

# Whitebark & limber pine in Canada: where have we been? where are we going?



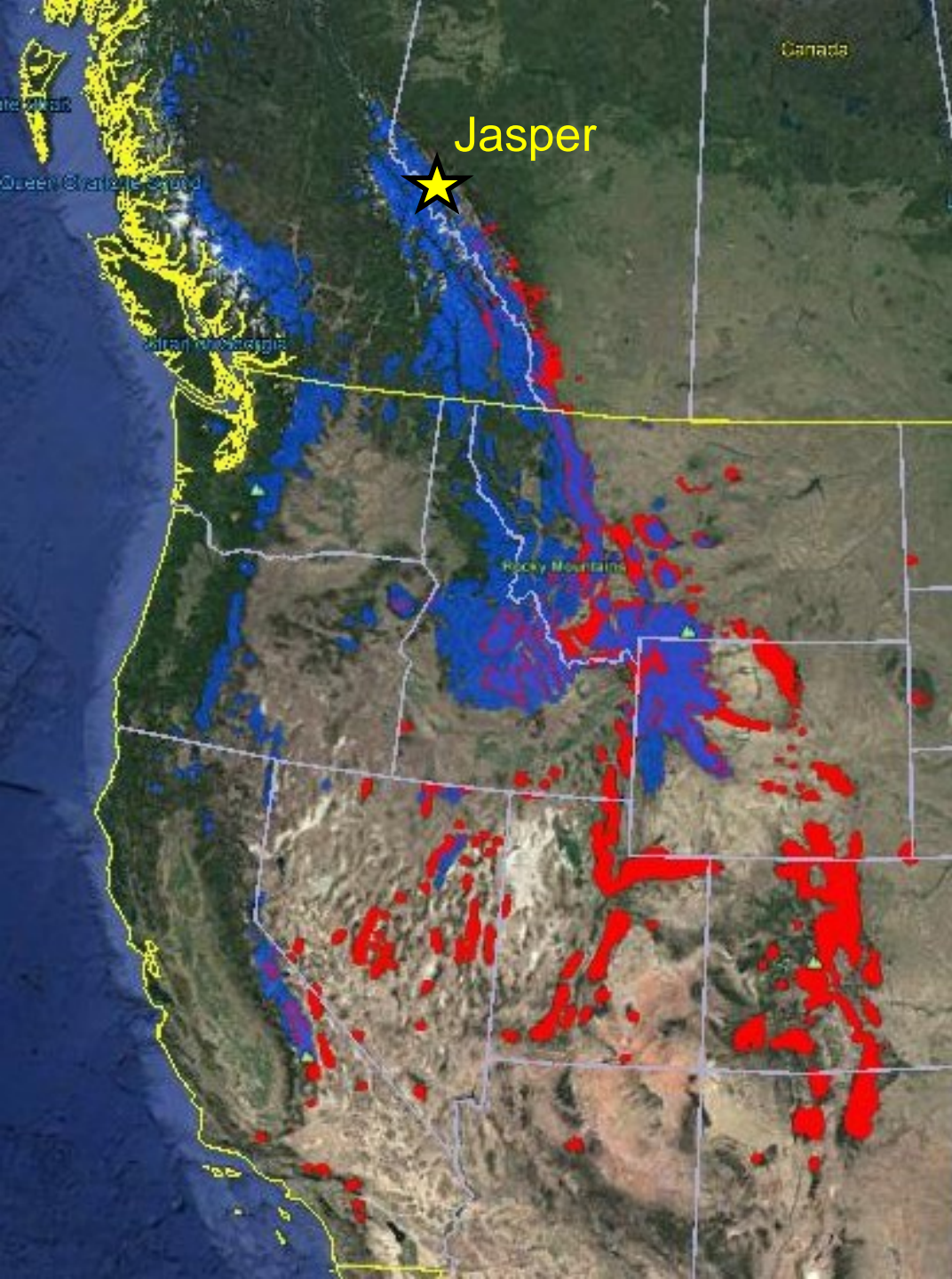
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# Outline

- Ranges of whitebark (WBP) & limber (LP) pine in Canada
- Identification 101
- Short history of white pine blister rust
- Chronology of inventory, research & monitoring & restoration activities
- Where to from here?



- Both species at northern limit of range in BC & AB
- WBP (blue) about 60% of range is in Canada
- LP (red) about 10% of range is in Canada
- Northern limit could be important under climate change

*Range maps and shape files available at [whitebarkfound.org](http://whitebarkfound.org)*



# Whitebark or limber?

whitebark



limber



# Whitebark or limber?



# **(Very) short history of WPBR**

- Vancouver was west coast introduction site in North America of WPBR in 1910
- Spread rapidly east and south, then north
- Branch dieback, reproductive failure from crown kill, direct seedling & tree mortality
- Single biggest cause of mortality in WBP & LP, but synergistic effects with fire exclusion, a warming climate & mountain pine beetle (MPB)
- Detected in southwestern AB on LP (1952) & WBP (1958)

# The early years ... the basics

- Day (1967) – distribution & some basic ecology
- Provincial natural resource inventories
- Ecological land classifications in national parks – Achuff et al. starting mid-1980s
- Achuff (1989) – old growth forests of WBP & LP in national parks
- Langor (1989) – beetles in LP
- Ogilvie (1990) – distribution & ecology
- Kendall (1996) – WPBR on WBP & LP in Waterton & Glacier & sw AB
- Stuart-Smith (1998) – pop'n genetics & WPBR
- Timoney (1999) – WBP communities in AB

# Early research ...

- Webster & Johnson (2000) – regional population dynamics LP
- Campbell & Antos (2000) – distribution, severity of WPBR & MPB
- Zeglen (2002) – incidence of WPBR
- Campbell & Antos (2003) – post-fire succession
- Krakowski et al. (2003) – inbreeding & conservation genetics



An aerial photograph showing a prescribed fire burning along a mountain ridge. The fire is a bright orange line with thick white and grey smoke rising from it. The ridge is covered in dark green coniferous forest. In the background, there are rugged, rocky mountains with some snow patches under a blue sky with scattered white clouds. The foreground shows rocky terrain and a gravelly area.

# Helen Ridge Prescribed Burn (1998)

*Photo: Brendan Wilson*

# National parks jump in ...

- Wilson & Stuart-Smith (2002) – conservation plan for Rocky Mountain national parks
- Parks Canada workshop (2003) – identify research, monitoring & restoration goals NPs
- Smith et al. (2003-04, 2009, 2014) – mortality & incidence of WPBR & MPB ... WBP & LP
- WPEF (2004) – first science meeting Waterton
- Smith et al. (2004) – seed/seedling exp. LP
- Inter-agency team in Alberta forms (2004)



# Trans-boundary links critical ...

- Waterton planted seedlings from Glacier NP, MT starting LP (2004) & WBP (2009)
- Rust screening of seed:
  - BC seed to Dorena Genetic Resource Center (Snieszko) since 2007, also some LP
  - Waterton seed to Coeur d'Alene Nursery (Mahalovich) starting in 2006
  - BCFS (2009): blister rust screening workshop
- Networking at annual WPEF meetings & High Five Symposium (2010) ... next one 2020
- Creation of WPEF-Canada in 2009

# Bring on the research ...

- Moody (2006) – post-fire regeneration
- Hamman & Wang (2006) – climate change modelling for conifers in BC
- Bower & Aitken (2006, 2008) – genetics: cold hardiness, seed transfer guidelines
- Leslie (2007) – when to collect seed
- BCFS (2007) – research & monitoring update
- AB/BC Intermountain Forest Health Workshops
- Letts et al. (2009) – LP & drought stress



# Species at risk ...

- Alberta (both WBP & LP):
  - status reports (2007)
  - legal listing Wildlife Act (2010) – Endangered
  - recovery plan (2014)
- BC – WBP is S2S1, blue list; LP is S2, red list
- Gene conservation plans & strategies (2009)
- Federal:
  - COSEWIC assessed both as Endangered
    - (WBP 2010; LP 2014)
  - WBP legal listing SARA (2012) – Endangered
  - Pending (LP listing; WBP Recovery Strategy)
  - Action Plan(s): national park multi-species plans

## Notice of permit

**Regional or Local Number:** J15-094

Notice is hereby given that pursuant to the provisions of section 74 of the Species at Risk Act permit no. J15-094 is issued.

**Purpose:**

Activity affecting the species is incidental to the carrying out of the activity

**Description:**

At the Mount Edith Cavell day use area in Jasper National Park, the Parks Canada Agency will be rehabilitating infrastructure and rerouting a road damaged in a flood event in 2012, expanding the parking lot to reduce congestion along the road, and repairing and adding to the trail network to contribute to visitor experience and reduce off-trail wandering and associated negative impacts. The project falls within high elevation critical habitat for the Tonquin subpopulation of Woodland Caribou (Southern Mountain Population), which occurs within the Jasper-Banff Local Population Unit as described in the 2014 recovery strategy for the species. Whitebark Pine also occurs within the project area, and areas where trail work will occur likely meet the criteria of regeneration critical habitat as described in the draft recovery strategy for the species.

**Start Date:** 2016-09-19 **End Date:** 2019-09-19

**Issuing Authority:** Parks Canada Agency

**Authority Used:**

- Species at Risk Act
- Canada National Parks Act

**Location of Activity (province, territory or ocean):**

- Alberta

**Affected Species:**

- [Woodland Caribou](#)
- [Whitebark Pine](#)

**Pre-Conditions:**

a) All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted: The current access road is in a flood zone, which poses a risk to visitor safety; therefore, a no action alternative is not considered feasible. A study was completed on the potential of offering a shuttle from the



# Inventory & mapping ...

- Ernst (2006) – plots in Castle, SW Alberta
- Remote sensing & GIS – McDermid (U of C)
  - Smith & McDermid (2008) – mapping in WLNP
  - Beyfuss & McLane – mapping of Rockies range
  - Mapping of WBP & LP range in Crown of Continent

# Leads to more research ...

- Classon (2010) – overstory & understory dynamics
- Hunt et al. (2010) – white pines, ribes & WPBR
- Bower et al. (2010) – storage & germination
- Sauchyn (2010) – climate history WBP & LP
- Wong & Daniels (2012, 2016) – disturbance dynamics, interaction WPBR x climate x MPB
- Tomback & Resler & others (2014) – role & health at treeline
- Liu et al. (2016) – diversity & population structure



# Wildlife connections ...

- McKay & Graham (2009-2010) – grizzly use of squirrel middens
- Barringer & Tomback & others (2012) – predicting stand visitation by nutcrackers
- Dohms & Burg (2013) – population genetic structure of nutcrackers
- Hamer & Pengelly (2015, 2016) – grizzly use of middens in Banff NP, WBP & LP
- McLane et al. (2015) – agent-based modelling of nutcrackers (Cascades)
- Peters (2017) – LP cone predation







# On the ground ...

- BCFS has been collecting seed for many years
- Alberta Tree Improvement & Seed Centre (ATISC) collecting seed, experimenting with germination & growing seedlings
- Naturalist Bob Brett did early WBP planting at Whistler/Blackcomb starting in 2002
- Randy Moody did direct seeding at Manning Provincial Park starting in 2006
- WLNP started using Verbenone & GLVs to protect plus trees in 2006
- Haeussler & Clason in the Bulkley Valley

# Restoration research ...

- Burke (2012) – resilience in Crown of Continent
- McLane & Aitken (2014) – assisted migration
- Palmer & Larson (2014) – should we move WBP?
- Lonergan, Cripps & others (2014) – role of fungi
  - Dr. Roland Treu, U of Athabasca, taking on this work in Canada
- Gelderman, Macdonald & Gould (2016) – regeneration niche of WBP

# First Nations activities ...

- WBP & LP seeds were traditional foods for First Nations in BC & AB
- A number of First Nations in BC have been management planning, seed collecting, planting, removing competing trees, utilisation studies (grizzly bears), mostly WBP so far ...
  - Lillooet Tribal Council & Cayoosh Band's Splitrock Nursery
  - Xeni Gwet'in First Nation restoration
  - St. Mary's Band & Ktunaxa Nation produce seedlings at Tipi Mountain Native Plants

# Threats galore ...

- White pine blister rust
- Mountain pine beetle
- Climate change
- Development can impact plus trees, seed sources:
  - Logging in mixed species stands
  - Oil & gas & coal mining – exploration roads, well pads, pipelines, mine sites
  - Wind farms – potentially LP ridges
  - Recreational properties – LP ridges, WBP at backcountry lodges
  - Ski areas – removing WBP new & old runs



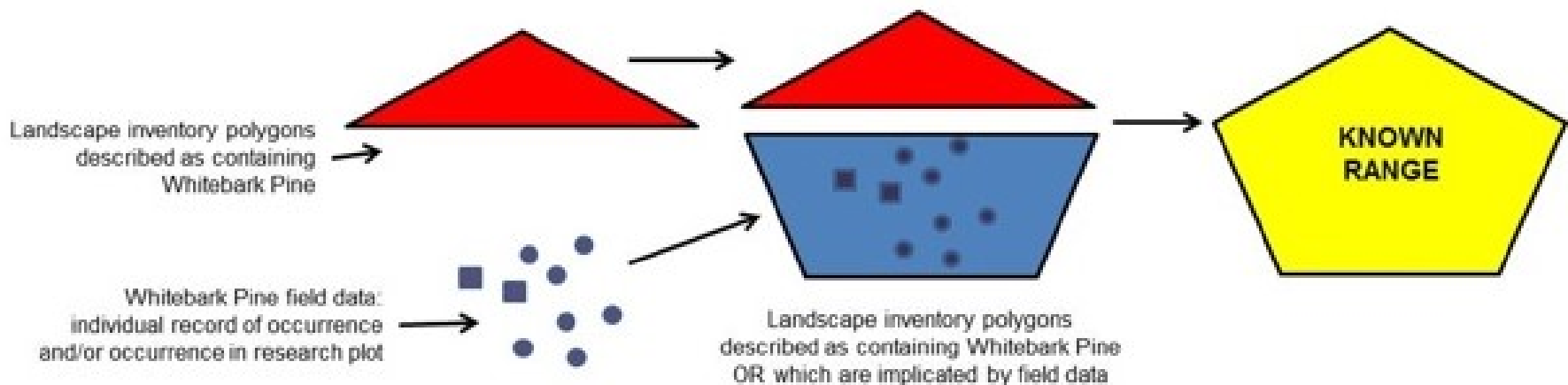
**Where to from here?**

# Recognise challenges

- Restoration of WBP further ahead than LP
- No rust screening facility in Canada
- Seed sources declining
- CLNU threshold
- Many dead forests might not have “right” fungi
- Site (in)accessibility impacts caging & planting
- **Plus side: some “natural selection” already happening**

# Inventory & assessment

- If we don't know where stands are, how can we protect or restore them, or identify critical habitat?
- **Remote sensing & ground truthing**



**Figure 3.** Overview of methods to determine known range for Whitebark Pine.

# Blister rust resistance

- Identify plus trees & protect from MPB
- Cage cones to protect from predation
- **Scale up rust screening**





# Growing seedlings

- Ramp up production
- Start seed orchards as soon as we have identified plus trees with resistance



*Photo: Cathy Cripps*



*Photo: Melissa Jenkins*

# Priorise activities

- Keane et al. (2012) – range-wide restoration strategy
- AB recovery plan WBP & LP (2014) & federal restoration strategy WBP (pending)
- Pigott et al. (2015) – promoting WBP recovery in BC
- **Create one collaborative fund (federal & provincial agencies, industry, NGOs) to pool money for restoration needs & then prioritise**

# Conclusions

- We've come a long way in 15 years – celebrate it
- Need to institutionalise WBP & LP restoration because the process is WAY longer than individual careers ... or lifetimes!
- Keep networking ...



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