



# Mountain Pine Beetle Ecology Program

October 25, 2008



# Outline

- MPBEP over view
- Effects of Mountain Pine Beetle attack on hydrology and post-attack vegetation and hydrologic recovery in lodgepole pine forests in Alberta
- Monitoring and Decision Support for Regeneration Management in a Mountain Pine Beetle Environment
- May 2008 Work shop Initiatives



# MPBEP Team Members

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Don Podlubny	Program Lead	Keith Ebbs	Rep for GAER
Bob Udell	FG&YA	Tom Archibald	FRI
Dennis Quintilio	Fire Specialist	Dan Lux	ASRD
Joyce Gould	TPR&C	John Stadt	ASRD
Kyle Clifford	TPR&C		
Richard Briand	West Fraser Mills Ltd.		
Pat Wearmouth	Weyerhaeuser Company		
Steve Otway	Jasper National Park		
Rob Gibb	Talisman Energy		
Ray Ault	FP Innovations, WFORG		
George Hamilton	Wild life ASRD		



# MPBEP Priority Areas

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- 1. Natural disturbance and stand dynamics research, which includes the relationship of fire, pine beetle and the eventual community impacts**



# MPBEP Priority Areas (continued)

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## **2. Understanding forest management implications and options associated with pine beetle infestations**



# MPBEP Priority Areas (continued)

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- 3. Quantification of the short and long-term changes to the fire regime that includes fire intensity and severity in beetle infected stands (*FERIC WFORG focus*)**



# MPBEP Strategies

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1. Identify research priorities for Alberta concerning forest ecology and forest fire relating to mountain pine beetle.
2. Attract and secure funding for long term program development.
3. Develop a multiple partner and discipline team to set direction.



# MPBEP Strategies (continued)

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4. Provide funding for directed research initiatives as well as for proposed research projects that support the priorities of the MPBEP.
5. Produce outcomes that can and will be used by resource managers.
6. Integrate as many other programs of the Foothills Research Institute in the work of the MPBEP as is practical and reasonable.



# MPBEP Strategies (continued)

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7. Be aware of and avoid duplication of research through communications and linkages with others engaged in MPB research.
8. Ensure dissemination of the program activities, learning's and deliverables.



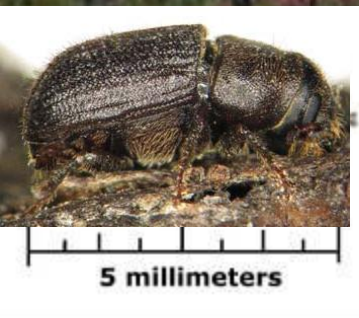
# MPBEP Funding 2008-09 fiscal year

<b>Funding Source</b>	<b>Amount</b>
Carry forward from MPBEP 2007-08	\$249,717.84
ASRD Grant	\$309,757.00
Alberta Forest Research Institute (AFRI)	\$100,000.00
Open FRIAA	\$143,100.00



# MPBEP Project 1

Effects of Simulated Mountain Pine Beetle Attack on Hydrology, Vegetation, and Below-Ground Processes in Lodgepole Pine Forests of the Western Alberta Foothills



MOUNTAIN PINE BEETLE



# MPBEP Project 1.

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## Investigators

Dr. Uldis Silins of the University of Alberta

Pablo Pina Ph.D. in Hydrology

Dr. Ellen Macdonald of the university of Alberta

Anne Macintosh Ph.D. Vegetation  
Ecology



# Before-after: treatment: control study design

## Experimental Treatments

- Control (untreated),
- Simulated MPB attack (50% over story kill)
- Simulated MPB attack (100% over story kill)
- Clearcut - harvested to simulate a "salvage logged" management treatment control

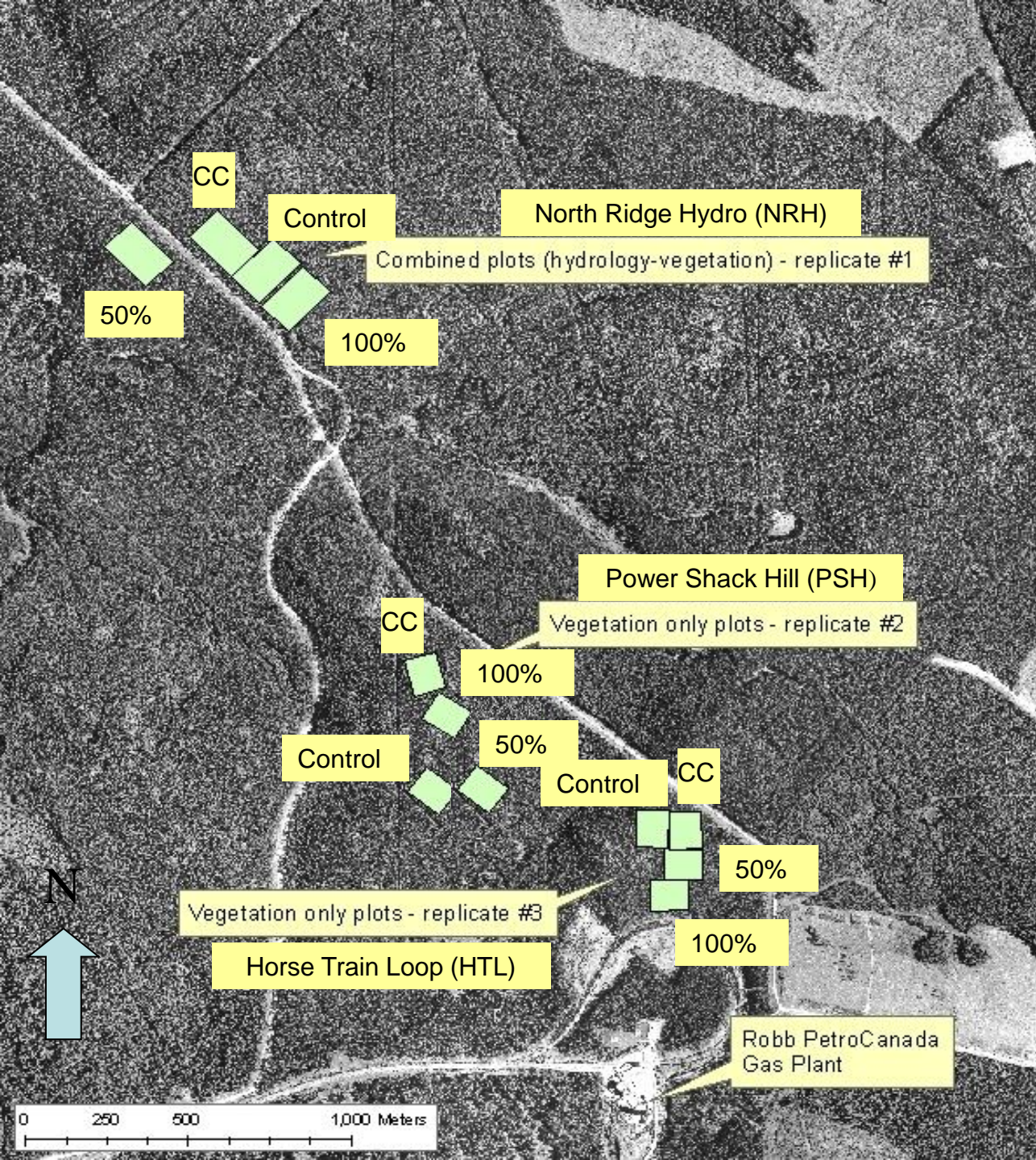
## Three growing seasons

- 2008/2009 (1 season pre-treatment calibration)
- 2009/2010 ("1 yr post-kill"\*)
- 2010/2011 ("2 yr post-kill")

*\*Individual trees treated with herbicide to simulate 2 levels of MPB kill (2009)*

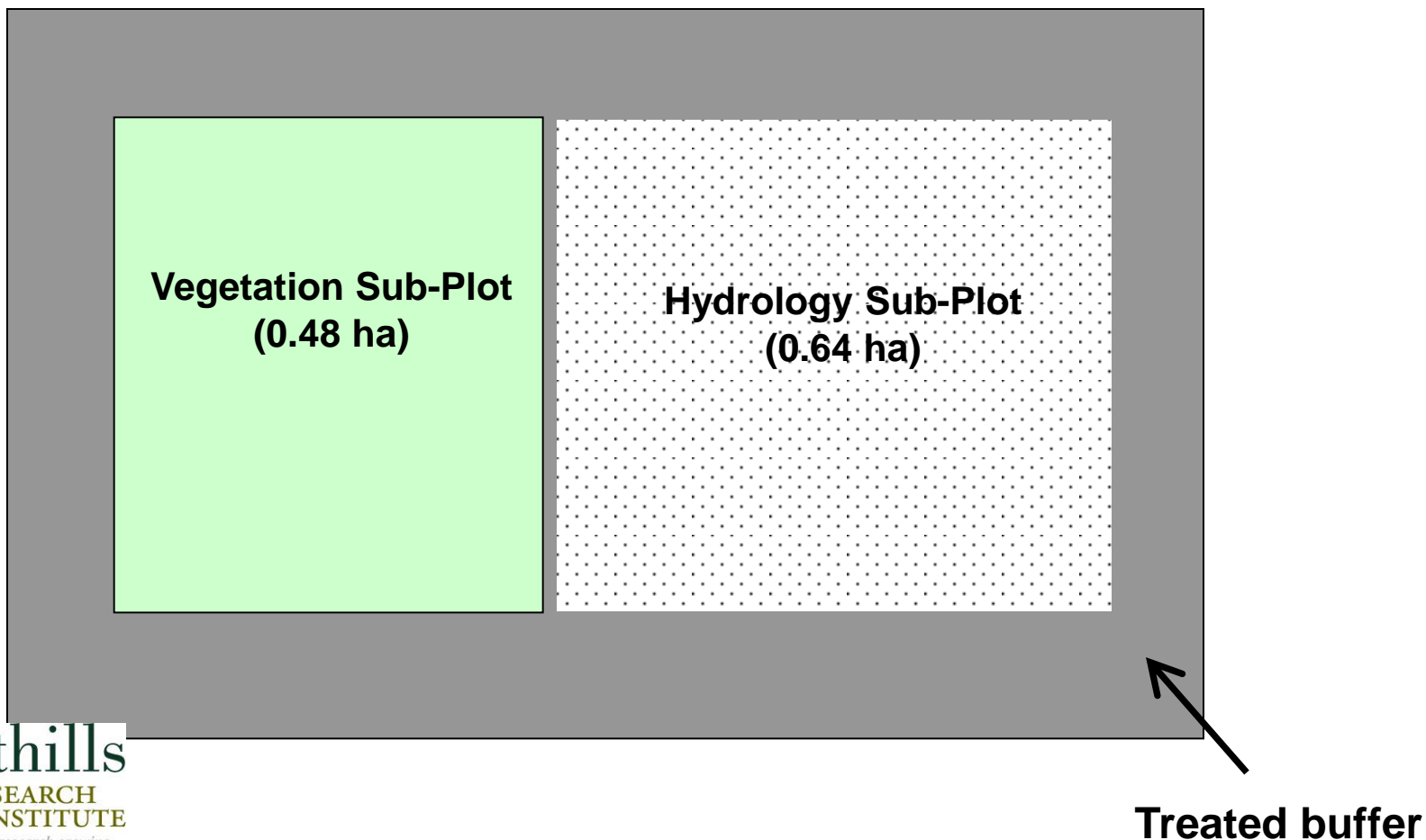
# STUDY AREA

- Lodgepole pine ~ 100-110 yrs (mature)
- Medium site index
- 2000-2500 stems/ha, 23-25 m height



# Plot Layout

- 4 treatments (Control, 50% kill, 100% kill, Salvage) x 3 replicates
- 12 stand scale plots - 2.2 ha (4 plots), 1.2 ha (8 plots)



# Early response of stand-scale hydrology

*(PhD Student: Pablo Pina)*

*Change water production (runoff) at different levels of “red attack” ?*

1. Over story interception of precipitation.
2. Canopy transpiration.
3. Understory evaporative losses.
4. Soil moisture / groundwater response.



# Post-attack vegetation response

*(PhD Student: Anne McIntosh)*

## *Early trajectory of post-attack response (advanced growth, understory veg) after different levels of “red attack” ?*

1. Changes in over story forest structure.
2. Changes in understory plant community composition (seedlings, vascular plants, bryophytes).
3. Recruitment of downed woody debris (DWD).
4. Changes in soil processes (nutrient availability, microbial community, decomposition).



# MPBEP Project 1. Partners

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University of Alberta

Forest Resource Improvement Association of  
Alberta

Foothills Research Institute

NSERC (through the U of A)



# MPBEP Project 2.

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Monitoring and Decision Support for  
Regeneration Management in a Mountain Pine  
Beetle Environment

## Investigators

Dr. Dick Dempster Project Lead

Dr. Ellen Macdonald Vegetation  
component

Dr. Rene Alfaro, Jodi Axelson  
and Dr. Brad Hawkes CFS Pacific  
Dendroecological studies



# MPBEP Project 2. Objective

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The objective of the proposed project is to provide a decision-support tool to assist forest managers in mitigating the impact of mountain pine beetle disturbance on forest resources such as timber, wildlife habitat, and water.



# MPBEP Project 2. Objective cont'd

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The tool will integrate the collection and management of baseline and monitoring data with simulation models, graphic displays, tabular reporting capabilities and expert knowledge to assist managers in selecting rational options that are likely to best meet their objectives.





# MPBEP Project 2.

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## Tasks completed to date

- Pre plot compilation and plot selection
- Vegetation protocols developed and tested
- Field measurement of 150 plots
- Dendroecological field work 75% completed



# MPBEP Project 2.

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Tasks to be completed by March 2009

- Field season data entry
- Compilation of data
- Dendroecology report
- Start on the Synthesis of a Decision Support System



# MPBEP Dendroecological work

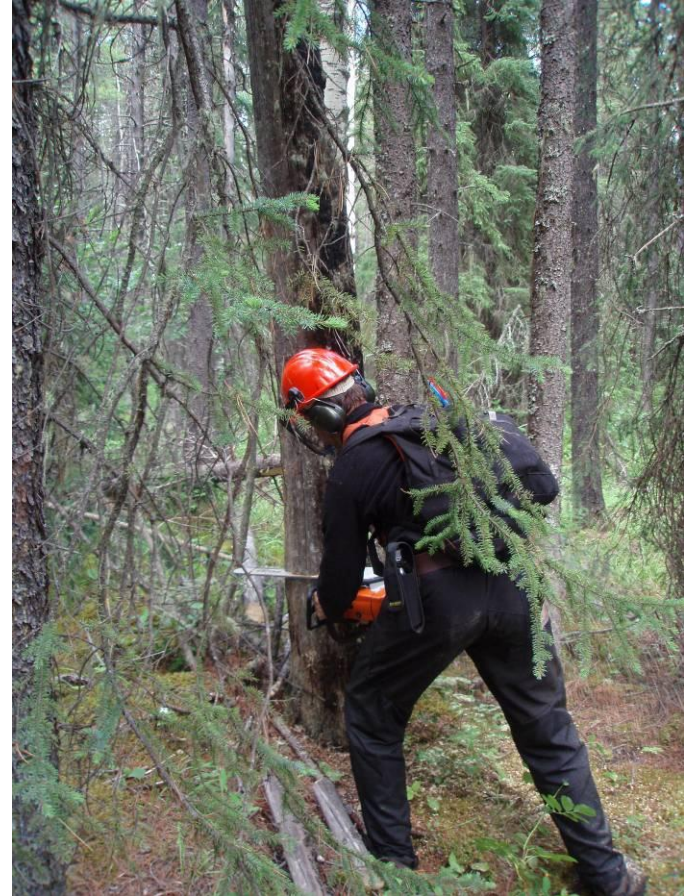
- **Projecting the timber supply of stands impacted by beetle requires an understanding of:**
  - Disturbance frequency by fire, beetle and other agents (e.g. budworms, wind throw)
  - Expected tree mortality from disturbance
  - Regeneration dynamics after disturbance
  - Composition (species, and diameter structure) and growth rates of the residual stand left after disturbance
- **Tree rings keep a record of past canopy disturbances**



# Fieldwork, summer 2008



Extracting an increment core in a SRD PSP

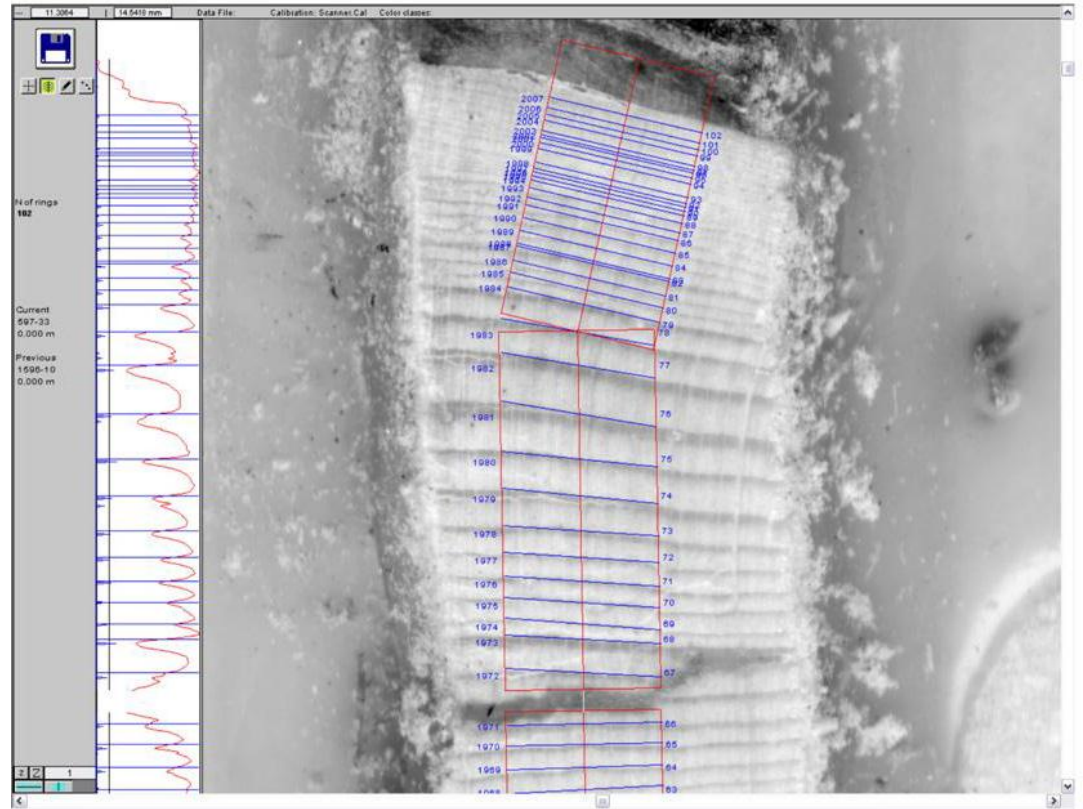


Cutting a wedge from a fire charred tree

# Lab work, fall 2008

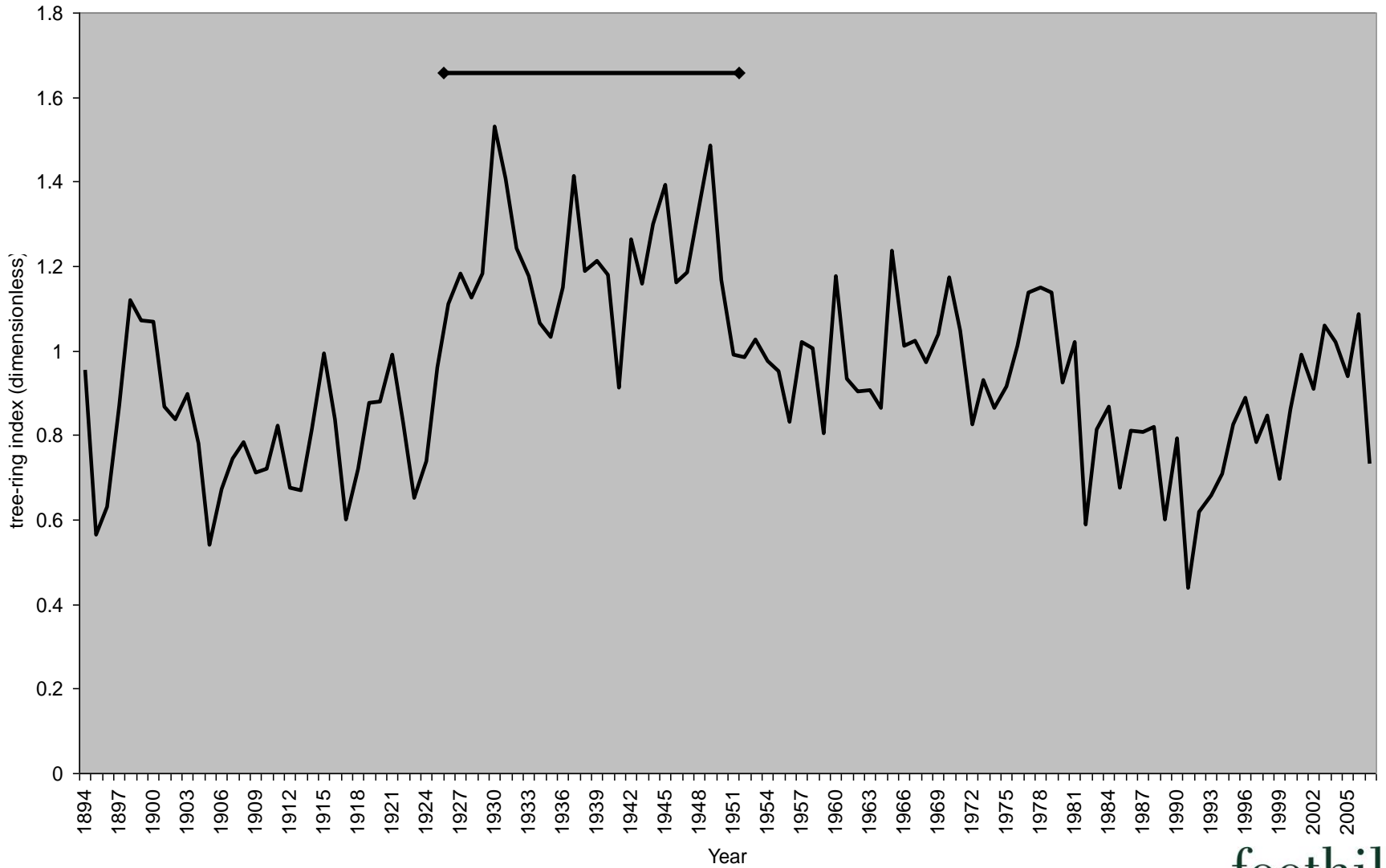


Increment cores mounted and sanded



Example of an increment core with annual rings measured in WinDendro system

# Lower Foothills Standard Chronology



# MPBEP Project 2. Partners

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Foothills Growth and Yield Association  
Forest Resource Improvement Association of  
Alberta  
Canadian Forest Service, Pacific Forestry Centre  
Alberta Sustainable Resource Development  
Foothills Research Institute



# MPBEP May 2008 Work Shop

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## Identified Research Priorities

1. General assessment of the MPB and the work on it in Alberta.
2. Utilize the Federal/Provincial risk assessment report to identify knowledge gaps needing research.



# MPBEP Research Priorities continued

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3. Review ASRD and Foothills Growth and Yield research priority lists against issue priorities arising from the work shop report.
4. Prepare an initial public assessment of public knowledge on the MPB, identifying values, perception on response to the problem.





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