FIA/FSP Executive Summary

Project: M086006

Title: Landscape Strategies for Mountain Pine Beetle Management: Some Stewardship Implications

Purpose and Management Implications:

As harvest rates are dramatically increased in response to the mountain pine-beetle (MPB) (*Dendroctonus ponderosae*) epidemic, how to conduct harvesting in a way that best achieves wildlife stewardship goals, and those for other non-timber values, is uncertain. Bunnell et al. (2004) provided a review of mostly stand-level approaches, but did not address the landscape scale in any detail. Eng (2004) reviewed both stand-scale and landscape-scale stewardship principles but did not conduct any assessment of feasibility, and Klenner (2006) provided salvage harvesting guidelines at the stand level. Our project builds on those reviews, "testing" some of the management principles through simulation modelling of the ~2.6 million hectare Nadina Forest District.

Project start date and duration: April 2006, two years.

Methodology overview:

We used spatially explicit landscape simulations in combination with habitat and population modelling to assess alternate management strategies for a sub-boreal landscape (Nadina Forest District) subject to an extensive mountain pine-beetle (*Dendroctonus ponderosae*) outbreak and climate change. A short-list of management options considered for detailed examination were protection of under-story trees during logging, 30-70% retention of overstory (partial cutting) for 30 or 50% of the area harvested each year, and timber harvest rate (100, 80 or 50% of current long-term sustained harvest estimates). We structured the analysis in a Probability network (PN) meta-model that incorporated the results of spatially explicit modelling of landscape conditions (disturbance by beetle, logging, and stochastic events, habitat quality, number of potential animal home-ranges, and connectedness of home-ranges) with analytical population modelling and parameter uncertainty. We applied a range of wildlife species characteristics (pseudo-species) of habitat recovery post-disturbance, spatial requirements, dispersal ability, and demography. We also applied the framework to specific species, such as the marten (*Martes americana*). The PN meta-model was then used to examine system response and analyze management trade-offs through structured decision analysis.

Interim findings/conclusions:

Habitat value and potential population size declined dramatically with the beetle outbreak and associated salvage cutting. Choice of management strategy had a long-term effect on population recovery potential, even with assumptions of increasing stochastic disturbance

due to climate change. The choice of management strategy depended strongly, however, on the acceptability weighting of possible wildlife outcomes against timber harvest outcomes, and on the time frame of interest. Understory protection and partial cutting had potential to narrow the long-term difference between the two resource values. Partial cutting, due to its perceived cost, was only chosen as an optimal strategy if wildlife values and/or timber harvest maximization were given higher weight than cost minimization.

Application of the meta-model framework to the marten (*Martes americana*) showed highly uncertain outcomes as for the more general pseudo-species analysis. In the longer term, to maintain populations capable of supporting a commercial fur harvest with minimal timber harvest impact, likely requires substantive application of partial cutting.

References:

Bunnell, F., K.A. Squires, I. Houde. 2004. Evaluating effects of large-scale salvage logging for mountain pine beetle in terrestrial and aquatic vertebrates. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. Mountain Pine Beetle Initiative Working Paper 2004-2. 57 p. [available on line] http://www.pfc.cfs.nrcan.gc.ca/cgi-bin/bstore/catalog_e.pl?catalog=25154

Eng, M. 2004. Forest Stewardship in the context of large-scale salvage operations: an interpretation paper. B.C. Min. For., Res. Br., Victoria B.C. Tech. Rep. 019. < http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/TR019.htm >

Klenner, W. 2006. Retention strategies to maintain habitat structure and wildlife diversity during the salvage harvesting of mountain pine beetle attack areas in the Southern Interior Forest Region. B.C. Min. For. Range, S. Int. For. Reg., Kamloops, B.C. Exten. Note 04. http://www.for.gov.bc.ca/hfd/Pubs/RSI/FSP/EN/RSI_EN04.htm

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