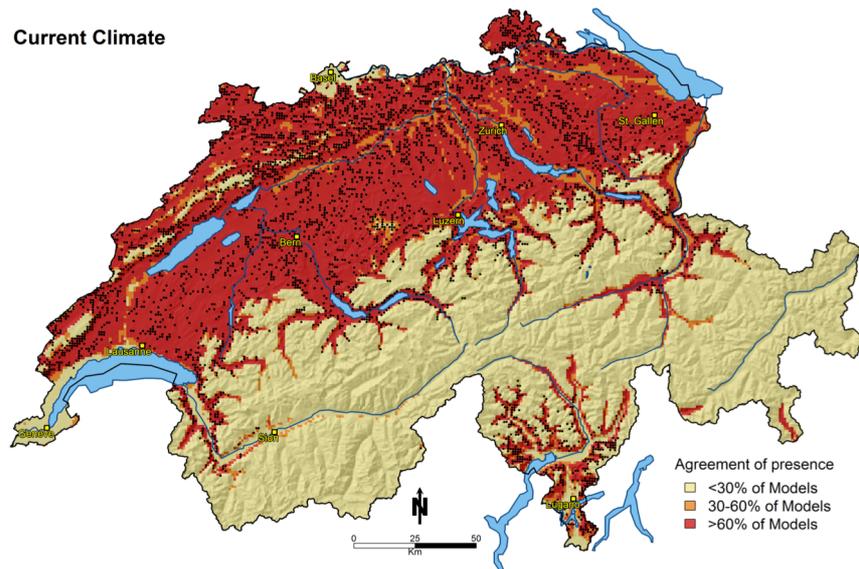


# *Fagus sylvatica*

## Description of model and ensemble projections

The current distribution of *Fagus sylvatica* is modelled to cover most of the Swiss Plateau, the Jura Mountains, and the Northern Pre-Alps. In addition, the species also grows at mid elevations in the Ticino and touches some of the inner Alpine valleys, as long as they are not too dry. The species has never migrated into the Poschiavo valley despite suitable climate. The species naturally inhabits primarily the lower and upper montane region and dominates the forests on the Plateau.

Under projected climate change using the A1B scenario, most combinations of statistical and regional climate models predict a successive disappearance of *F. sylvatica* on the Plateau, meaning that these regions represent soon climate conditions, under which no presence of *Fagus* is currently being observed. The species “escapes” to higher altitudes. Yet, see the growth analyses (Appendix S2) for alternative views on the future of *Fagus* on the Swiss Plateau until 2100.



**Figure 1.** Current distribution (black dots) from the Swiss National Forest inventory (LFI 1) and simulated habitat suitability under current climate as calibrated from forest inventory data across the Alps (MANFRED project).

## Synthesis and Conclusions

The model fits the distribution of *Fagus sylvatica* well, and can be considered a credible model to project the future habitat suitability of *Fagus*. The ensemble models project a 19% overlap between the current and the future range in Switzerland and even higher overlaps (58%) in Europe. This is a much higher overlap than previously modeled (Zimmermann *et al.* 2006). The difference mostly originates from using less extreme climate scenarios in this report. Here we used the A1B scenario, a moderate scenario from the fourth IPCC assessment report (IPCC 2007). The previous simulations were based on the 3<sup>rd</sup> assessment report (IPCC 2001), where the A1FI scenario was much more extreme compared to the current A1B.

However, the species will lose much of its range and the future range is much smaller than the current one (51% and 63% for Switzerland and Europe, respectively). However, the species is not particularly threatened, and will still find sufficient suitable habitat, both in Switzerland and in Europe. As a preferred timber, it might profit from assisted migration to higher altitudes, where necessary. There may be provenances (originating from the South of the Alps) that might be characterized by higher drought tolerance than the northern Alpine provenances, and these might be suitable alternatives to improve the drought adaptation of the species north of the Alps.

The disappearance on the Swiss Plateau means, that the future climate is warmer (and partly also drier) than any observed current distribution of *Fagus*. On the other hand it might take 100s if not 1000s of years, until the species is outcompeted by immigrating competitors, such as oak species. Until 2050, and despite projections of habitat loss on the Plateau, the climate will probably not be extreme enough to drive *Fagus* to extinction. The growth analyses (S2) indicate that under a warming climate, *Fagus* thrives well, as long as summer precipitation is not declining.

### Range change statistics

	CH	Europe
<b>Current range size [km<sup>2</sup>]</b>	17'678	95'695
<b>Future (2080) range size</b>	8'992	61'013
<b>Range Change 2080/2000 [%]</b>	50.8%	63.7%
<b>Overlap 2000/2080 [km<sup>2</sup>]</b>	3'383	55'139
<b>Overlap/current range [%]</b>	19.1%	57.6%

References

IPCC (2001) *Climate Change 2001: The Physical Science Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change* Cambridge University Press, Cambridge, UK and New York, NY, USA.

IPCC (2007) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* Cambridge University Press, Cambridge, UK and New York, NY, USA.

Zimmermann NE, Bolliger J, Gehrig-Fasel J, et al. (2006) Wo wachsen die Bäume in 100 Jahren? In: *Wald und Klimawandel* (ed. Wohlgemuth T), pp. 63-71. WSL, Birmensdorf, Schweiz.

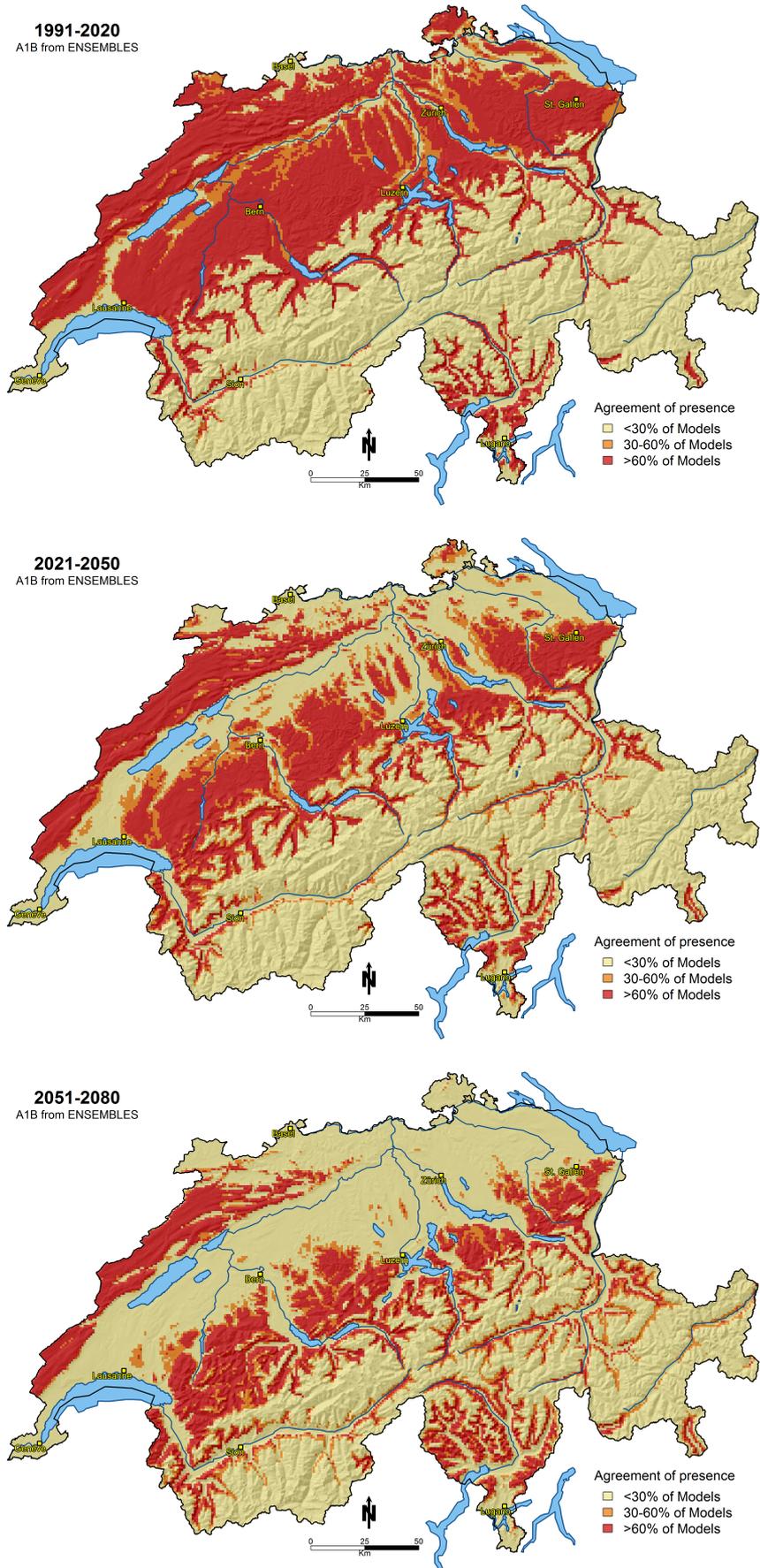


Figure 2: Ensemble of projected future ranges of suitable habitat as modeled from six RCMs and six statistical models. Light yellow colors indicate that all climate & statistical model combinations project absence of the species, while dark red colors indicate presence. Orange colors indicate uncertainty regarding habitat suitability.