

Reconstitution de la composition préindustrielle et des changements du couvert forestier au cours du XX^{ème} siècle dans la sapinière du Témiscamingue.

Crédits Mathieu Dupuis

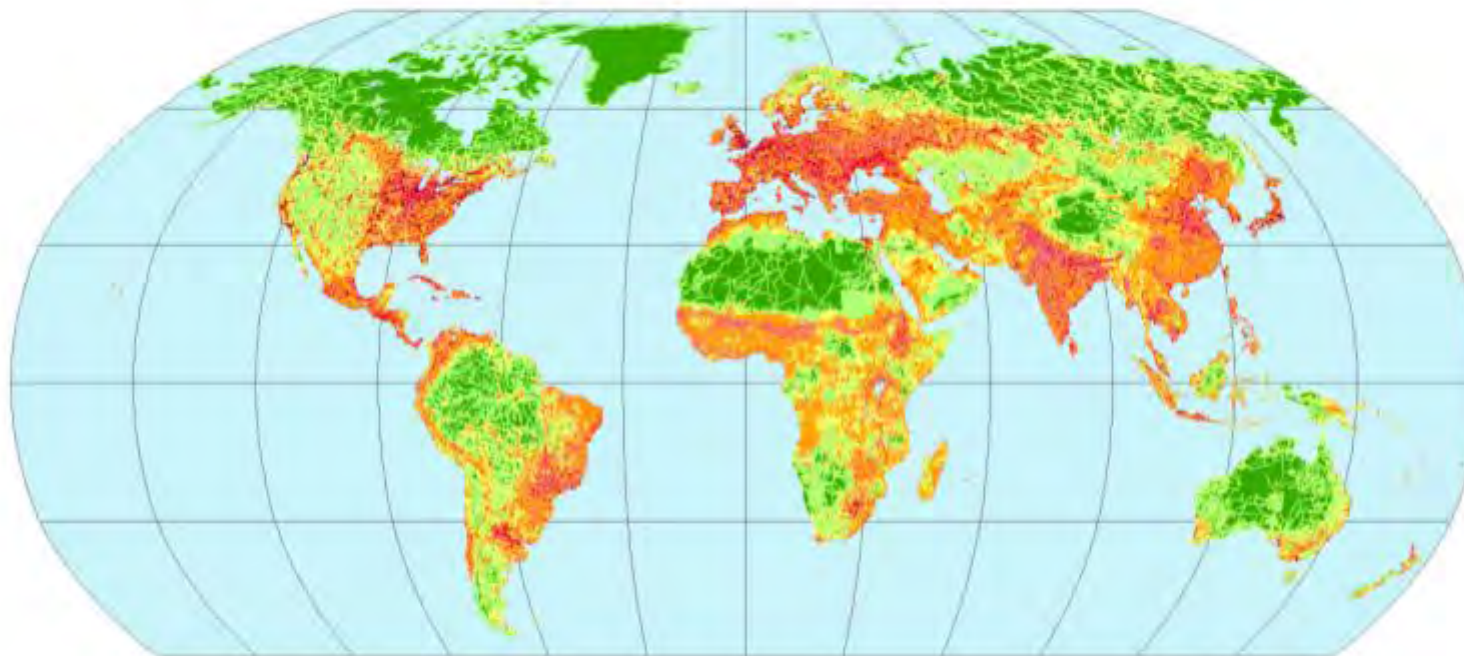


V. Danneyrolles, D. Arseneault et Y. Bergeron

Introduction - *contexte fondamentale*

The Human Footprint ver. 2

Global

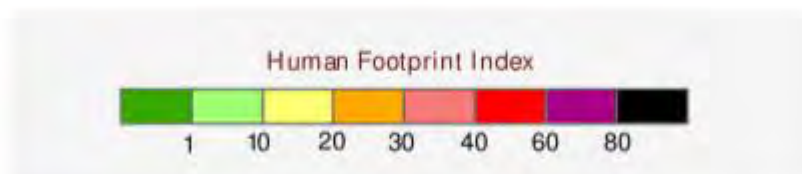


Robinson Projection

The Human Footprint Index

The Human Footprint Index (HF) expresses as a percentage the relative human influence in each terrestrial biome. HF values range from 0 to 100. A value of zero represents the least influenced - the "most wild" part of the biome with value of 100 representing the most influenced (least wild) part of the biome.

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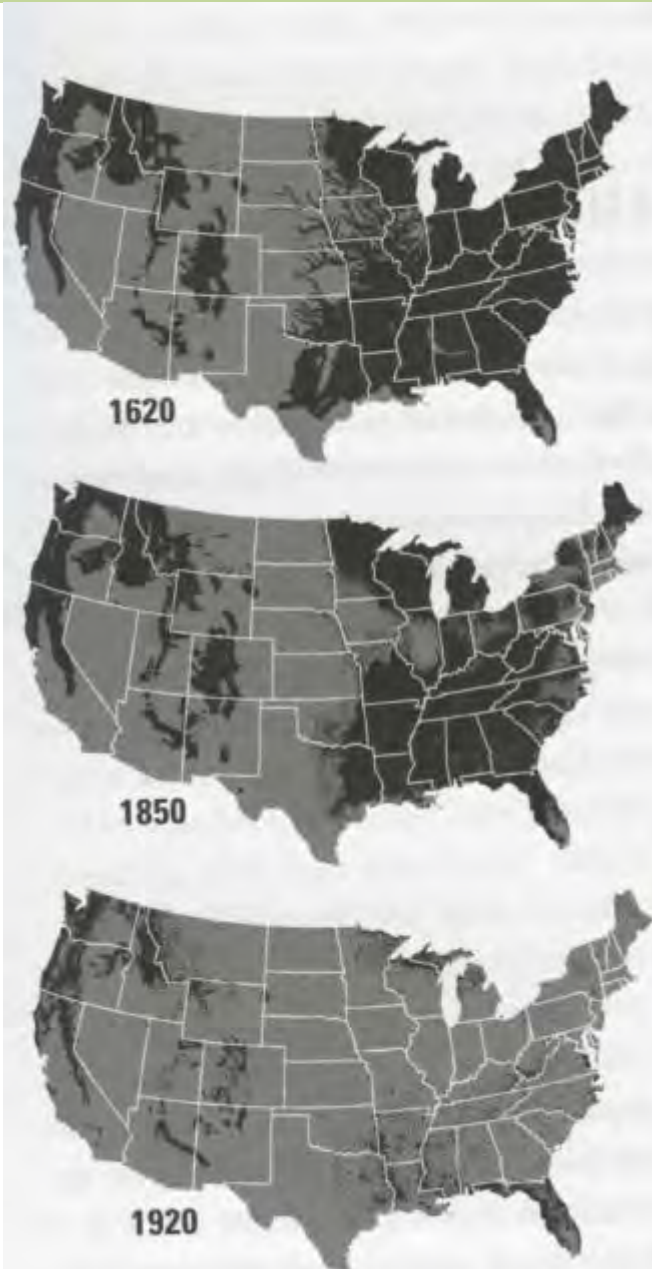


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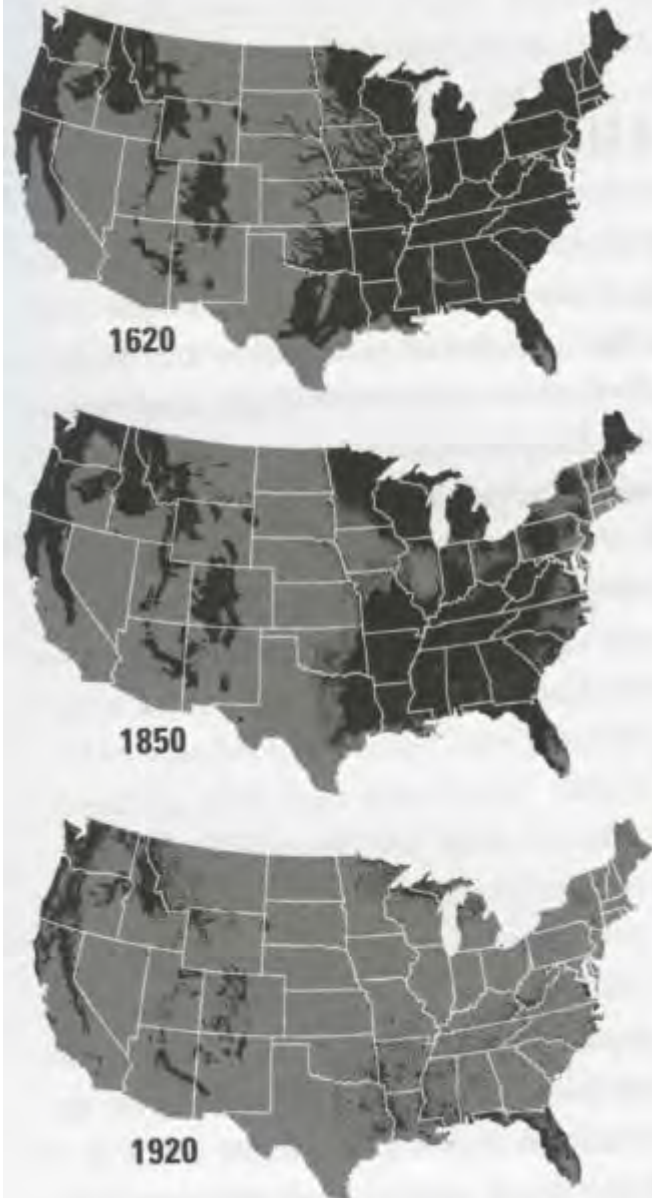


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Introduction - *contexte fondamental*



Introduction - *contexte fondamental*



**Forêts plus jeunes, plus fragmentées,
structures simplifiées et composées d'une
plus forte proportion d'espèce pionnières.**

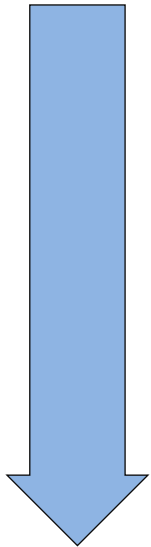
(Foster *et al.*, 1998; Lorimer, 2001; Whitney, 1994, Thompson *et al.* 2013)



Introduction - *contexte fondamental*

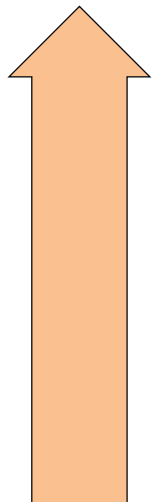
Composition a la limite des forêts tempérées et boréales

Épinettes, Sapins, Pins, Mélèzes, Cèdres, Pruche , Hêtre



Introduction - *contexte fondamental*

Composition a la limite des forêts tempérées et boréales



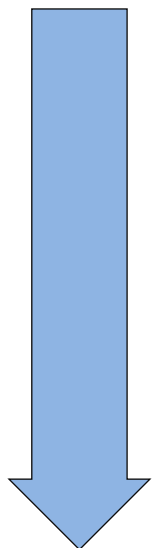
Bouleau blanc



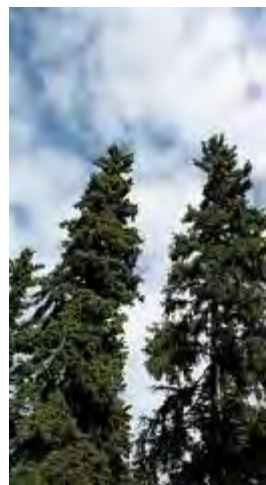
Peupliers



Érables



Épinettes, Sapins, Pins, Mélèzes, Cèdres, Pruche, Hêtre



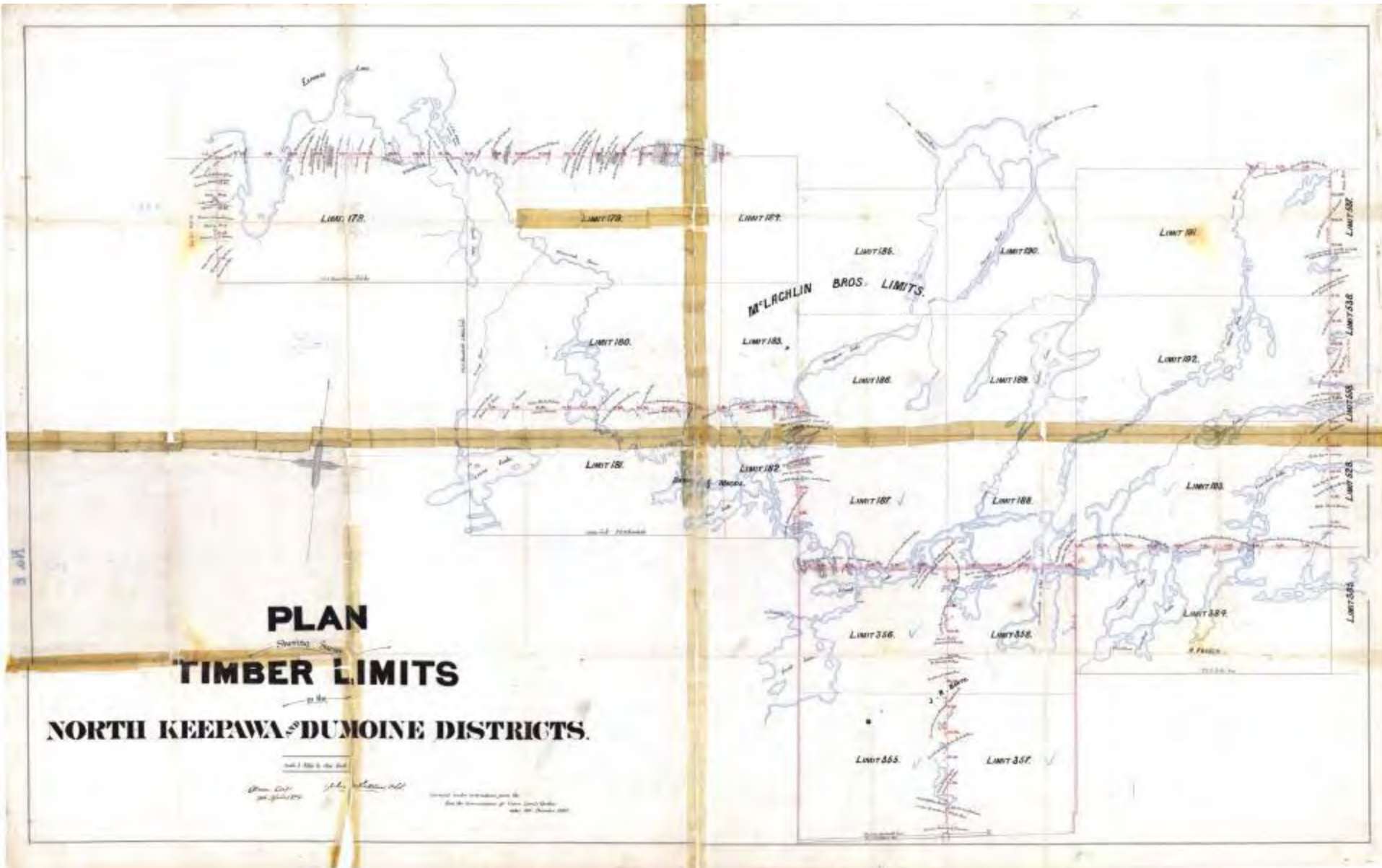
Introduction - *contexte appliqué*

Aménagement écosystémique ...
... besoin de références



Tembec

Objectifs

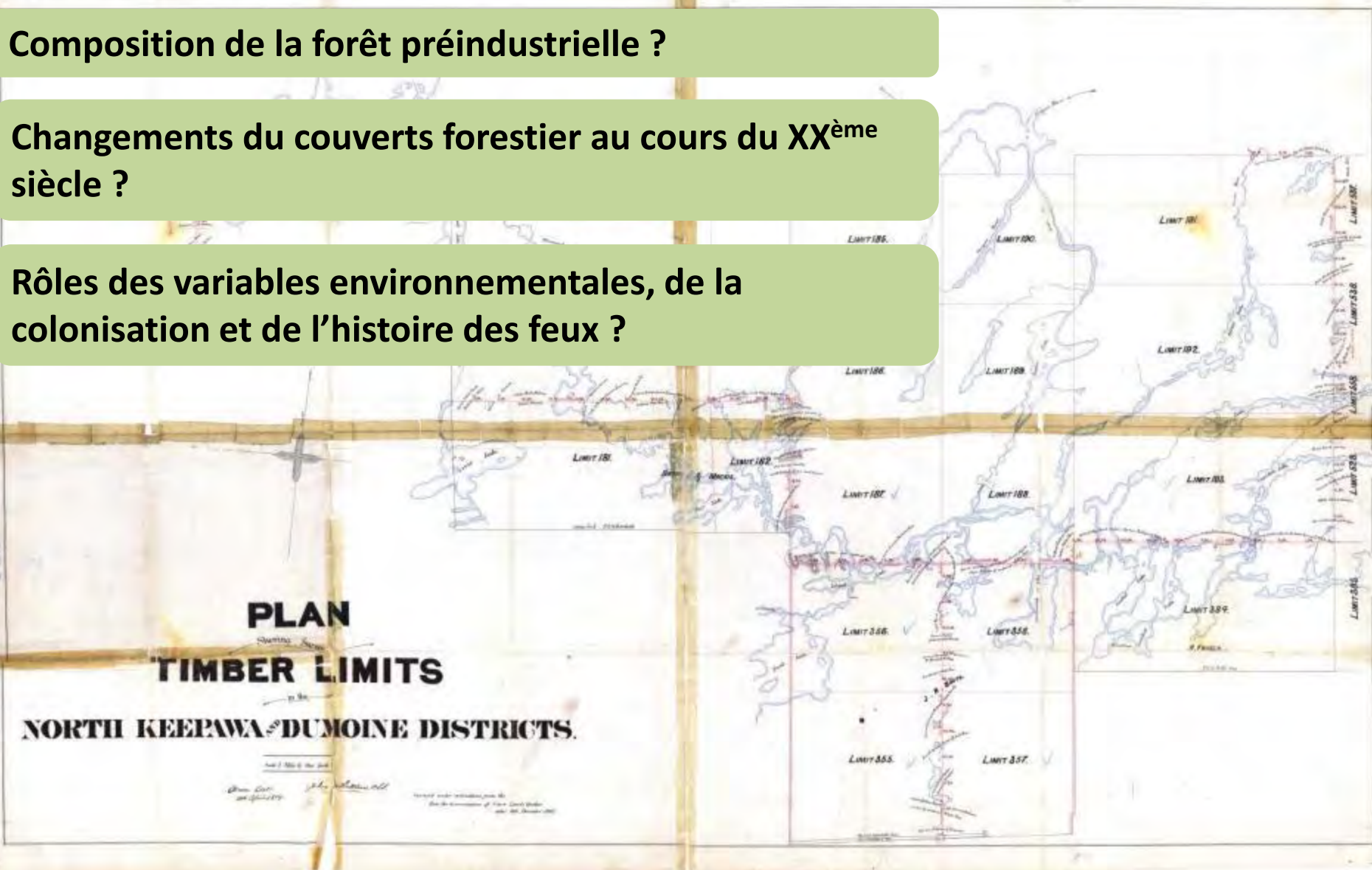


Objectifs

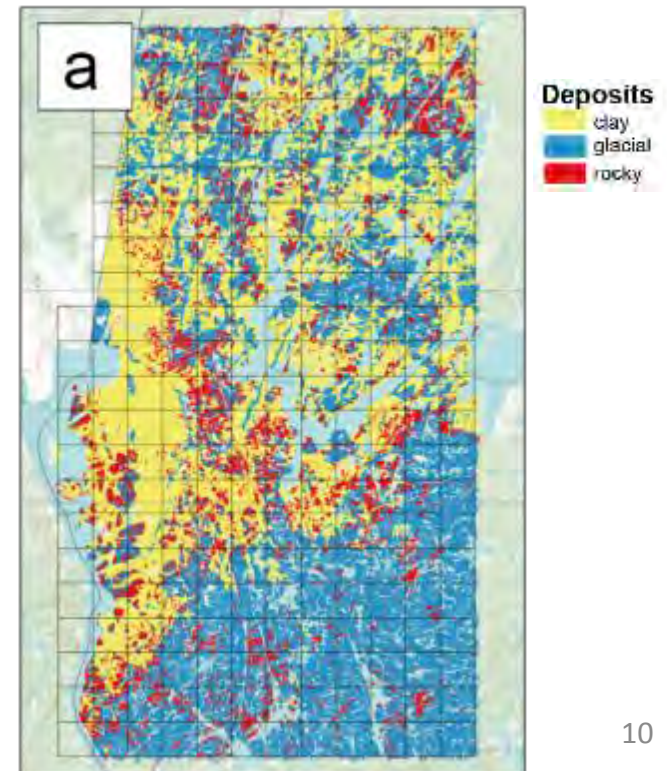
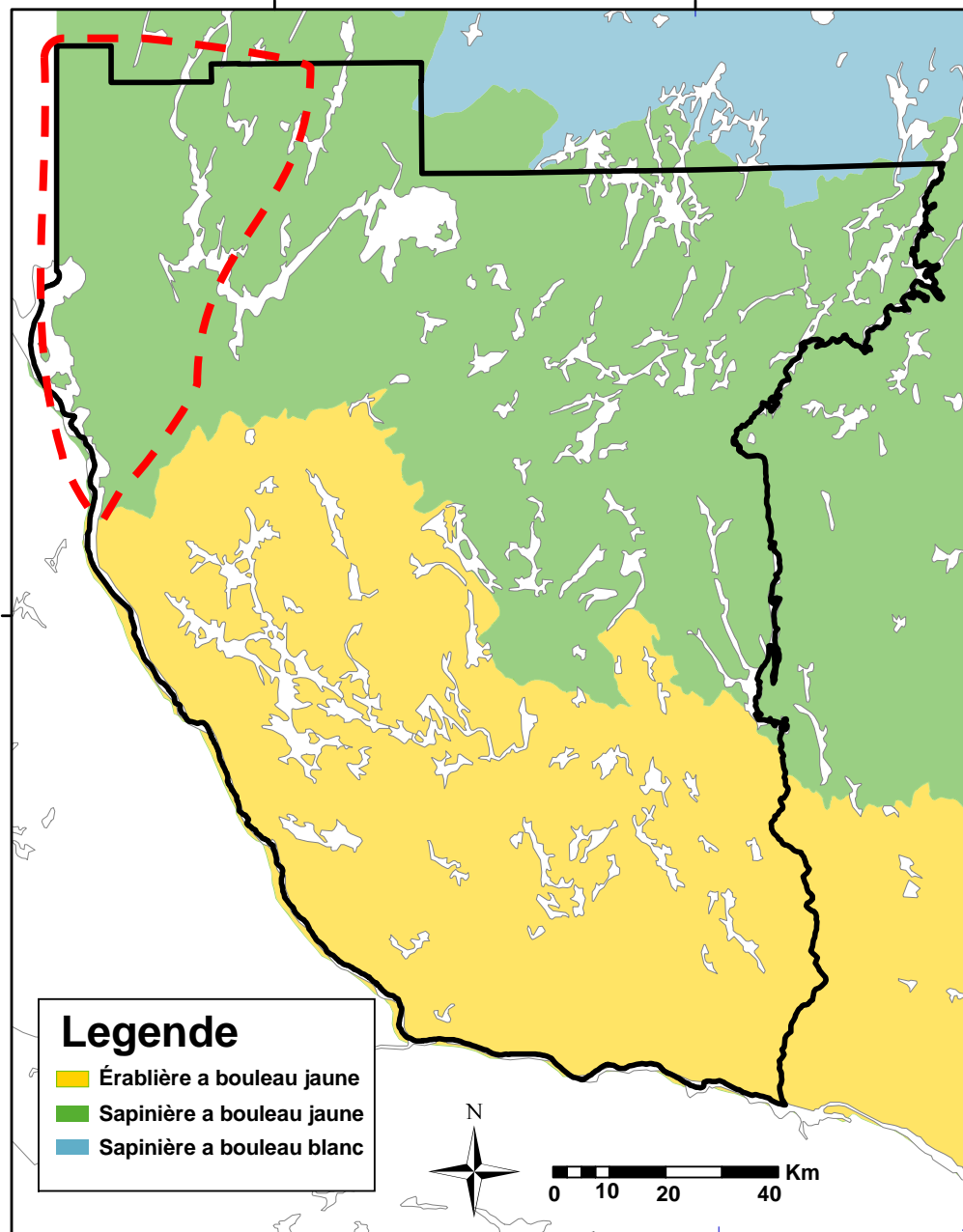
Composition de la forêt préindustrielle ?

Changements du couverts forestier au cours du XX^{ème} siècle ?

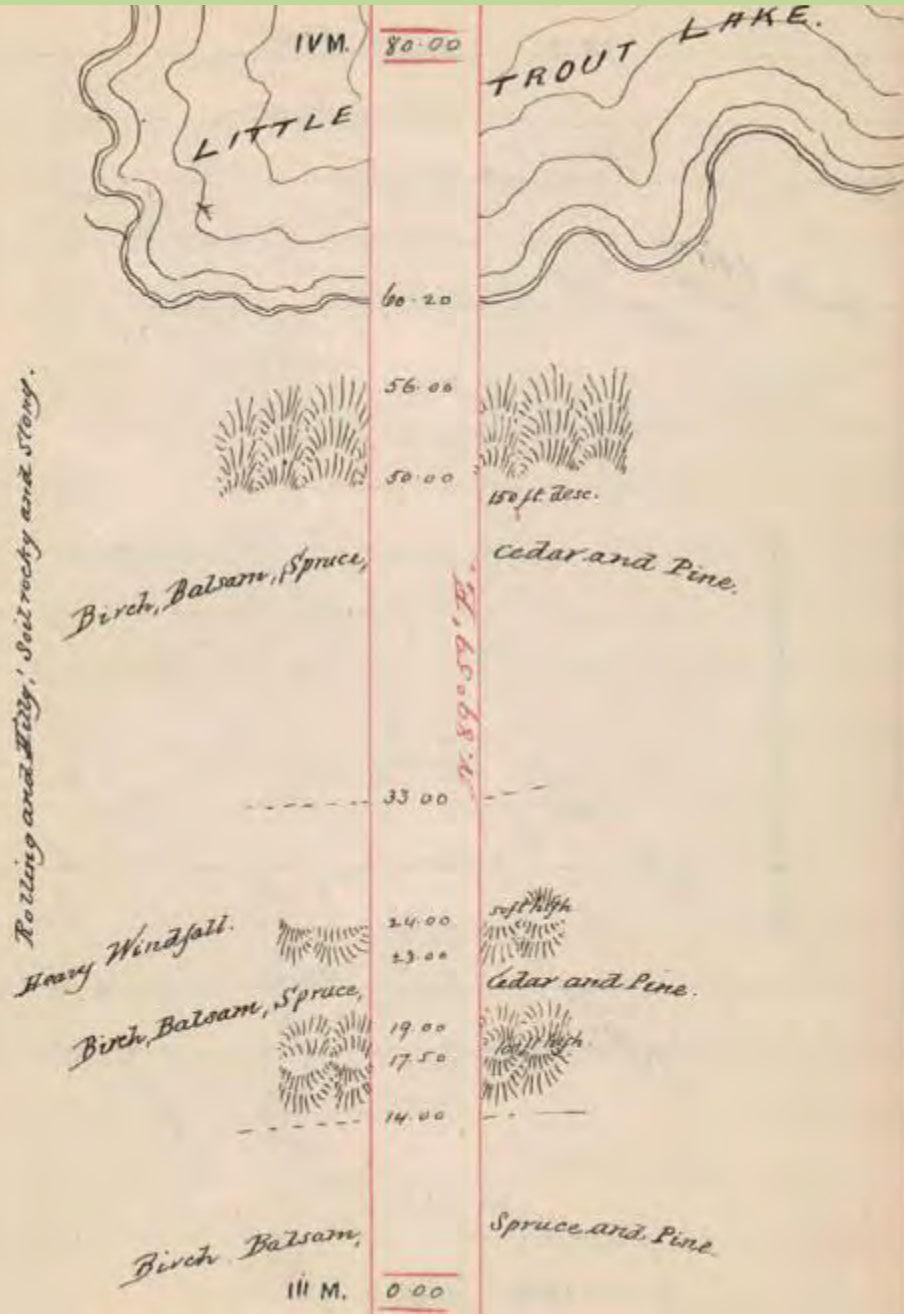
Rôles des variables environnementales, de la colonisation et de l'histoire des feux ?



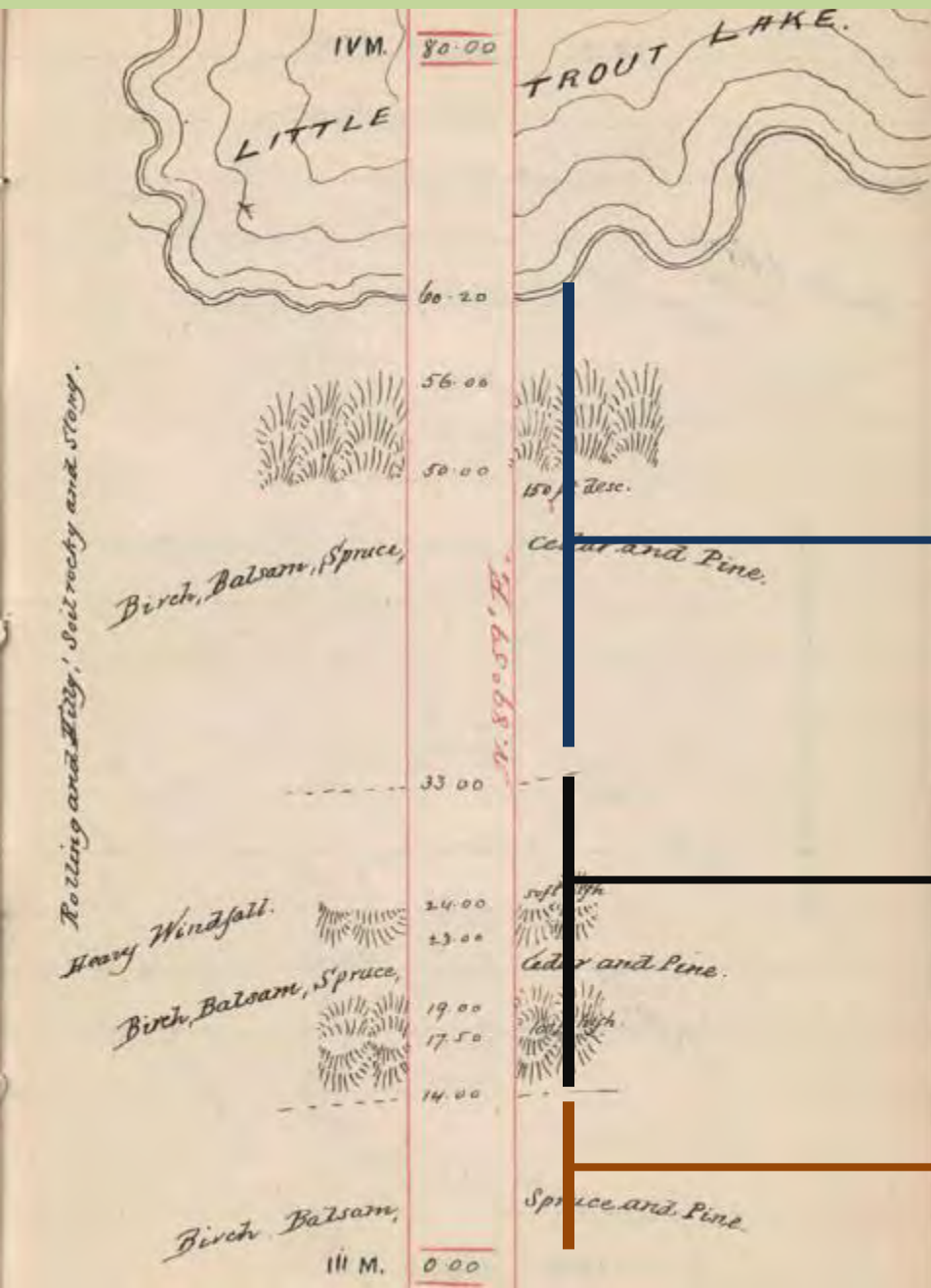
Zone d'étude



Méthodologie



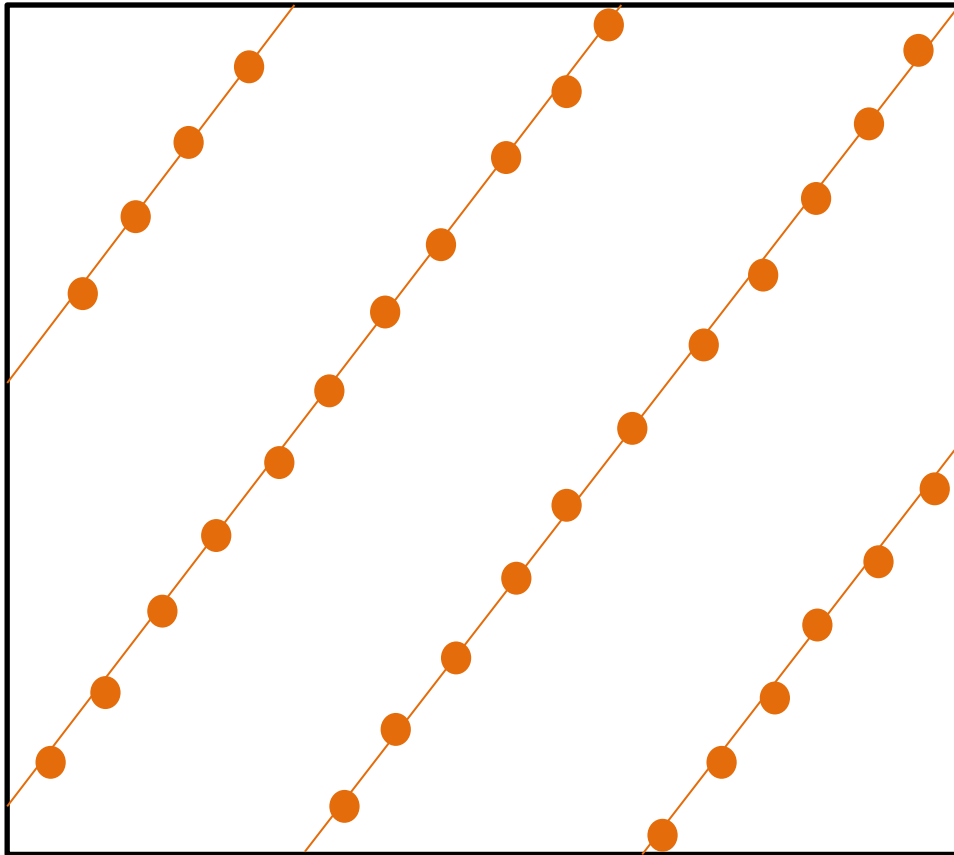
Méthodologie



Construction base de données
à partir des archives d'arpentage

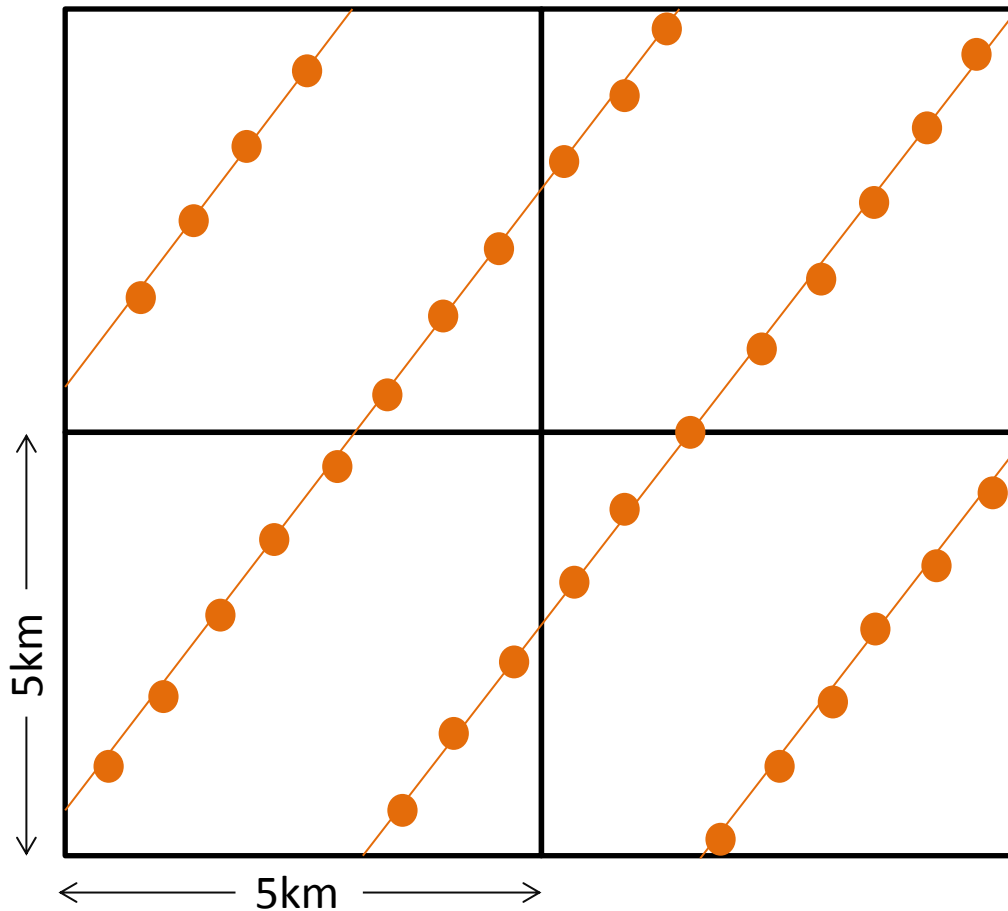
	birch	balsam	spruce	cedar	pine
	1	2	3	4	5
	1	2	3	4	5
	1	2	3		4

Méthodologie



- lignes d'arpentage
- observations historiques

Méthodologie



Dominance

% d'observation ou un taxon est donné dominant

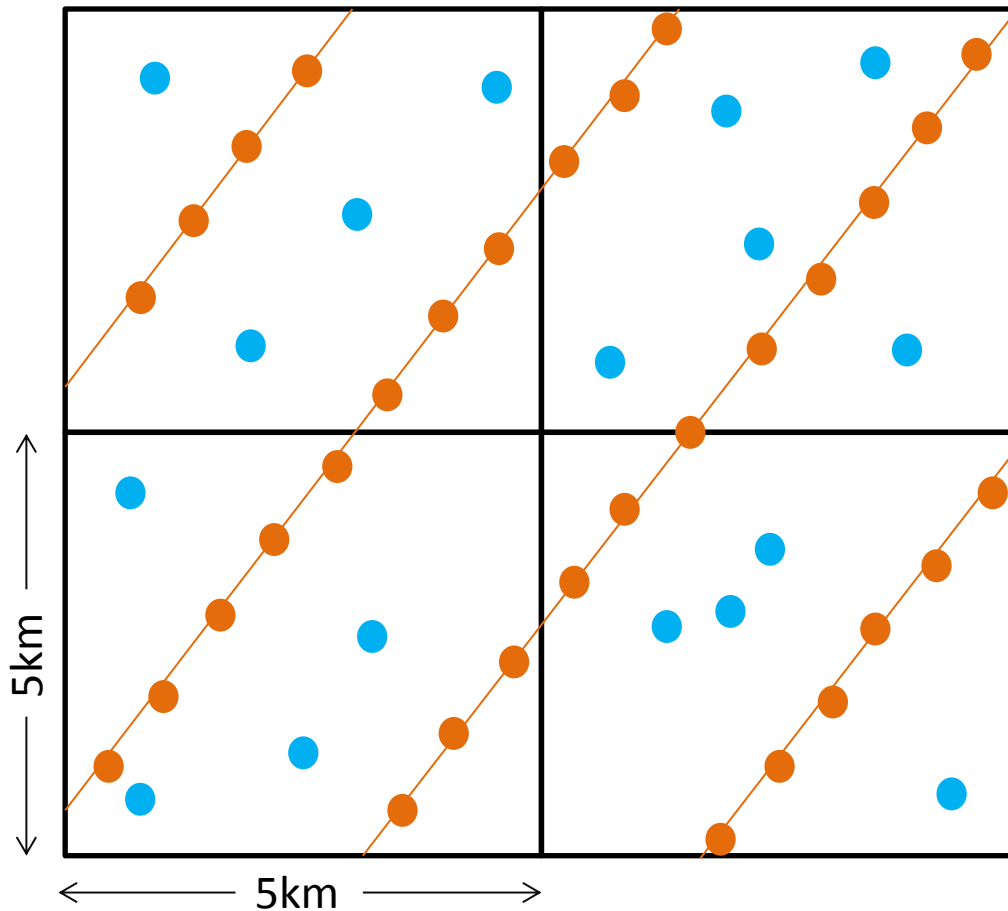
Fréquence

% d'observation ou un taxon est mentionné peu importe le rang

— lignes d'arpentage

● observations historiques

Méthodologie



Dominance

% d'observation ou un taxon est donné dominant

Fréquence

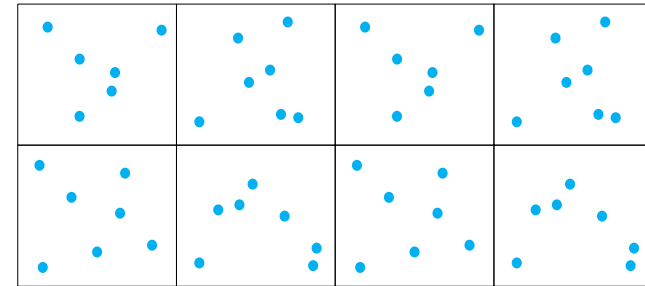
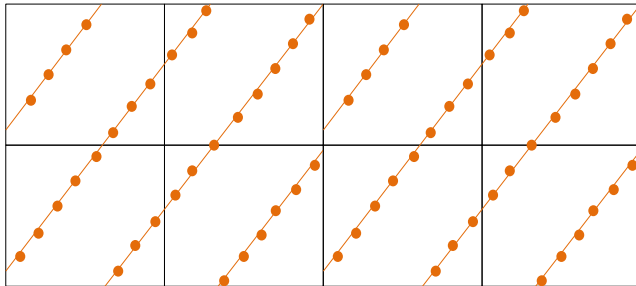
% d'observation ou un taxon est mentionné peu importe le rang

- lignes d'arpentage
- observations historiques
- placettes PET MRNF

Cluster a contrainte spatiale « *const.clust* » (Legendre 2011)

Analyse multivariée - déterminer des groupes géographiquement cohérents

1. Les indices de compositions préindustrielles et actuelles

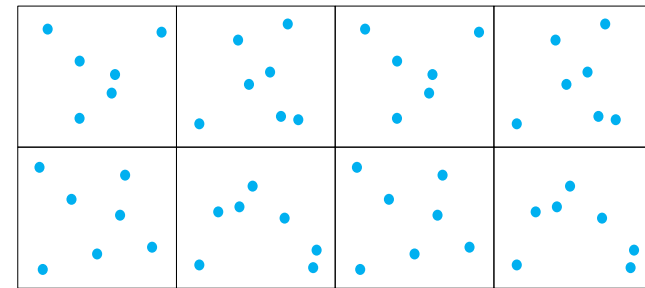
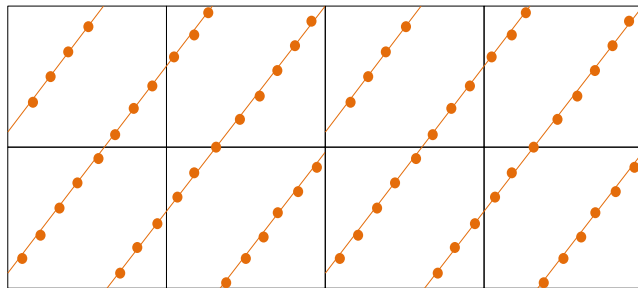


Méthodologie

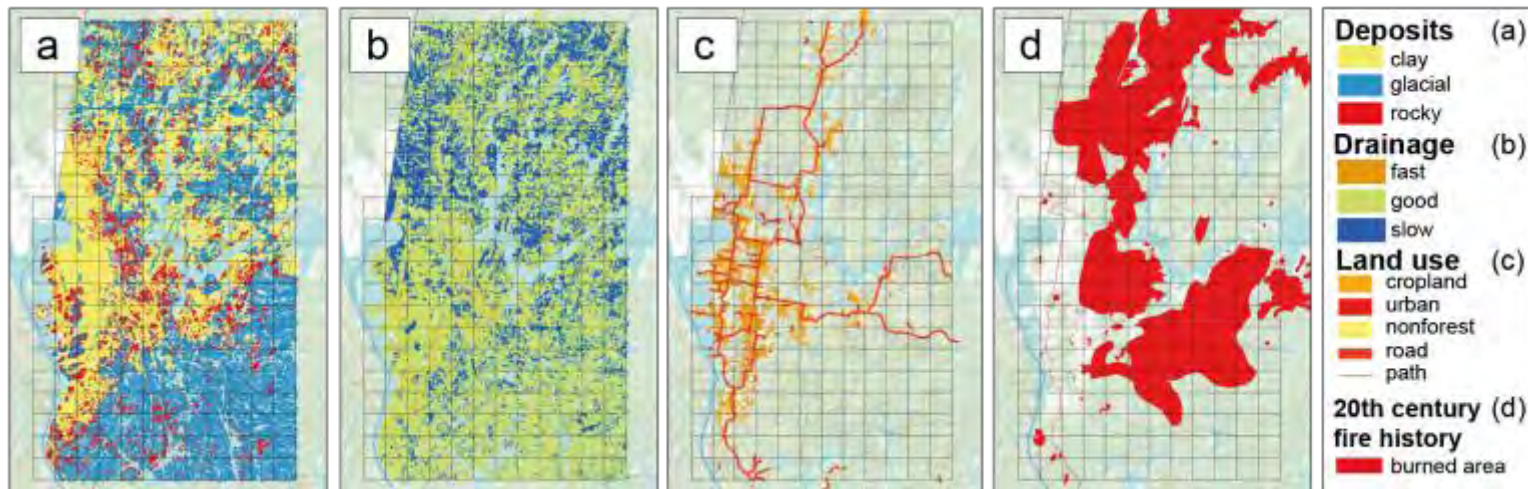
Cluster a contrainte spatiale « *const.clust* » (Legendre 2011)

Analyse multivariée - déterminer des groupes géographiquement cohérents

1. Les indices de compositions préindustrielles et actuelles



2. Les variables environnementales, d'usage des sols, et d'histoire des feux



Résultats - Discussion

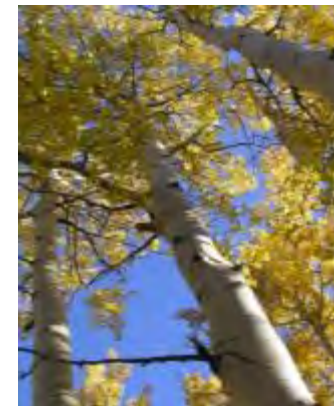
PREINDUS.

DOMINANCE	%
Spruces	46,46%
Fir	20,81%
Pines	5,16%
Cedar	3,10%
Larch	1,93%
Poplars	8,72%
W. Birch	7,28%
Y. Birch	1,69%
Maples	0,10%
Other	4,74%

FRÉQUENCE	%
Spruces	24,54%
Fir	22,11%
Pines	9,91%
Cedar	6,21%
Larch	2,51%
Poplars	7,81%
W. Birch	20,64%
Y. Birch	4,48%
Maples	0,34%
Other	1,45%

Composition préindustrielle

Dominance des Épinettes, du Sapin, des Peupliers et Bouleau blancs...



...forte fréquence du Bouleau blanc et des Pins



Résultats - Discussion

	PREINDUS.	ACTUELLE
DOMINANCE	%	%
Spruces	46,46%	18,88%
Fir	20,81%	12,96%
Pines	5,16%	8,02%
Cedar	3,10%	5,23%
Larch	1,93%	0,70%
Poplars	8,72%	28,64%
W. Birch	7,28%	15,40%
Y. Birch	1,69%	1,60%
Maples	0,10%	3,10%
Other	4,74%	5,47%

	%	%
FRÉQUENCE	%	%
Spruces	24,54%	16,69%
Fir	22,11%	16,45%
Pines	9,91%	5,63%
Cedar	6,21%	3,54%
Larch	2,51%	1,09%
Poplars	7,81%	14,74%
W. Birch	20,64%	18,33%
Y. Birch	4,48%	1,61%
Maples	0,34%	11,18%
Other	1,45%	10,75%

DOMINANCE



Peupliers, Bouleaux blancs



Épinettes, Sapins

FRÉQUENCE

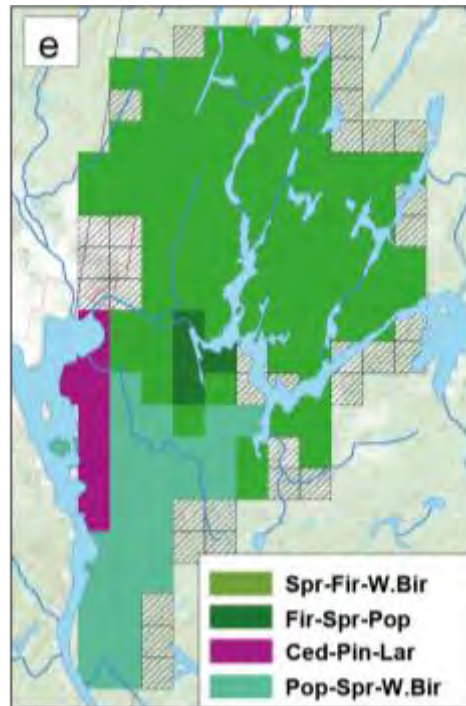
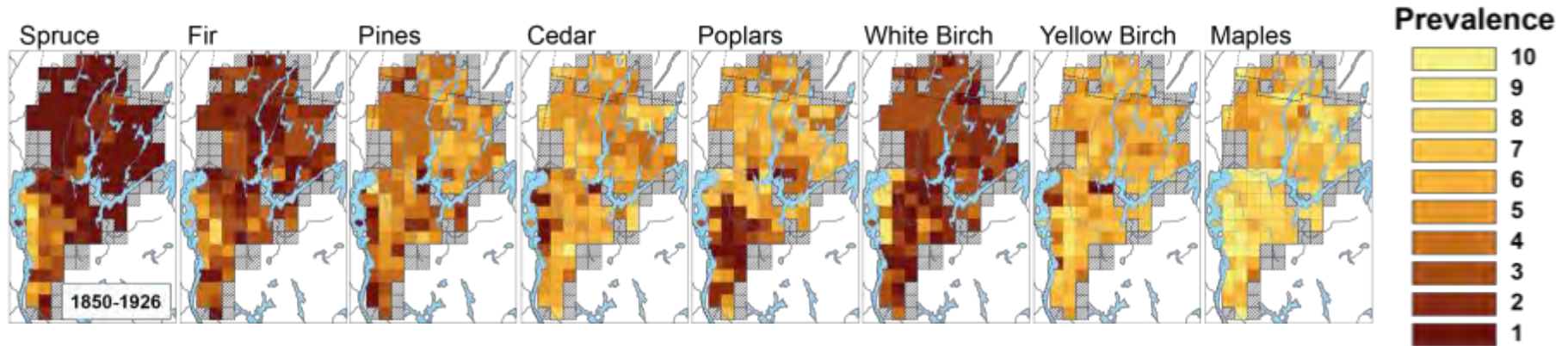


Peupliers, Érables

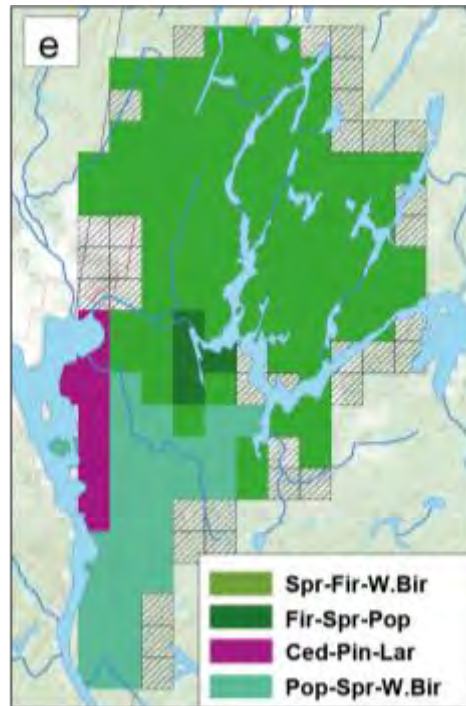
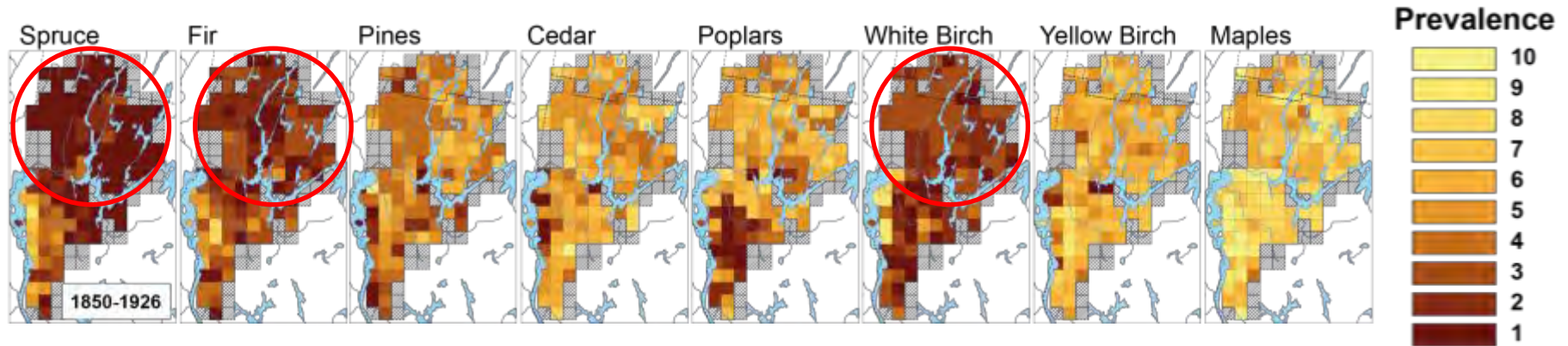


**Épinettes, Sapins, Pins, Cèdres
Mélèzes, Bouleau blancs, Bouleau
Jaunes**

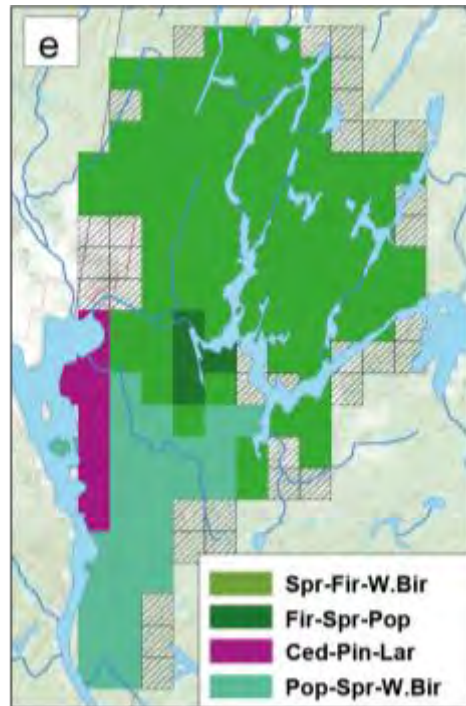
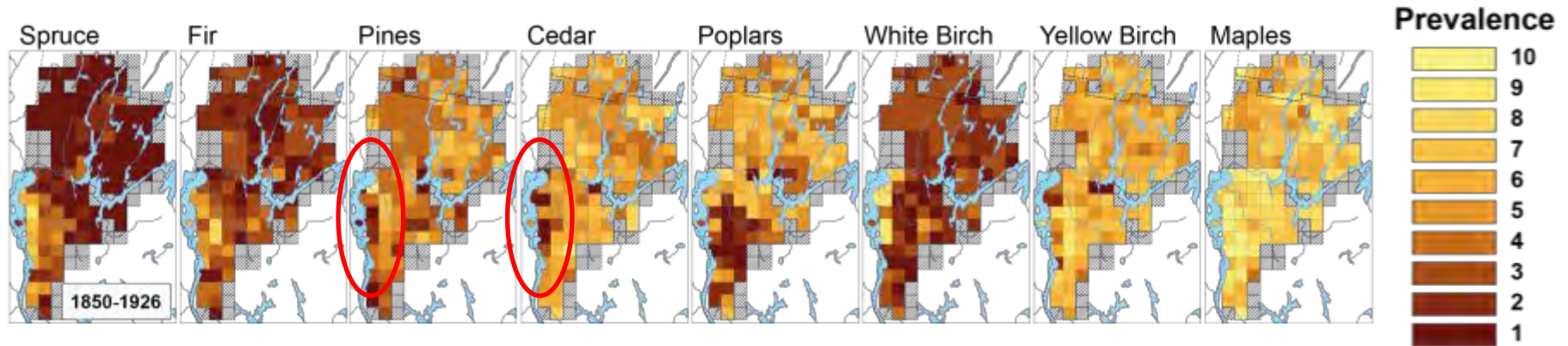
Résultats - Discussion



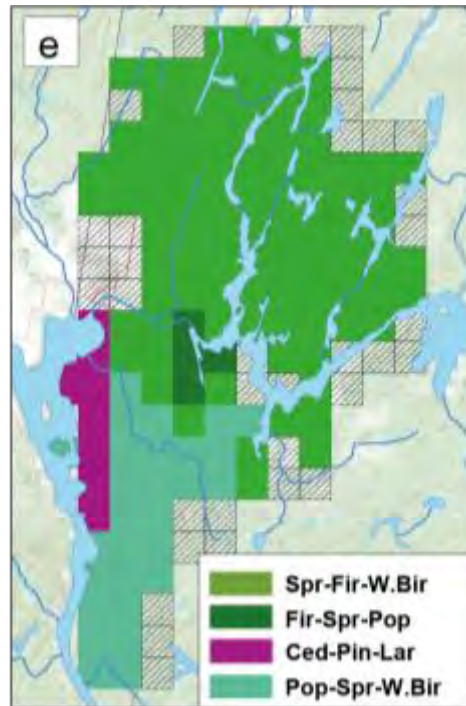
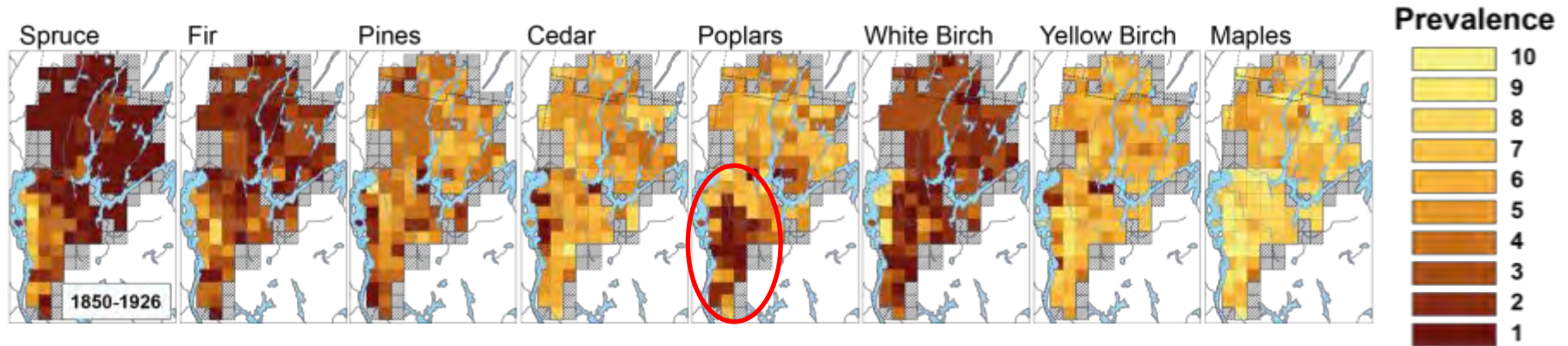
Résultats - Discussion



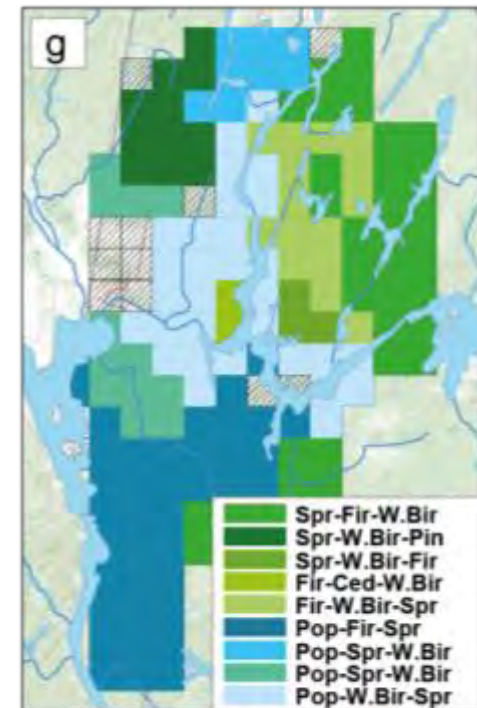
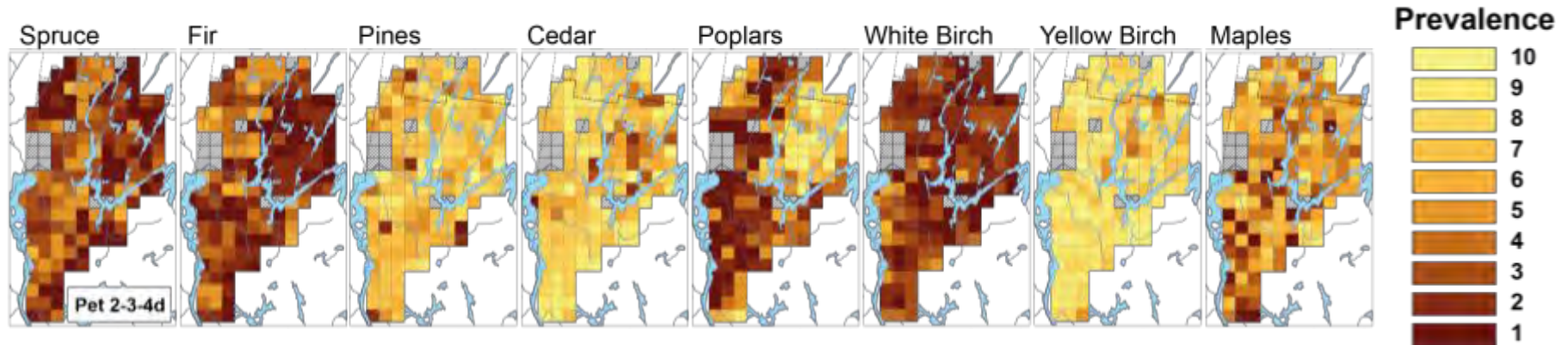
Résultats - Discussion



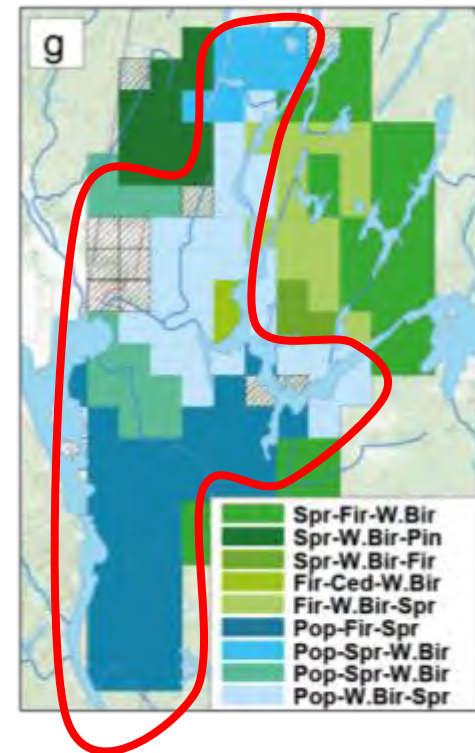
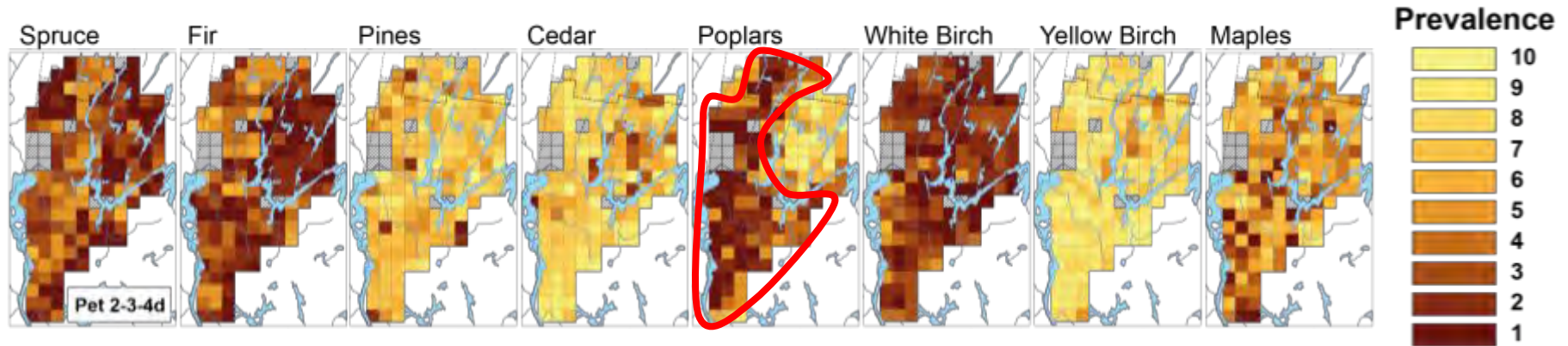
Résultats - Discussion



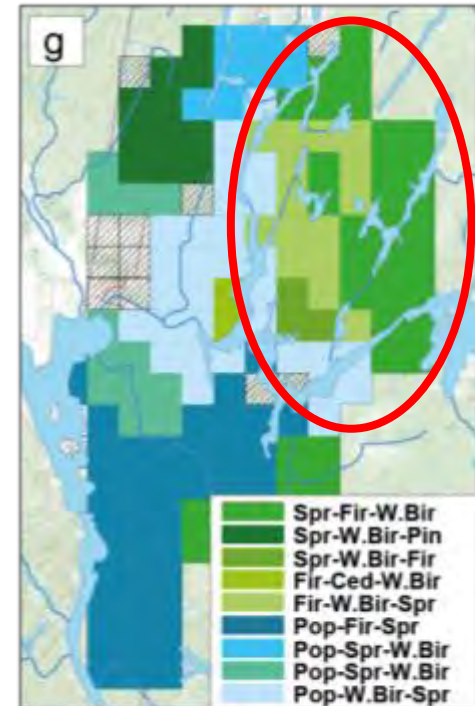
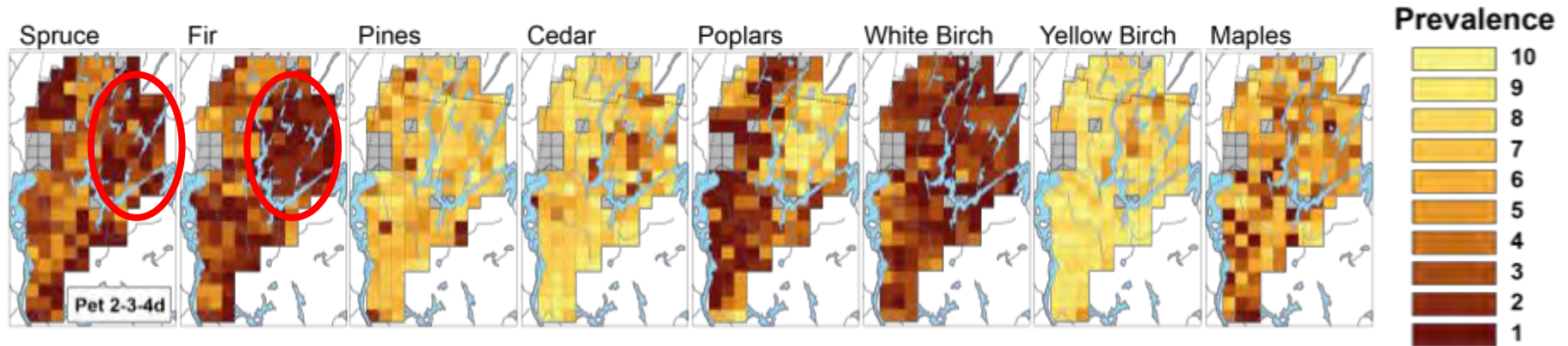
Résultats - Discussion



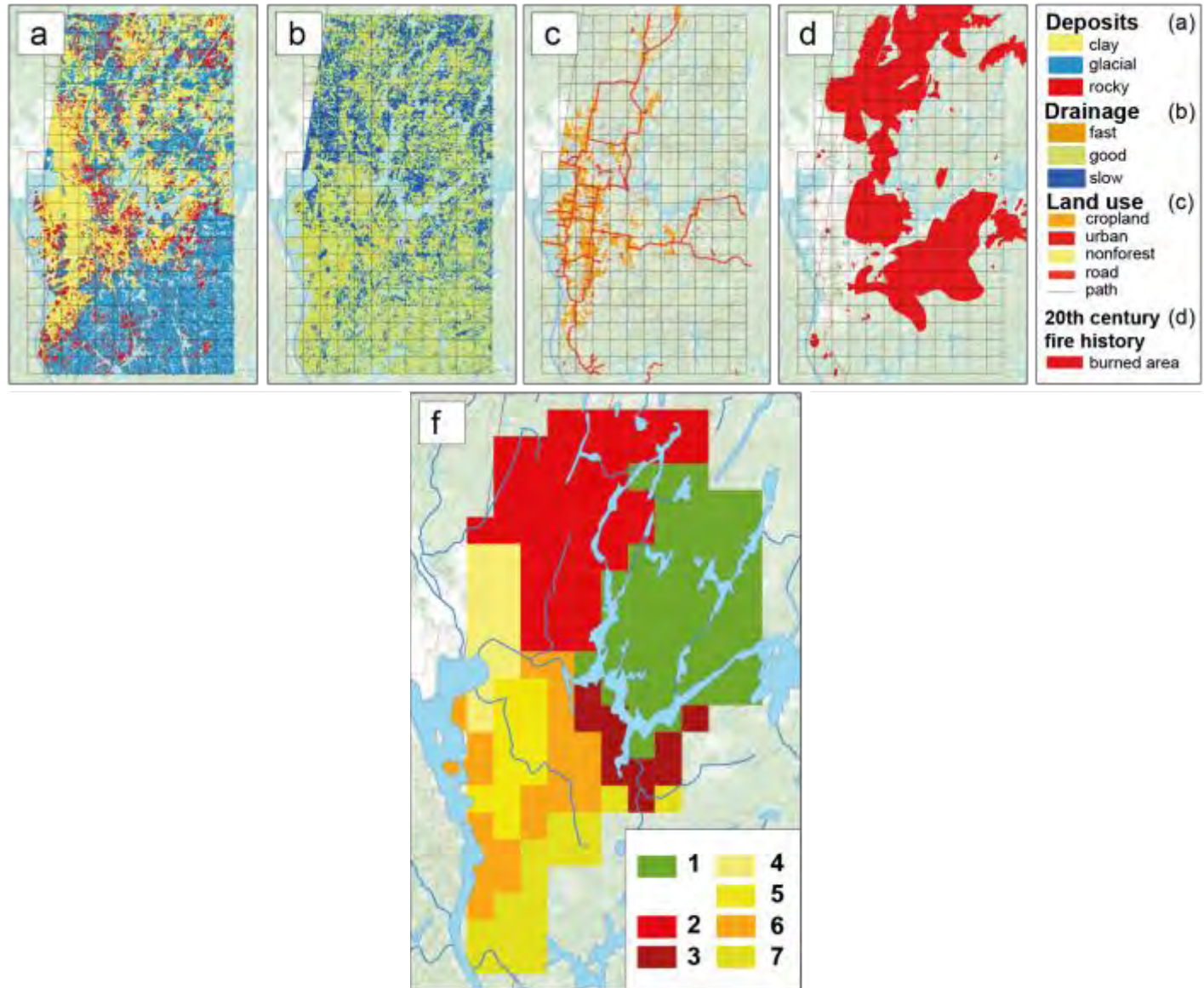
Résultats - Discussion



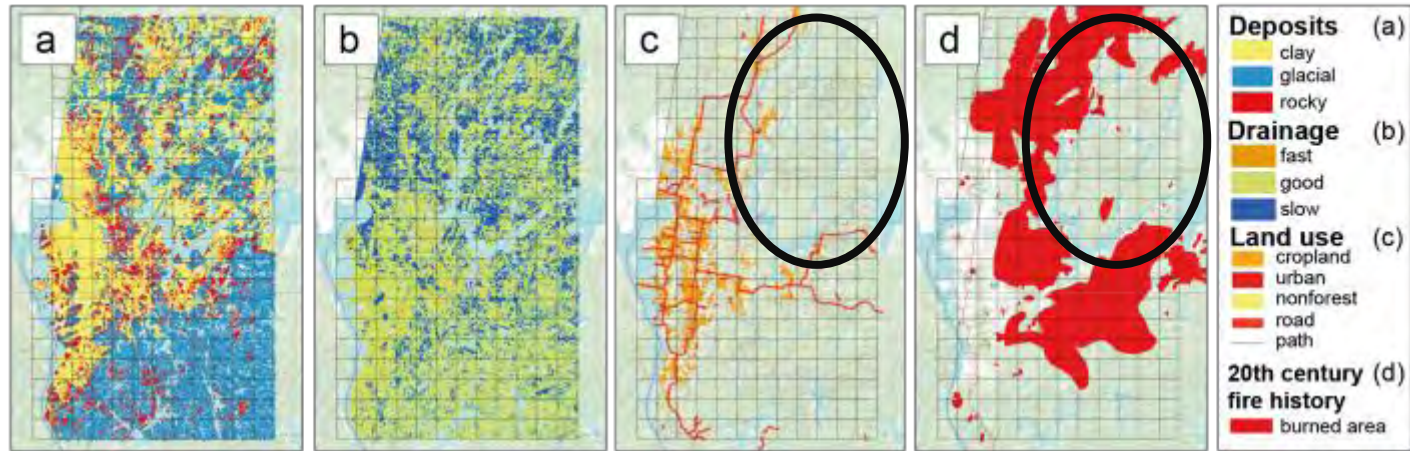
Résultats - Discussion



Résultats - Discussion

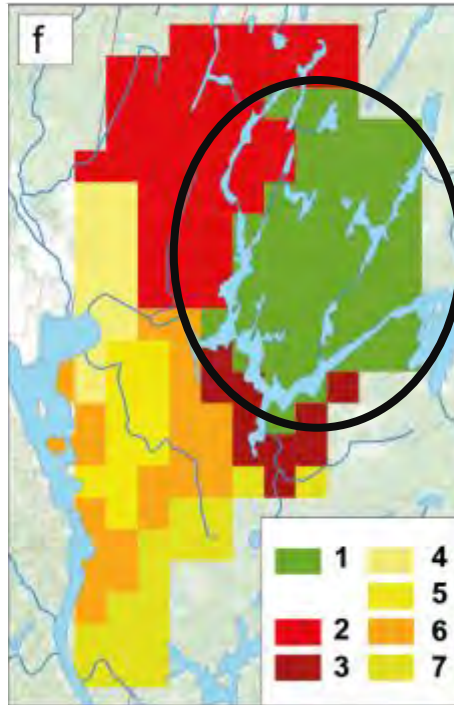


Résultats - Discussion

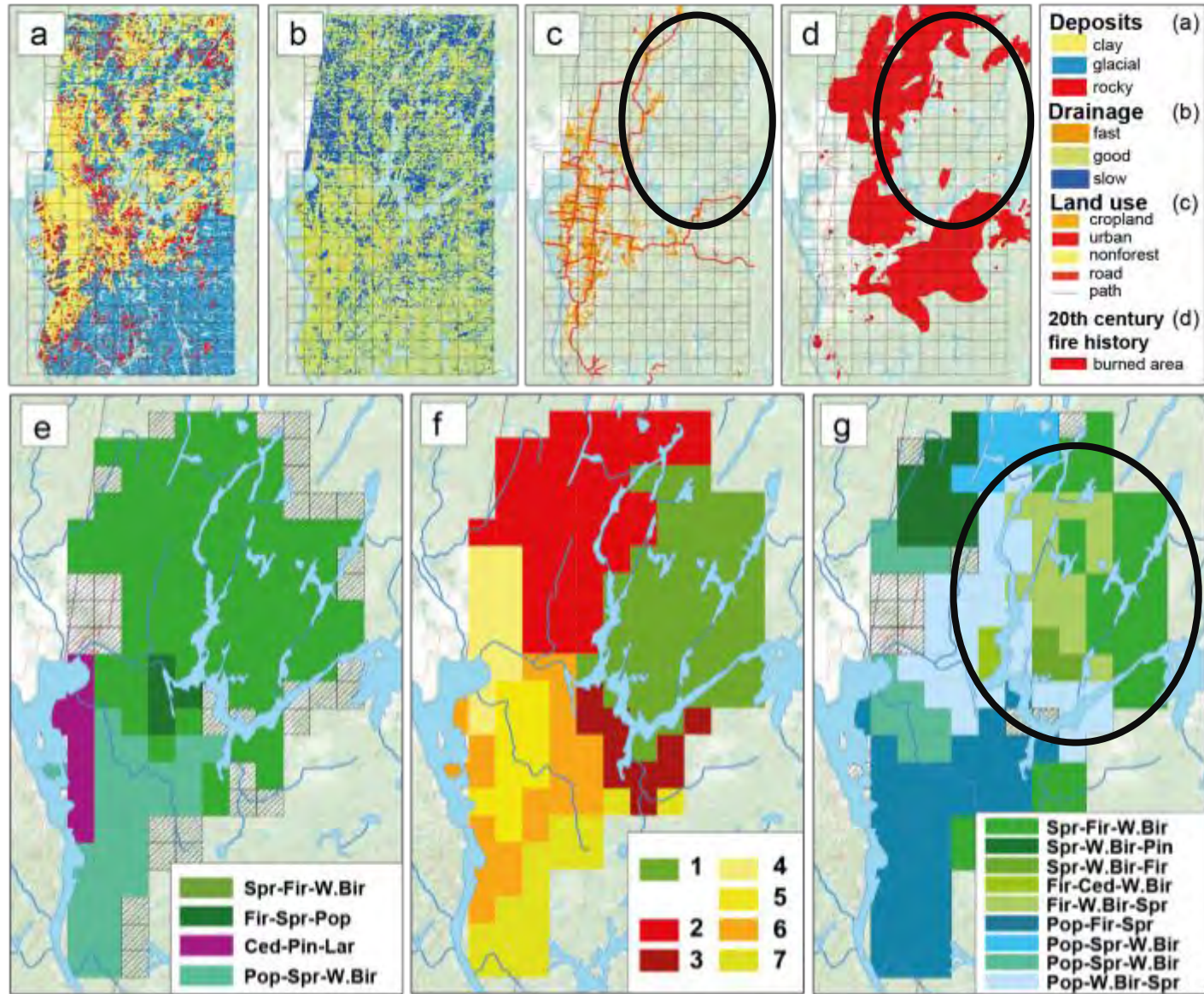


zone 1

*Pas brûlée,
pas colonisée ...*



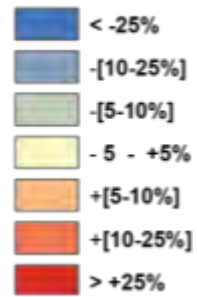
Résultats - Discussion



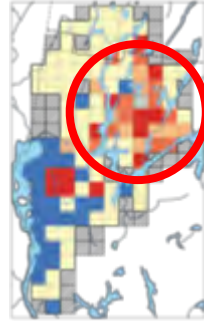
Résultats - Discussion

DOMINANCE

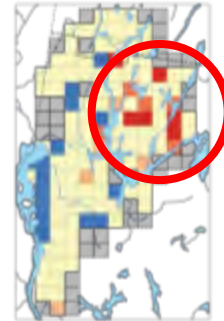
Difference



Cedar

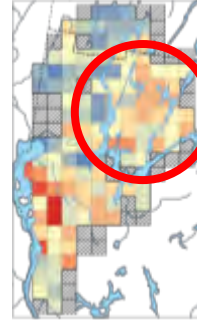


Yellow Birch

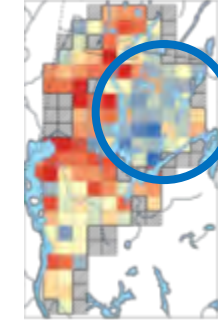


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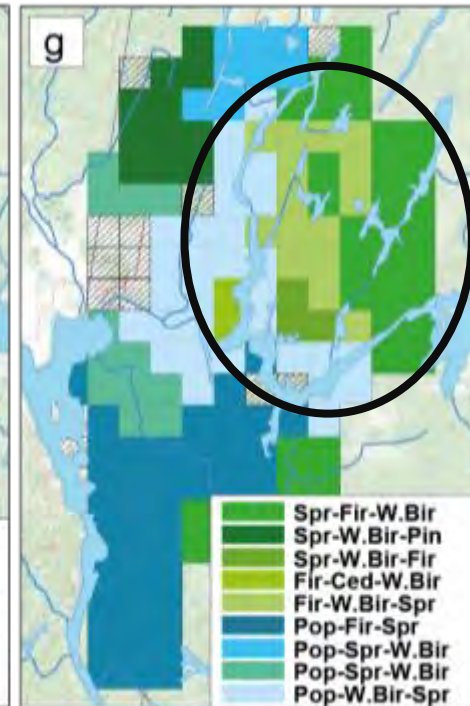
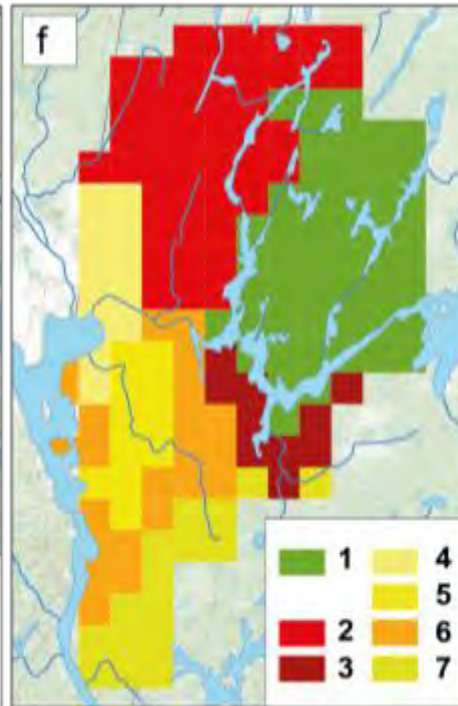
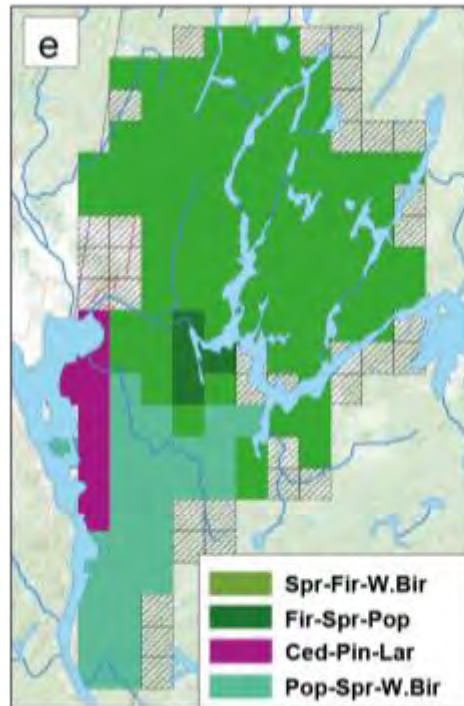
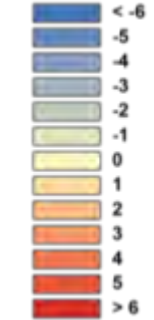
Fir



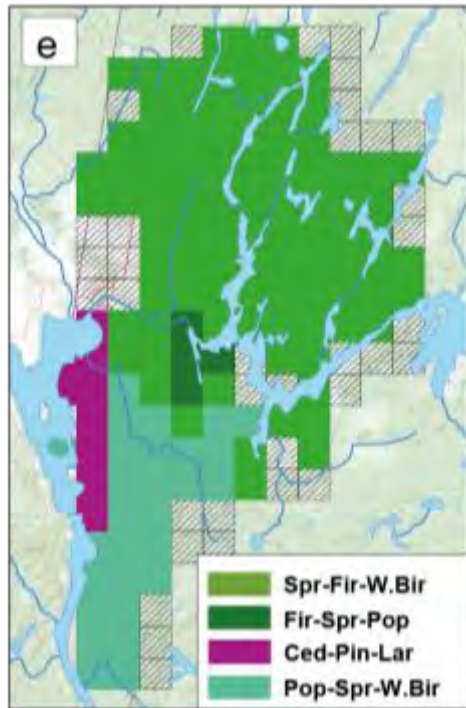
Poplars



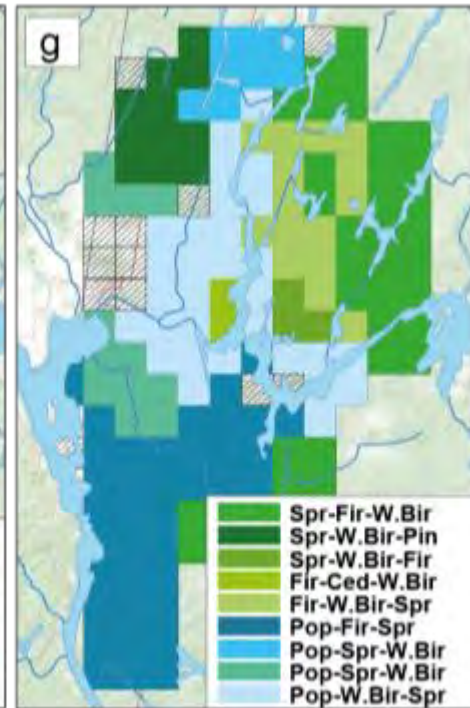
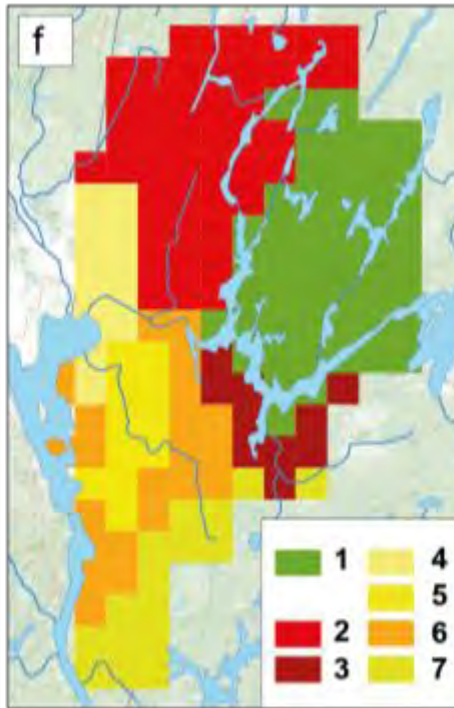
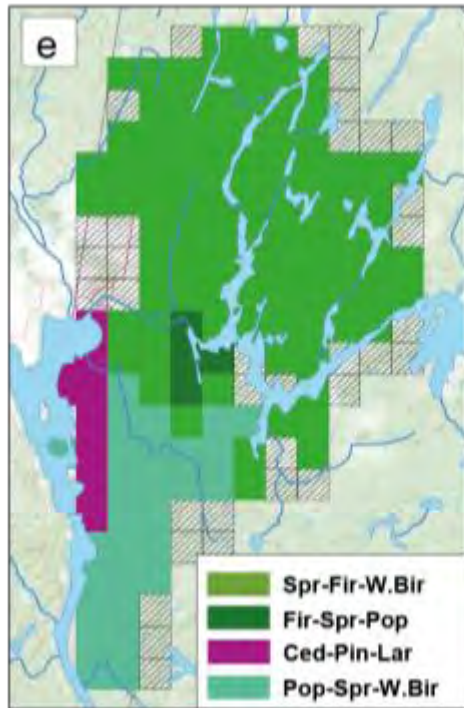
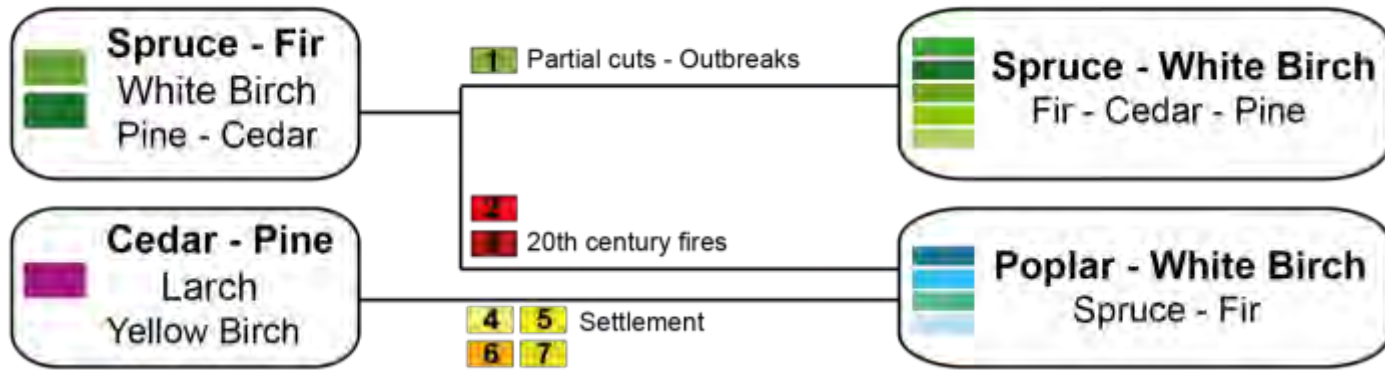
Difference



Résultats - Discussion



Résultats - Discussion



Conclusion

- 1 **Composition préindustrielle plus coniférienne : Épinettes, Sapin, Pins et Cèdres**
Enfeuillage de la forêt (Peupliers, Bouleaux Blanc et Érables)
- 2 **Intérêt du *clustering* sous contrainte spatiale**
Changements structurés a l'échelle du paysage



Conclusion

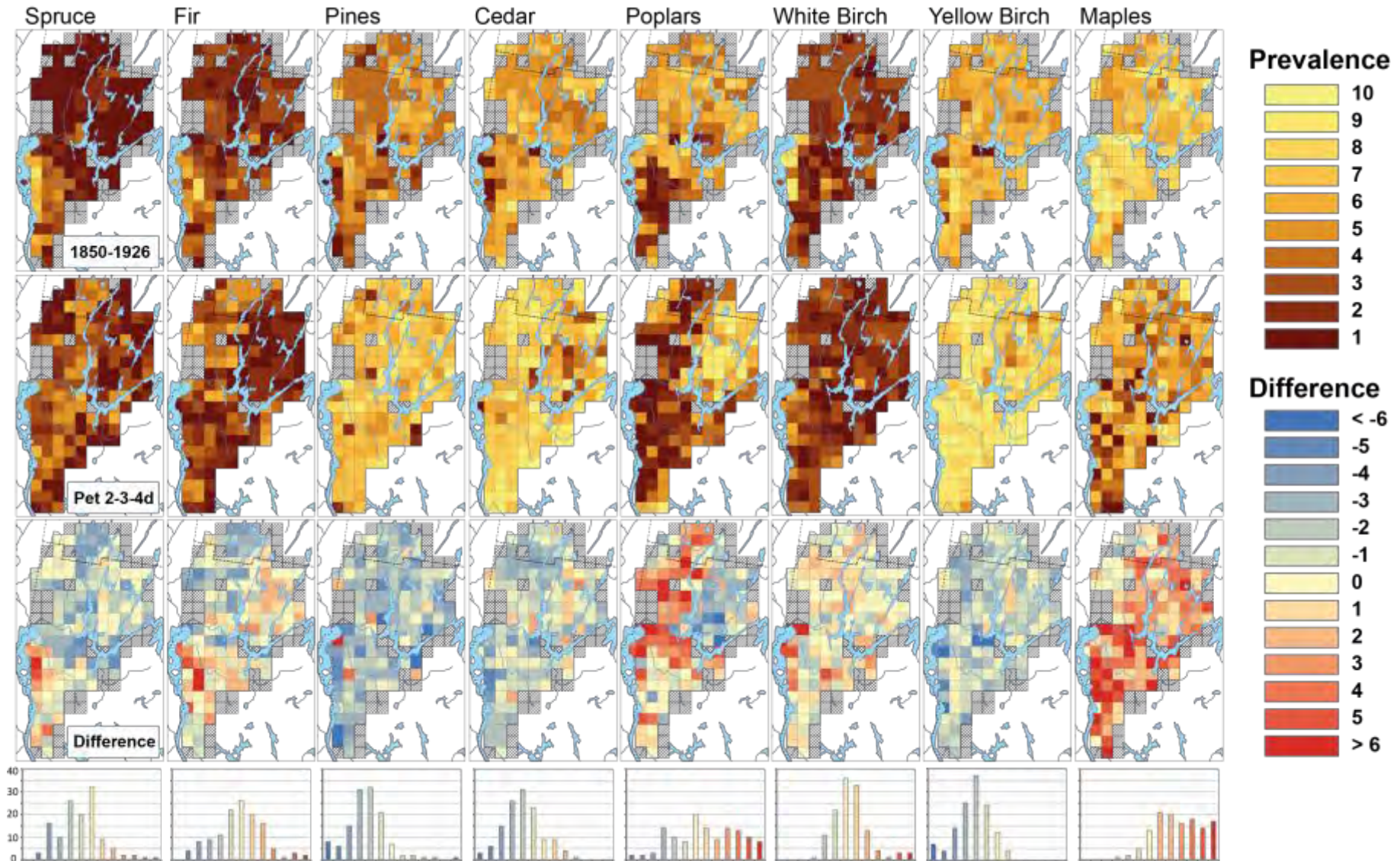
- 1 Composition préindustrielle plus coniférienne : Épinettes, Sapin, Pins et Cèdres
Enfeuillage de la forêt (Peupliers, Bouleaux Blanc et Érables)
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Changements structurés a l'échelle du paysage



Merci pour votre attention
à suivre ...

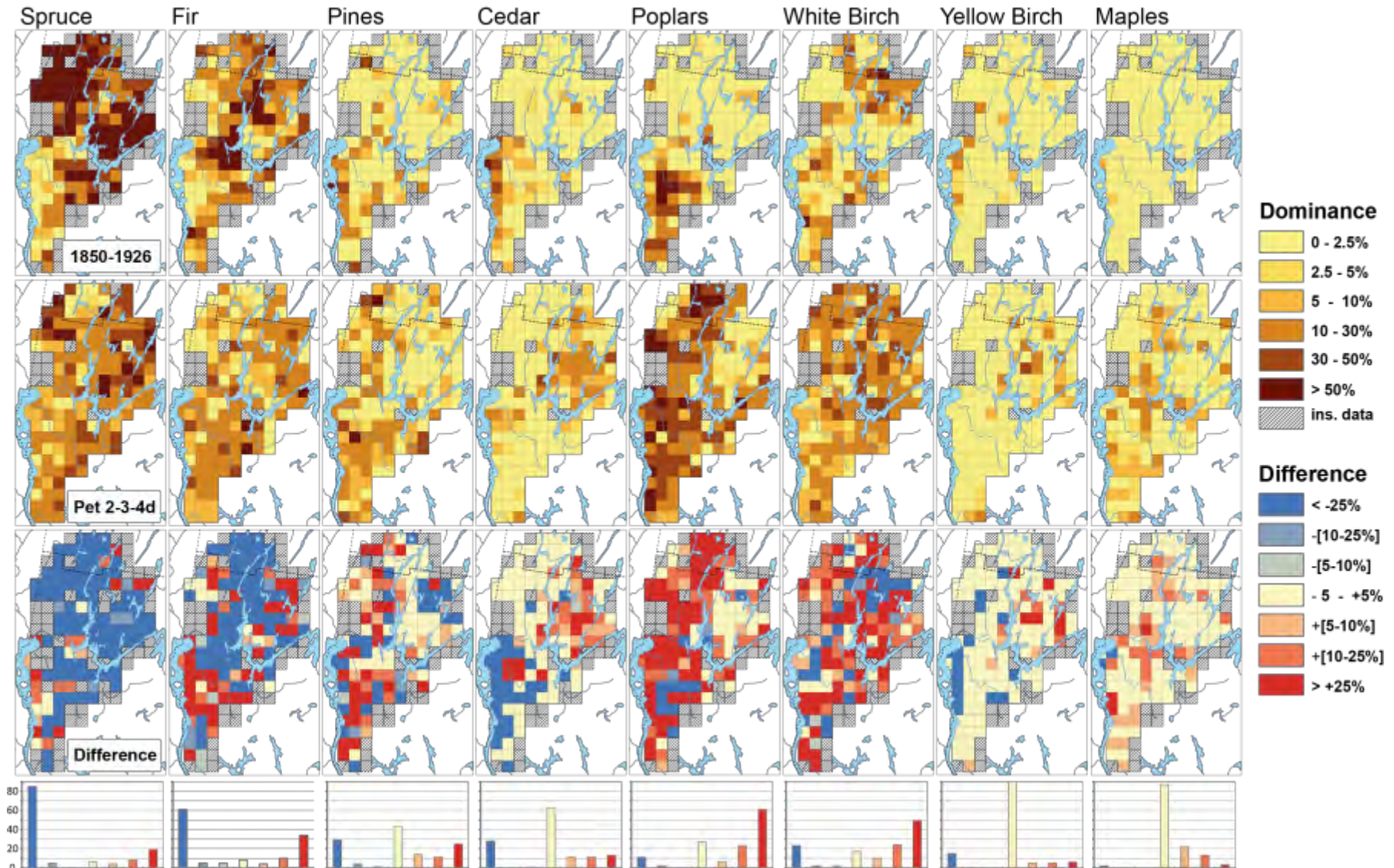
Résultats - Discussion

Prévalence (% d'absence/présence par cellules)



Résultats - Discussion

Dominance (% de mention en rang 1 par cellules)



Cluster variables environnementales, usages des sols et histoire des feux

FID	LACU	GLAC	ROCH	RAP	BON	LEN	AGRI	INFRA	ROUT	CHEM	FEU	X	Y
1	0,049741	0,681798	0,210181	0,017569	0,884869	0,097562	0	0,026543	1,651501	48,64019	0,523737	-820,508	403,3242
2	0,010748	0,762226	0,129465	0	0,817737	0,182263	0	0,031733	14,6661	20,52019	1,000000	-815,508	403,3242
3	0	0,877737	0,055195	0	0,847686	0,152314	0	0,039659	7,46827	6,623438	0	-810,508	403,3242
...
164	0,000726	0,668757	0,166959	0	0,77408	0,22592	0	0,078393	1,984686	9,542459	0	-815,508	408,3242

Cluster composition

FID	spruce	fir	pine	cedar	poplar	...	spruce	fir	pine	cedar	poplar	X	Y
1	0,116065	0,286559	0	0	0	...	0,402624	0,402624	0,325061	0	0	0,763184	403,3242
2	0,003585	0	0,159036	0,262591	0,021509	...	0,205946	0,149694	0,325315	0,355592	0,139402	0,598438	403,3242
3	0,053289	0,17338	0,030058	0	0,01265	...	0,237744	0,34362	0,233632	0,021947	0,021315	0,605863	403,3242
...
164	0,397158	0,383611	0,031803	0	0	...	0,695988	0,814784	0,39109	0,381805	0	-815,508	408,3242

Résultats - Discussion

Composition actuelle plus hétérogène a l'échelle du paysage

(Thompson et al. 2013)

