

# Change in blister rust infection in whitebark and limber pine in Canada over time



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# Introduction

- Maintain and restore ecological integrity in national parks
- Assess and recover species at risk
- Previous monitoring: in 2003-04, 57% of all WB and 32% of all LP trees were already dead or showed signs of infection





# Objective

Quantify the rate of change in WPBR infection and mortality of WBP and LP.

- Resurvey stands assessed in 1996 and in 2003-2004\*



\* *Smith, C.M, B. Wilson, S. Rasheed, R.C. Walker, T. Carolin, B. Shepherd. 2008. Whitebark pine and white pine blister rust in the Rocky Mountains of Canada and northern Montana. Can. J. For. Res. 38:982-995.*



# Study Area

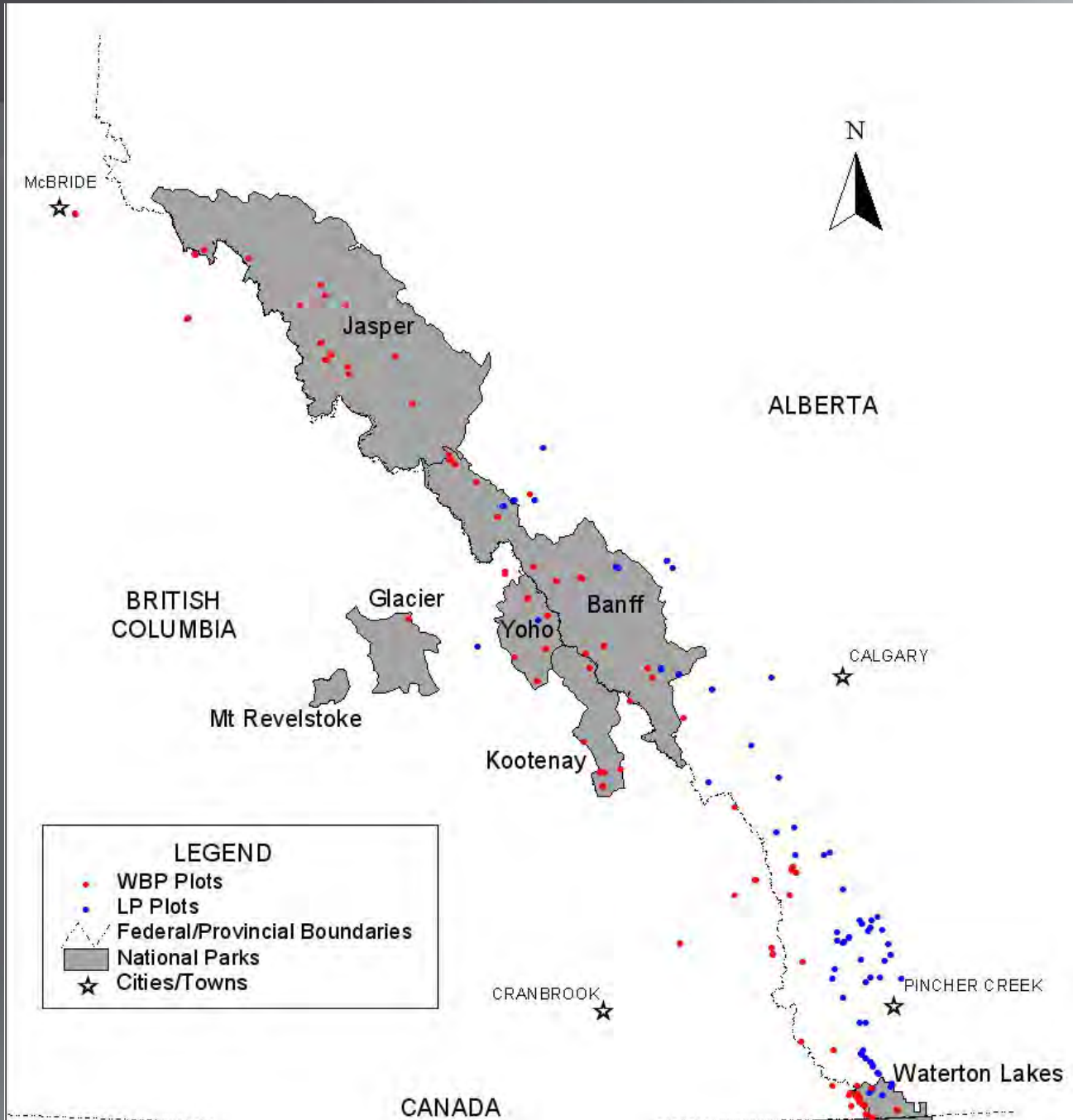
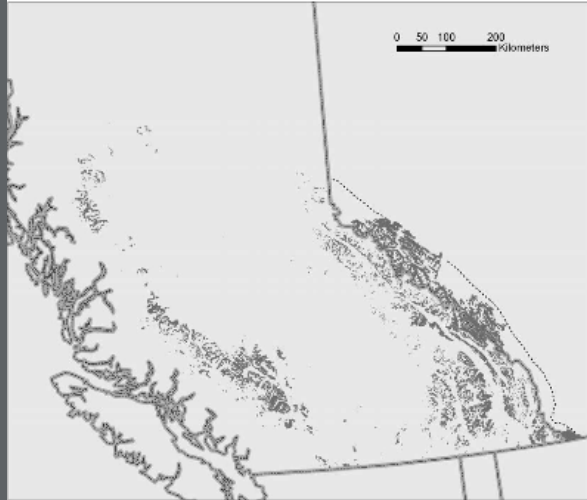






Image Landsat  
Image Parks Canada  
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Google earth

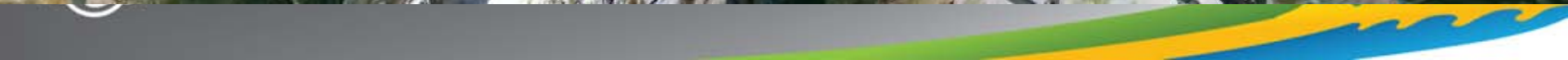






Image Landsat

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# Methods



Presence/absence - disease

Auxiliary signs

% canopy kill

Cause of death

Regeneration

Factors influencing  
infection and mortality using  
linear and logistic regression.



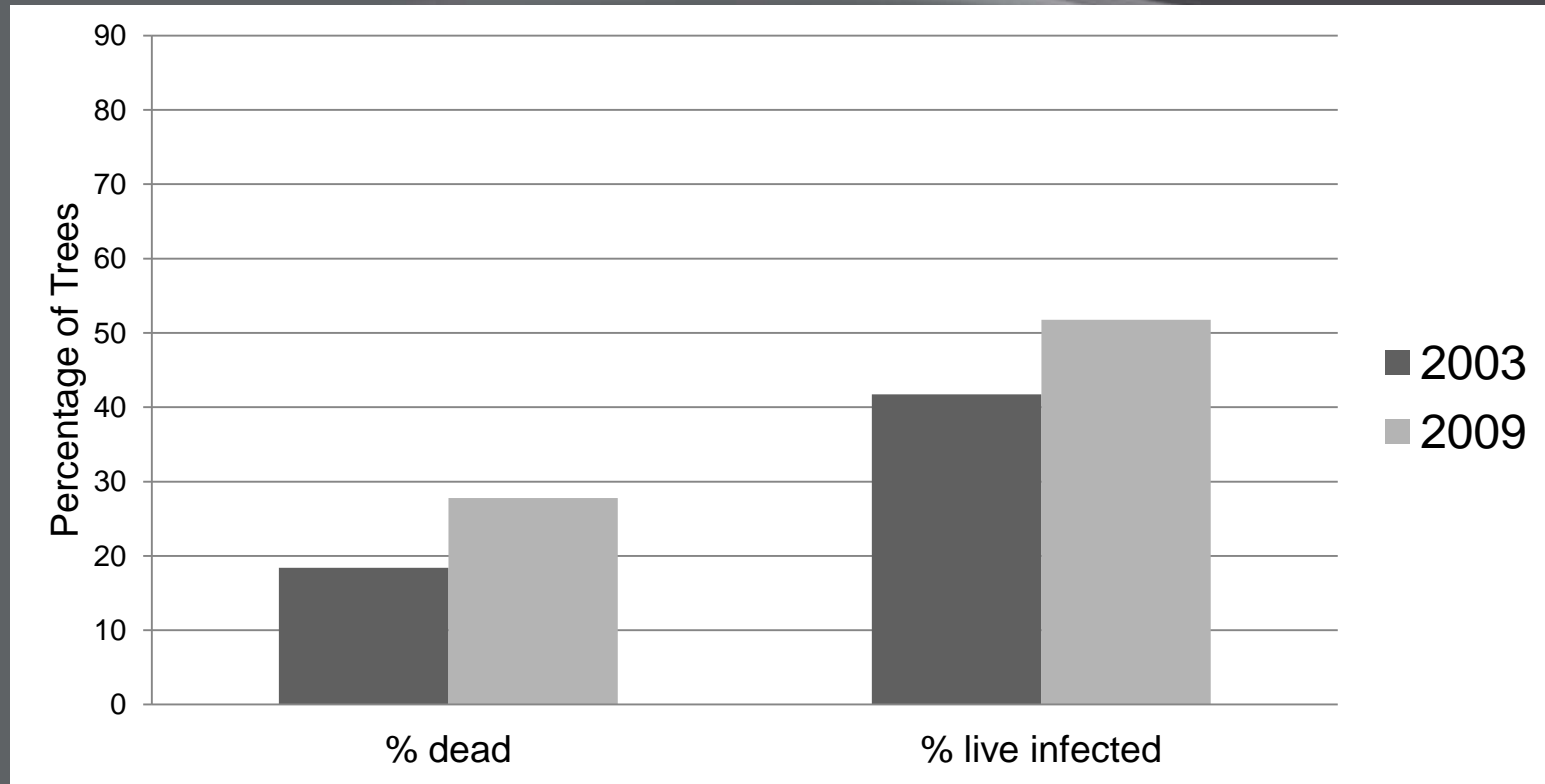
# Results

- Assessed almost 6000 trees.
- The disease is widespread:  
98% of plots had at least one tree infected
- Infection and mortality were spread across all dbh classes





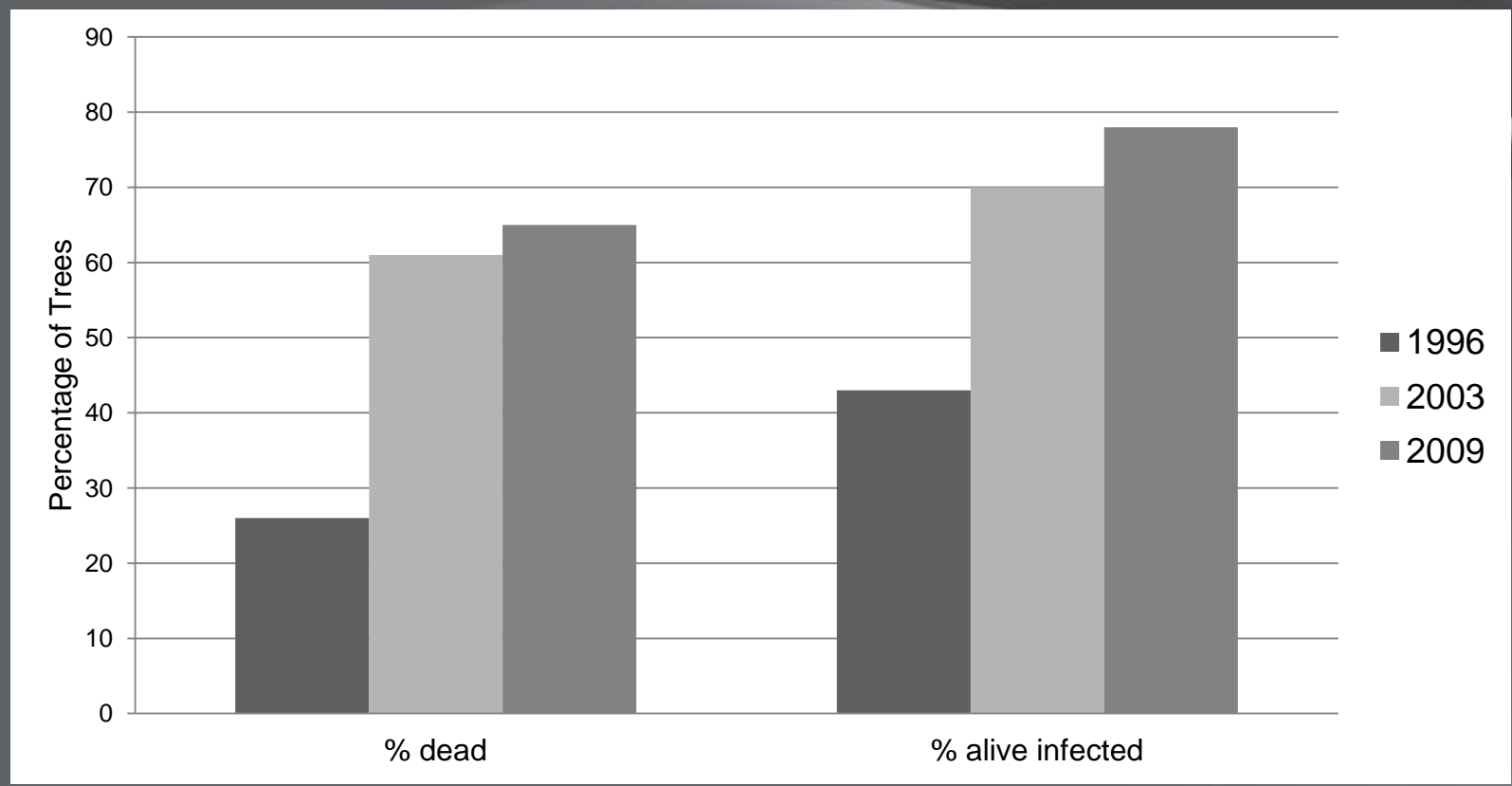
# Results: 2-period re-measurement



- Mortality & infection levels increased 2% per year over 5 years



# Results: 3-period re-measurement

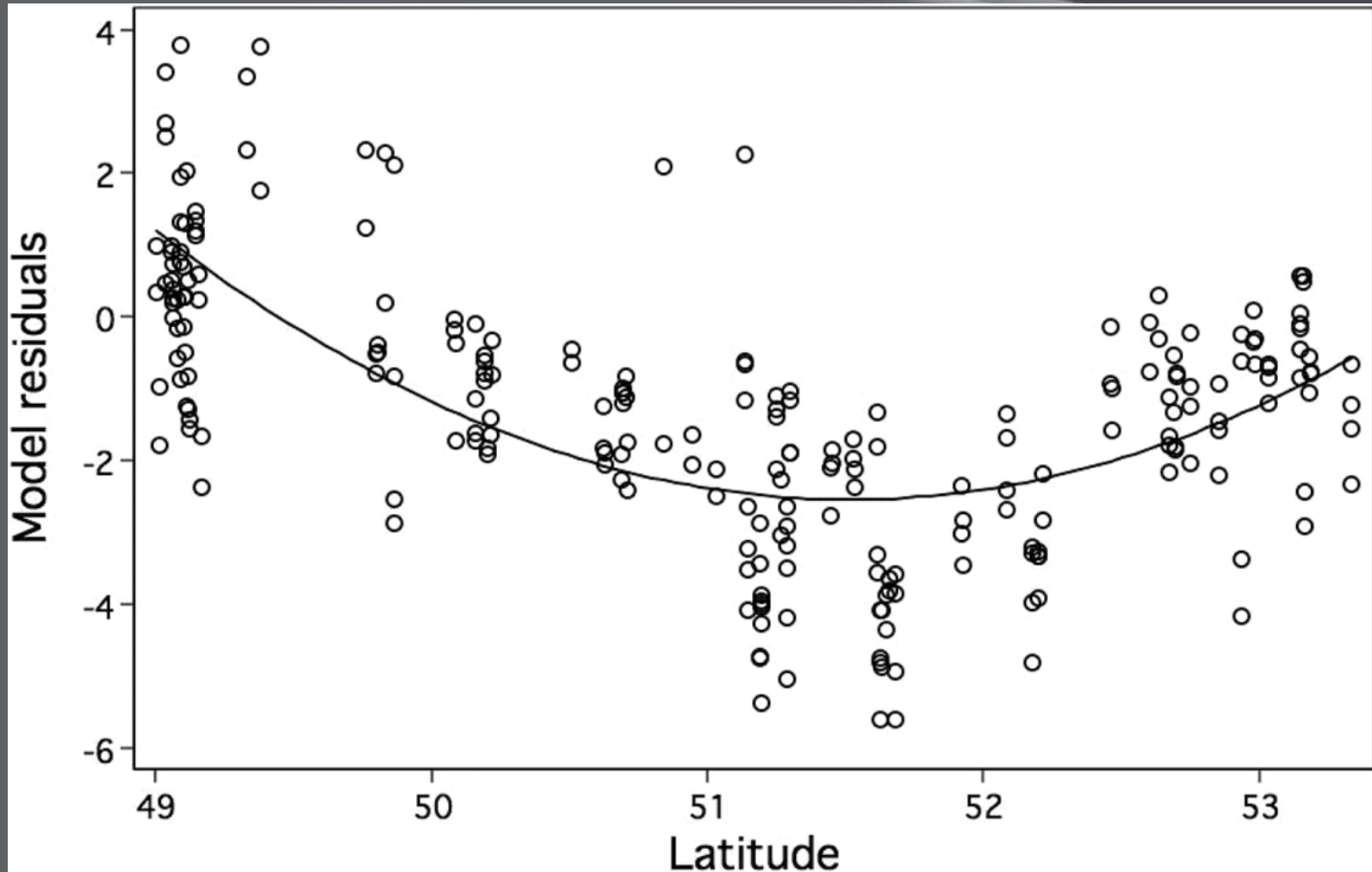


- Mortality & infection levels increased 3% per year over 13 years (8 plots)





# Infection by latitude



# Results: seedlings

Year	# short (< 50 cm)	# tall (> 50 cm)	% of seedlings infected WPBR
2003-04	1671	1203	17
2009	1857	1788	15

- 15% of 115 plots had no regeneration.



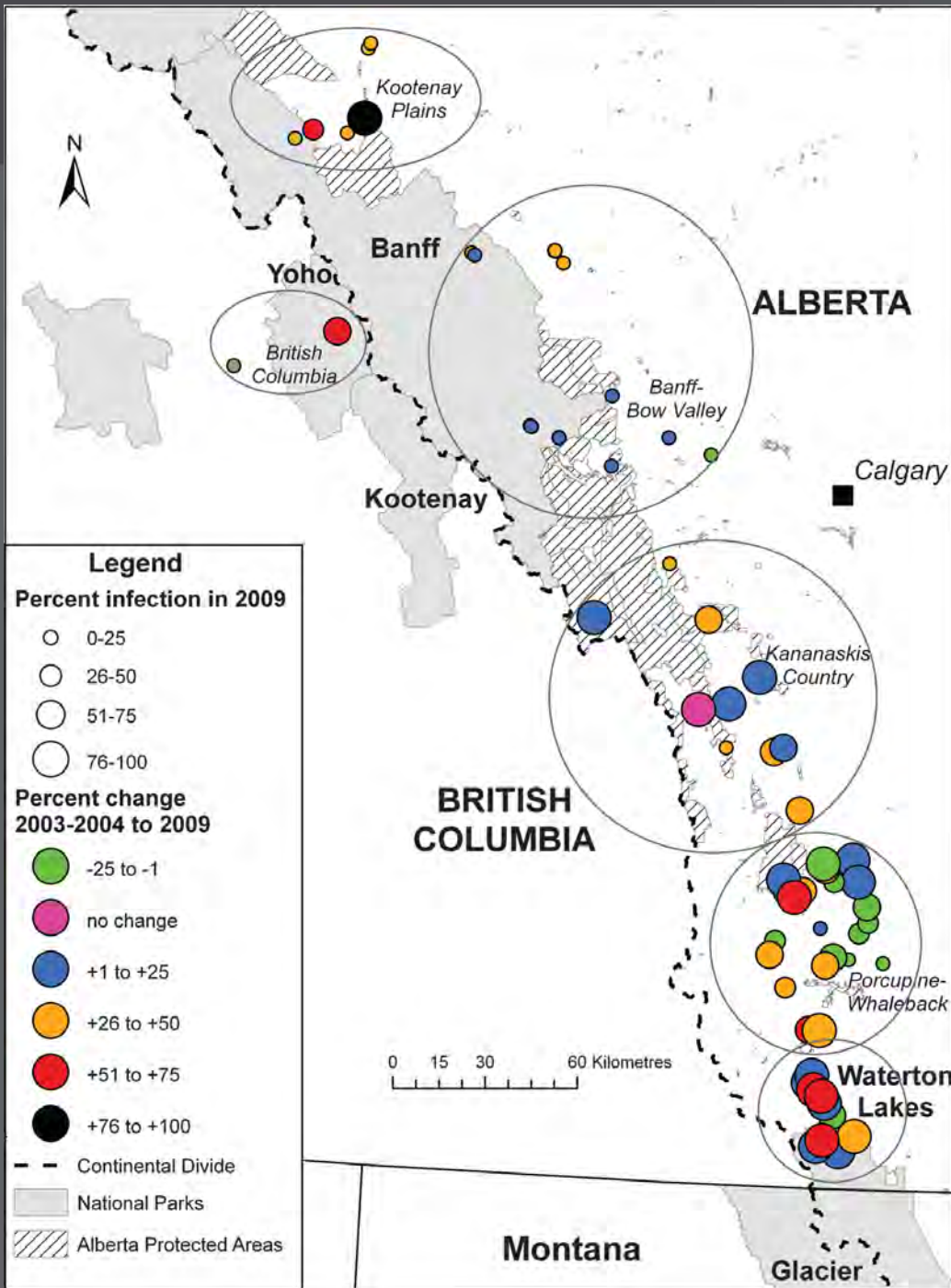


# Results

- Assessed over 800 trees.
- 85 plots from 2003 & 2004 re-measured
- 10 plots were measured by Kendall (1996-97) and were re-measured in 2003 and 2009



# Limber Pine



- Disease is spreading and increasing in incidence and impact.



# Mortality & infection – 3 time periods

Year	Total trees	No. dead	% Dead	No. assessable*	% Live infected
1996	756	226	29.9	530	72.8
2003–2004	977	487	49.8	470	46.2
2009	887	410	46.2	460	65.9

- Mortality appears to have reached a plateau
- Decline in infection by 4%/yr from 1996 to 2003/04
- Sharp increase in infection of 3%/yr to 2009

\*Based on 12 plots in the southern zone



# Conclusions

- Monitoring data informed listing as Endangered
- Recovery Strategies are underway
- Priority: restoration in the southern zone
- Seed collection, prescribed fire, planting seedlings ongoing
- Repeat monitoring in 2014





# Acknowledgements

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