Conclusion

The great diversity and ages of forests found in western Washington makes the task of creating a comprehensive guide difficult. There will be occasional forests that do not fit the keys properly, and others where the ages are difficult to discern. Each stand presents its own set of mysteries, and there are sure to be cases when professional judgment will have to substitute for certainty. Ultimately, however, it is to be hoped that the ecological knowledge contained in this guide can be used to narrow the range of possibilities and give the user increased confidence in making age determinations in older forests.

English Equivalents

When you know:	Multiply by	To find
Centimeters (cm)	.39	Inches (in)
Meters (m)	3.28	Feet (ft)
Kilometers (km)	.62	Miles (mi)
Square kilometers (km^2)	.386	Square miles (mi^2)
Square kilometers (km^2)	247.1	Acres (ac)
Hectares (Ha)	2.47	Acres
Cubic meters (m^3)	35.3	Cubic feet (ft^3)
Cubic meters (m^3)	177	Approx*. Board feet (bf)

*Based on ft^3 x 5

Citations

Franklin, J.F. and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. USDA Forest Service, Pacific Northwest Research Station General Technical Report PNW-8. Portland, OR. 417 p.

Franklin, J.F., and R.H. Waring. 1980. Distinctive features of the northwestern coniferous forest: development, structure, and function. Pages 59-86 in R.H. Waring (ed.), Forests: fresh perspectives from ecosystem analysis. Oregon Sate Univ. Press. Corvallis, Oregon.

Franklin, J.F., T.A. Spies, R. Van Pelt, A.B. Carey, D.A. Thornburgh, D.R. Berg, D.B. Lindenmeier, M.E. Harmon, W.S. Keeton, D.C. Shaw, K. Bible, and J. Chen. 2002. Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas fir forests as an example. For. Ecol. Manag. 155: 399–423.

Keen. F.P. 1943. Ponderosa pine tree classes redefined. J. For. 41: 249-253.

Appendix

Crosswalk between stand development terms used in this guide and terms used in other DNR publications.

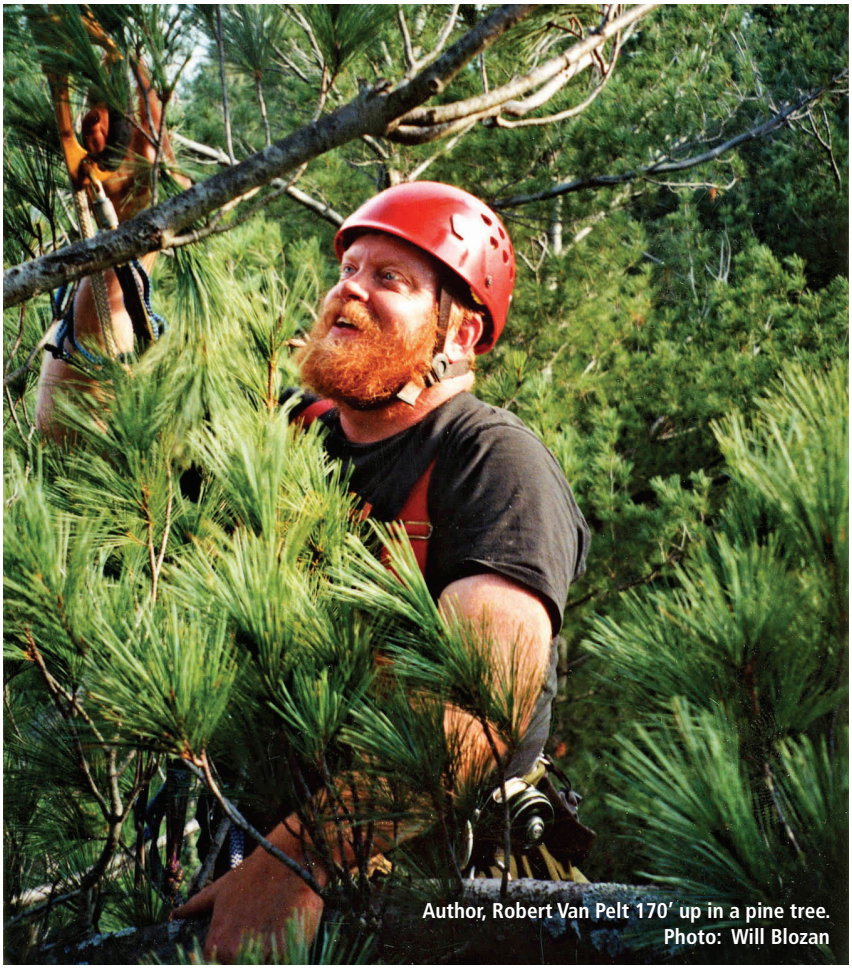
OG Guide	DNR Glossary	Essential Ecological process, elements and other notes
Cohort establishment phase	Ecosystem initiation	Establishment of cohort individuals
Canopy closure	Competitive exclusion: sapling exclusion	Canopy closes
Late canopy closure and early Biomass accumulation/stem exclusion	Competitive exclusion: pole exclusion	Inter-tree competition is the dominant ecological process. Live trees compete with each other for resources (light, water, nutrients). Loss of stems <2" dbh due to shading; Self pruning begins
Biomass accumulation /stem exclusion and early Maturation I	Competitive exclusion: large tree exclusion	Inter-tree competition is the dominate ecological process. Live trees compete with each other for resources (light, water, nutrients). Loss of stems <5" dbh due to shading.
Maturation I	Understory development And Botanically diverse	A shift of the dominate mortality processes occurrs from inter-tree competition to stochastic events (disease, wind, fire, pests) resulting in stem loss of larger trees (dominant and co-dominant) and a loss of shade. Openings in the canopy appear, allowing regeneration of shade tolerant species. High rate of biomass accumulation is maintained. In later stages, rate of live biomass accumulation begins to decrease. Continued understory development and stochastic stem loss. Stages generally lacking large down woody debris and large snags.
Maturation II	Botanically diverse	Development of additional species in lower and mid canopy. Large down woody material and large snags are generally absent or at low levels.
Vertical diversification	Niche diversification	Development of additional species in lower and mid canopy to abundant additional species at all canopy levels and increasing levels of large down woody debris and large snags.
Horizontal diversification	Fully functional	More stochastic stem losses create larger gaps. High accumulation of large woody debris, large snags.

Development stages used in this guide from Franklin et al. 2002. DNR stages adapted from Carey et al 1996 and Franklin et al 2002.

About the author

Robert Van Pelt is a research ecologist at the University of Washington in Seattle, where he received both his Ms and PhD. A native of the Midwest, he has lived in Seattle for more than 20 years. He has studied old-growth forests extensively across North America, particularly in California and the Pacific Northwest.

Currently, he is involved in canopy research on the structure and physiology of the world's tallest trees – coast redwood, Douglas fir, Sitka spruce, giant sequoia, and mountain ash in Australia. Always fascinated with facts and figures, his passion for trees led him to start the Washington Big Tree Program in 1987, which keeps records on the largest of each species of tree in the state. This ultimately led Robert to write *Forest Giants of the Pacific Coast* (2001), which chronicles in detail the largest trees in western North America.



Author, Robert Van Pelt 170' up in a pine tree.
Photo: Will Blozan

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Doug Sutherland - Commissioner of Public Lands

Land Management Division
P.O. Box 47016
Olympia, WA 98504-7016

www.dnr.wa.gov

Persons needing this information in an alternate format may call (360) 902-1600 or TTY 711.

Printed in the USA