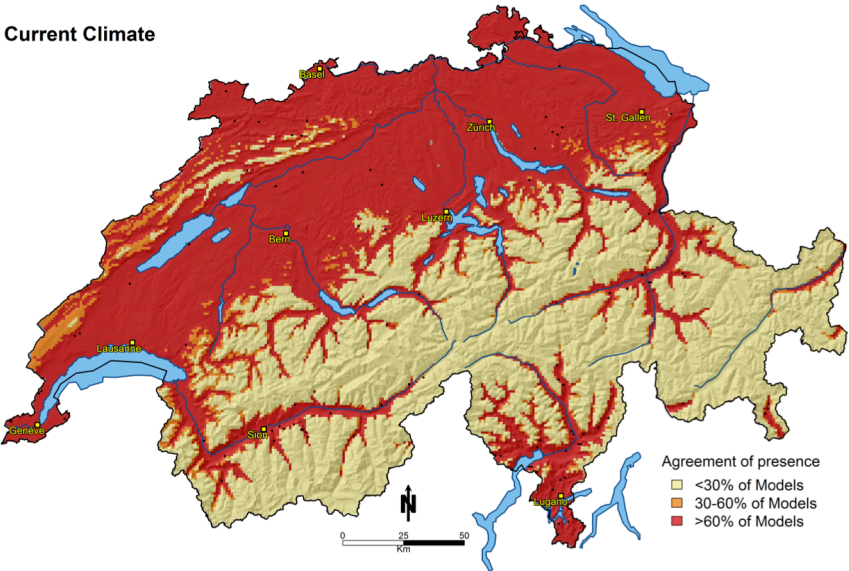


# *Populus tremula*

## Description of model and ensemble projections

The distribution model of *Populus tremula* is modelled to cover all lower altitudes in Switzerland under current climate conditions up to an elevation of ca. 1400 m a.s.l. and partly even beyond. The species is not demanding with regards to soil conditions and can grow on almost every soil. It also is projected to occur in the more oceanic climates north of the Alps, as well as in the more continental interior Alps, or the sub-mediterranean to insubric regions south of the Alps.

Under expected climate change using the A1B scenario, most combinations of statistical and regional climate models predict a rapid spread to higher altitudes, meaning that these altitudes soon represent suitable conditions for the species up to ca. 2000 m a.s.l. and even beyond.



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

## Synthesis and Conclusions

The model fits the distribution of *P. tremula* well, and can be considered a credible model to project the future habitat suitability of the species. The ensemble models project a 100% overlap between the current and the future range in Switzerland and a range size increase of ca. 36%. No similar statistic is available for Europe.

The species will not suffer much threat from climate change. It is the fastest growing species in Europe, and reaches its maximum size already at the age of 60 (usually reaching merely 100 years of age). It is very shade intolerant, and cannot even regenerate under its own canopy. Under darker canopies such as beech, oak or spruce forests, regeneration is neither possible. Yet, it has very effective wind-based seed dispersal, which allows the species to rapidly spread across large landscape. In a simulation study that has compared realistic migration rates of many different tree species in Europe under combined climate and land use change scenarios, *P. tremula* was least affected by time lags in the response to simulated climate change (Meier *et al.* 2012). It was almost able to track climate change at the projected climate velocity, and thus didn't show much difficulties in re-adjusting to changing climate conditions.

*P. tremula* is a true pioneer species with no specific requirements regarding soil conditions, given that it is not too cold. The species will face least difficulties in response to climate change. It has currently not much economic value in Switzerland, although in other regions (e.g. Italy) it is planted for fiber production. Due to its easy regeneration under almost all future temperature and moisture conditions, it might receive more economic attention in a warmer and drier climate on the Swiss Plateau. It has very high ecological value as food source for many native butterfly species, especially not yet grown to full size.

Range change statistics		
	CH	Europe
Current range size [km²]	21'145	–
Future (2080) range size	28'756	–
Range Change 2080/2000 [%]	136.0%	–
Overlap 2000/2080 [km²]	21'145	–
Overlap/current range [%]	100%	–

References

Meier ES, Lischke H, Schmatz DR, Zimmermann NE (2012) Climate, competition and connectivity affect future migration and ranges of European trees. *Global Ecology and Biogeography* 21, 164-178.

