EVALUATING THE COST-EFFECTIVENESS OF ALBERTA'S FOREST MANAGEMENT STRATEGIES IN RESPONSE TO THE MOUNTAIN PINE BEETLE

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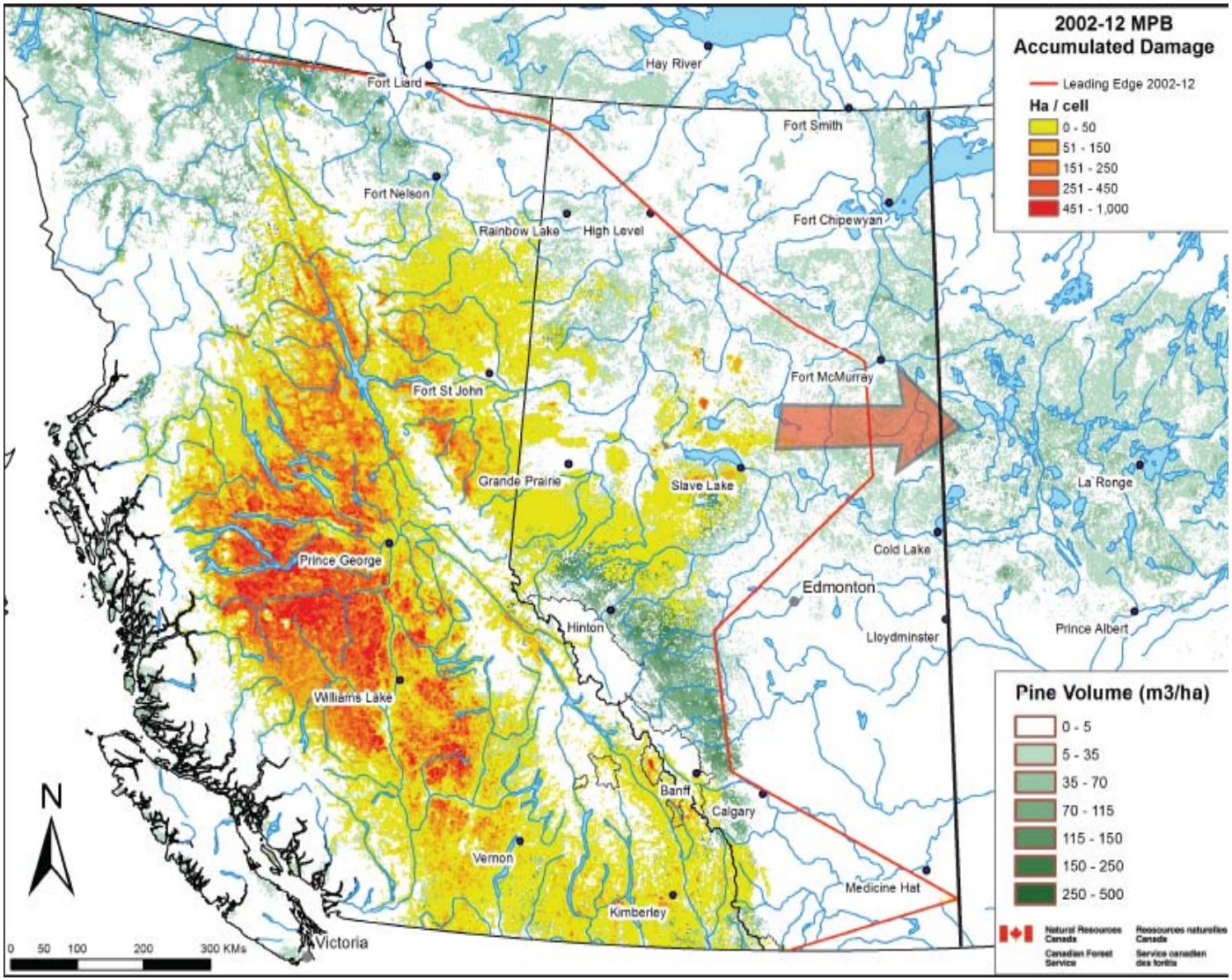
Background

- The Mountain Pine Beetle infestation in British Columbia has affected 18 million m^3 of land and is spreading further east into Alberta and beyond. Values at risk include Alberta's forest industry, worth $9 billion annually, employing 38,000 workers which is largely dependent on pine and is therefore at risk of significant economic loss from MPB-induced mortality; and associated ecosystem services



Courtesy, Hodgson & Cooke 2015

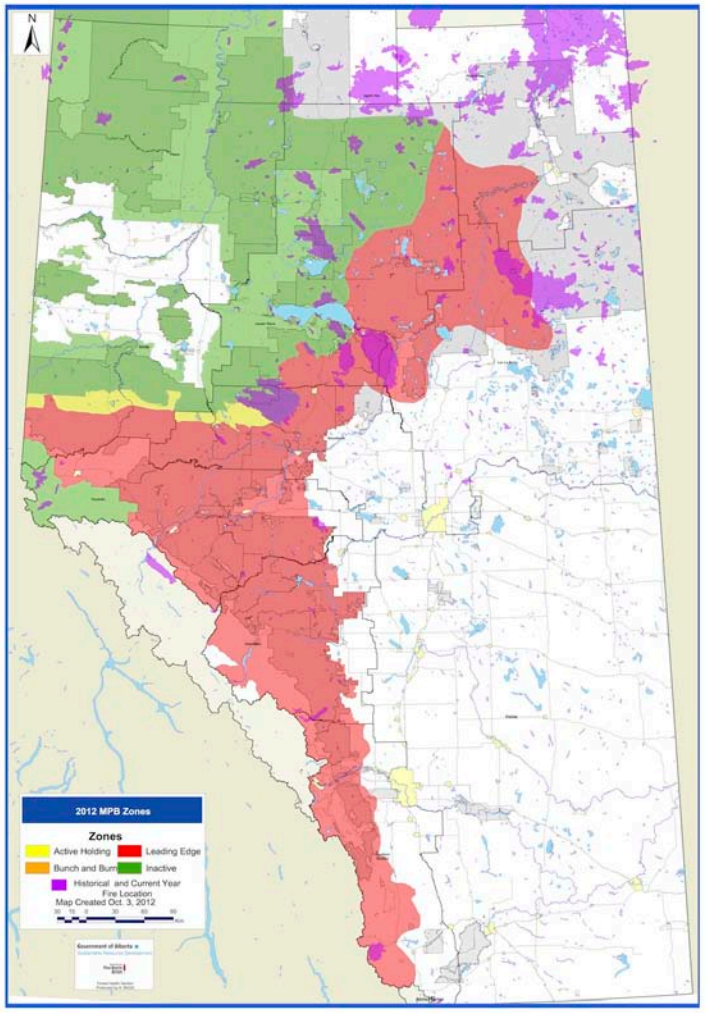
Efforts to Date

- Government of Alberta has spent nearly $370 million on direct control efforts since 2007
- Currently the government of Saskatchewan is funding control efforts in Alberta

Marten Hills, Alberta

Strategies

- AESRD has implemented strategies intended specifically to slow the beetle's eastward movement, targeting the suppression of MPB populations within stands and areas predicted to have the highest likelihood of promoting additional spread (level 1 and level 2 treatments)
- Province is divided into a leading edge and holding zone

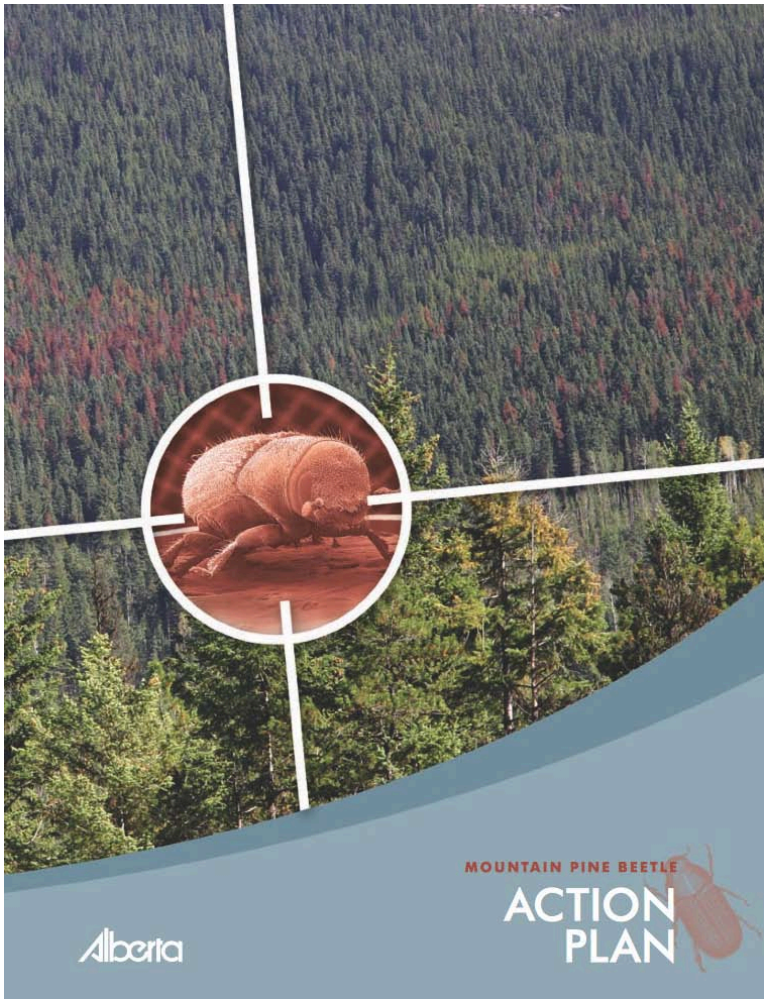


Policy Objectives

- The primary goals of the Alberta government's mitigation efforts are to slow the spread of MPB into vulnerable pine-dominated watersheds of the eastern slopes and the boreal forest
- The larger policy context is developing a National Pest Management strategy on how to best address other pests and pathogens expanding into new habitat and geographic ranges.
  - Six et al. (2014) suggests that the opportunities for successful suppression via direct control are relatively rare, depending on early, aggressive and sustained treatment, and lack of this is what accounts for suppression program failure. This view is supported in a recent study involving case-study meta-analyses of invasives (e.g. Tobin et al. 2014).

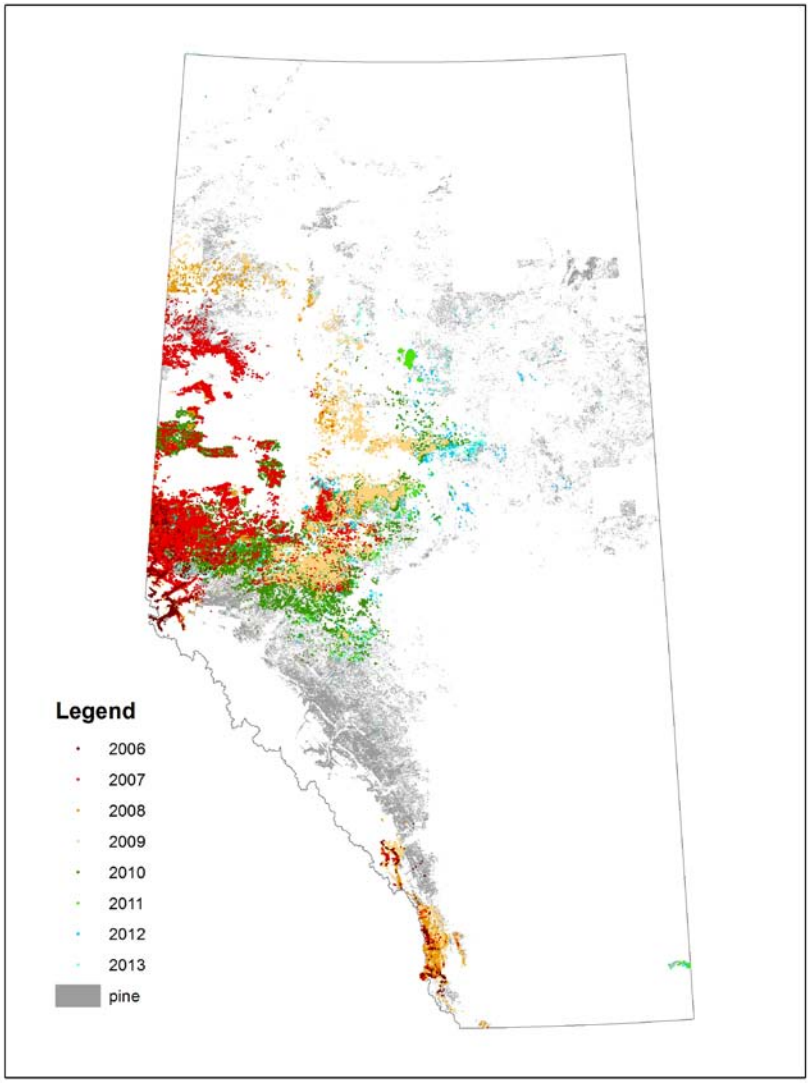
Cost Effectiveness Framework

- Three-step approach
- First identify effects of stand level treatments
- Second, scale to the landscape given data
- Third, quantify the impact (what would have happened absent interventions)?

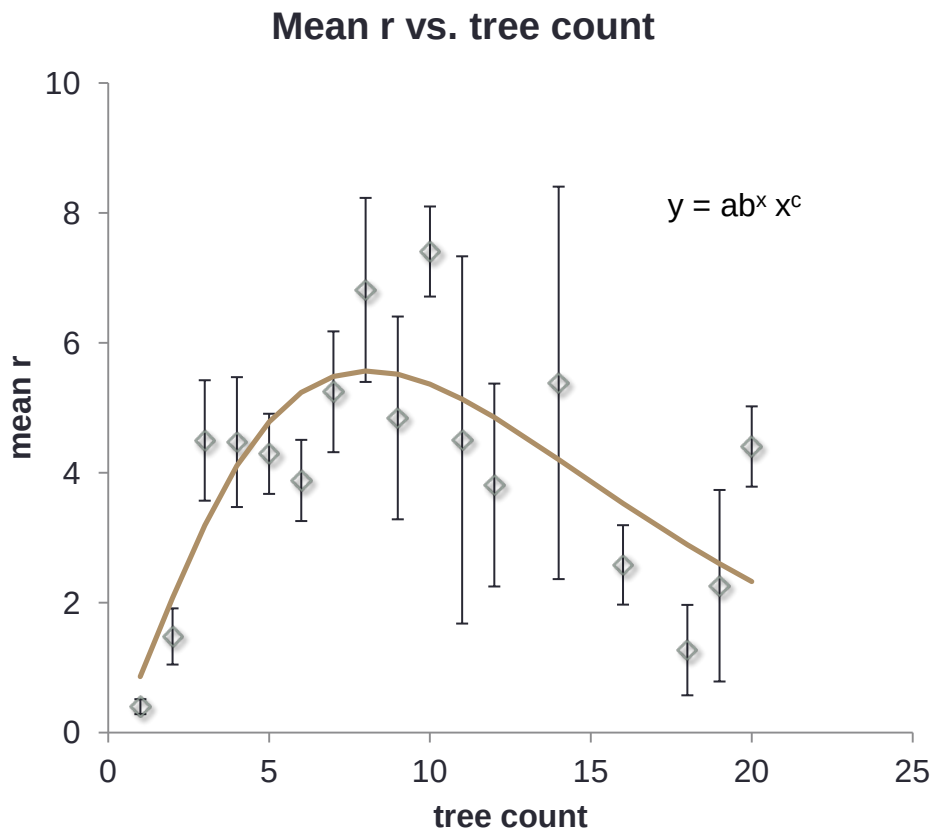


Aerial Survey Data 2006-2013

- Data show locations of dead trees identified during annual aerial surveys
- Type 1 treatments (Individual tree removal) were applied each year with a focus on front-line areas
- **How effective are these expensive treatments at reducing spread?**

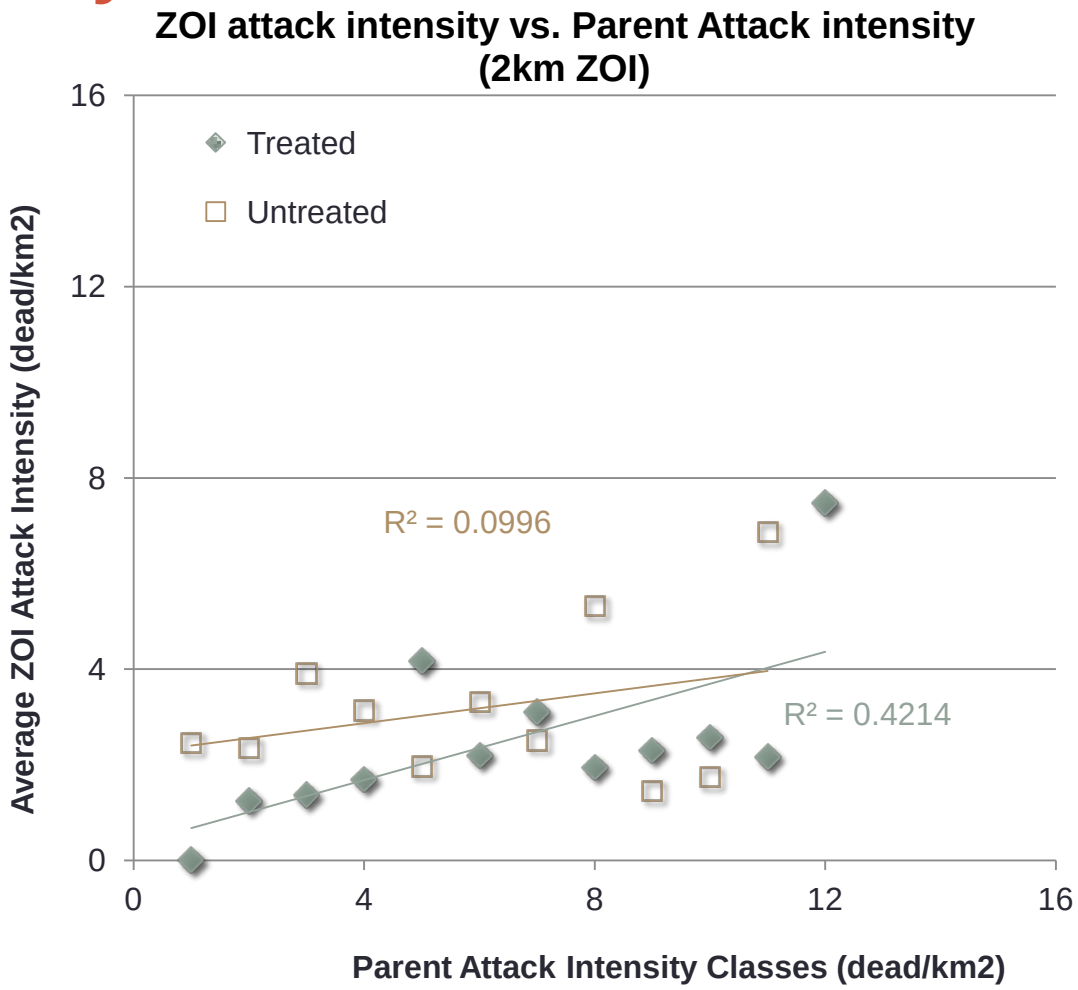


Fecundity plotted against trees attacked in a stand



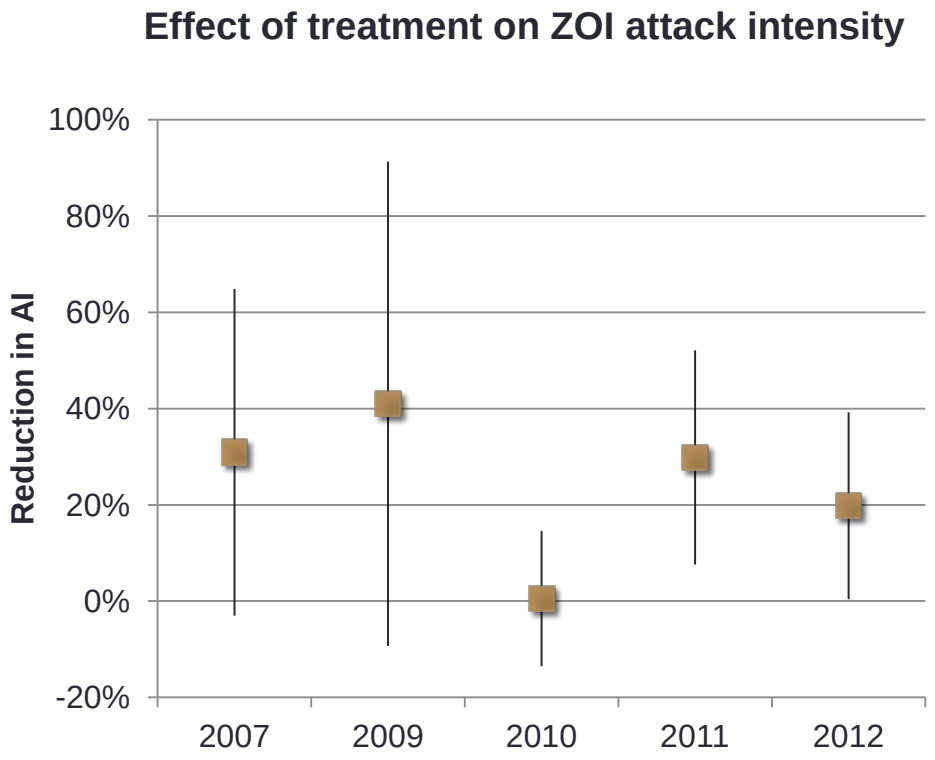
Relationship Between Parent and Zone of Attack Intensity

- Assessed by grouping parents into classes based upon Attack Intensity
- All years included except 2008 (immigration year)
- Treatment appears to be effective in reducing attack intensity in ZOI area
- Less effective at higher parent attack intensity



Relative Reduction in Attack Intensity (2 km zone of influence)

- Assessed by comparing relative change from parent to ZOI in treated vs. untreated parents
- Each year analyzed independently (2008 excluded)
- Parents with < 3 dead excluded
- Substantial error terms
- **Mean reduction in AI of 24%**
- Less effective in years with high R-values (2010 & 2012)



Management Implications

- Efforts to date show treatments reduce fecundity within individual stands
- Depending on population levels, this reduction is sufficient to extirpate local populations
- Next steps involve scaling up to identify if it “slowed the spread”
- In the meantime the results can contribute to identifying stands that are at higher risk and prioritizing monitoring/treatment