



The Burn-P3 fire simulation model

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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

Ignition *

Fuels ("snapshot")

Topography

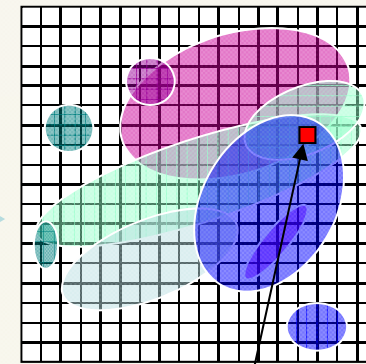
Weather
duration*
daily conditions*

BP MODEL

Fire spread
simulation
(Prometheus)

Fire
perimeter

OUTPUT



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

**probabilistic*

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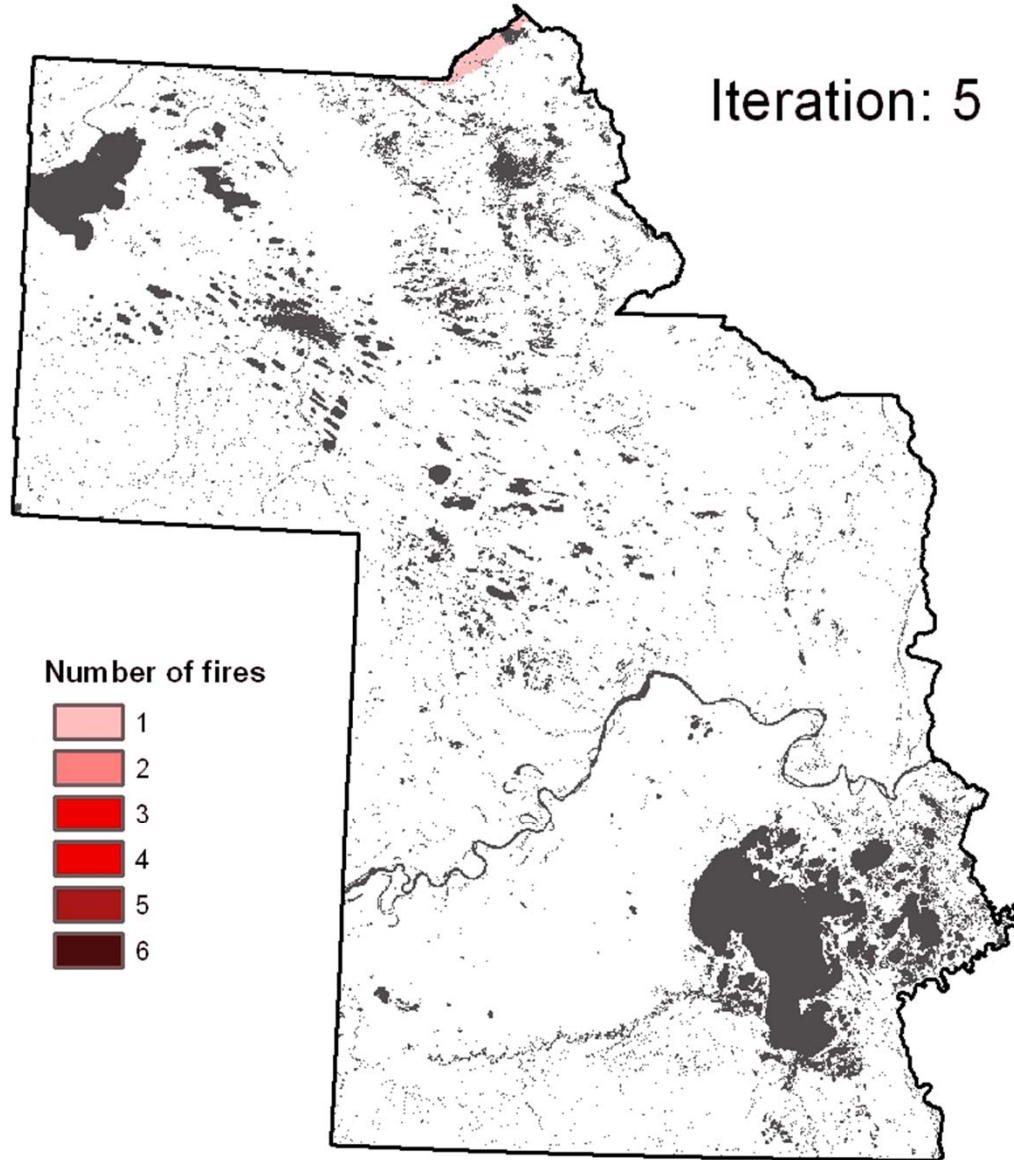


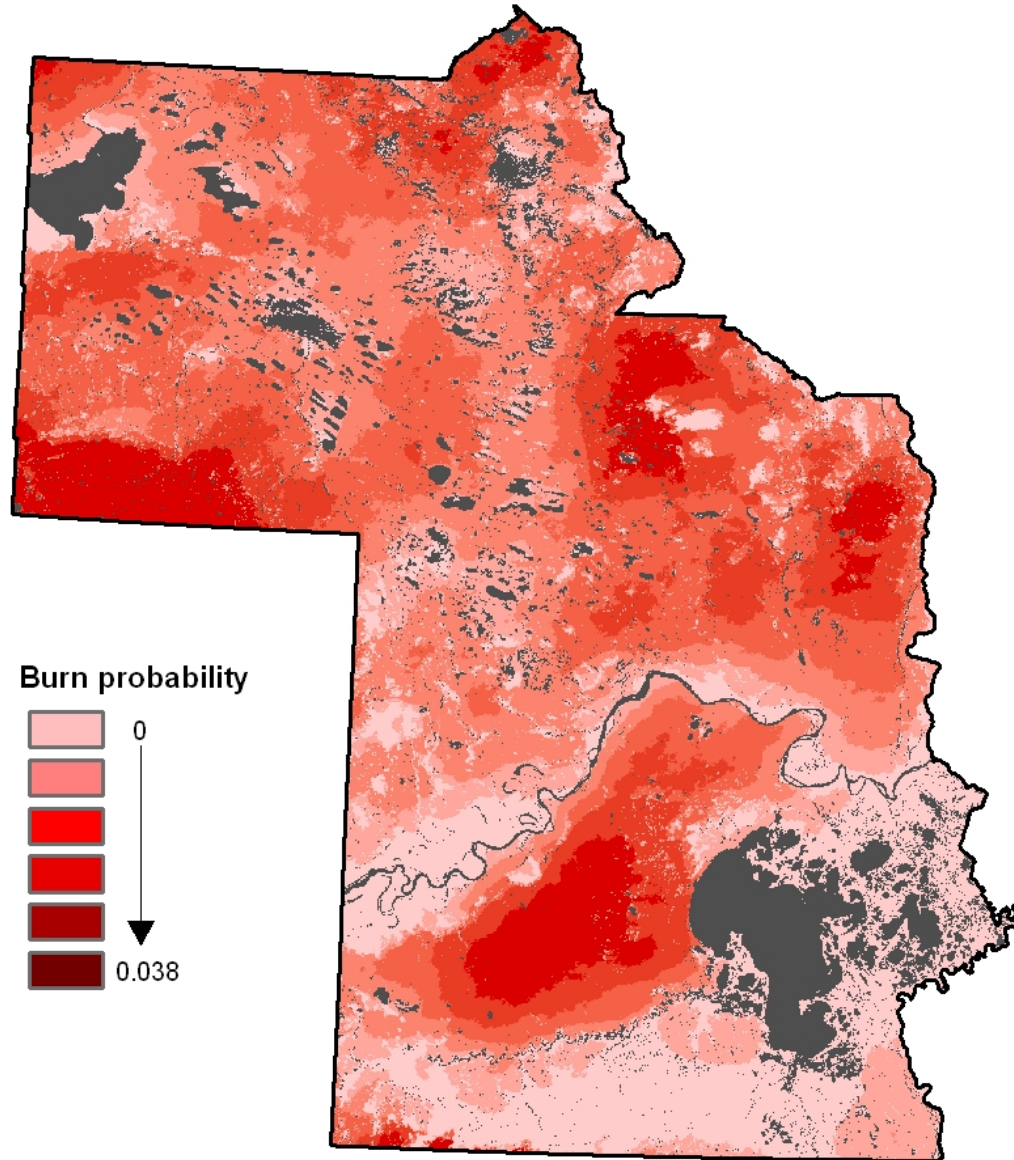
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Iteration: 5







The Burn-P3 software

The screenshot displays the Burn-P3 software interface. On the left is a project tree with the following structure:

- Dictionary
 - NWT East.dic
- Landscape
 - FBP System fuel lookup table
 - National_Default_Fbp_LUT_for_NWT.lut
 - Mapped inputs
 - FBP System fuels = fbpfuels_100m_east (m)
 - Elevation = dem_east_100m.asc
 - Weather zones = wx_zones_east.asc
- Modules
 - Ignitions
 - Burning conditions
 - Fire weather list = NWT East Wx Stream.csv
 - Sequential fire weather records
 - Distribution of spread-event days = WBNP_
 - Fire growth
- Simulation
 - Length of run = 10 iterations
 - Minimum fire size = 200 ha
 - Random control = do a new run
- Outputs
 - BP map = test1.asc
 - Statistics = test1.csv

The central map shows a landscape with a color-coded fire risk or fuel load distribution. A 'Fire growth module' dialog box is open in the foreground, containing the following settings:

- Geographic coordinates (in degrees):
 - Latitude: 59.89491
 - Longitude: -114.08921
- Prometheus settings:
 - Mean elevation (in m): 326
 - Number of hours per day of burning under maximum conditions: 6
 - Fire acceleration
 - Buildup effect
 - Fires stop growing when encountering plot edge
- Seasonal vegetation states:
 - Grass curing
 - Green-up

Buttons for 'OK' and 'Cancel' are visible at the bottom of the dialog box.

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Burn-P3 user documentation

Burn-P3

User's

The screenshot shows a web browser window titled "HTML Help" with a table of contents on the left and a detailed page on the right. The table of contents includes sections from "Section 1. The Burn-P3 fire simulation model" to "Section 8. Resources". The right page is titled "Fire Behavior Prediction (FBP) fuel grid" and contains text explaining the grid's purpose and a legend for fuel types.

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](#).

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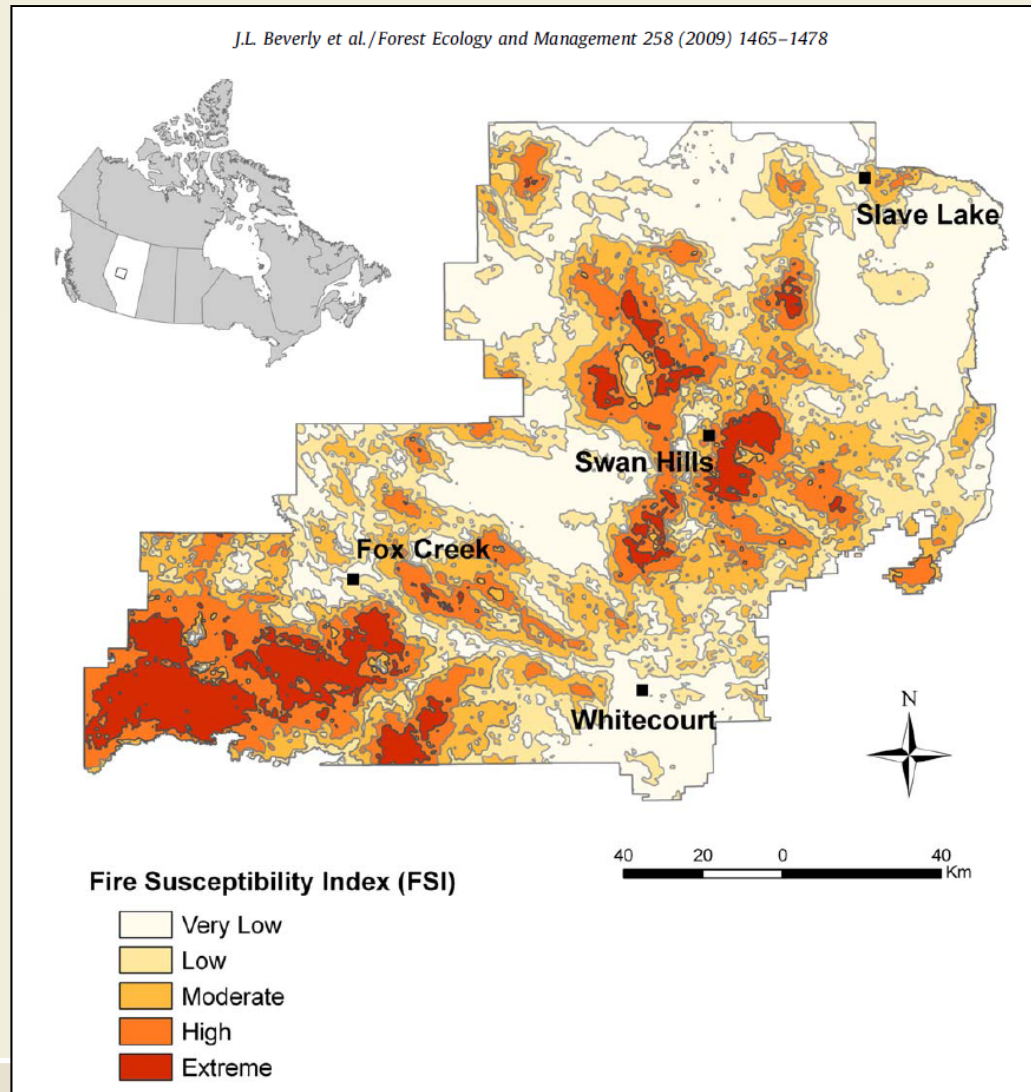
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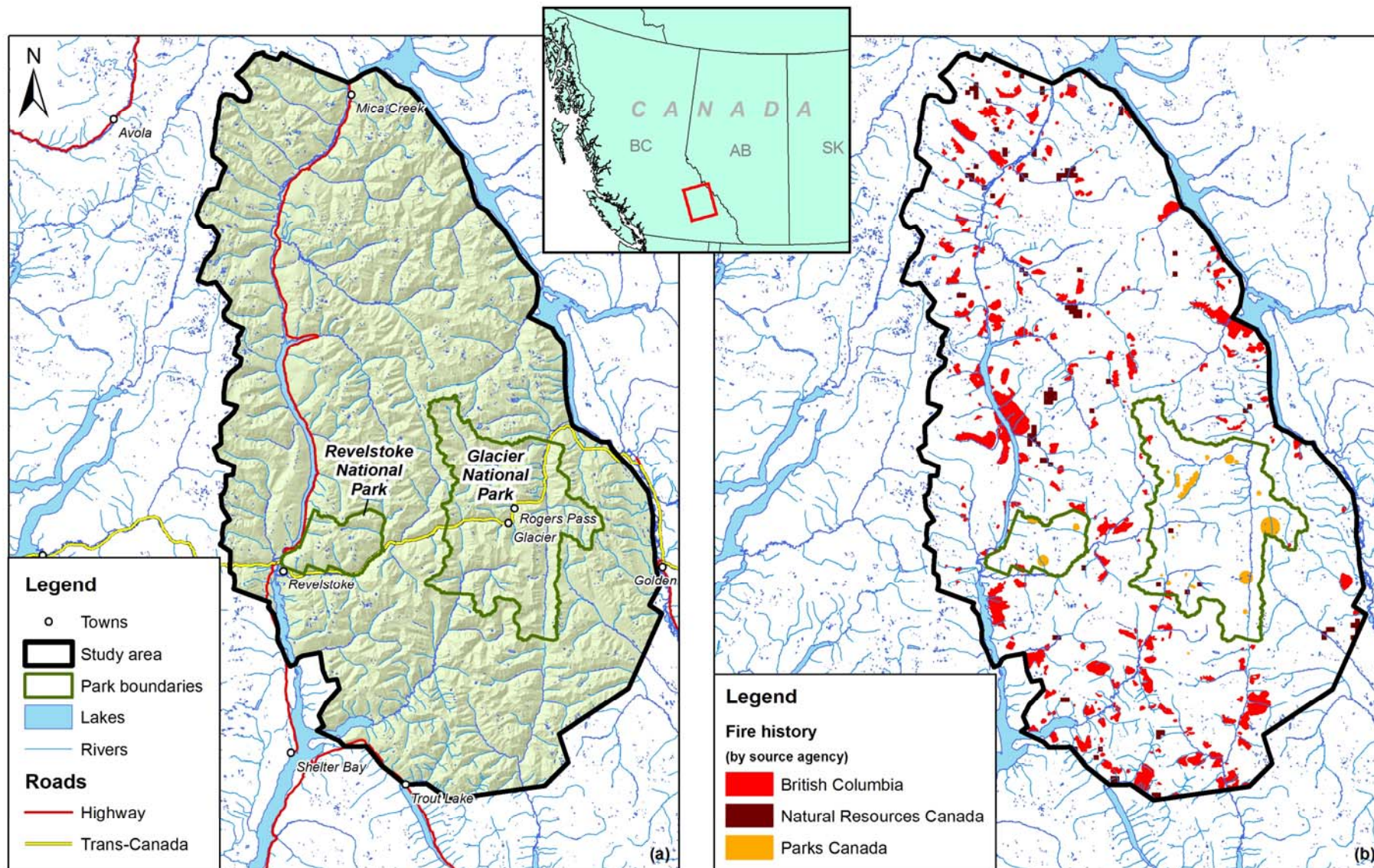
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Risk analysis

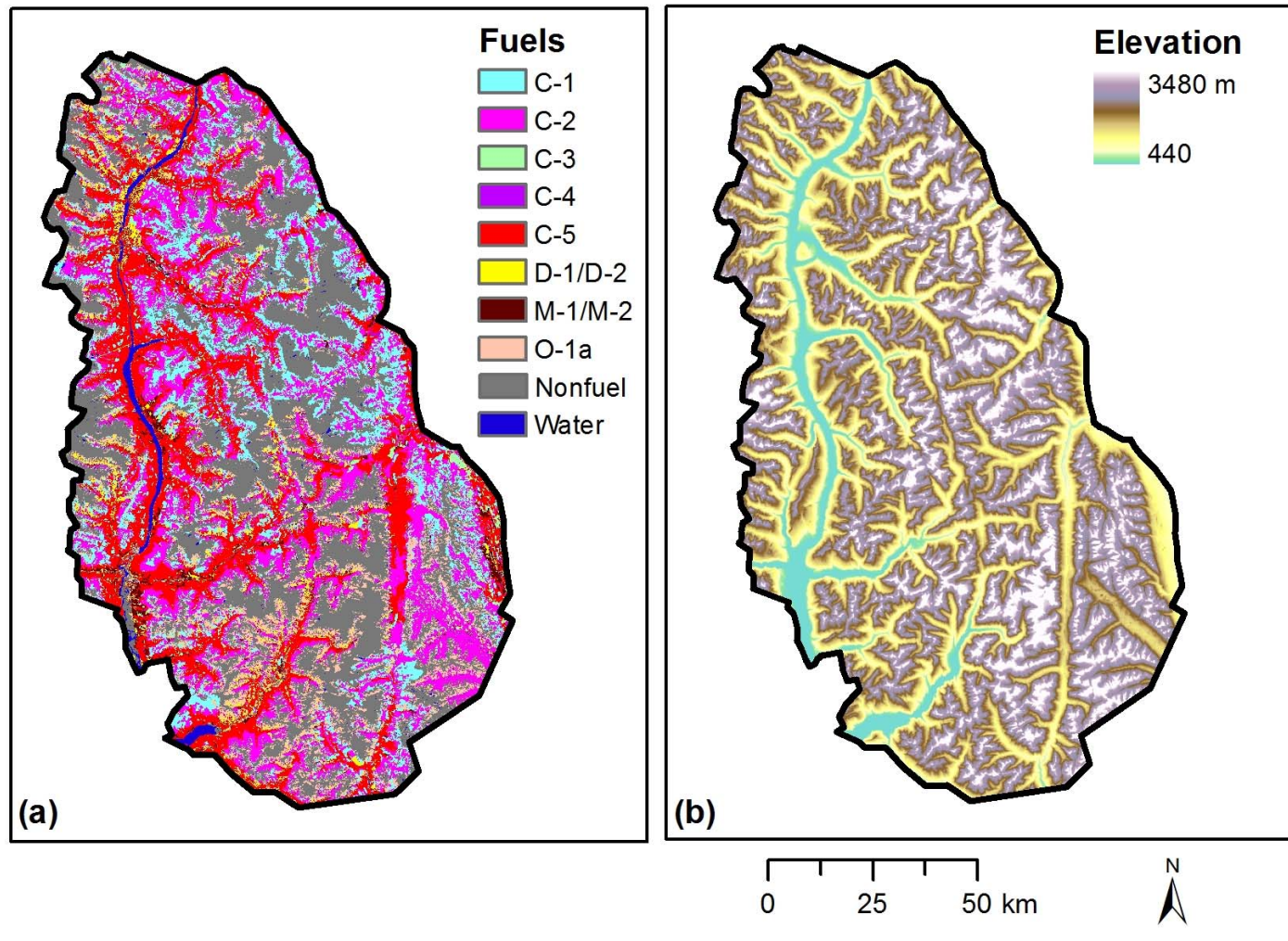


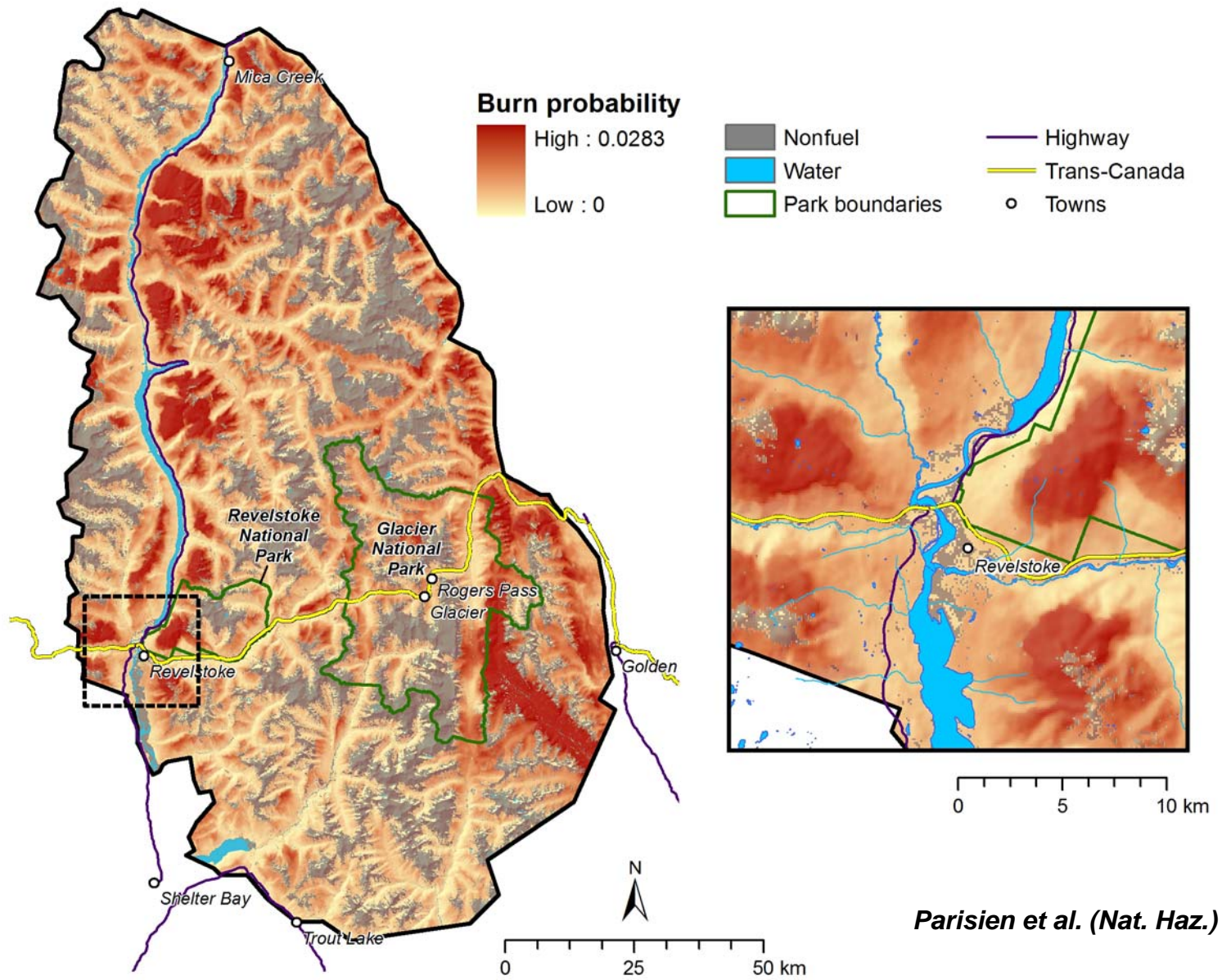


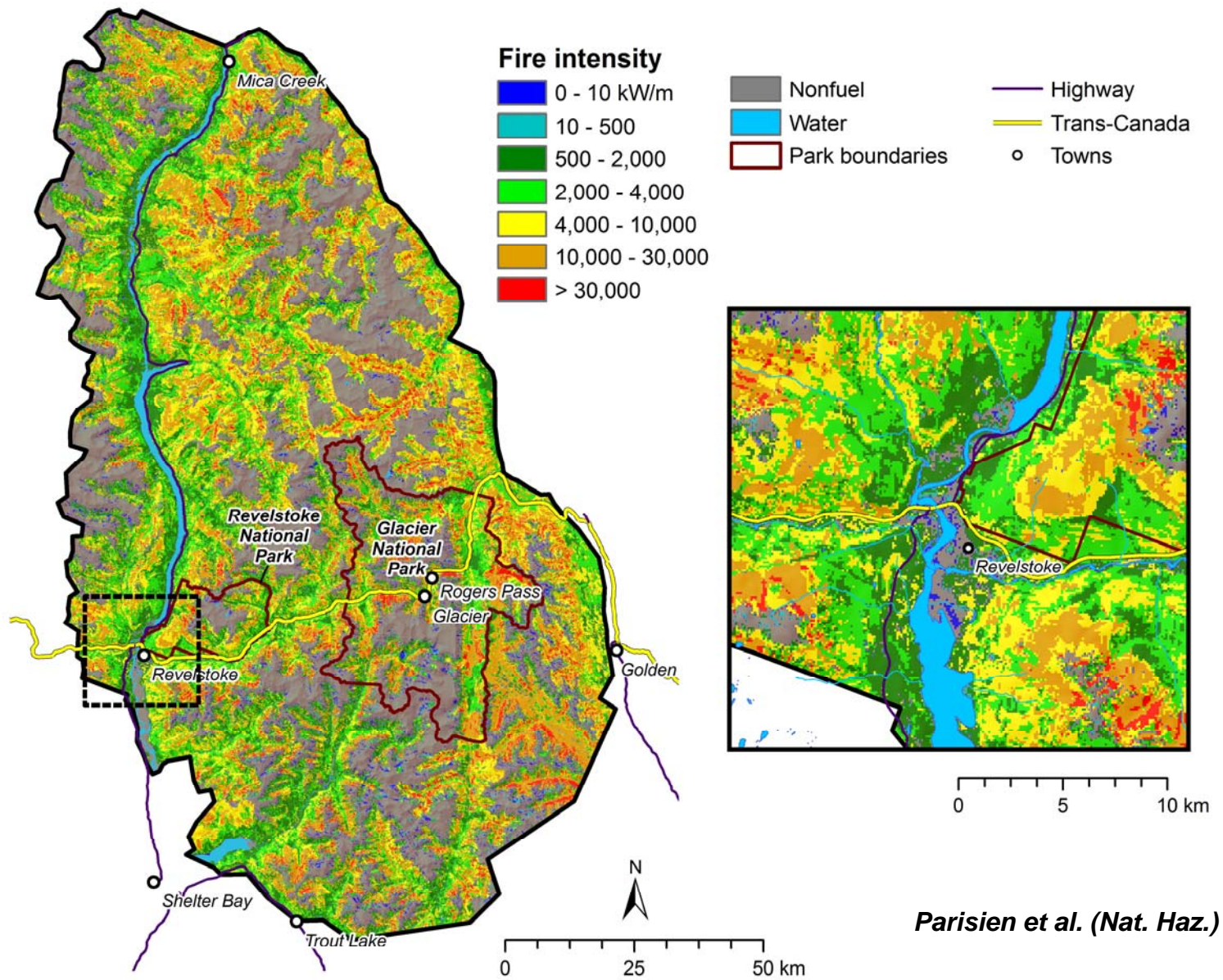
0 25 50 km



Fuels and topography



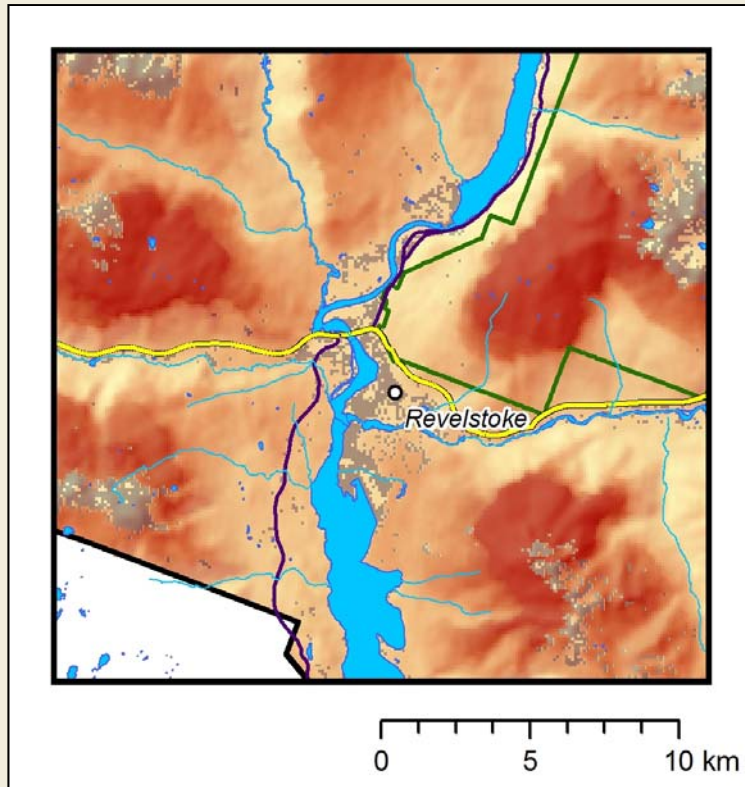




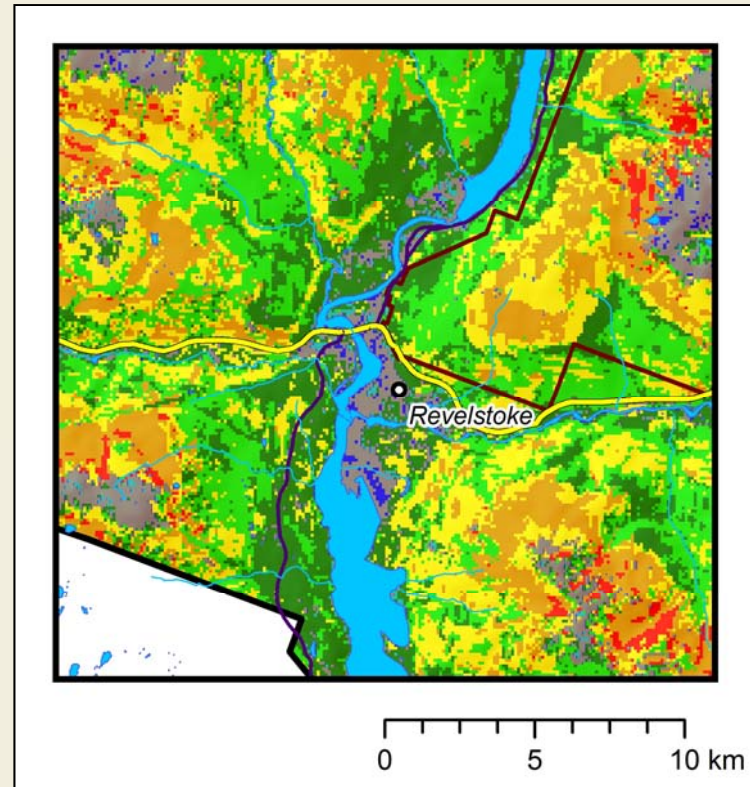


Burn probability and fire effects

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**

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Thank you

Photo: Simon Hunt (Parks Canada)