log taken at the end of the log that was closest to the ground in the standing tree. May be measured under-bark or inside bark (LEDIB and LEDUB) or over-bark (LEDOB). Without qualification, LED is commonly taken to mean an under-bark measurement.
Leasehold	An estate in land granted by the owner of the freehold to another person which usually gives the right of exclusive possession and use of the land to that other person for a specified number of years.

Log	A whole, contiguous, longitudinal section of a tree stem produced during harvesting. The raw material from which timber, plywood and other wood products are manufactured.
Logging	See 'Harvesting'.
Lumber	See 'Timber'.
Mean annual increment (MAI)	The MAI at a point of time in a crop rotation is defined as the average increment between that point in time and the start of the rotation. Without qualification the term is assumed to apply to volume increment and has units of m^3/ha/year but the term is not limited to volume. Although MAI is commonly used as a measure of forest productivity, there is considerable variation in what is included in definitions of MAI. • The start of the rotation might be the time of planting or the time of harvesting of the previous crop or some arbitrary point in time for continuous cover crops. • The area might be the gross area (e.g. including roads and gaps) or limited to net stocked area. • The volume might be total stem volume or merchantable volume. • 'Increment' might be limited to those trees that are standing at the point in time at which MAI is calculated or include trees that have been removed in previous thinning operations and/or by mortality. Practitioners are advised to: • Be extremely cautious of any reference to MAI without a robust definition. • To provide a complete definition where they use MAI in a valuation document. See also 'Site productivity index'.
Mean crop height	The average height of crop trees – commonly a **New Zealand** term. As distinct from Top Height.
Mean Top Height (MTH)	See 'Top Height'.
Mensuration	The theory and practice of measuring standing trees and logs to determine yields and other parameters.
Merchantable volume	See 'Recoverable yield'.
Merchantable yield	See 'Recoverable yield'.
MGP	"Machine graded pine" is a descriptor for pine timber that has been machine stress graded to a recognised standard. e.g. MGP10 where the number 10 refers to the minimum threshold for stiffness of 10 thousand megapascals. MGP12 has a minimum stiffness of 12 thousand megapascals.

Natural areas	Areas of land with a predominant cover of indigenous vegetation or where vegetation is naturally excluded, including natural forests as defined above, wetlands, naturally occurring water bodies, sub-alpine and alpine areas.
Natural forest	Areas of land which are predominantly covered in indigenous tree species that are naturally established, including managed forest areas where natural regeneration is supplemented by seeding (usually aerial) or planting of indigenous species.
Net stocked area	The area of land currently occupied by the tree crop as distinct from area occupied by, for example, water bodies, roads and non-crop species.
Outturn	The amount of a forest product generated by a process and expressed as an absolute quantity or a proportion of inputs
Occlusion	The process in a tree stem whereby new healthy tissue grows over and covers stem wounds, branch stubs, etc. This process may also enclose small bark or resin pockets associated with the wound and known as the occlusion defect.
Peeler	A log used for the production of veneers by rotary peeling in a lathe (see also 'Veneer Log').
Piece size	The size (volume, weight or dimensions) of a single log or tree. Average Piece Size is a useful parameter to indicate the size and power of equipment used in harvesting, the costs of the harvesting, and the value of the assortment of logs.
Plantation forest	Areas of land predominantly covered in planted trees managed for commercial purposes. Excludes natural forests as defined.
Plantlets	A plant produced by micropropagation.
Plywood	A flat panel made up of a number of thin sheets ('Veneers') of wood in which the direction of each layer ('Ply') is at right angles to the one under it. The sheets are joined under pressure by a bonding agent.
Predominant/ Dominant Height (PH)	See 'Top Height'.
Predominant Mean Height (PMH)	See 'Top Height'.
Prescription	The specification for a single intervention or sequence of interventions applied to growing trees, including the nature of the intervention (e.g. thinning, pruning), the trigger criteria (e.g. age or size), the required outcomes (e.g. target stocking) and operational procedures.
Probable Limits of Error (PLE)	Often used in an inventory context to report sampling error as an alternative to a Confidence Interval. Defined as half the width of the confidence interval for an estimated mean or total expressed as a percentage of the estimated mean or total. Without qualification the confidence interval is commonly taken to be a 95% confidence interval.
Pruned height	The height above ground level of the lowest branch whorl remaining after the last pruning operation.

Pruned log	A log from the pruned part of a tree.
Pruned log index (PLI)	A New Zealand index for the quality of pruned logs based on measurable log parameters that reflects the potential for producing clear grades of timber from pruned sawlogs.
Pruning	The silvicultural practice of removing the lower branches of a tree by mechanical means (e.g. shears, saws) while the tree is still growing to eliminate or prevent the formation of knots and deformation of the grain in the wood subsequently grown. A strategy to grow clearwood.
Pruning intensity	For a single tree, the pruned height divided by the height of the tree at time of pruning. For a pruning operation, the average pruned height divided by the average height of pruned trees at the time of pruning.
Pulp log	A log used as fibre input for the production of woodchips for pulp and paper and reconstituted wood products.
Recoverable yield	The quantity of wood, usually expressed as a volume of round logs, expected to be made available for sale or use by a harvesting operation. As distinct from non-recoverable yield which includes stumps, tops, broken and undersize sections of stem. Synonyms: Merchantable yield, merchantable volume, recoverable volume.
Regime	A complete programme of silvicultural operations covering the stand rotation, directed towards the creation of a specific mix of forest products.
Roundwood	Any wood in log form but more specifically used as a term for wood that is used in log form; e.g. posts and poles.
Rotation	The span of years in which a tree crop grows from planting through to felling. Usually has an economic connotation in that a rotation is optimised to some set of economic criteria. A first rotation is referred to as R1, a second as R2 and so on. In some contexts, the duration of second or subsequent rotations is defined in terms of the interval between the felling of two consecutive crops; i.e. it includes the time when the site is unoccupied between harvesting and replanting.
Sawlog	A log used in the sawmilling industry to produce a range of sawn products or the export log industry, where this can cover a range of log qualities, each with their own refined form of coding.
Seedlings	Small trees grown from seed in a nursery (usually) for planting out at the forest site.
Silviculture	The practice of tending forest crops based on the knowledge of forestry; more particularly managing all aspects of the establishment, composition and growth of forests (excludes harvesting and subsequent operations).

Site productivity	The capacity of a forest site to produce more or less wood per unit time than another site with an equivalent crop (species, regime, etc). The term may be used in a qualitative sense or with a specific "Site productivity index".
Site productivity index	A quantitative index of "Site productivity". These have in common: • Each is specific to a crop species. • Estimation requires tree measurements and, in most cases, a predictive model (e.g. growth model) to adjust for measurement age. • Estimated values are not pure measures of site productivity. They are always influenced by how well the current or previous crop performed. • Values estimated using a predictive model are sensitive to the model used; e.g. site index is sensitive to the height projection function. • If sufficient measurement data exists to estimate the productivity index then, in general, sufficient data exists to directly estimate future yield without the productivity index. • They are susceptible to misuse. Common misuses that valuers should be aware of: • The use of inventory plots that have been post-stratified using a site productivity index calculated from the plot measurements with strata that were defined, and had their areas calculated, using a site productivity index from a different source; e.g., opinion or predicted site quality. • Applying equal meaning to indices with the same name but calculated in different ways; e.g. opinion vs. measurement. • Use of an index calculated using one predictive model in a context that calls for calculation using a different model; e.g. using a basal area function that depends on predicted site index with a height model other than the one used when the basal area function was built. Specific site productivity indices include: • Site index. • Site quality (in Australia). • 300 Index (in New Zealand). • Mean annual increment (MAI).
Site Index (SI)	A measure of site productivity expressed in terms of top height at an index age. For *Pinus radiata* in Australia and New Zealand the index age is usually 20 but the definitions of top height vary; See Top Height. See also Site Quality (SQ). See 'Site productivity index'.
Site Quality (SQ)	Depending on context: • An **Australian** site productivity index commonly expressed in terms of volume per hectare at a particular age.

	• A synonym for site productivity.
Skid site	An area of land in the forest, often specially prepared and surfaced, where logs or tree lengths extracted from the forest are accumulated and further processed by trimming, cutting to length ('bucking'), sorting, marking and stacking and thereafter loaded on to trucks for removal. Alternative terms are 'Landing' and 'Dump'.
Small end diameter (SED)	The diameter of a log taken at the end of the log that was furthest from the ground in the standing tree. May be measured under-bark or inside bark (SEDIB and SEDUB) or over-bark (SEDOB). Without qualification, SED is commonly taken to mean an under-bark measurement.
Softwood	Usually refers to the wood from the botanical groupings including coniferous trees, gymnosperms, usually with needles or scalelike leaves such as pines, firs, spruces and other similar genera.
Solid wood	Wood (usually sawn, sliced or peeled) which is used in its natural form and not reconstituted by a pulping or chipping process.
Species	'Group of animals or plants subordinate in classification to Genus and having members that can interbreed and that differ only in minor details' (Concise Oxford Dictionary). E.g. *Pinus radiata* is the short specific name for a species fully named in accordance with the International Rules of Botanical Nomenclature *Pinus radiata* D. Don. (The underlining is optional).
Stand	A unit of forest area and the trees growing thereon (usually contiguous but not necessarily so) used as a basic unit of forest record, description and/or management. The points of similarity or difference that lead to delineation between one stand and another vary by ownership, context and forest type but often include elements of age, species composition, management history, management intention, expected yield and/or maximum and minimum stand area. When stand is used as a unit of forest record there is often a formal definition of these things.
Stem	The major vertical structural member of a tree (i.e. trunk).
Stems per hectare (SPH)	In a general context; the number of live trees per hectare. Compounded uses of the term include 'Crop SPH', 'Pruned SPH', etc, all of which have obvious meanings. Commonly referred to as `Stocking'. In a mensuration context; the number of live stems per hectare having a presence at breast height (non-zero DBH) or, in some cases, including stems that are expected to have presence at breast height when they are tall enough; e.g. planted stocking. The primary distinction from trees per hectare relates to trees forked below breast height which may have more than one stem at breast height.
Stocking	See 'Stems Per Hectare'.

Stumpage	The value of a crop of trees or of forest produce where the price point is defined as the standing tree; i.e., on-stump. Stumpage is a useful concept because the price point reflects a return to the forest grower. It is not a requirement that the actual point-of-sale be on-stump for stumpage to be calculated or useful. Where the point-of-sale is after harvest, stumpage is often calculated as the proceeds at actual point-of-sale less the costs between the standing tree and the point-of-sale. There is however, no standard definition of which costs are, or should be, included in this calculation. While it is usual to include the direct costs of felling, extraction and delivery, there are other costs that might also be included; e.g., roading costs, post-harvest site restoration, marketing and other fees. Readers should refer to specific definitions of stumpage, e.g. in contract terms, in situations where they are likely to be material to a valuation. Stumpage may refer to unit value or total value.
Sustainable Forest Management (SFM)	In **Australia**, SFM mostly applies to natural forests and entails the management of forests to maintain their full range of environmental, social and economic values[1]. Australia's Sustainable Forest Management Framework of Criteria and Indicators 2008 established the criteria and indicators against which SFM can be assessed, in this case for Australia's international reporting obligations. Various Forest Certification schemes also assesses sustainability criteria of natural and planted forests for reporting purposes. In the context of **New Zealand's** Resource Management Act (1991) sustainable management includes: Managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social economic, and cultural wellbeing and for their health and safety while: a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.
Sustainable yield	The yield of merchantable forest produce that may be taken from a forest area whilst sustaining the long-term productive capacity of the forest area. In practice 'Sustainable Yield' is also defined by reference to maintaining a minimum age of felling and/or meeting other minimum requirements over a period of time.
Sweep	Deviation from straightness of a log or stem section. Definitions are shaped by measurement constraints but are typically expressed as the maximum perpendicular distance between a straight line joining the two

[1] https://www.agriculture.gov.au/forestry/australias-forests/forest-mgnt

ends of the log and an equivalent path following the curve of the log. Differences relate to the choice of points on the ends of the log and the definition of the equivalent path.

In log product specifications, maximum allowable sweep is often expressed as a proportion of the small end diameter of the log.

Symbol

A notation for a concept or measurement, usually by means of an initial letter acronym or condensation of the word and containing mathematical notation as appropriate. An inventory of standard forest terminology symbols has been prepared by the International Union of Forest Research Organisations (IUOFRO) 'The Standardisation of Symbols in Forest Mensuration' 1959. However, the standard does not appear to be much used in New Zealand. Abbreviations commonly used in **New Zealand** are given in parentheses after the defined word in this present Glossary. Standard mathematical, mensurational, system internationale and statistical notation is used in conjunction with these abbreviations.

Major IUFRO Symbols are:

c	circumference or girth
d	diameter
f	form factor
g	basal area at 1.3 m
h	height
i	increment
k	form quotient
n	number (of stems, years etc.)
p	increment per cent (volume, value, etc.)
t	age
v	volume.

Capital letters should generally be reserved for one of two purposes: either to denote totals per unit area (e.g. V = volume per ha) or population totals in sampling schemes.

Example:

The IUFRO term is N/ha whereas the usual symbol in **New Zealand** is SPH (Stems Per Hectare).

Where these symbols are used they are identified by 'IUFRO' in the text of this Glossary.

Symbols used in this glossary and otherwise unidentified are the 'NZ Set' and are summarised in Chapter E3.

The Metric Systems Internationale symbol set is also commonly used in conjunction with the IUFRO and the **New Zealand** set.

Tending	A collective term for silvicultural operations that are directly applied to the growing tree e.g. aerial fertilisation and fire protection are not usually referred to as 'tending', whereas pruning and thinning are referred to as 'tending'.
Terrain	Similar to 'Topography' but also has connotations of the effect of the soil, water, rock and vegetation cover conditions on the ability to traverse the country.
Timber	Any wood reduced by sawing or other mechanical means to a square or rectangular section and (frequently) dried, planed or given treatment against insect, borer and fungal attack. Alternative term: 'Lumber'.
Thinning	The silvicultural practice of removing selected trees to promote the more rapid growth of the crop trees. May be 'to waste' where the thinned trees are left on the forest site or 'production' where the thinned trees are removed for use.
Thinnings	Logs produced by thinning.
Top height Mean top height Mean dominant height Dominant height Predominant mean height Predominant height	Top height is used here as a generic term for a diverse family of measures of the "average" height of the "largest" trees in a plot. These have in common that: • The measures exist because the height of a well-defined top element is less sensitive to stocking and better correlated with age and site productivity than an average across all trees. • The top element is defined within a measurement plot. The top height of a stand is the average of plot-level top heights and not the average height of the largest trees in the stand. Definitions differ in terms of: • How many trees are included in the top element; typically, between 40 and 100 trees/ha. • How trees are ranked; by height or by DBH. • How the top element is selected; e.g. the tallest tree in each quadrant of a plot, or strictly from above for all trees in the plot. • How the "average" is calculated; e.g. mean height of all trees in the top element or the expected value of the height of a tree of average or quadratic mean DBH under a defined model. • Whether and when differences between definitions have a material effect. Diversity is partly a function of culture and history but is also a function of requirements; e.g. growth modelling vs inventory, data availability, measurement protocols and choice of processing software. In New Zealand, the most commonly used top height definition in an inventory context is the average height of the largest 100 trees per hectare, by DBH. An alternative, sometimes used during growth model development, is the height predicted by a Petterson height/dbh curve from the quadratic mean DBH of the 100 largest trees per hectare, by DBH.

In Australia there is no common definition for top height, and even the name varies between states. There are some general commonalities:

- Within a plantation context, it may be defined as the mean height of X trees with the largest DBH (or height), where X can be 40, 75, 100, or 200.
- Within a natural forest context, mean dominant height is the mean of the tallest Y trees, where Y is 30 (1 per 1/30th ha) or 200.

Readers are encouraged to:

- Be explicit about the definitions of terms that they are using.
- Be wary of undefined terms; even ones that use common names.
- Be mindful of the possibility of introducing errors by assuming that measures under different definitions are safely inter-changeable.

Topography

The vertical form of the land surface. Usually expressed by contours in mapping systems.

Tree crop

Depending on context:

- All trees grown for productive purposes on an identifiable area of land for all or part of a single rotation, including trees harvested before the end of the rotation. Different rotations imply different crops.
- The trees grown for productive purposes that exist on an identifiable area of land at a point in time.

Tree stocks

The plant material used for planting, includes seedlings and plantlets.

Veneer

A thin sheet of wood produced from a short log ('Billet') by rotary peeling in a lathe or by slicing across the grain. Used in the production of Plywood and other laminated products.

Veneer log

A log, usually of large diameter and high quality, used for making veneer. Also called a 'Peeler' when used for rotary peeling.

Vocabulary

Words used in forestry are defined in many source works from general purpose dictionaries through to specialist vocabularies. An example of the latter, possibly the most comprehensive work in English, is 'Terminology of Forest Science, Technology Practice and Products,' Society of American Foresters 1971. Forestry is notable for many local word usages, jargon words and units of measurement, for example in 'skid', 'landing' and 'dump' are in common use and denote essentially the same thing.

Volume

'Solid content, bulk, space occupied by gas or liquid, ...' (Concise Oxford Dictionary). In forestry usually refers to the wood content of the stem of a tree.

Many ways of calculating and expressing the volume of a log or tree from its linear dimensions have been developed. Trees and logs have non regular shapes which differ between species, log position in the stem and age class.

The measurement of log volume and its application to costs, values, weights and so on is a complex and specialised study. Also used in compound measures, (e.g. 'Volume per Hectare'), aggregated measures (e.g. 'Stand Volume', 'Forest Growing Stock Volume'), and qualified measures (e.g. 'Merchantable Volume'). See 'Cubic Metres'.

Whorl	A group of branches growing radially around the tree. A typical branching habit of 'softwoods', but not of 'hardwoods'.
Wood chips	Wood in the form of small fragments, generated either in a whole log chip mill or as a by-product of the manufacture of timber and plywood and used as biofuel or in the manufacture of pulp and paper and various composite panel products such as medium density fibreboard, particle board and hardboard.
Yield	The quantity of forest produce that is, or is expected to be, recovered from a crop of trees. Net yield generally means the same as 'Merchantable Yield'.

CHAPTER E2 – GLOSSARY OF FORESTRY ECONOMIC TERMS

Revision History

Original Standard	Released in May 1999
Revision in August 2023	Main changes are: • Addition/editing of – Discount rate – Nominal – Valuation date

CHAPTER E2 – GLOSSARY OF FORESTRY ECONOMIC TERMS

Term	Definition
APLPI	Australian Pine Log Price Index
Articulation	The way concepts, treatments and definitions relate to one another in a (supposedly) logical system. The objective of articulation in a system of valuation is to make parts of the subject of the valuation (e.g. the Forest) susceptible to the general propositions of mathematics and simple logic. (e.g. that the parts add up to the whole, the 'Real Return' when adjusted by the 'Rate of Inflation' equals the Gross Rate of Return). Lack of 'Articulation' is prima facie evidence that the valuation (etc.) is flawed. Because of the long time spans involved in forestry and the complexity of the data, lack of 'Articulation' that would be immaterial in (say) the valuation of a car would be material in the valuation of a large forest.
Beta (β)	A measure of the riskiness of an equity investment and used as a multiplier of the premium rate of return to capital (i.e. above the risk free rate) required in the overall industry or investment class for a particular equity investment. A generalised equation relating rates of return and beta is: $ER_i = R_f + \beta(ER_m - R_f)$ where: ER_i = expected rate of return on asset i. R_f = the 'risk free' rate of return. ER_m = the rate of return expected in the industry or investment class (i.e. the market rate of return). $(ER_m – R_f)$ = market risk premium The Beta number is developed from the fluctuations over time in the value of the capital. A beta measure can apply to assets (i.e an investment in trees) or to equity (i.e. an investment in 50% leveraged company 'A', compared with investment in debt free company 'B' owning identical assets).
Capital (economic sense)	The wealth used in the forms of land, plant, equipment and labour with a view to producing a surplus.
Capital (accounting sense)	A quantum of wealth, measured in monetary terms and owned by an 'Investor', committed to an enterprise and which is at risk dependent on the success of the enterprise. The many categories of 'Capital' have different rights, obligations and risks attached to them.
Cashflow	The movement of cash resulting from transactions with parties external to the forest enterprise. 'Costs' may be regarded as negative cashflows and 'revenues' as positive cashflows. Note: Cashflows are generally 'transaction' based. Value increments (for example) in a forest are not cashflows. For the purpose of analysis cashflows are projected 'transactions' and may include flows which are not strictly 'transaction' based but are implied 'transactions' to fit all value effects into an

	'enterprise' 'life' (e.g. land notionally 'bought' and 'sold' at the beginning and end of a 'rotation').
Compound rate	See 'Discount rate'.
Consideration	In simple terms, the price paid for goods. Although 'consideration' may be other than money it is usually expressed as a quantum of money. 'Consideration' is always related to a transaction.
Cost	The price of a good as viewed from the purchaser's viewpoint.
Cost benefit analysis	An economic analysis technique which aims to evaluate a project in terms of all the relevant costs and benefits associated with it, including imputed social costs and benefits not otherwise recognised in the cashflows.
CPI	Consumer Price Index
CEV	Crop expectation value, being the expectation value of the tree crop. Also see TCEV.
Currency	The units and legal framework given to the money issued within a country.
Deflation	See Inflation.
Discount period	The period (length of time) between a Discount point and the Valuation point.
Discount point	The point in time at which a cashflow is assumed to occur. It is common practice to assign each cashflow to one of a finite number of equally-spaced discount points, typically a year apart; for example, to assume that all of the cashflows in single year occur at a discount point in the middle of the year. The length of time between the first 'Discount point' and the 'Valuation point' need not be the same as the length of time between consecutive 'Discount points'. A common example where they are not the same is when the Valuation point is at the beginning of a year and the first 'Discount point' is mid-year.
Discount rate	A rate quantifying the preference for access to wealth or resources sooner rather than later, now rather than in the future or before now rather than now. A popular expression for this concept is the "time value of money". Discount rate can be defined with reference to the base equation in which it is used: $$V_2 = \frac{V_1}{(1+r)^{(t_2-t_1)}} = V_1(1+r)^{(t_1-t_2)}$$ Where: $r =$ Discount rate $V_2 =$ Value at time 2 ($) $V_1 =$ Value at time 1 ($) $t_2 =$ Time 2 (years) $t_1 =$ Time 1 (years) In forest valuation the units of time are typically, but not always, years. Provided that the units of the discount rate are consistent with the units of

time, any unit of time may be used. Likewise, the units of value are typically a unit of currency but the base equation may be used with quantities having other units; e.g. cubic metres.

Time can have any value from the domain of real numbers; it is not restricted to integers or even to positive numbers, but the convention is that larger numbers represent later times.

Discount rates are often presented as a percentage; for example, a discount rate presented as 4% is used in the above equation as $(1 + r) = \left(1 + \frac{4}{100}\right) = 1.04$

Use of the term "discount rate" is often restricted to situations where the present value of a future cashflow is being calculated ($t_2 > t_1$) and may be replaced by "compound rate" where the future value of a current cashflow, or the current value of a past cashflow, is being calculated ($t_2 < t_1$). This distinction serves mostly to highlight the direction of the calculations; forward in time versus backward. The two terms are mathematically equivalent in the calculations to which they are applied. There may be valid reasons for using different rates for compounding (forward) and discounting (backward) but these reasons relate to the context in which the calculation is made, e.g. the time span, and not the calculation itself.

To some extent, differences between discount rates reflect variations in emphasis on the many reasons for placing a time value on money. For example, recognising the expected decline over time of the purchasing power of a nominal unit of currency due to inflation leads to "nominal" discount rates. These are typically higher than "real" discount rates, which ignore inflation and assume that cashflows will be expressed in "real" (constant purchasing power) terms. To a larger extent, variety in the values of discount rates used in forest valuation reflects the fact that discount rates are derived from observation of human behaviour with different evidence at different points in time from different people, with different analytical techniques applied to the evidence and different people involved in the analysis.

Discounted cashflow	A cashflow discounted, using a 'Discount Rate' to the 'Valuation point'.
Enterprise	The scope of the economic venture considered by the analysis. In the forestry sense the 'enterprise' may be the age class, or the stand, or the crop type or the forest or any other definable unit. In analysis the 'enterprise' is generally given a 'life'.
Equity	The residual interest in the assets of an entity after deduction of its liabilities.
Exchange rate	The ratio at which the currencies of two countries are exchanged at a particular time.
Exit price	The price that would be received to sell an asset or paid to transfer a liability.
Fair Value	The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

	Also see 'Market Value' and 'Value'.
Fixed costs	Costs which in the short run, do not vary in total with output or the level of activity. Therefore, in unit terms they vary inversely with output.
Highest and best use	The use of a non-financial asset by market participants that would maximise the value of the asset or the group of assets and liabilities (e.g. a business) within which the asset would be used.
Income	Net profit, i.e. what remains after expenses and taxes have been subtracted from revenue.
Inflation	A measure of the increase of price levels over time as measured by money — and hence, inversely, a measure of the decreasing purchasing power of unit money measures over time. Usually expressed as a percentage rate. 'Deflation' is the same effect but with decreasing price levels and increased purchasing power.
Interest rate	The proportion of a capital sum (usually expressed as a percentage) charged by the lender (actually or notionally) to the borrower for the use of that capital sum over a unit time (usually a year). There are many (mathematically related) ways of expressing this rate, viz 'In Arrears', 'Real', 'In Advance', etc.
Internal rate of return (IRR)	The 'Discount Rate' at which the 'Investment' and the 'Future Returns' equate in a 'Net Present Value' calculation. There are as many varieties of 'IRR' as there are of the type of cashflow input into the model. See in this context 'Real', 'Tax', and 'Interest Rate'.
Investment	The initial capital sum and (generally) any future sums laid out as 'Capital'.
Land Expectatioin Value (LEV)	The 'price' that can be imputed to land so that all the positive and negative 'cashflows' (including the 'price' imputed to the land) associated with the forestry 'enterprise' when discounted at the required rate % indicate a zero 'enterprise' capital value. In common language, the maximum that can be paid for land to achieve a given rate of project return.
Life	The span of time in which an economic 'enterprise' starts and concludes. In forestry the life is often defined by reference to tree age.
Market	A series of 'transactions' in goods or services of a similar nature carried out by individuals assumed to have a reasonable knowledge of the nature of the goods and services traded, the past history of 'prices' and a reasonable appreciation of the factors influencing 'prices'.
Market value	Market value is the amount for which the defined good or service should exchange: • on the date of the valuation; • between a willing buyer and a willing seller; • in an arm's length transaction; • after proper marketing; and

	• wherein the parties had each acted knowledgeably, prudently and without compulsion. 'Market price' and 'Market cost' are the same measure. 'Market Values' may be applied (with appropriate adjustments) to a good not yet the subject of a transaction to give a market-based valuation. Also see 'Value' and 'Fair Value'.
Money	A measure of wealth having universal acceptance in (typically) one country.
Net Present Value (NPV)	The sum of all the 'Discounted Cashflows' appropriate to the item measured. The NPV of a project is a measure of the project's contribution to wealth. In this context the word 'present' means a predefined point in time, typically on or before the first 'Discount Point', and not the date at which the calculation is performed.
Nominal	Refers to the use, in discounted cashflow analysis, of currency amounts expressed in terms of the currency units at the time of the cashflow. For past cashflows this means using the actual (nominal) amount at the time of the transaction and for future cashflows it means calculating what the amount will be after allowing for the effects of expected inflation. This differs from "Real" cashflows in which all amounts are adjusted for inflation so that any unit of currency has the same notional purchasing power (real value) no matter where in the cashflow it appears.
Opportunity Cost	The Opportunity Cost of a decision is the value of the next best alternative which has to be given up because of that decision.
Price	The quantum of money (or money's worth expressed in current money terms) used as the consideration in an economic transaction. 'Price' always has a connotation of occurrence at a defined point in time.
Price point	A geographic point where a commercial transaction is assumed to take place. Differs from 'Point of Sale' in that in fact no transactions as described may actually take place at the Price Point. The Price Point is a convenient point to which costs and prices may be adjusted to bring all transactions in an area on to a common basis. On-stump or 'Stumpage' is an example of a common price point.
Profit	The return due to the owner(s) of invested capital through the operation of an enterprise. 'Profit' may be viewed as a return to the owners of the 'Capital' for their entrepreneurial ability which appears as a cost to the purchaser of the enterprise's products.
Rational	A rational outcome, action or conclusion is based on the rules and processes of reason. Rationality, being based on culturally, personally or organisationally held postulates, precepts and perceptions of facts, will produce different outcomes for different entities from the same situation. In the economic arena market participants may therefore consider the actions of other participants irrational. A market outcome of price, market, volume etc. is, by extension, reckoned to result from the 'average' postulates, precepts and perceptions

	held by the participants in the market rationally assembled. It is generally held that a market will tend to impose a common rationality on participants in the medium to long term. Economic rationality is generally considered able to be represented by mathematical constructs, but this does not imply that market participants will always proceed from a pre-existing rational model.
Real	With reference to 'cashflows' and calculated 'Net Present Values' refers to a calculation and a result in which future (or past) inflation or deflation has been excluded from the included money quanta and interest rates. Hence 'Real Interest Rate', 'Real Value', 'Value in 2020 dollars'. The underlying postulate is that value concepts can be best comprehended by reference to the present prices of goods and services and value impacts of present interest rates.
Revenue	The total amount of income generated by the sale of goods or services.
Risk	The likelihood of occurrence of an event adverse to the 'enterprise'. Usually expressed as a percentage of the 'capital' of the 'enterprise' exposed to future adverse events. May be categorised by the type of risk , viz 'Inflation Risk', 'Capital Loss Risk', 'Industry Risk' etc. Risk is connected to both 'Interest Rate' and 'Profit'.
Social cost	Costs which may not feature in financial accounts in the short term, e.g. costs of air and water pollution, but which are real costs to society as a whole.
Tax	Any contribution levied on a person (including a corporate person) by law for the support of national, state or local government. In the context of forestry analysis local government taxes ('Rates') and 'ad valorem' national government taxes ('GST', 'Land Tax', 'Stamp Duty', 'Filing Fees', 'Excise Duties') are generally internalised into cost and the expression 'Pre-Tax' is taken to mean (with respect to a cashflow) 'before the impost of Income Tax and the benefit of any associated tax deductions or write offs on the forest owning entity'.
TCEV	Terminating crop expectation value, being the terminal expectation value of the tree crop, typically computed at the end of a modelling period. Also see CEV.
Transaction	A transfer of goods and/or services from a seller to a buyer in return for 'consideration' transferred to the seller from the buyer. A 'transaction' is the best evidence of value in that two separate individuals are agreeing at a definable point of time with respect to definable goods/services and a specific and universal measure of value. At the point of the 'transaction', 'price' and 'buyer's cost' and 'value' are an equal quantum of wealth.
Valuation date	The date upon which a valuation is declared to be valid. Perceived value changes with time for a variety of reasons: e.g., growth, legislative changes, natural disasters, changing access to information. That is why it is important, for every valuation, to declare a date upon which the valuation is considered to be valid. When discounted cashflow analysis is used it is often the case that the Valuation date is the same as the Valuation point for the NPV calculation, but this is not universally true and the two terms express different concepts.

Valuation event	Expected occurrence relevant to a valuation process and its associated cashflows. Includes: land purchase, establishment operations, tending operations, other operations, harvesting operations and the associated costs of those operations. Recognition of overheads. Payment of interest, dividends and taxation. Receipt and return of capital and borrowings.
Valuation point	The point in time at which Net Present Value is defined. In other words, the point in time that defines the Present in NPV. A valuation may have more than one valuation point; for example, a closing value representing the value of future rotations beyond some future point in time has an internal valuation point at that future point in time.
Value	The quantum of moneys worth placed on a defined good or service by an individual or market at a particular time. Two individuals may legitimately hold that the same good or service has a different value at the same time. A 'transaction' in the subject good or service can only take place in a free 'market' if each prospective party separately holds that their personally held value for the good or service is either, below the transaction value (in the case of the seller) or, above it (in the case of the buyer). Value is always subjective and largely immeasurable until a completed transaction places a 'price' or 'exchange value' on the good or service in that instance. It follows that each party to a transaction will receive a surplus of personal value from the transaction. The subcategories of personally held value (e.g. need, sentimental, ecological, aesthetic, compensation, spiritual, cultural, time preference, loss minimisation) are extensive. Articulate analysis of the personal value components plus the personal surplus back to price is rarely possible. (See 'Market Value' and 'Fair Value').

CHAPTER E3 – GLOSSARY OF SYMBOLS COMMONLY USED IN FORESTRY

Revision History

Original Standard	Released in May 1999
Revision in August 2023	Main changes are: • minor updates

CHAPTER E3 – GLOSSARY OF SYMBOLS COMMONLY USED IN FORESTRY

Symbol	Definition
1R	Current rotation
2R	Second or next rotation
2R+	All future rotations
CAI	Current Annual Increment
DBH,DBHOB	Diameter at Breast Height Over Bark (1.3 m above ground in Australia, 1.4 m in New Zealand)
DBHIB, DBHUB	Diameter at Breast Height Inside (Under) Bark. (1.3 m above ground in Australia, 1.4 m in New Zealand)
DOB	Diameter Over Bark
DIB, DUB	Diamter Inside (Under) Bark
DOS	Diameter over Stubs
GIS	Geographic Information System
HBU	Highest and Best Use
LED	Large End Diameter
MAI	Mean Annual Increment
MCH	Mean Crop height
MDH	Mean Dominant Height
MTDBH, MTD	Mean Top DBH
MTH	Mean Top Height
NPA	Net Productive Area
NSA	Net Stocked Area
PLE	Probable Limits of Error
PMH	Predominant Mean Height
SED	Small End Diameter
- SEDUB, SEDIB	SED under bark, SED inside bark
- SEDOB	SED over bark
SI	Site Index
SI	Systeme Internationale or International System of Units
SQ	Site Quality
SPH	Stems Per Hectare
TRV	Total Recoverable Volume
TSV	Total Standing Volume