Symposium Abstracts: Outbreaks, Climate Change, and Shifting Priorities: The Future of Forest Entomology

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Forest Entomology in the BCFLNR

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Forest entomologists have been hired by the province since the late 1970s and have played a vital role in applying their skills and expert advice to help manage forest insect pests in British Columbia. This presentation describes the current roles and responsibilities of professional forest entomologists in the B.C. public service and provides insight into how important these positions will be in the future— Some challenges facing the maintenance and recruitment of these positions are also discussed.

Dryocoetes confusus, shaping subalpine fir forests

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The western balsam bark beetle is considered the most destructive mortality agent in subalpine-fir ecosystems, yet the actual impact of this beetle is not well quantified. Results from two long-term studies highlight the significant and ongoing impact by western balsam bark beetle in high-elevation forests of southern British Columbia. The wet, cold Engelmann Spruce–Subalpine Fir ecosystem (ESSFwc) is the most predominant ecosystem in southern B.C. that contains subalpine fir suffering moderate levels of attack by western balsam bark beetle—on average 0.8% trees killed annually. The very dry, cold Engelmann Spruce–Subalpine Fir (ESSFxc) ecosystem sustained the highest levels of mortality: averaging 1.6% trees killed annually (47% average in-stand mortality by 2014). Therefore, it is reasonable to conclude that, with continued and increasing climatic stresses in the ESSFwc, this ecosystem will likely experience higher and more severe levels of attack in the coming decades. The preponderance of red attack in the 2014 assessment compared to the first assessment in 1997 suggests that mortality is occurring at higher rates now than two decades ago.

Predicting Outbreaks of the Western Spruce Budworm: Are we there yet?

Brian Van Hezewijk, Natural Resources Canada, Victoria, B.C.

The western spruce budworm, *Choristoneura occidentalis* Freeman, is the most important defoliator of spruce–fir forests in western North America. If we want to better predict forest carbon balances and regional timber supplies, or gain a better understanding of climate change feedbacks, I argue that we need to have an accurate and usable population model for this species. In this presentation, I describe some of the past research that has shaped our understanding of western spruce budworm dynamics, our current work aimed at filling important gaps in our knowledge—particularly for low-density populations—and describe a new spatially explicit model intended to both describe and project populations at the regional scale.

Western Spruce Budworm in a Changing World

Lisa Poirier, University of Northern British Columbia, Prince George, B.C.

In recent years, western spruce budworm, among other forest insects, has reached outbreak levels in areas where it had not been recorded historically. The influence of climate on insect outbreaks is clear and well documented. The complex and changing ecological interactions among the abiotic and biotic environment, the host, and the insect are still challenging to unravel. For example, in areas with shorter growing seasons, the ability of the host tree to compensate for defoliation by production of late buds may be inhibited, possibly increasing the risk of mortality.

Furthermore, interactions between insects can affect outcomes. Forest managers often suggest that defoliation of Douglas-fir by insects such as western spruce budworm can facilitate later attack by Douglas-fir beetle. Initial spatiotemporal analysis has suggested that, on a landscape scale at least, beetle attack may actually be less likely following a western spruce budworm outbreak. Our efforts to predict the future, even in an era of increasingly rapid change, can often be meaningfully informed by looking to the past. Ongoing dendrochronological analyses examine western spruce budworm and Douglas-fir beetle history near the northern limits of interior Douglas-fir forest type. These reconstructions may help to identify the abiotic and biotic stresses that could trigger or intensify insect outbreaks. Both current and historical data about the world inhabited by these insects are needed to make reliable predictions about their future impacts.

Evolution of Decision Support for Forest Ecosystem Management: Towards Open Modelling and Data

Bill Riel and Alex M. Chubaty, Pacific Forestry Research Centre, Victoria, B.C.

Forest ecosystem decision support systems evolved out of a need to apply the results of scientific research to forest management and policy. Initially, these were closed systems, limited by technologies and data availability at the time. The recent availability of large spatial datasets and high-performance computing has enabled creation of new systems-modelling approaches. We examine decision support tools and models used for mountain pine beetle management in B.C. by discussing the advantages and limitations of these historical approaches. Current development of open and scalable modelling platforms seeks to overcome many of the historical limitations and provide cross-disciplinary integration, along with enhanced transparency, accountability, and scientific reproducibility.