

GLOSSARY OF FOREST TERMINOLOGY

including

IRWIN'S CONVERSION FACTORS

and including

IRWIN'S RULES OF THUMB

Terms in *italics* are defined elsewhere in the glossary.

Acre

- 0.4047 *hectares*, the *reciprocal* of which is 2.471.

All-aged

- a condition where many ages of trees occur in a stand. An all-aged management system is designed to produce a stand where all ages, or sizes, are present in a stand at one time, usually to a predetermined *stand structure* model which defines the age or size spread and numbers of stems required in the stand by size class. The form of this model determines what the stand will look like, how it will grow, and which species and trees will thrive. This management system is more suited to *shade tolerant* species such as sugar maple than to *shade intolerant* ones such as oak.

Basal Area

- the cross sectional area of a stem at breast height (*dbh*) (4.5 feet for Imperial people and 1.3 metres for metric people), also expressed as the basal area per acre or hectare representing the sum of all trees on the unit of area.

- the purpose of this unit of measure is to indicate how much *growing stock*, or volume of trees is present on the area. It is used as part of a *stand structure* model to determine when thinning is necessary in order to thin crowded trees, and how much of a thinning in order not to decimate a stand. Hence the determination of a "optimum basal area" which will allow trees to grow at their maximum potential.

- residual basal area or *residual stocking* refers to the amount of the stand remaining after a thinning or harvest.

- IRWIN's rule of thumb states that for a given basal area, volume can be calculated. For instance in hardwood sawlogs, one square foot of basal area usually represents between 100 and 125 board feet. For conifers, if the basal area per acre is divided by a factor of 4, (See table

below) this gives a reasonable estimate of cords per acre (*net merchantable volume*: see below). This works for trees 50 feet tall. Of course for taller trees, a smaller factor is appropriate, and for shorter trees, a larger factor:

VOLUME FACTORS FOR PLANTATION VOLUMES: **

Stand Height	Gross Merchantable Volume	Net Merchantable Volume
25	7.0	7.3
30	6.0	6.3
35	5.2	5.4
40	4.6	4.8
45	4.1	4.3
50	3.7	3.9
55	3.4	3.6
60	3.2	3.4
65	2.9	3.0
70	2.7	2.8
75	2.6	2.7
80	2.4	2.5
85	2.3	2.4
90	2.2	2.3

** This works for white pine, red pine and spruce. For Scots pine and jack pine, multiply the resultant cords X 0.6 to allow a volume deduction for poor form.

- For red pine stands, if one wants to totally confuse the issue, the stand height can be multiplied by the basal area and then by 0.5 to produce Gross Total Volume, or the volume of the entire stand of trees, less branches. I don't know of anyone silly enough to actually use this rule.

- 1 square foot of basal area per acre equals .2296 square metres per hectare, the *reciprocal* of which is 4.356.

Biodiversity

- A short form for biotic or biological diversity - refers to the variety of wild life species, the genetic variability of each species, and the variety of different *ecosystems* they form.

- IRWIN'S GLOSSARY states that biodiversity or biological diversity should not be confused, or interchanged with species richness. Species richness often is used to describe presence of a great number of species in a given, often limited, area. Biodiversity on the other hand can refer to several different types of *ecosystems* which may have their own levels of species richness. "Edge" ecosystems are typically species rich. In some cases, such as with *shade intolerant* species, these *ecosystems* must be maintained with a very narrow range of species present, or

species richness, as allowing too many species to interact in the *ecosystem* will often result in the loss of the *ecosystem* type, i.e. loss of the *shade intolerants* to *shade tolerants*. Maintaining a reduced species richness on a limited area may not be necessarily bad, or unnatural, because some species, notably *shade intolerants* may often occur in *ecosystems* with a reduced *species richness* and may in fact be dependent on the maintenance of this condition. This is also true of some bird species that are discriminated against by predation in the species rich forest edge. They prefer the relatively limited species richness of the forest interior which affords them protection.

Climax (ecosystem)

- Climax in ecological terms means a collection of plants and animals that has progressed, through *succession*, to a relatively stable condition that is self sustaining or self perpetuating. In forest terms this is usually a forest composed of *shade tolerant* species, that can persist for long periods as an understory, that has high regenerative capability and heavy seed, and that can regenerate in small stand openings with relatively low light conditions and with relatively undisturbed seed beds. Examples of such species are sugar maple and american beech.
- There is some disagreement in professional circles as to whether a climax forest ever occurs in nature. Natural forces such as insects, disease, windthrow and fire, if left to occur at natural intervals, will usually prevent a true climax forest from developing. The occurrence of these forces, which essentially recycle an *ecosystem*, are also the reason why "old growth" rarely occurs in nature and could be considered a man-made phenomenon.

Coppice

- a shoot (sprout) or the resulting tree originating from a stump of a tree.

Cord

- Defined in the Crown Timber Act, now the Crown Forest Sustainability Act, this is 128 cubic feet of stacked wood, usually 4 ft. X 4 ft. X 8 ft. This actually contains only 85 cubic feet of solid wood when bark and air are taken into consideration. 1 cord stacked therefore is equal to 3.64 cubic metres, but 1 cord, considering the 85 cubic feet of solid wood contains only 2.4069 cubic metres of solid wood. If this is not confusing enough, a cunit is 100 cubic feet of solid wood, or 1.1765 cords.
- To add further confusion to whatever clarity exists, firewood cords or face cords are not legally defined in either the Crown Timber Act or the Weights and Measures Act, and therefore should be priced and sold based on the cubic feet they contain. (I know of no one who sells face cords in metric units.)
- one 21 inch diameter hardwood tree or one 24 inch conifer tree will yield one cord (See table below).
- 1000 fbm of hardwood sawlogs will generally yield 1.5 cords of fuelwood from the tops of the trees

TREES REQUIRED TO EQUAL ONE CORD:

Tree DBH	Hardwood	Softwood
7	15	20
8	11	13
9	8	10
10	6	8
11	5	7
12	4	6
13	3.5	4.5
14	3	3.7
15	2.5	3
16	2	2.5
17	1.7	2.1
18	1.5	1.9
19	1.3	1.6
20	1.2	1.5
21	1.0	1.4
22	.9	1.2
23	.8	1.1
24	.7	1.0
25	.6	.9
26	.58	.8
27	.5	.77
28	.44	.7
29	.43	-

- See Irwin's rule of thumb under *Basal Area*

Crop Tree

- any tree forming or selected to form, a component of the final crop, specifically, one selected to be carried through to maturity.

DBH or Diameter, Breast Height

- the diameter of a stem of a tree measured at 4.5 feet for Imperial people and 1.3 metres for metric people. This is the point on the stem or bole at which *basal area* of a tree, or of trees per acre or per hectare, is calculated.

Ecosystem

- a network of living things - such as plants and animals, including humans - and non-living components of their environment - such as air, light, soil, nutrients and water - interacting with each other and with other ecosystems. Ecosystems vary in size and scale, are dynamic, constantly changing, while providing each species with its unique life requirements within a series of progressively larger ecosystems.

- ecosystems also may provide a species with its life requirements within a specific stage of development of a specific ecosystem. This means, for instance, that if a species requires early *successional* vegetation of a certain species composition, or a species composition that tends to be transitional, then to maintain *biodiversity* this *successional* or transitional stage must be represented across the landscape. Allowing all vegetation to achieve a so-called *climax* will therefore reduce *biodiversity* by removing those species dependent on various *successional* stages, and that cannot compete in, or normally drop out of a *climax* ecosystem.

Endangered species

- any indigenous species of fauna or flora that, on the basis of the best available scientific evidence, is indicated to be threatened with immediate extinction throughout all or a significant portion of its range.

Epicormic sprout

- a branch arising spontaneously from an adventitious or dormant bud on the stem or branch of a woody plant. These often sprout on tree stems following a heavy thinning.

Even-aged

- condition of a stand in which relatively small age differences exist between individual trees. Normally, plantations occur this way. Even-aged management systems are those whereby *stands* are grown this way until harvest, and are regenerated or re-planted as a similar even-aged stand. This management system is most useful for *shade intolerant* species.

Fbm (Feet Board Measure)

- also commonly referred to as board feet, this is a measure of lumber 1 foot square and 1 inch thick. Thankfully, there is no metric equivalent as we have not yet had time to grow metric saw timber. All our trees were grown in imperial units.

- the commonly accepted conversion in Irwin's rules of thumb, for converting cubic feet to board feet is to multiply the cubic foot volume by 5.35. Yes, the conversion should be to multiply cubic foot volume by 12.0, but when we talk board feet, we are talking about what we can actually saw in flat boards out of a round log, so there is considerable waste.

- further, using the above conversion, 1,000 fbm is roughly equivalent to 2 cords. In 1,000 fbm of logs, one can also usually produce 1.5 cords of firewood from the tops. Therefore, 1,000 fbm of standing trees represents a total of 3.5 cords of wood.

- These conversions are useful to compare fbm prices of standing trees to firewood prices. For instance, \$200.00 per 1,000 fbm (Mfbm) compares to \$100.00 per cord contained in the logs (@ 2 cords/Mfbm). This is a standing price which should only be compared to face cord value when labour is considered. For instance, the same 2 cords would produce 8 face cords of 12 inch wood for a retail value, at \$55.00 per face cord, of \$440.00. However, cost of producing the wood cut and split is probably \$280.00 (\$35.00 per face cord X 4 face cords per cord X 2 cords) leaving a profit margin of perhaps \$160.00, less than if the trees were sold as logs. Whether the trees are sold as logs or used as firewood, there would still be the same 1.5 cords of firewood in the tops.

- although many forest companies do not use the Ontario log rule, the conversion from cubic metres to board feet, Ontario rule, is 227 fbm per cubic metre or 4.41 cubic metres per thousand board feet.

- many company's use the Doyle rule which gives more volume to larger trees and less volume to smaller trees.

- as a rough calculation then, a tree that was 24 inches in diameter at the stump and 12 inches in diameter at the point where it divided into heavy limbs at a height of 50 feet would have 3, 16 foot logs in it and would have roughly:

$2 \text{ feet} + 1 \text{ foot} / 2 = 1.5 \text{ feet}$ average diameter for the tree X 48 feet of length [50 feet less trim for the boards, called "broomage"] = 72 cubic feet of volume in the tree.

then: 72 cubic feet X 5.35 board feet per cubic foot = 385 board feet.

Since trees have parabolic (rounded) surfaces instead of straight sides, the true figure is actually higher than 385, (460 fbm) but you get the idea. The same calculations can be done for logs. Remember that defects such as rot or crooked stems must be deducted from this calculation of *gross merchantable volume*.

Forest Management

- the application of business methods and technical forestry principles to the operation of a forest property.

Forester

- someone who actually knows something about the science of forestry including: Forest ecology, forest soils, statistics, mensuration, dendrology, tree physiology and morphology, fire science and ecology, silvics and silviculture, pathology, entomology, zoology, wood science, wood technology and many of those other nice technical fields to do with maths, sciences and biology. This label does not encompass those chain saw operators or people who splash paint on trees or buy and sell standing trees and call themselves foresters.

Gross Merchantable Volume

- the total volume of a tree(s) (*gross total volume*) less the top and stump. For tree harvesting, stump height should be a maximum of 12 inches or the diameter of the stump to a maximum of 24 inches. Top diameter for hardwoods is normally 10 inches and for conifers, 4 inches.

Gross Total Volume

- total volume of the tree.

Growing Stock

- the total of all trees on a unit of area, either metric or imperial, often expressed in *basal area* and/or trees per acre or hectare.

Habitat

- is the soil, water, air, rocks, rain, heat, and other plants and animals which combine to provide the food, water and space needed for wild life to survive. It is continuously changing in response to fire, flood, weather, new species, population fluctuations, disease, *succession* and human disturbance.

Hectare

- 2.47105 acres the reciprocal of which is 0.4047.

Net Merchantable Volume

- the total volume of the tree(s) (*gross total volume*) less the top and stump, (*gross merchantable volume*) and less cull (rot) = net merchantable volume.

Rare species

- any indigenous species of fauna or flora that is represented by small, but relatively stable, populations, and/or should be monitored periodically for evidence of a possible decline.

Reciprocal

- if one knows the conversion factors one way, for instance, from hectares to acres which is to multiply hectares by 2.471, then to go the other way, instead of dividing acres by 2.471, multiply acres by the reciprocal of the conversion factor ($1 / 2.47105 = 0.4047$). Therefore acres $\times 0.4047 =$ hectares. This is particularly useful for lazy people like me who have a calculator that does reciprocals and who would like to program a constant into a calculator for a string of multiplications rather than key in a whole string of divisions.

Residual stocking

- refers to the amount of the stand remaining after a thinning or harvest. (see *stocking*)

Shade Tolerance

- this does not refer to a tree's patience, but it's ability to grow under a degree of shade produced by it's neighbours in a stand, or produced by competition such as weeds and grass.

Shade tolerant species are sugar maple, beech or hemlock. Shade intolerant species are poplar, oak and red pine. Some species are in between such as white spruce and white pine.

Silvics

- the life history and general characteristics of forest stands, with particular reference to environmental factors. This includes such things as shade tolerance, seed and regeneration needs and characteristics, soil and site requirements, growth form and habits.

Silviculture

- the art of producing and tending a forest: the application of the knowledge of *silvics* in the treatment of a forest: the theory and practice of controlling forest establishment, composition and growth.

Silvicultural system

- a method of silvicultural procedure worked out in accordance with the accepted sets of silvicultural principles by which tree crops constituting forests are tended, harvested, and replaced by new crops of distinctive form.

Site index (similar to site class)

- a measure of site based on the height of the dominant trees in a stand at an arbitrary chosen age, most commonly 50 years. This is a measure of the productivity of a site, based on the premise that a better site will grow taller trees in a given time period than a poorer site.

- in agricultural terms, this could be equated to an agricultural capability of land.

Stand

- an aggregation of trees possessing sufficient uniformity in composition, age arrangement or condition to be distinguishable from adjacent stands.

Stand structure

- a term used to describe the stocking and arrangement of individual trees including presence of various size or age classes and those trees occupying various crown positions.

- In all-aged management silvicultural systems, stand structure is normally defined by a reverse "J" curve which is computed by a mathematical formula. The formula depicts a stand with many ages or sizes present in the stand, with decreasing numbers of trees as their diameters increase, and stocking of the total stand rigidly controlled, between a maximum and a minimum, by periodic thinning or harvest. Ideally, each harvest or thinning must create conditions suitable for recruitment of more trees, by establishing a new class of regeneration. Seedling regeneration is preferred over suckers or sprouts and this in turn is controlled by *residual stocking* levels.

Stocking

- a measure of the proportion of the area in a stand actually occupied by trees. This can be expressed as *basal area* or trees per unit area.

Succession

- the process whereby species replace each other. Usually this occurs due to *silvics* whereby species are better adapted to a given set of conditions than another species. For instance, species with greater *shade tolerance* will survive under the canopy of a stand and replace the trees in it as they mature and die out. If a stand is disturbed, often shade tolerant species already growing in the understory or those species that have the greatest potential to produce seed and rapidly establish seedlings, will form the new stand.
- Succession and regeneration success is also influenced greatly by:
 - browse pressures concentrated on certain species that are preferred by wildlife, or
 - the amount of predation that normally occurs to the seed of a given species or
 - the periodicity of seed crops; whether seed is produced annually, or more often at irregular intervals of from 2 to as much as 10 years between bumper seed crops.

Sucker

- a shoot (sprout) or the resulting tree originating from a root of a tree.

Threatened species

- any indigenous species of fauna or flora that, on the basis of the best available scientific evidence, is indicated to be experiencing a definite non-cyclical decline throughout all or a major portion of its range, and that is likely to become an *endangered species* if the factors responsible for the decline continue unabated.

Wetland

- means lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens.
- lands being used for agricultural purposes that are periodically "soaked" or "wet" are not considered to be wetlands in this definition. Such lands, whether or not they were wetlands at one time are considered to have been converted to alternate uses.
- within this definition, "hydric" soils are soils that are characterized by an abundance of moisture, to the extent that the soils are either inundated or dominated by water-tolerant vegetation. IRWIN'S GLOSSARY states that this is a soil definition that is defined by the presence of a certain type of vegetation. A true soil definition would refer to the formation of certain types of soil profiles and horizons that form in moist or wet conditions, such as mottled or gleyed horizons, and including organic matter descriptions in the case of organic soils. The term "hydric" in the Canadian System of Soil Classification refers to organic soils that have present in them a water layer. This is therefore a classification that is applied to wetlands that have floating vegetation. Many southern Ontario wetlands are not "hydric" by this definition as they are most often imperfectly or poorly drained mineral soil overlain by organic horizons

and/or standing water. Wetlands commonly occurring on organic profiles, as opposed to mineral soil profiles, do not necessarily have this "hydric" layer.

Wetland Classification

- The Ontario wetland classification system contains 7 classes, each of which represents a point spread (rating or score) based on biological, social, hydrological, and special feature components. Wetlands which score high in all components are designated provincially significant, and are allocated to Class 1 to 3, while the remaining, less significant wetlands are assigned to Classes 4 to 7 as locally significant.

Wild Life

- all wild mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, fungi, algae, bacteria, and other wild organisms.

Working Group

- a description which classifies a stand by its predominant species, usually the one which constitutes the greatest volume or *basal area* in the stand. A working group may represent the entire stand for pure species plantations or as little as 30 or 40% of the stand for stands with many species i.e. Pw4 (40%), Pr3 (30%), Sw3 (30%). In this case White pine is the working group. The stand could also be described as a conifer, or as a shade intolerant working group. This designation is useful when planning management strategies and *silvicultural systems* for the forest. Some working groups are not intended to be permanent, but as management occurs and some species are removed from or added to the stand, working groups may change. In other working groups, special treatments must be adopted if they are to be maintained.

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