



Mid-Term Timber Supply

June 11, 2012

Resource Values Assessment: Biodiversity

State of Knowledge:

- The B.C. government has been implementing measures to conserve biodiversity using coarse and fine filter approaches since the early 1990s. These include establishing new provincial parks and protected areas and providing biodiversity requirements under the *Forest and Range Practices Act*.
- A coarse-filter approach aims to retain biological diversity and ecological integrity by maintaining a variety of ecosystems across the landscape, and by ensuring that representative ecosystem structure, composition and function are maintained on the landscape.
- Strategic land and resource management planning processes, which involve First Nations, stakeholders and the public, provide a coarse filter approach to protect and manage important ecosystems and habitats by carefully managing lands available for resource development. The goal is to protect ecosystems and manage biodiversity while engaging in sustainable resource management activities such as forestry and agriculture.
- Reserving portions of landscapes, such as Old Growth Management Areas (OGMAs), by setting seral stage targets and allowing natural processes, including disturbances such as fire, to interact with plants and wildlife are common coarse-filter conservation strategies. This approach assumes ecosystems are managed to preserve their native composition, structure, and function will retain the vast majority of species that evolved within them.
- Fine filter approaches – such as ungulate winter ranges and wildlife habitat areas – evaluate whether a sufficient amount and distribution of habitat is provided for specific species or ecosystems whose unique needs are not completely addressed by a coarse filter strategy.

Current condition:

- Total area reserved for maintaining biodiversity varies between affected timber supply areas.
- The retention of wildlife tree patches ranges from 1% to 18% of the total cut block area, depending on current levels of harvest and landscape units
- The level of retention around riparian features varies based on the size of the feature. Riparian Management Areas established along features range from 10 metres to 100 metres.
- For current conditions pertaining to landscape level management of biodiversity, refer to the Mid Term Timber Supply Resource Values Assessment for *Old Growth, Cariboo-Chilcotin Land Use Plan*, and *Non-Spatial Landscape Biodiversity Objectives for the Prince George Timber Supply Area*.

Sustainability Risks:

- Reduce ecosystem resilience and limit options to respond to unforeseen and changing environmental conditions such as those associated with climate change, and disturbances such as wildfire and the mountain pine beetle.
- Recruitment of appropriate habitat and attributes would take over 140 years, and recruitment of specific old growth stand structure elements such as large trees and snags could take over 200 years.
- Habitat fragmentation and connectivity reduction.
- Old growth reliant species (e.g. bird species and fur bearers) and ecosystems will be lost; some may not recover.

SUPPORTING DOCUMENTS:

Angelstam, P. 1997. Landscape analysis as a tool for the scientific management of biodiversity. *Ecological Bulletin*. Vol. 46: 140-170.

Angelstam, P.K. 1998. Maintaining and restoring biodiversity in European boreal forests by developing natural disturbance regimes. *J. Veg. Sci.* 9:593–602.

Association of BC Forest Professionals. June 2011 Principles of Stewardship of Forests, Forest Lands, Forest Resources and Forest Ecosystems (Draft), , June 2011.
http://www.abcfp.ca/regulating_the_profession/documents/Principles_Forest_Stewardship_Discussion_Paper.pdf

Bergeron, Y. and B. Harvey. 1997. Basing silviculture on natural ecosystem dynamics: an approach applied to the southern boreal mixedwood forest of Quebec. *For. Ecol. Manag.* 92:235–242.

BC Ministry of Forests and Range, 2008. <http://www.for.gov.bc.ca/code/>

Bunnell, F.L., L.L. Kremsater, and E. Wind. 1991, Managing to sustain vertebrate richness in forest of the Pacific Northwest: relationships within stands. *Environ. Rev.* Vol. 7: 97-146.

Bunnell, F.L. 1995. Forest-dwelling vertebrate faunas and natural fire regimes in British Columbia. *Conserv. Biol.* 9:636–644.

Densmore N and A. F. Linnell Nemecc. 2006. Resource Stewardship Monitoring: Stand-level Biodiversity Analysis of 2005/2006 Field Season Data by Biogeoclimatic Zone. B.C. Min. For. Ran., For. Prac. Br., Victoria, B.C. FREP. <http://www.for.gov.bc.ca/hfp/frep/publications/index.htm>

DeLong, S.C. 1998. Natural disturbance rate and patch size distribution of forests in northern British Columbia: implications for forest management. *Northwest Sci.* 72:35–48.

DeLong, S.C. and W.B. Kessler. 2000. Ecological characteristics of mature forest remnants left by wildfire. *For. Ecol. Manag.* 131:93–106.

DeLong, C., P.J. Burton, and M. Harrison. 2004. Assessing the relative quality of old-growth forest: an example from the Robson Valley, British Columbia. *B.C. Journal of Ecosystems and Management* 4(2):71-86. <http://www.mendeley.com/research/assessing-relative-quality-oldgrowth-forest-example-robson-valley-british-columbia-1/>

DeLong, S.C., L.D. Daniels, B. Heemskerk, and K.O. Storaunet. 2005. Temporal development of decaying log habitats in wet spruce-fir stands in east-central British Columbia. *Canadian Journal of Forest Research* 35:2841-2850. <http://www.nrcresearchpress.com/doi/pdf/10.1139/x05-215>

DeLong, S.C., G.D. Sutherland, L.D. Daniels, B. Heemskerk, and K.O. Storaunet. 2008. Temporal dynamics and development of snag habitats in wet spruce-fir stands in east-central British Columbia. *Forest Ecology and Management* 255:3613-3620.
http://www.skogoglandskap.no/publikasjon/temporal_dynamics_of_snags_and_development_of_snag_habitats_in_wet_spruce_E28093fir_stands_in_east-central_british_columbia/content3_view

DeLong, S.C. 2010. Land units and benchmarks for developing natural disturbance-based forest management guidance for northeastern British Columbia. B.C. Min. For. Range, For. Sci. Prog., Victoria, B.C. Tech. Rep. 059. www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr059.htm

Fahrig, L. 2001. How much habitat is enough? *Biological Conservation*. Vol. 100: 65-74.

Franklin, J.F. , D. Lindenmayer, J. A. MacMahon, A. McKee, J. Magnuson, D. A. Perry, R. Waide, and D. Foster. 2000. Threads of Continuity, *Conservation Magazine*. Vol. 1, No. 1
<http://www.conservationmagazine.org/2008/07/threads-of-continuity/>

Grumbine, R. E. 1994. What is Ecosystem Management? *Conservation Biology*. Vol. 8(1): 27-38.

Heemskerk, B.H., B.J. Rogers, and S.C. DeLong. 2009. Ecosystem and tree attributes affecting the presence of functional Wildlife Tree types. B.C. Min. For. Range, Res. Br., Victoria, B.C. Tech. Rep. 051.
www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr051.htm

Hilbert, J. 2003. Old-Growth Definitions and Management: A Literature Review for the Ministry of Sustainable Resource Management, Northern Interior Region and the University of Northern British Columbia. Unpublished Report.

Holt, R.F. and Utzig, G. 2002. Indicators, Thresholds and Risks; Links to a Habitat Supply Modeling Strategy and Environmental Risk Analysis in BC. A Discussion Paper prepared for the B.C. Habitat Modeling Steering Committee. Unpublished Report.

Holt, R.F. and G. Sutherland. 2003. Environmental risk assessment, Base Case-Coarse Filter. Final Report Summary An Environmental Risk Assessment for the North Coast LRMP planning area.
http://www.cortex.ca/coarse_filter_biodiv_era_summary.pdf

Landres, P.B., P. Morgan, and F.J. Swanson. 1999. Overview of the use of natural variability concepts in managing ecological systems. *Ecological Applications*. Vol. 9(4): 1179-1188.

Lewis, K.J. and B.S. Lindgren. 2000. A conceptual model of biotic disturbance ecology in the central interior of B.C.: how forest management can turn Dr. Jekyll into Mr. Hyde. *For. Chron.* 76:433-443.

Lindenmayer, D.B., C.R. Margules, and D.B. Botkin. 1999. Indicators of Biodiversity for Ecologically Sustainable Forest Management. *Conservation Biology*. Vol 14(1): 941 – 950.

Lindenmayer, D.B. and Franklin, J.F. 2002. *Conserving Forest Biodiversity. A comprehensive multi-scaled approach.* Island Press.

Lindenmayer, D.B., D.R. Foster, J.F. Franklin, M.L Hunter, R.F. Noss, F.A. Schmiegelow, D. Perry. 2004. Salvage Harvesting Policies After Natural Disturbances. *Science*. Vol. 303: 1303-1304.

Lofroth, E.C. 2001. Northern wolverine project: 2000/01 year end report. Forest renewal activity no. 712260, British Columbia, Canada.

MacKillop, D and R. F. Holt. 2004. Mountain Pine Beetles (*Dendroctonus ponderosae*) and old-growth forest characteristics in the Moist Interior Plateau, Vanderhoof District. Research Report prepared for West Fraser Sawmills. http://www.veridianecological.ca/publications/SBS_MPB_OG_Final.pdf

Meitner, Michael, Cluny South, Carissa Wieler. April 2011. Post-mountain pine beetle recreational usage survey - Final Report. Contract / File No: 1070-20/CS1179A048

Ministry of Environment. IWMS Species Accounts, and Conservation Framework summary reports, both available off BC Species & Ecosystems Explorer: <http://www.env.gov.bc.ca/atrisk/toolintro.html>

Ministry of Environment. Mountain Caribou Recovery Implementation Plan. Up-date 2009. <http://www.env.gov.bc.ca/wld/speciesconservation/mc/index.html>

Ministry of Forests and Ministry of Environment. 1995. *Forest Practices Code Biodiversity Guidebook – September 1995*

Ministry of Forest and Ministry of Environment. 1995. *Forest Practices Code Riparian Management Area Guidebook – December 1995*

Ministry of Sustainable Resource Management. 2004. *Order Establishing Provincial Non-Spatial Old Growth Objectives - June 30, 2004.* http://archive.ilmb.gov.bc.ca/slrp/lrmp/policiesguidelinesandassessments/oldgrowth/pdf/Old_Growth_Order_May18th_FINAL.pdf

Ministry of Sustainable Resource Management, April 2004 (revised December 2005). *Background Information and Supporting Documentation for the Process Involved in Developing the Recommended Biodiversity Objectives in the PG TSA* http://archive.ilmb.gov.bc.ca/slrp/srmp/north/prince_george_tsa/pg_tsa_biodiversity_order_bkgrnd_report.pdf

Morgan, D., D. Daust and A. Fall 2002. A Landscape Event Simulation Approach for the North Coast LRMP. Unpublished Report of the NC LRMP. Ministry of Sustainable Resource Management, Smithers, BC.

Purdon, M. 2003. The nature of ecosystem management: postmodernism and plurality in the sustainable management of the boreal forest. *Environmental Science & Policy*. Vol. 6: 377-388.

Rogeau, M.-P. 2001. Fire history study Mackenzie TSA, British Columbia. Report for Abitibi Consolidated Ltd., Mackenzie, B.C.

Stevenson S.K., M. Jull and B.J. Rogers. 2006. Abundance and attributes of wildlife trees and coarse woody debris at three silvicultural systems study areas in the interior cedar hemlock zone, British Columbia. *For Ecol Mgt* 233:176-191. <http://web.unbc.ca/~wetbelt/docs/Abundance-of-attributes-of-WLT-and-CWD-Stevenson-et-al-2006.pdf>

Swetnam, T.C, Allen and J. Betancourt. 1999. Applied historical ecology: using the past to manage for the future. *Ecological Applications*. Vol 9: 1189-1206.

Wong, C. B. Dorner, and H. Sandmann. 2003. Estimating Historical Variability of Natural Disturbances in British Columbia. *Land Management Handbook* 53.