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A tool for incorporating site level climate change impacts into land management decisions

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Abstract

Drought is one of the leading causes of forest mortality related to climate change. We have developed a tool to predict risk of stand-level tree species mortality from drought and drought-related insect attack. Within climatically homogeneous areas, we use past and predicted future climate data, along with typical site and soil conditions for ecosystem units, to calculate actual and potential evapo-transpiration (AET and PET) for these units. Knowledge of tree species drought tolerance limits, which can be expressed by AET/PET, can then be used to develop tree mortality risk maps using forest cover and ecosystem unit maps as input layers in a GIS. Risk related to tree mortality agents that are enhanced by drought (e.g., bark beetle species) can also be mapped based on ecosystem-specific AET/PET values and tree species and age derived from forest cover polygons.

The accuracy and reliability of the maps was tested with field data and dendro-chronology lab analysis. The tool we developed can be used to map the risk of drought-related mortality at a relatively fine scale for any plant species with a well-established drought tolerance. This tool thus provides information at an appropriate scale to guide operational forest management adaptation to climate change and compliments other tools such as large-scale bioclimate envelope models.

Biography

Craig DeLong is a professional biologist who has a BSc in Biology (Univ. of Victoria) and an MSc in Natural Resources Management (Univ. of Northern B.C.). Craig DeLong's areas of expertise include forest ecology research, ecosystem classification and interpretation, ecosystem mapping, and quality assurance of site unit mapping. His current interests are natural disturbance dynamics at multiple scales, natural strand dynamics and succession, natural disturbance as a template for forest management, the ecology and management of mixedwood forests and site level impacts of climate change.

The main goal of Craig's research is to maintain ecosystem integrity and function while reducing the cost of forest management through a better understanding of forest ecosystems. Craig has published over twenty journal articles, produced five field guides for site identification using the Biogeoclimatic Ecosystem Classification system, and contributed to three books including a plant identification book.