

Lukas Van Riel¹, François Girard^{2,3}, Mathieu Bouchard^{3,4}, Marie-Hélène Brice^{1,5,6}

1 Institut de recherche en biologie végétale, Dép. de sciences biologiques, Université de Montréal, Montréal, QC, Canada

2 Département de Géographie, Université de Montréal, QC, Canada

3 Centre d'étude de la forêt, Université Laval, QC, Canada

4 Département des sciences du bois et de la forêt, Université Laval, QC, Canada

5 Jardin botanique de Montréal, Montréal, QC, Canada

6 Institut de Recherche sur les Forêts, Université du Québec en Abitibi-Témiscamingue, QC, Canada

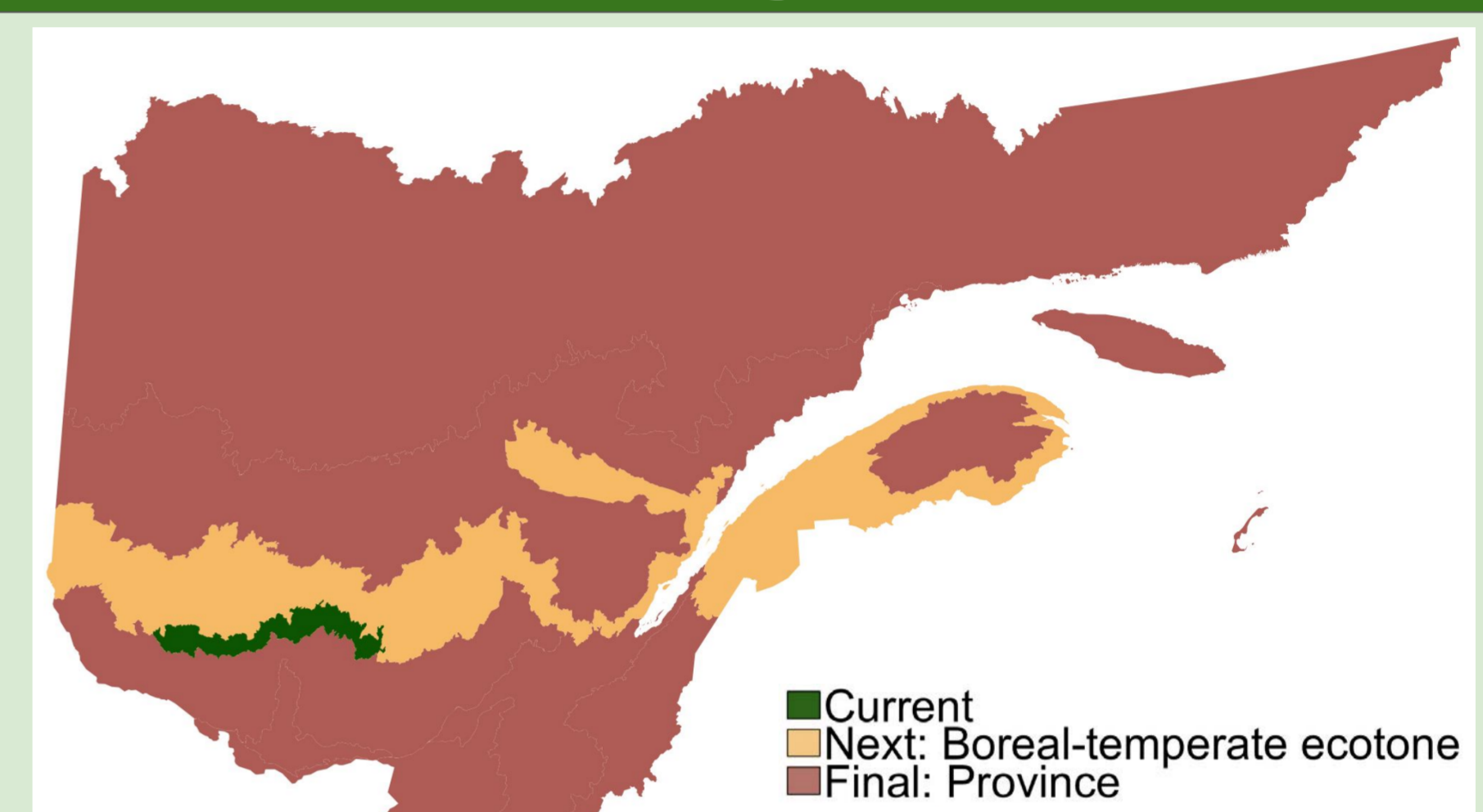
Background

- Climate change will shift geographic ranges northwards
- **Trees can not keep up with their climatic niche** due to their long generation times and short dispersal distances¹
- **Significant uncertainty** on these lags still exists due to different climate scenarios and future fire regimes
- Additional factors also complicate the migration of trees:
 - Interspecific competition²
 - Soil heterogeneity³
 - Natural and anthropogenic disturbances⁴
- It is important to **improve our knowledge of forest succession under future climate conditions**
- The **boreal-temperate ecotone** is an ideal study area since the impacts of global change are visible earlier at transition zones⁵

Aim

- How do climate, soil and disturbance impact the succession probabilities at the ecotone?
- Are there differences in post-fire succession probabilities between the temperate, mixed and boreal forest?

Study area



Methods

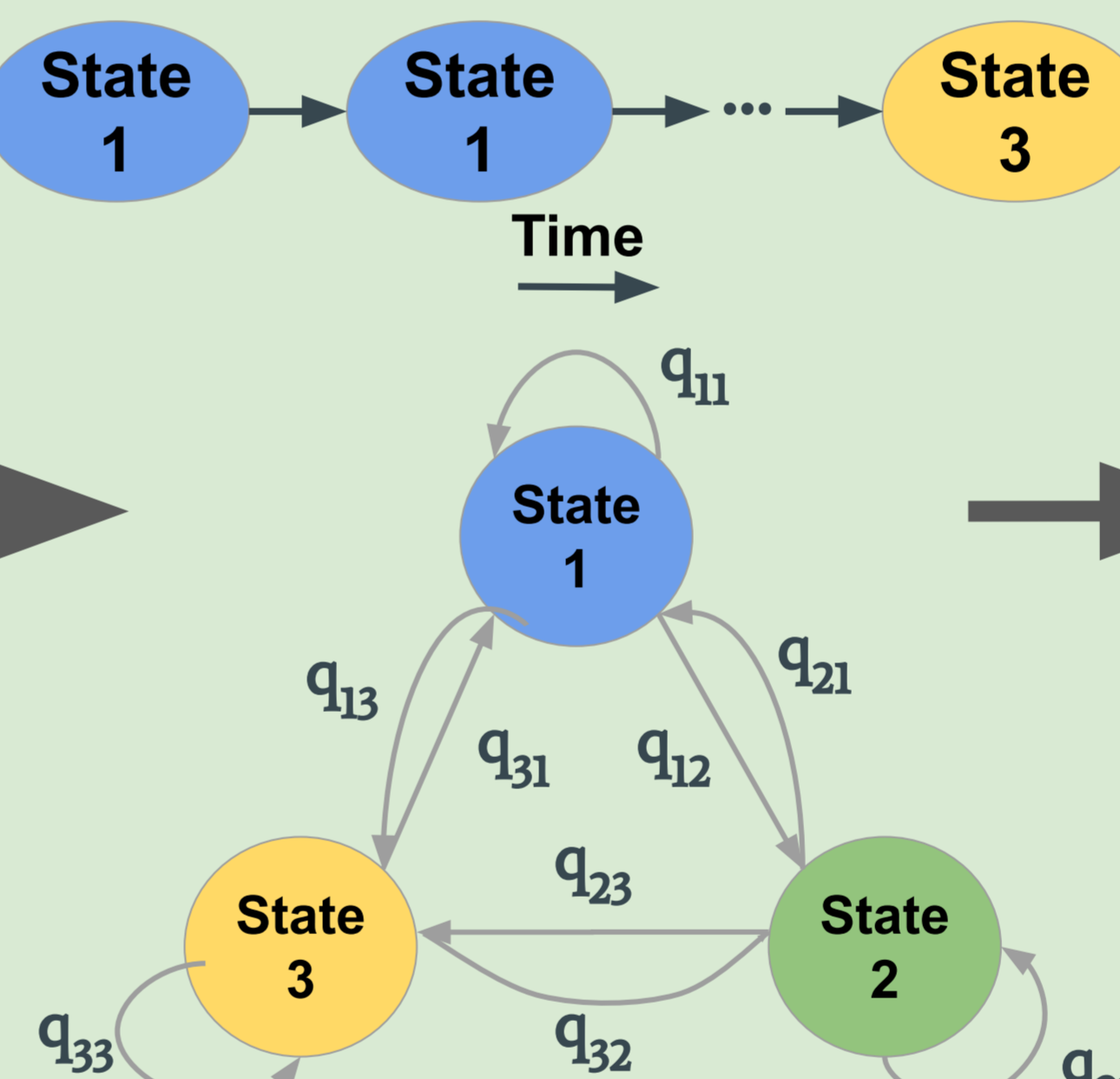
SIFORT data⁶

- Raster covering Quebec
- 15" x 15"
- Classified with photo-interpretation
- 5 inventories between 1970 and 2019
- Selected 39 097 polygons that were inventoried at least twice

Species grouping

STATE	1	2	3	4	5	6	7	8	9
	Paper birch	Shade intolerants	Yellow birch	Maples	Other deciduous	Balsam fir	Red and black spruce	Jack pine	Other coniferous

Markov chain model⁷



Transition probabilities

	To State 1	To State 2	To State 3
From State 1	0.75	0.2	0.05
From State 2	0.2	0.7	0.1
From State 3	0.2	0.2	0.6

Some preliminary results

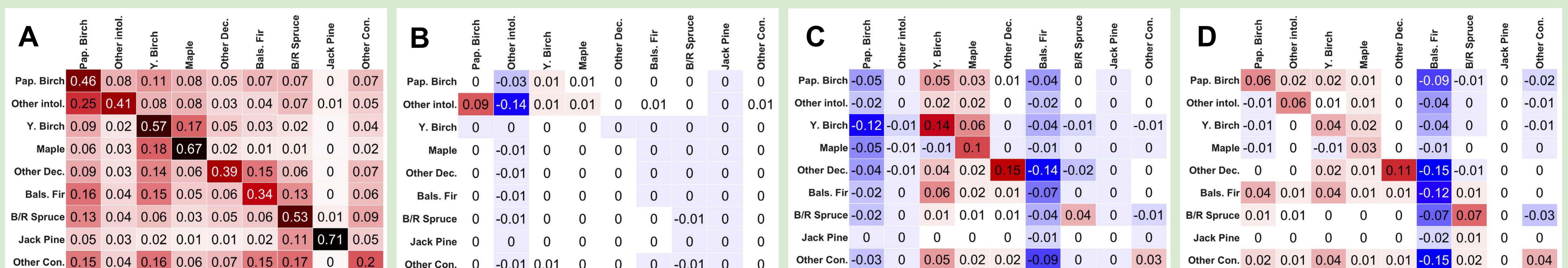


Fig. 1: **A:** Transition probabilities after 10 years without perturbation. **B:** Change in probability compared to panel A for fire. **C:** Change in probability compared to panel A for harvest. **D:** Change in probability compared to panel A for pest outbreak.

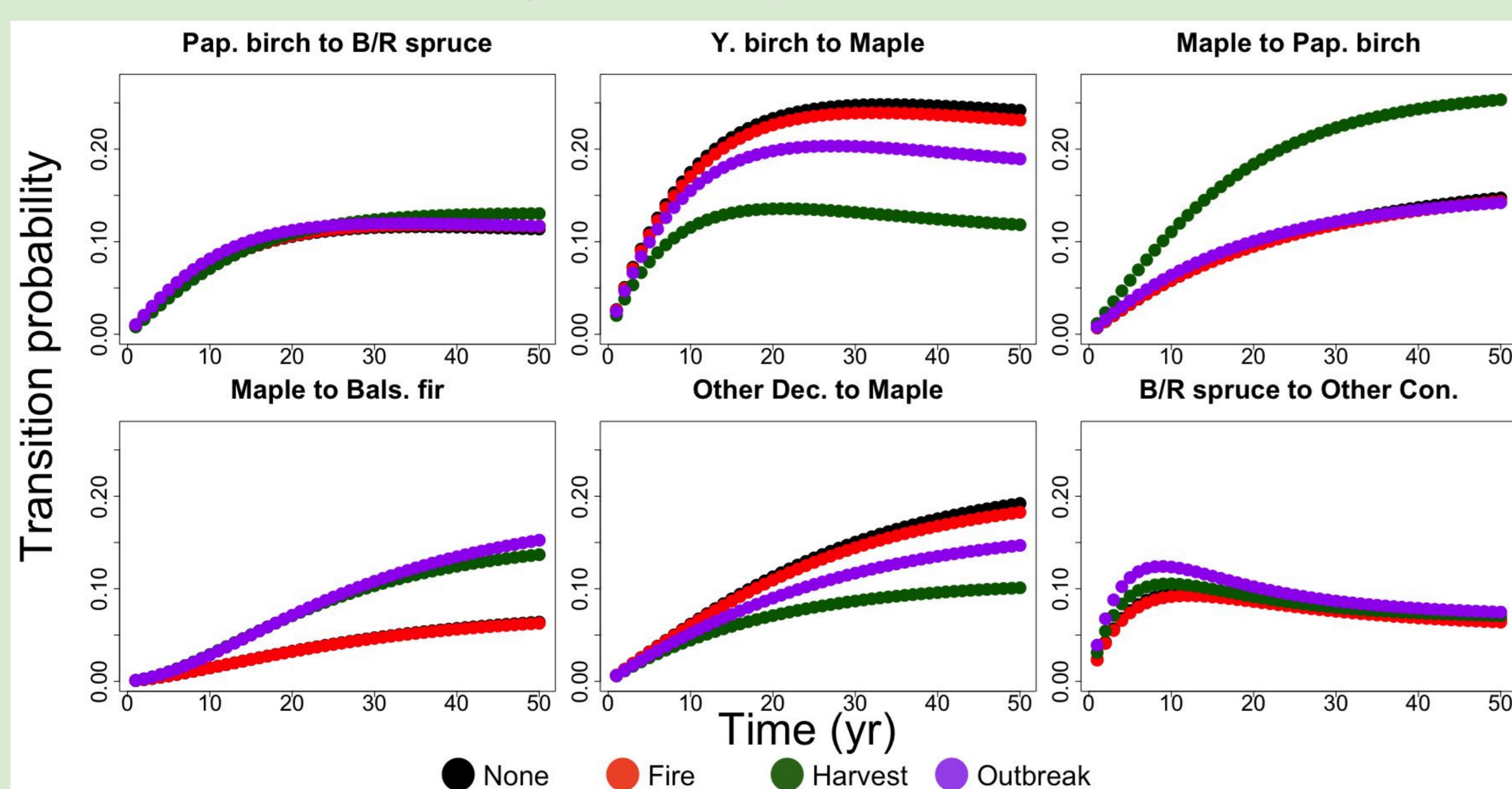


Fig. 2: Transition probabilities as function of time without perturbation, after fire, harvest and pest outbreak.

Future work

- Model all covariates simultaneously
- Increase study area to include all of the boreal-temperate ecotone and afterwards the province
- Compare post-fire succession between forest types
- Integrate results with Quebec Landscape Dynamics Model⁸

References

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