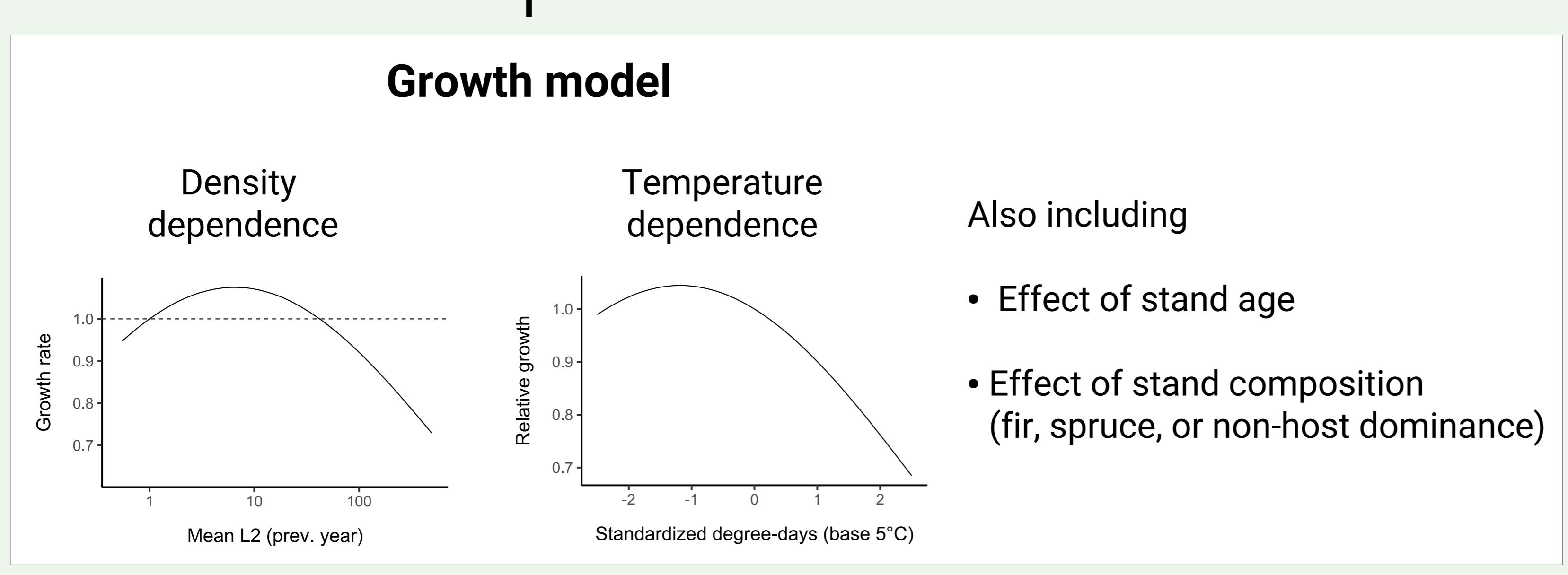
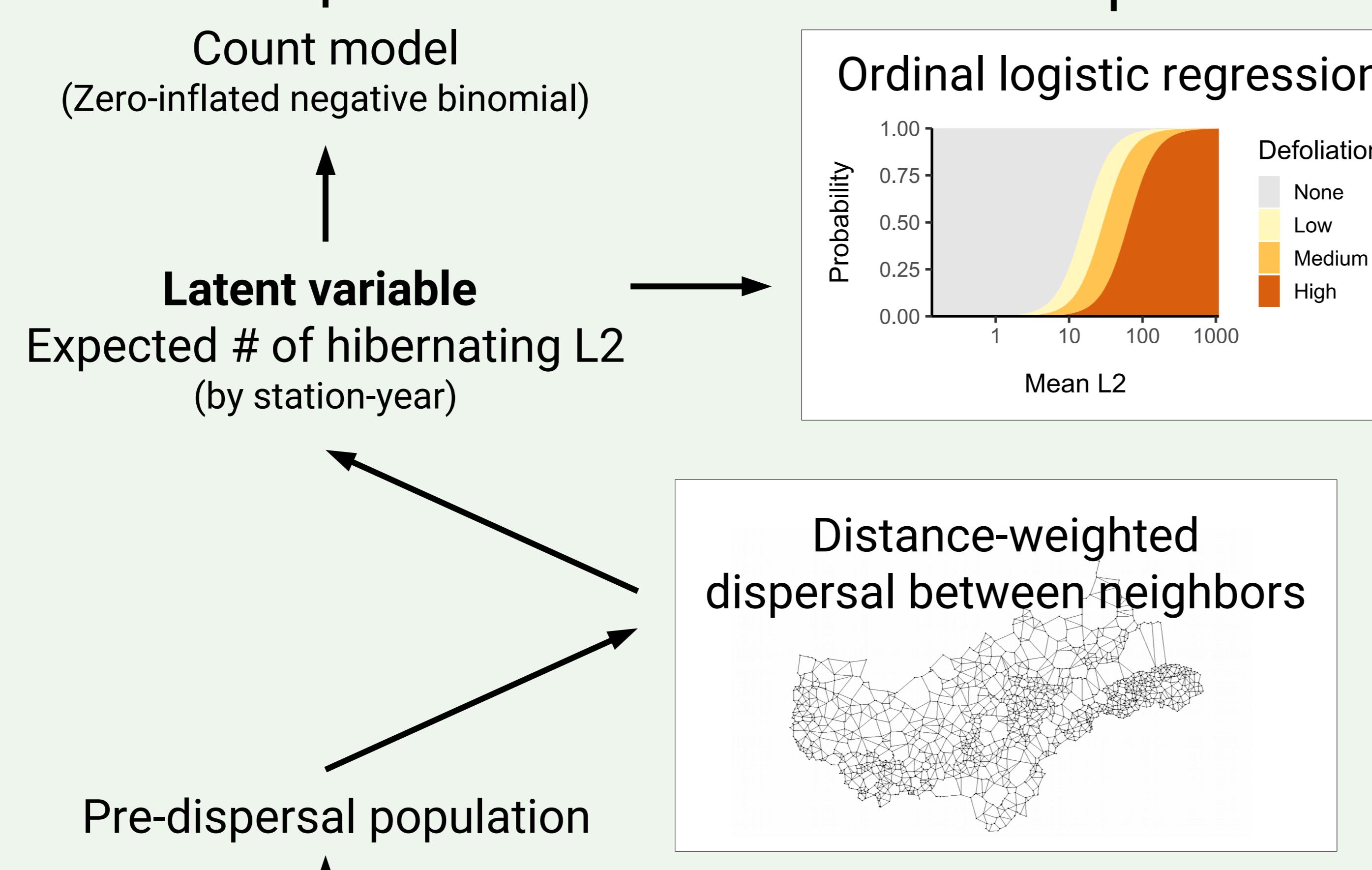
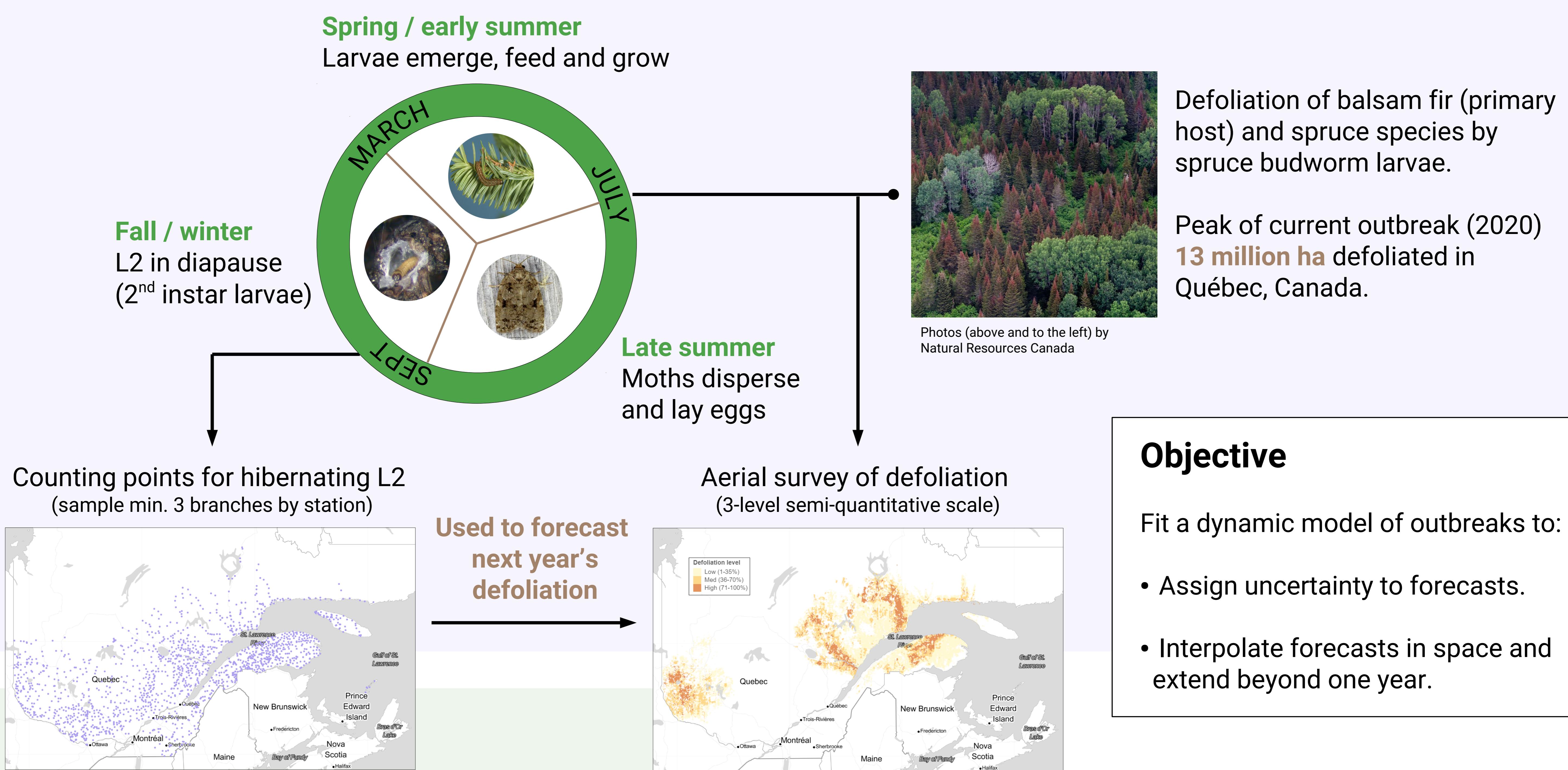


Integrating deep and wide data sources with process-based model blocks for ecological forecasts: the case of spruce budworm outbreaks

PROBLEM



Assessment and next steps

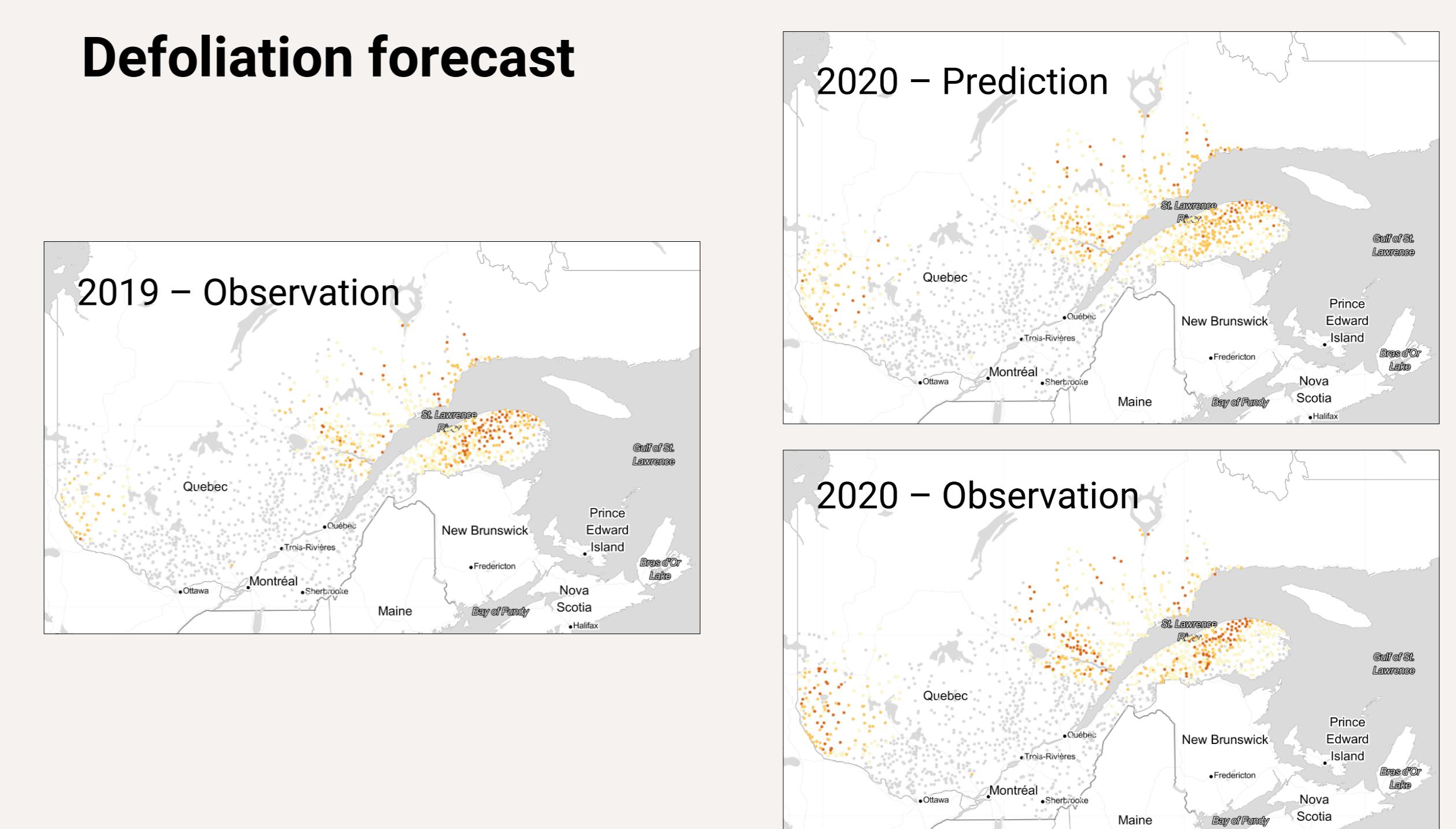
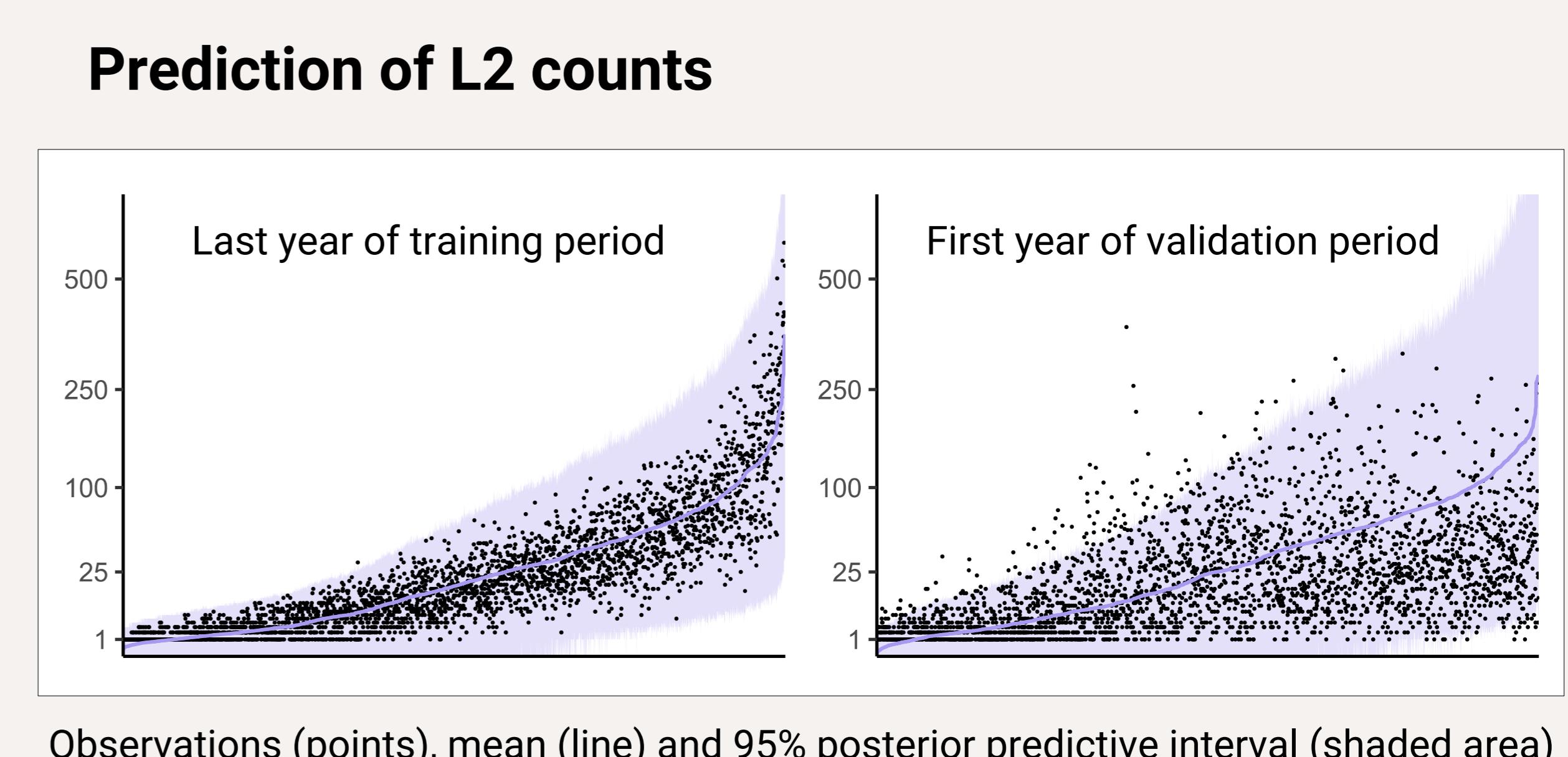
- The spatiotemporal population dynamics model provides a greater forecasting range (new sites, two years ahead), but its accuracy could be improved (e.g. add non-isotropic and population density-dependent dispersal by emulating output of mechanistic models).
- Model on a grid covering whole study area, instead of point sites (long computation times in current implementation of hierarchical Bayesian model in Stan).

This study is part of the project: "Forecasting spruce budworm activity in a climate change context".
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Students and postdocs: Max Debaly, Judicaël Osse, Anoj Subedi.

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RESULTS



Event	Model	2020		2021		Forecast year
		Y	N	Y	N	
New defoliation (8% of sites)	S T C	63	55	33	34	2020
	S T	63	54	33	34	2021
	T C	63	55	20	30	2020
	T	63	54	20	28	2021
	0	67	48	18	19	
Increased defoliation (9% of sites)	S T C	63	40	44	35	2020
	S T	63	41	42	36	2021
	T C	62	40	38	35	2020
	T	63	41	36	35	2021
	0	63	40	40	15	
Decreased defoliation (16% of sites)	S T C	40	36	44	30	2020
	S T	42	37	46	30	2021
	T C	40	36	46	28	2020
	T	43	37	48	28	2021
	0	44	35	42	48	

Recall (in %)
% of occurrences that were correctly predicted

Precision (in %)
% of predicted events that did occur

Model codes

S = spatial dynamics
T = temporal dynamics
C = covariates (climate/forest)
0 = base model (previous year L2 only)