

Recent Observations of Fire Behaviour

IN



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Mountain Pine Beetle- Affected Stands





Overview

- Current MPB outbreak status
- Recent observations study – Rate of Spread model
- Inferences regarding Headfire Intensity
- Questions and discussion



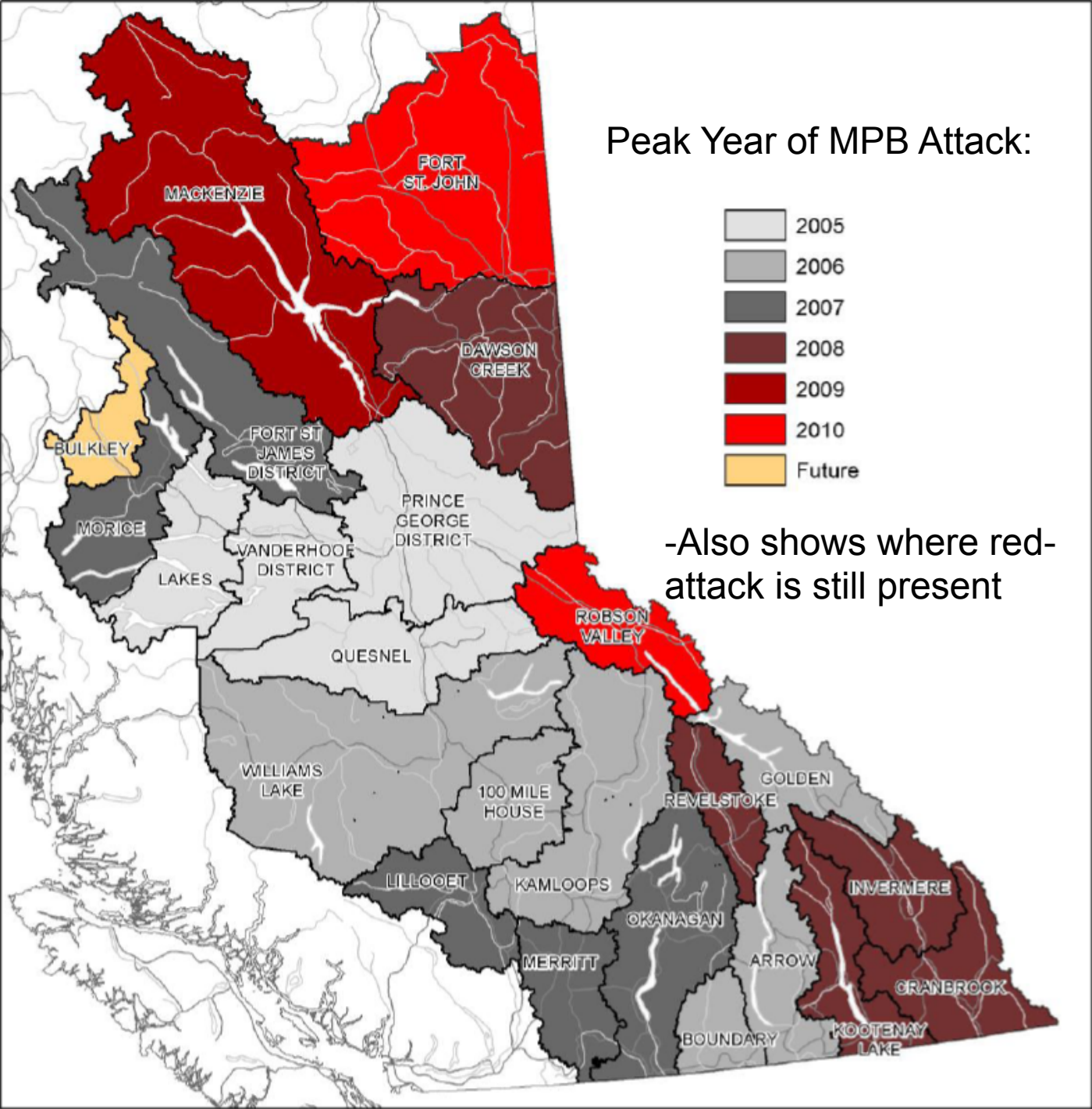


Current MPB Outbreak

- BC: 18.1 - 20 million ha affected (2012)
 - 53% of pine volume killed (2011)
 - Projected to reach 60 % by 2021
- AB: 6 million ha 'at risk' (2010)
- Millions of ha in US (WA, CO, WY, etc.)
- (BC) Outbreak extent decreasing from 2005-2007 peak
- Current outbreak front is NE/NW (BC), boreal (AB and rest of Canada)



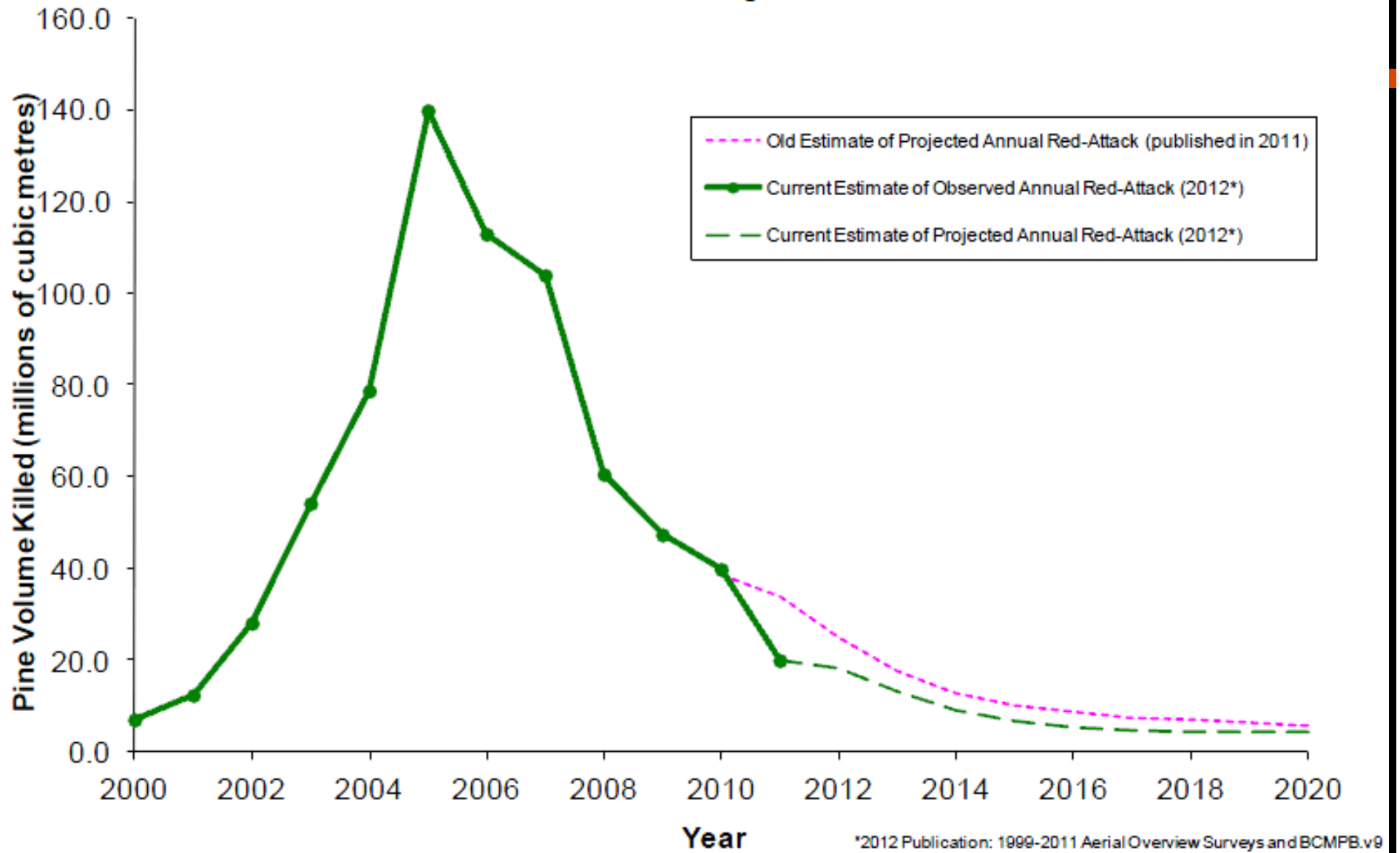
Peak Year of MPB Attack:



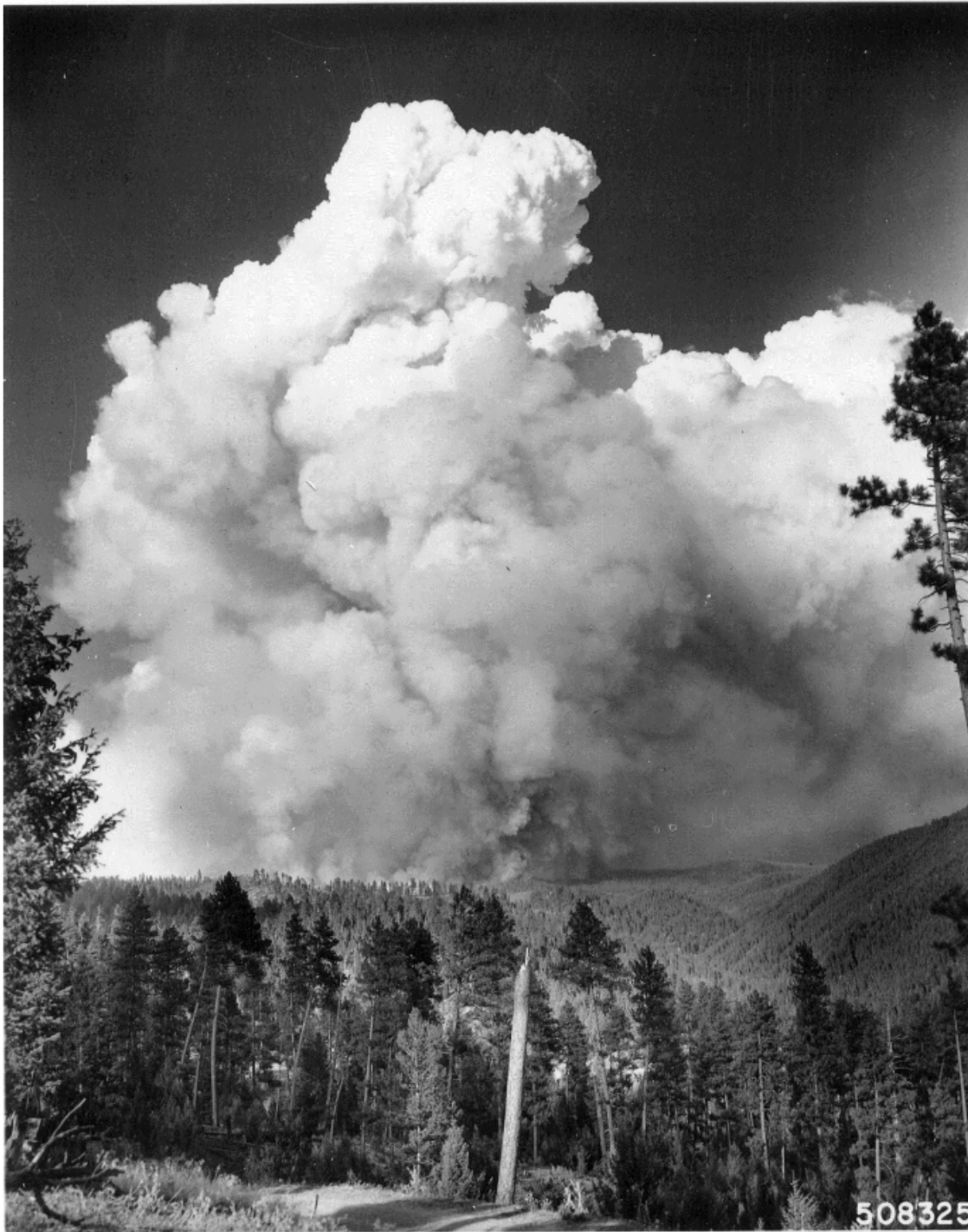
-Also shows where red-attack is still present



Entire Province Timber Harvesting Land Base



*2012 Publication: 1999-2011 Aerial Overview Surveys and BCMPB.v9



- **What about fire?**

- Example of extreme fire behaviour in old grey-attack long ago:

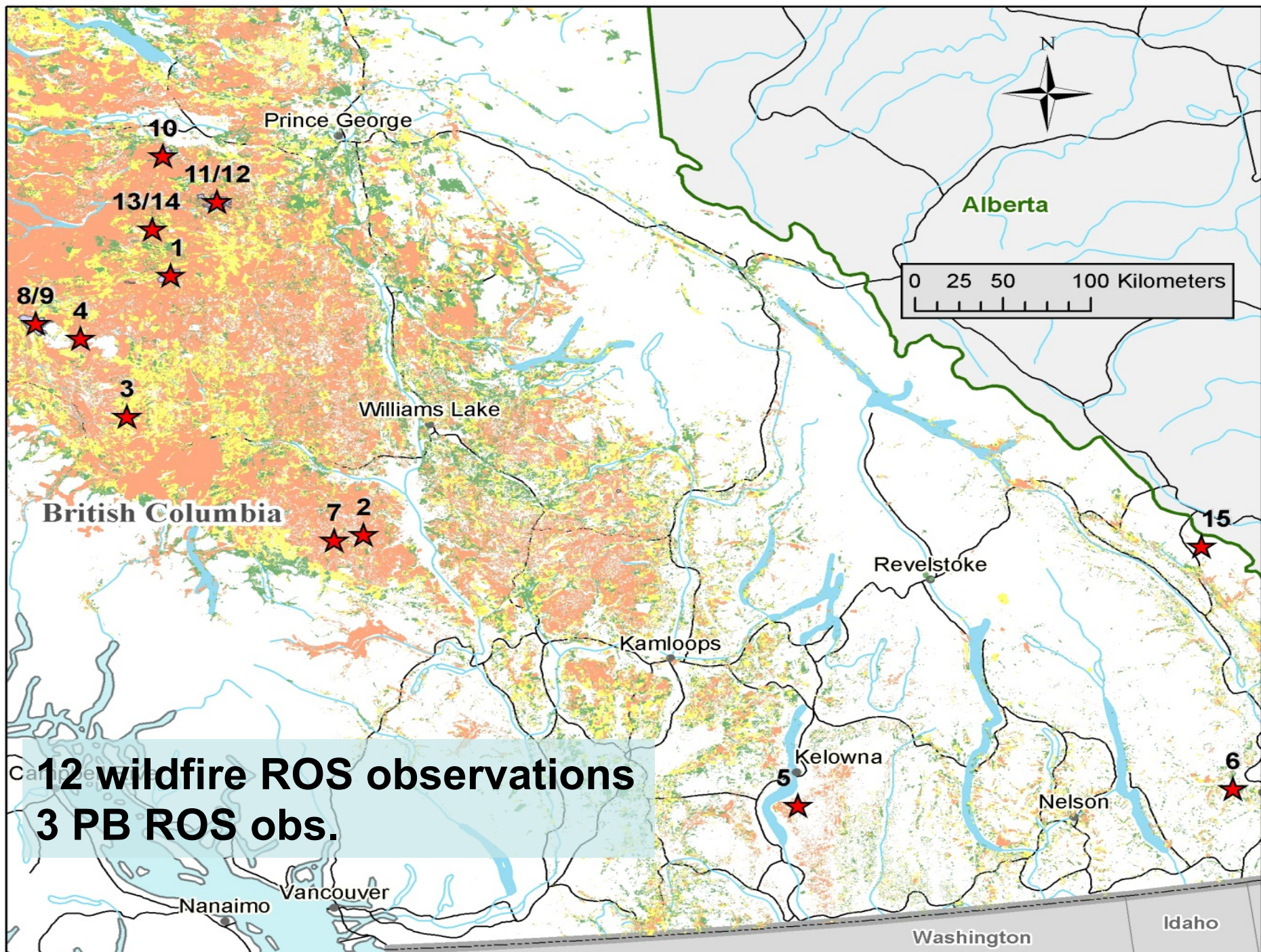
- Sleeping Child Fire (1961, Montana), burning in lodgepole pine stands affected by MPB attacks in 1928-1932.

- “In spite of rapid initial attack”, lightning fire grew to 3640 ha within 24 hours.

- credit: M. Alexander – photo in Jenkins et al. (2012)



- Recent Observations Study** – 15 observations (14 modeled)
- BC air attack photos (photo-interp. by R. Lanoville) – 9 fire runs
 - Wildfire monitoring/observation (S. Harvey & D. Hicks) – 3 runs
 - Experimental burns (Carrott Lake, Kootenay Nat. Park) – 3 runs





G40100 (2005)



*Repeated evidence for continuous crown fires in red/grey
attack lodgepole pine & pine/spruce, <1 to 6 years post-MPB*

C20650 (2009)



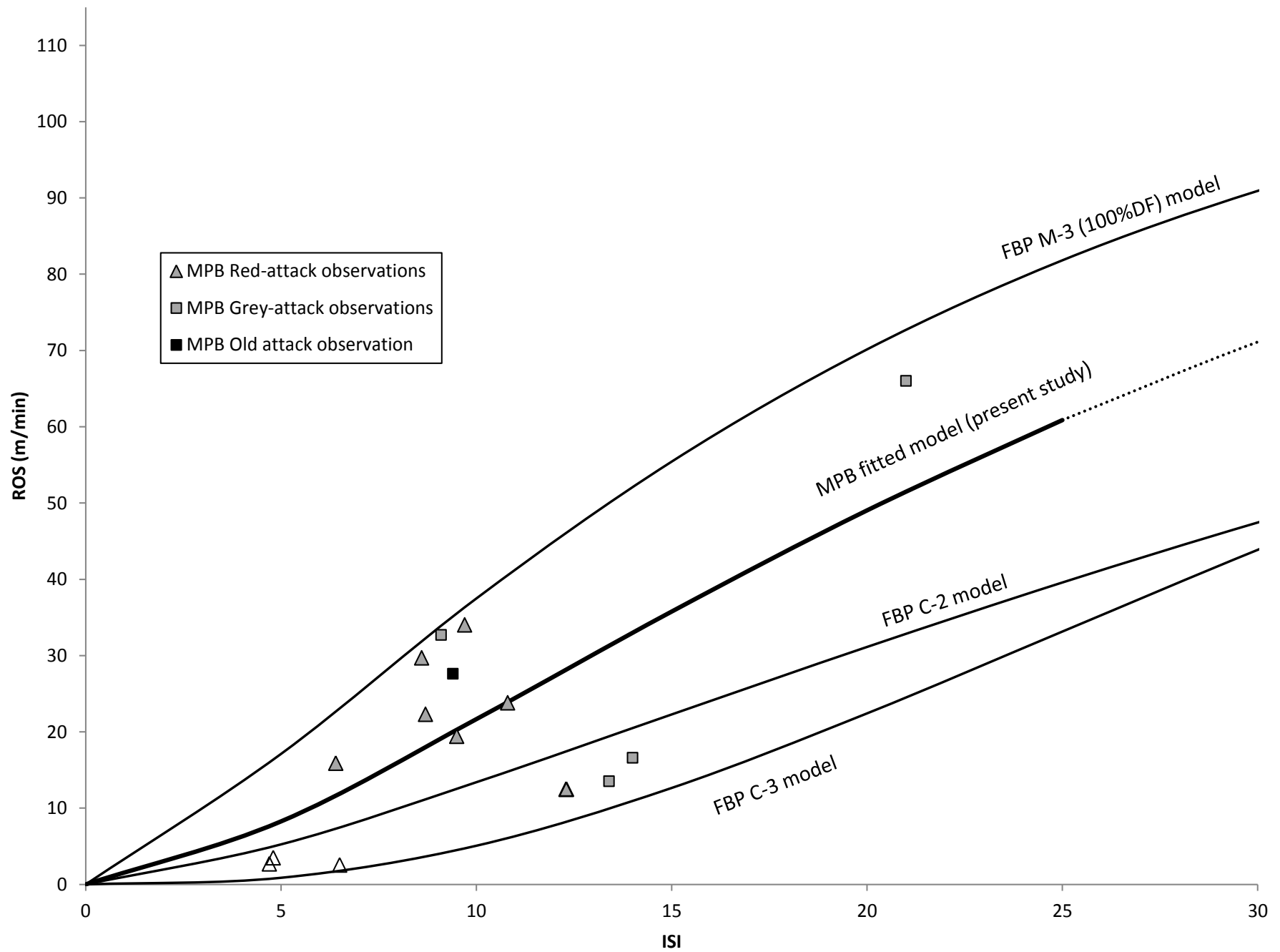
$$ISI = 0.208e^{0.05039W} \times 91.9e^{-0.138m} \times \left[1 + \frac{m^{5.31}}{4.93 \times 10^7} \right]$$

(Van Wagner 1987)

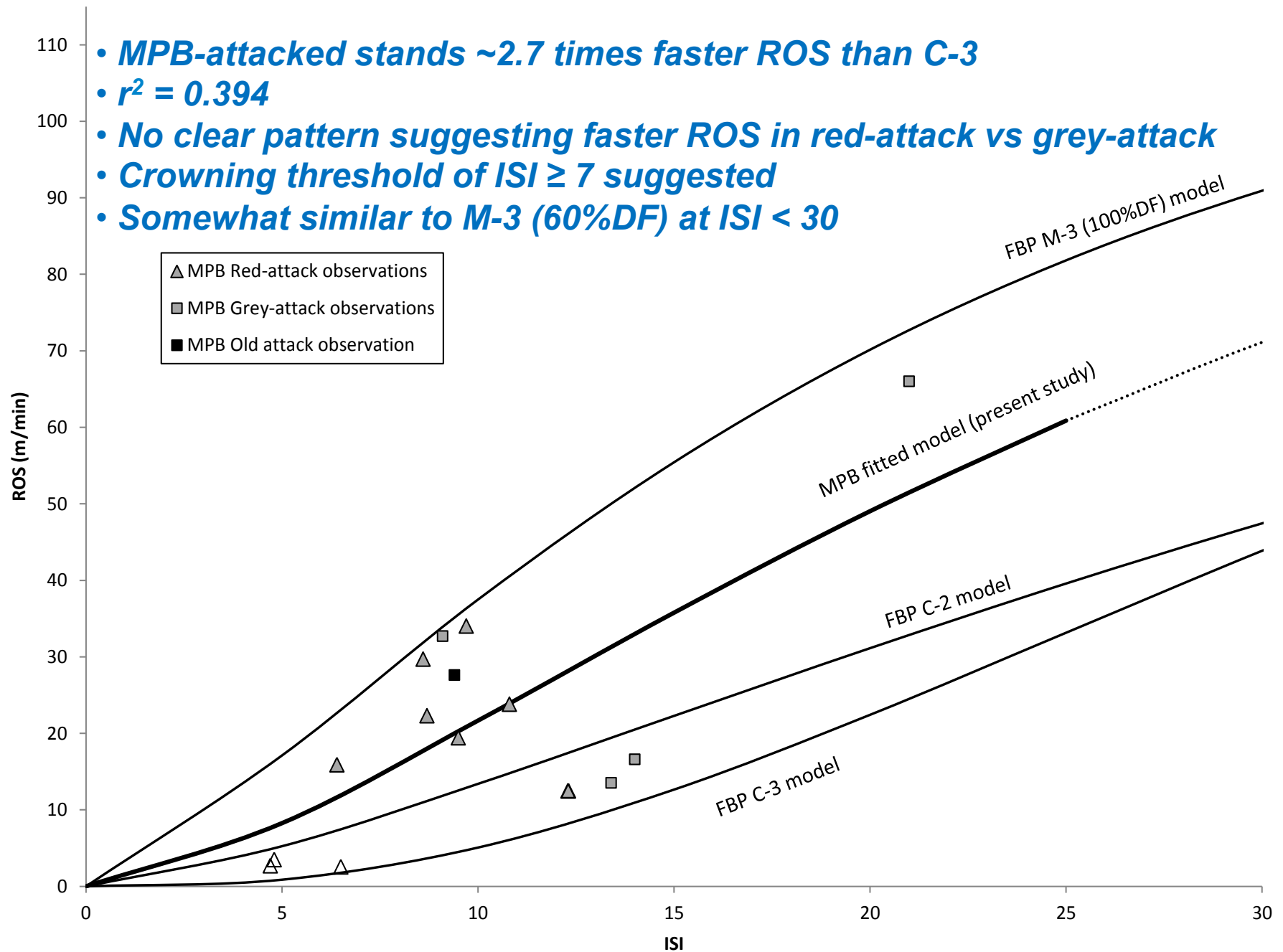
$$ROS = a \times (1 - e^{(-b \times ISI)})^c$$

(FCFDG 1992)

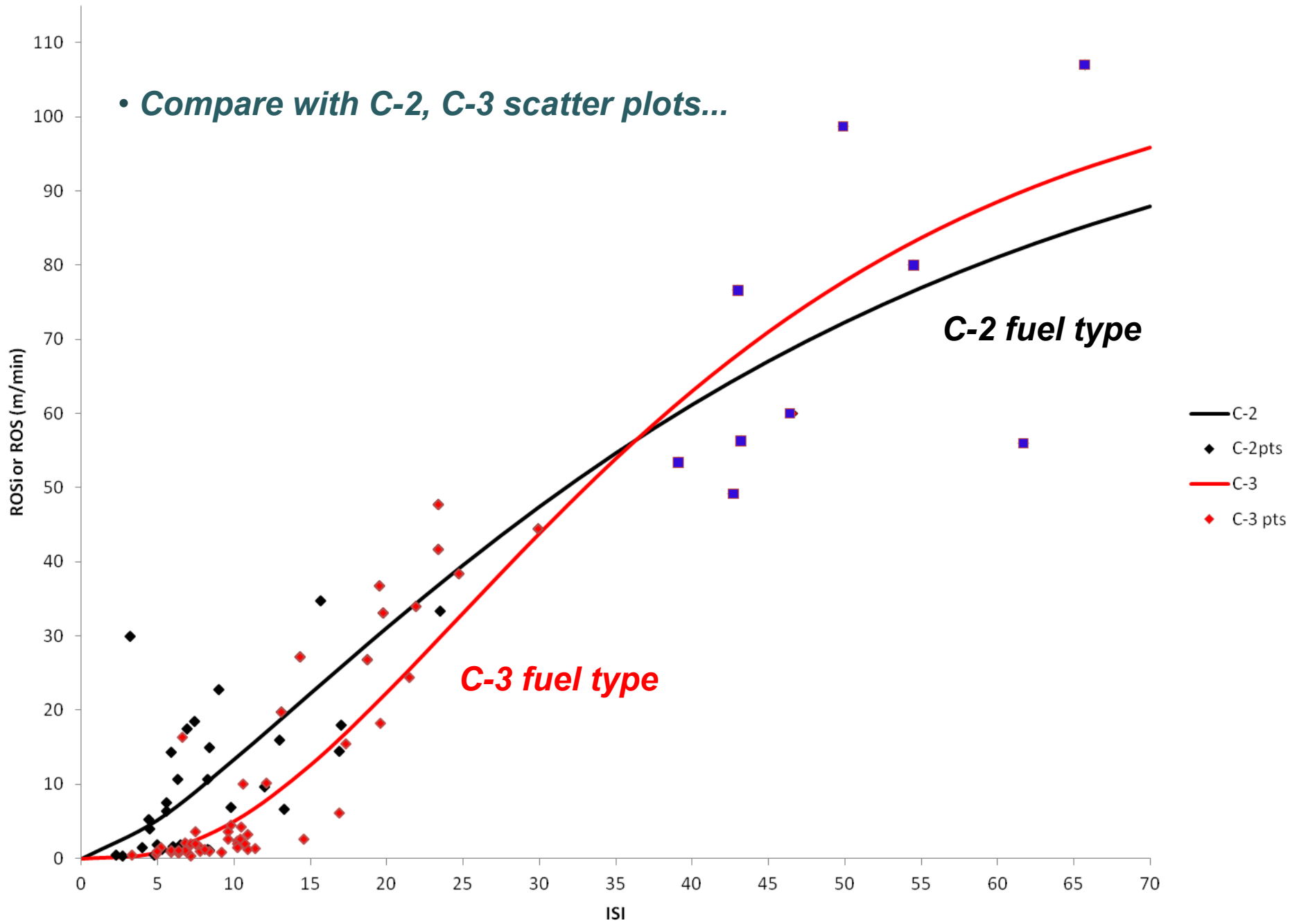


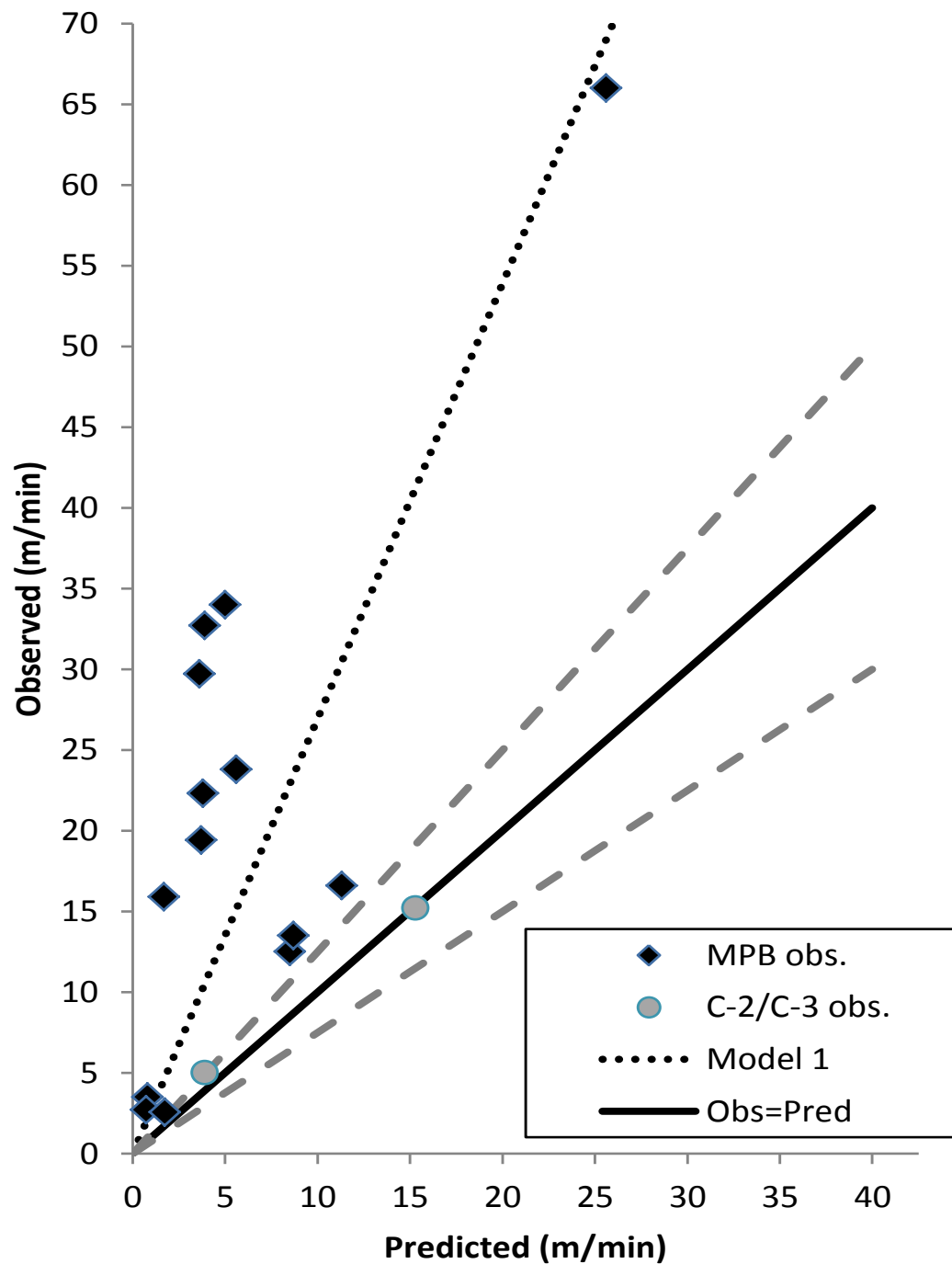


- **MPB-attacked stands ~2.7 times faster ROS than C-3**
- **$r^2 = 0.394$**
- **No clear pattern suggesting faster ROS in red-attack vs grey-attack**
- **Crowning threshold of $ISI \geq 7$ suggested**
- **Somewhat similar to M-3 (60%DF) at $ISI < 30$**



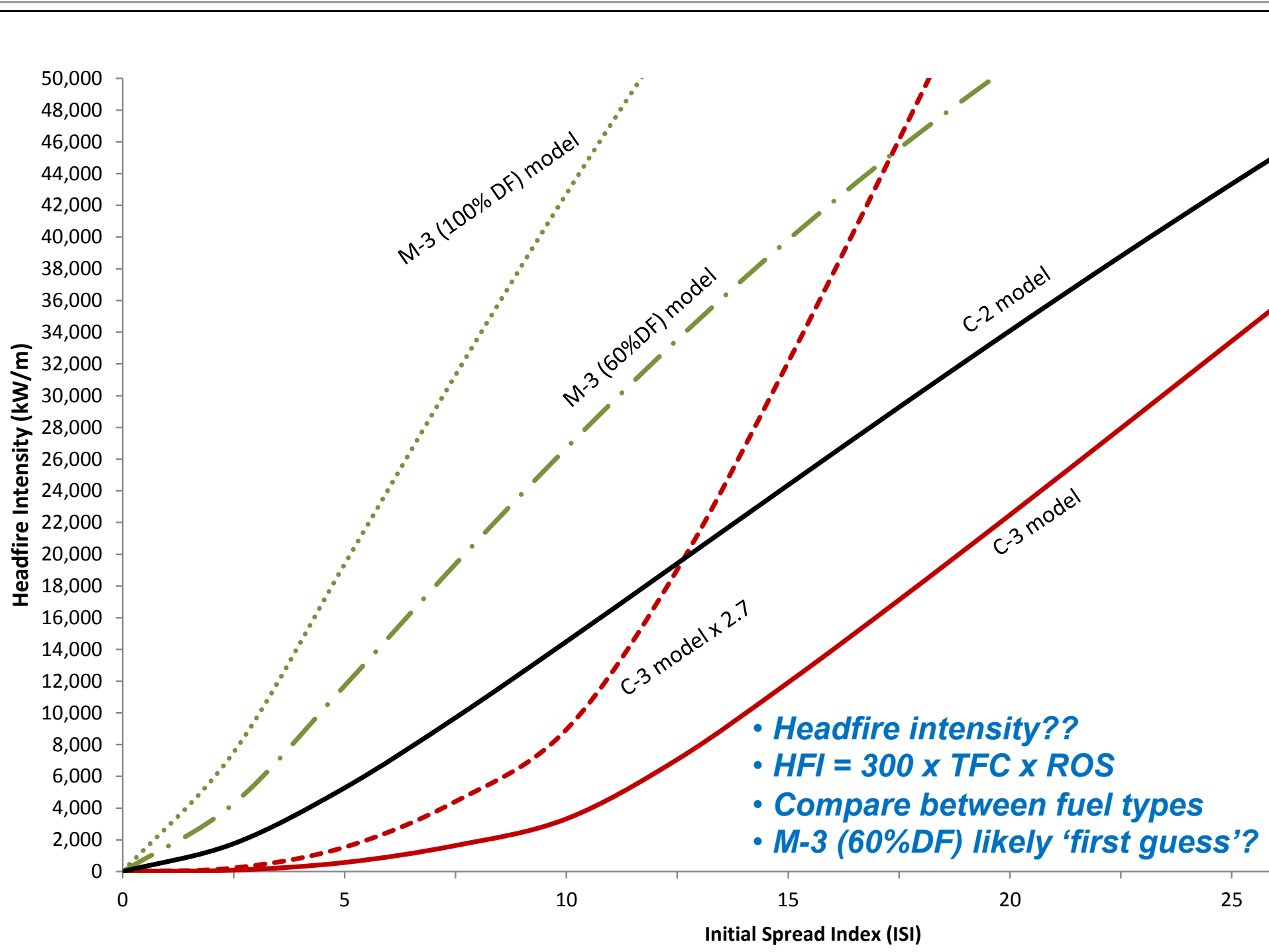
• Compare with C-2, C-3 scatter plots...





- Observed vs Predicted compared with C-3 model
- Also 2 photo-interp. points in green conifer fuels (C-2, C-3)
- Suggests ok methodology





- *Headfire intensity??*
- *HFI = 300 x TFC x ROS*
- *Compare between fuel types*
- *M-3 (60%DF) likely 'first guess'?*

Importance of Understory Structure (Grey)



Lush green herbaceous understory
(Lower fire risk)

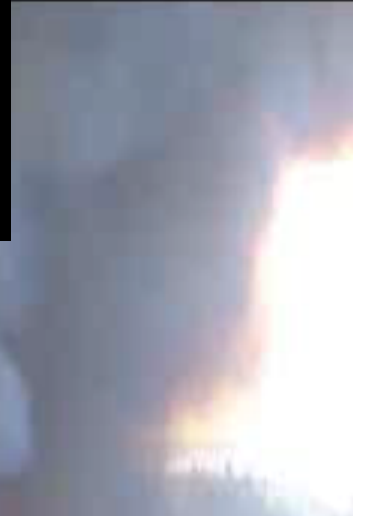
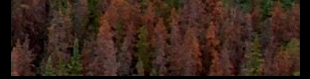


Absent understory
(Possibly surface fire only – depends on remaining green pines or other conifers)



Conifer understory
(fast rate of spread, high spotting potential, high intensity)

- Legacy in BC will be grey- and old grey-attack MPB-killed stands
- e.g. Greer Creek fire (2010)
- High intensity, lower ROS?





- In sum:
- ROS in 0-6 year post-MPB PI 2.7 x faster than C-3
- No consistent difference between ROS of red- & grey-attack (but check understory, remnant live overstory)
- Crowning threshold ~ ISI 7
- No new HFI findings, but likely closer to M-3 (60%DF) than C-3

