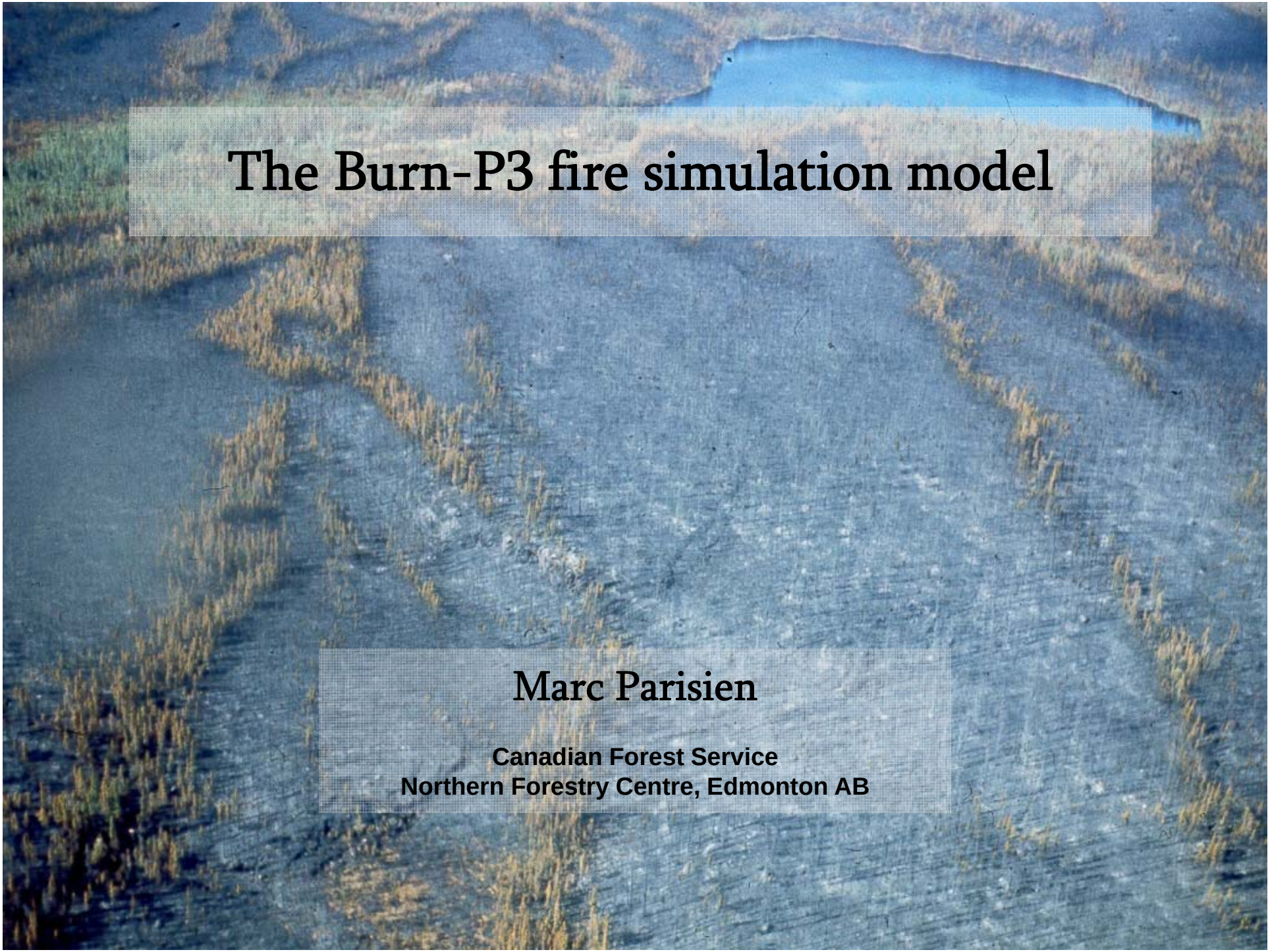


The Burn-P3 fire simulation model

Marc Parisien

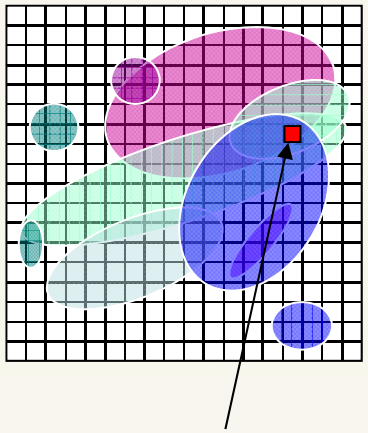
Canadian Forest Service
Northern Forestry Centre, Edmonton AB

What is Burn-P3?

- A **landscape model** that simulates the ignition and spread wildfires
- A **tool** initially designed for long-term planning of **fire management** activities
- A Windows-based **software**

Burn-P3 general design

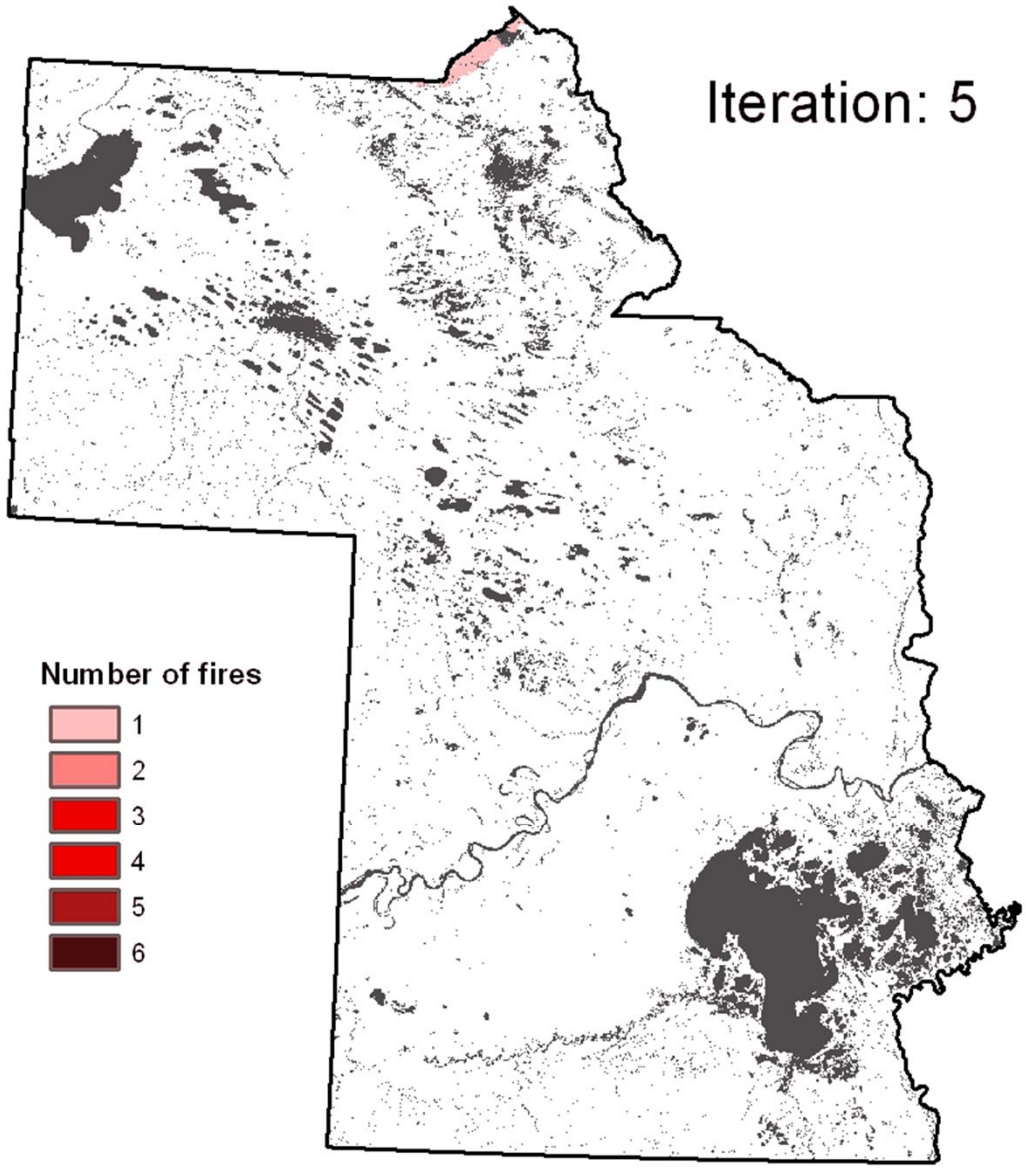
INPUT	BP MODEL	OUTPUT
Ignition * **Fuels** (“snapshot”) **Topography** Weather duration* daily conditions*	Fire spread simulation (Prometheus)	Fire perimeter

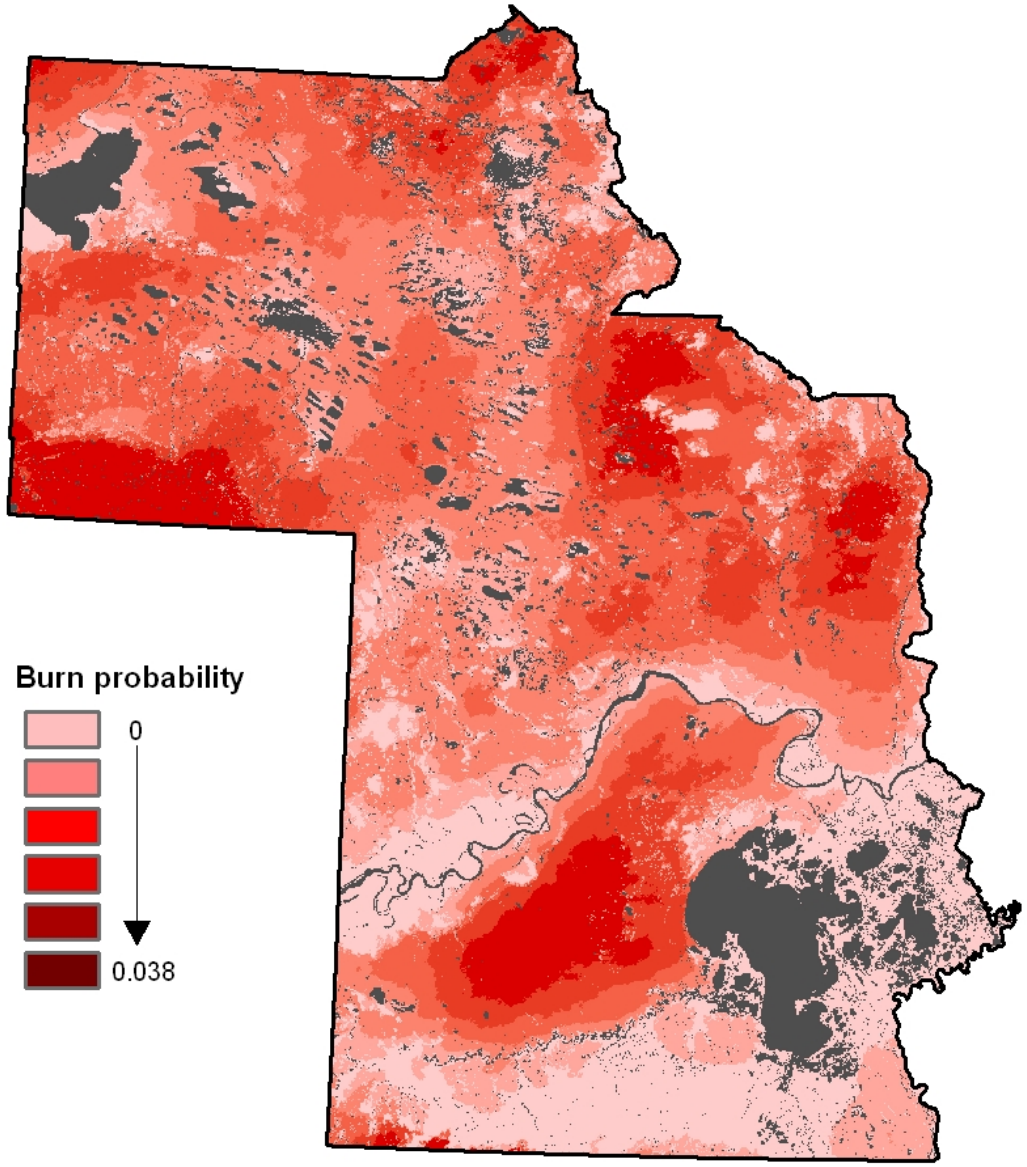


$$BP_i = \frac{b_i}{N} \times 100$$

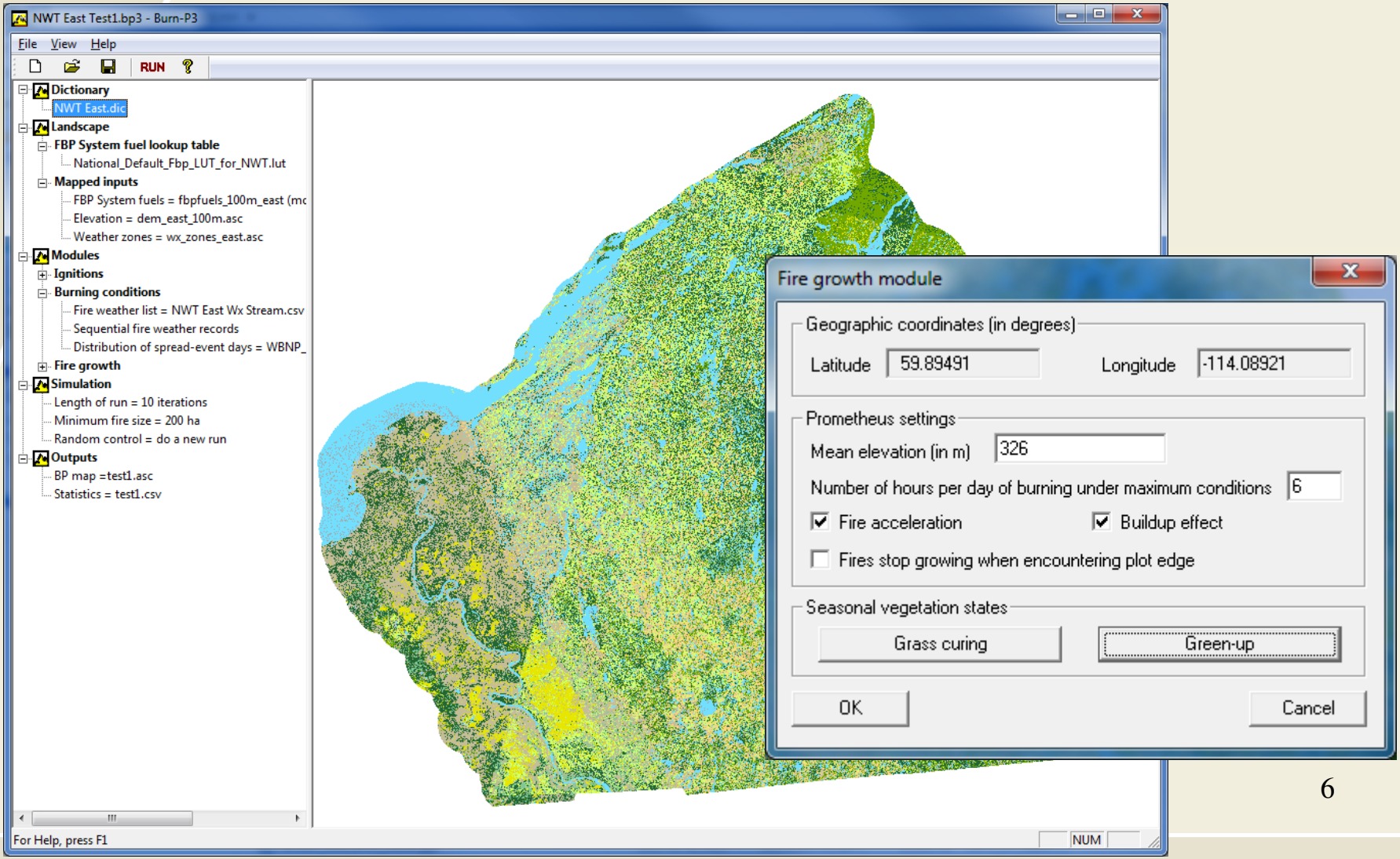
$$= \frac{50}{50{,}000} \times 100 = 0.1\%$$

**probabilistic*


Iteration: 5
Number of fires
1
2
3
4
5
6


Burn probability
0
0.038

The Burn-P3 software



Burn-P3 user documentation

Burn-P3

User's

Canada

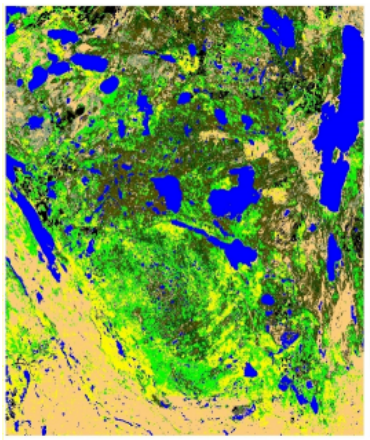
HTML Help

Hide Back Print Options

- Section 1. The Burn-P3 fire simulation model
  - What is Burn-P3?
  - Burn-P3 general desing
- Section 2. Burn-P3 components
  - Burn-P3 dictionary
  - Landscape
    - FBP fuel lookup table
    - Mapped inputs
      - FBP fuel grid
      - Elevation
      - Fire and Weather zones
      - Vectorized fuelbreaks
  - Ignitions module
  - Burning conditions module
  - Fire growth module
  - Burn-P3 simulation window
- Section 3. Data catalogue
- Section 4. Getting started
- Section 5. Creating a Burn-P3 project
- Section 6. Burn-P3 experimental functions
- Section 7. Troubleshooting
- Section 8. Resources

Fire Behavior Prediction (FBP) fuel grid

The Fire Behavior Prediction (FBP) fuel grid is required to run the model ignition and spread of fires in Burn-P3. The grid encompasses the area of interest, in addition to a buffer area that surrounds it. This buffer is necessary to avoid having an edge effect in the resulting Burn probability map. The FBP fuel grid is incomplete without the Projection file and FBP fuel lookup table.



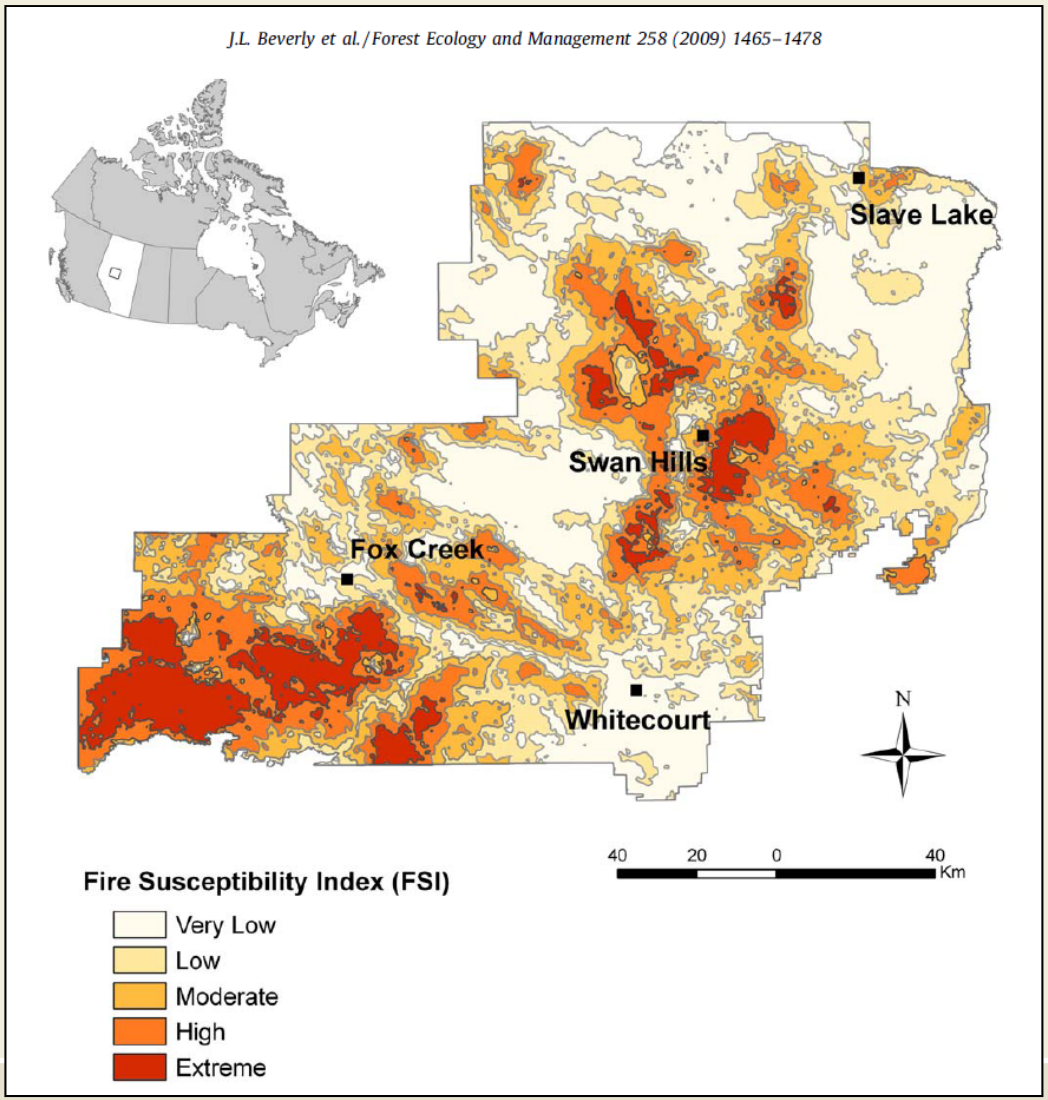
FBP fuel types

- Spruce-Lichen Woodland (C-1)
- Boreal Spruce (C-2)
- Mature Jack or Lodgepole Pine (C-3)
- Immature Jack or Lodgepole Pine (C-4)
- Leafless Aspen (D-1)
- Slash (S-1)
- Grass (O-1)
- Boreal Mixewood (M-1 and M-2)
- Nonfuel
- Water

Example of Fire Behavior Prediction (FBP) fuel grid

See also FBP fuel grid in the Data catalogue.

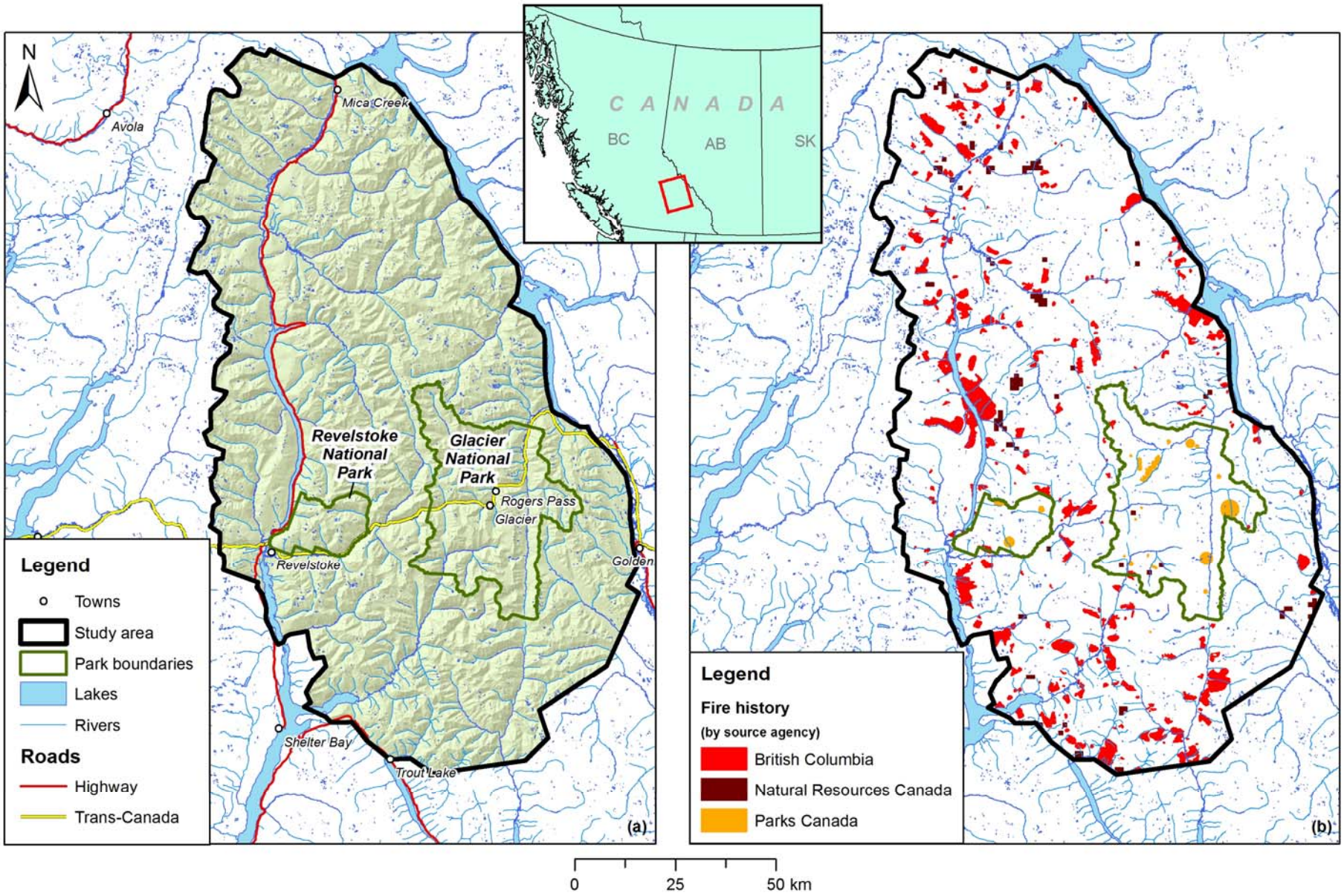
Risk analysis



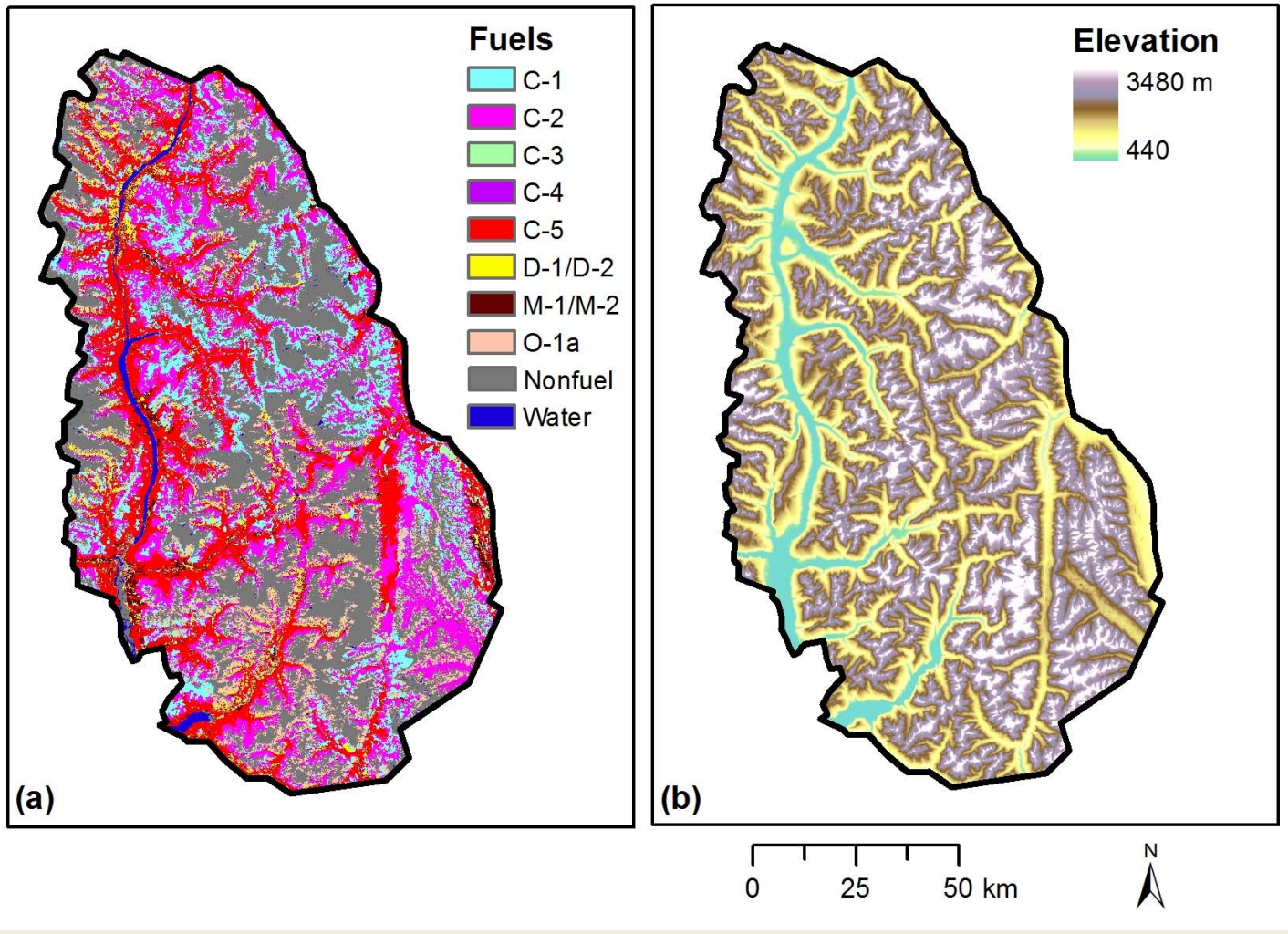
Natural Resources Canada | Ressources naturelles Canada

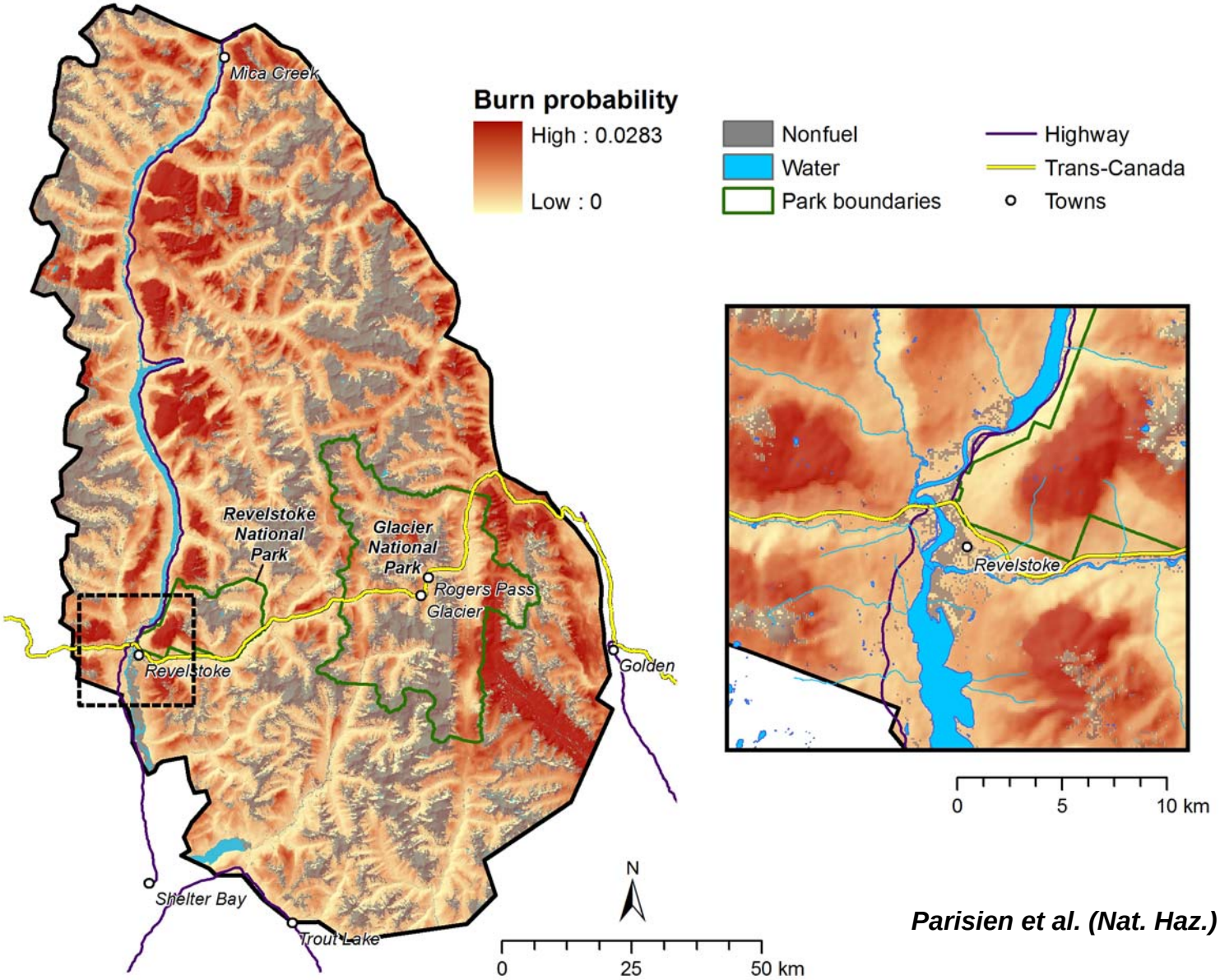
Beverly et al. (2009, For. Ecol. Manage)

Canada

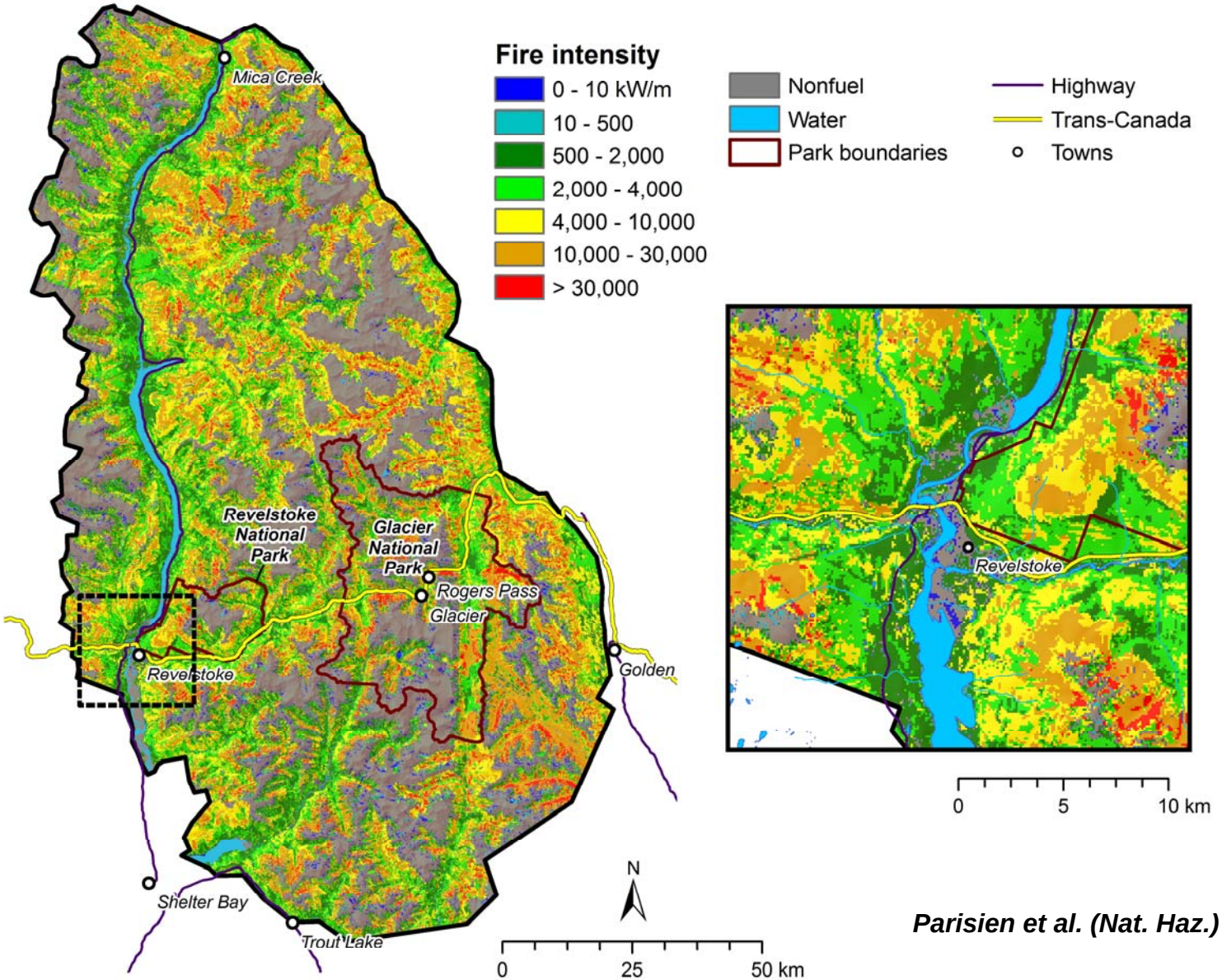

N
Avola
Mica Creek
Revelstoke National Park
Glacier National Park
Rogers Pass
Glacier
Revelstoke
Golden
Shelter Bay
Trout Lake
Legend
Towns
Study area
Park boundaries
Lakes
Rivers
Roads
Highway
Trans-Canada
(a)
C A N A D A
BC
AB
SK
Legend
Fire history
(by source agency)
British Columbia
Natural Resources Canada
Parks Canada
(b)
0
25
50 km

Fuels and topography





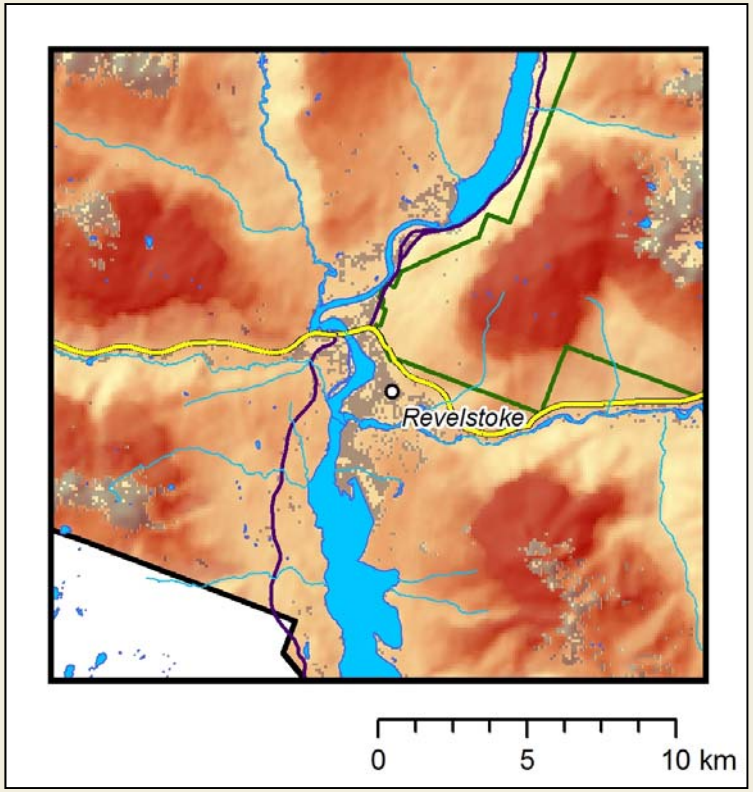
Parisien et al. (Nat. Haz.)



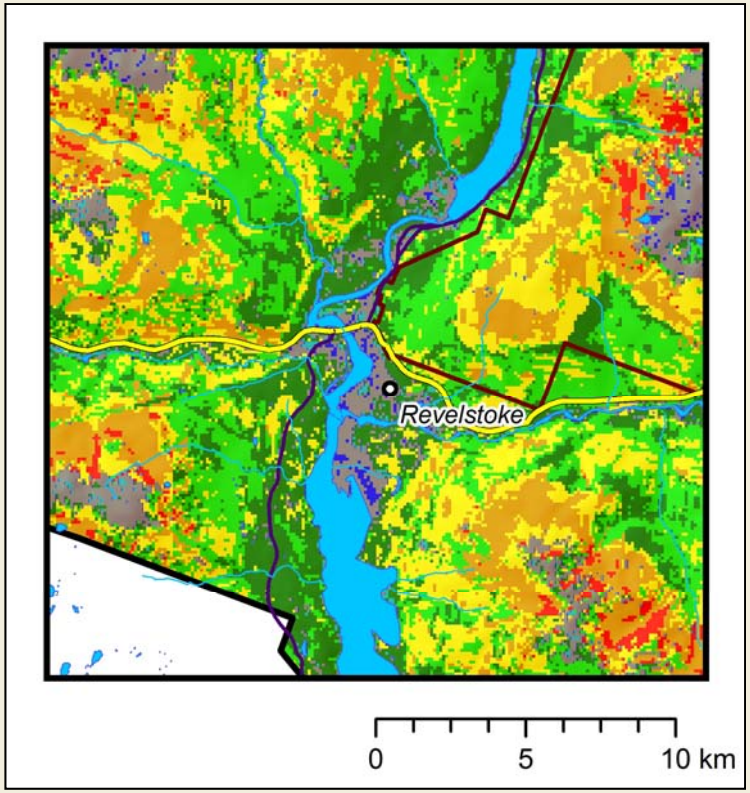
Parisien et al. (Nat. Haz.)

Burn probability and fire effects

Likelihood of burning



Potential fire impacts



Concluding remarks

- Simulating the ignition and spread captures the **spatial context** of wildfires
- Burn-P3 is a **data-hungry** model… but we have lots of data
- Incorporating **natural variability** increases the accuracy of modeled BP
- After the initial time investment, it's fairly easy to run **what-if scenarios**


Thank you
Photo: Simon Hunt (Parks Canada)