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## **Genomics-Enhanced Forecasting to Secure Canada's Ligno-Cellulosic Feedstock Supply for Bioenergy Using the Mountain Pine Beetle System**

### **Integrated GE<sup>3</sup>LS Research**

A model of the effects of epidemics on forest feedstock

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### **Summary**

Conifer forests are Canada's largest renewable source of lignocellulose. Their sustainable use for bioenergy production would form a strategic part of economic diversification within the forestry sector and help alleviate our dependence on fossil fuels. Drawing on feedstock from conifer forests affected by the mountain pine beetle epidemic to generate biofuels would also help mitigate some of the negative economic and environmental impacts of such large-scale disturbance on this valuable resource. Our integrated team of investigators with experience in environmental risk assessment will use genomic data in developing models for forecasting the possibility of future pine-beetle outbreaks in both time and geographical location.

We will model the spread and likelihood of a pine-beetle outbreak using genomic data for the pine beetle and its associated fungal species. Then, we will use these data to devise environmental-risk models to improve our capacity to estimate the likelihood of outbreaks of mountain pine beetle infestations. This will allow more accurate estimates of fibre supply. We will then combine this information with estimates of forest-deterioration rates due to the pine beetle with economic variables such as prices of bioenergy, costs, and discount rates. Finally we will weave all this information into a model that will elucidate the viability of the bioenergy industry given the variability of prices and of feedstock availability.

We anticipate that this project will help clarify the economic potential of the bioenergy industry in Canada and inform decisions regarding investment in bioenergy facilities.