

Ulmus glabra

Description of model and ensemble projections

The current distribution of *Ulmus glabra* is projected to occur in a scattered manner throughout the Plateau and the Jura Mountains, as well as in Southern Switzerland in the lower regions of the Ticino. The model quality is not very good, and the different models disagree quite a bit when projecting the spatial distribution of the species. The reason for this is the very high variability of presence and absence under current conditions on the Swiss Plateau. The species is not found steadily in plots that seem suitable, and therefore some regions are not well modelled.

Under projected climate change using the A1B scenario, most combinations of statistical and regional climate models predict a retreat from the Plateau and from the lowest altitudes in the Ticino and a spread of *U. glabra* to higher altitudes both in the Northern Pre-Alps and in the Jura as well as in the Ticino. This means that these regions will soon harbor climate conditions, under which *U. glabra* will find suitable habitats.

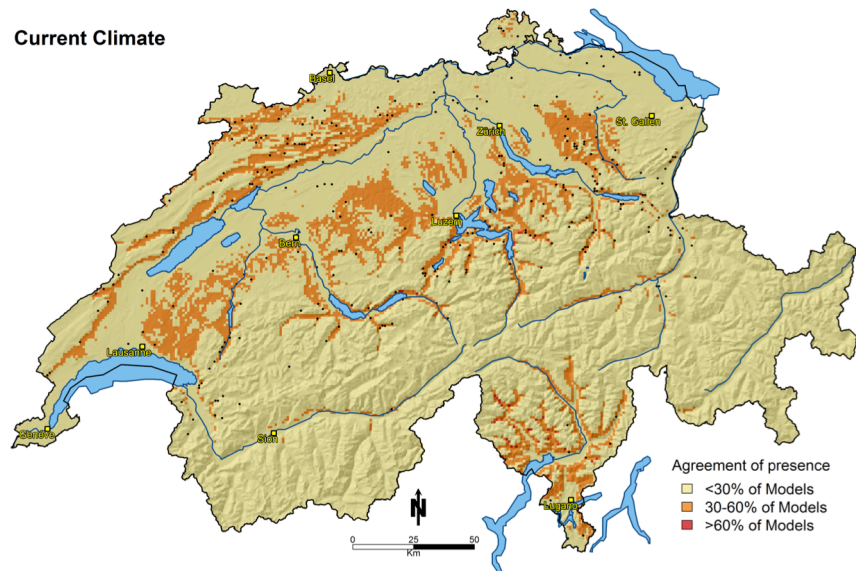


Figure 1. Current distribution (black dots) from the Swiss National Forest inventory (LFI 1) and simulated habitat suitability under current climate as calibrated from forest inventory data across the Alps (MANFRED project).

Synthesis and Conclusions

The model of *U. glabra* cannot be considered a very credible model to project the current and future habitat suitability of the species. It provides the general area of the species well, but not the detailed local distribution. *U. glabra* is very demanding regarding soil conditions, and requires moist/humid, and nutrient-rich soils. The range statistic for this species is not very meaningful, due to the fact that pan-European models have not been fitted (no data available for ICP Level I data). For Switzerland, the range size is projected to remain approximately of the same size. However, there is only a very small range overlap of 5% between the current and projected future ranges.

The species will likely spread to cooler sites, and the Swiss Plateau and the Southern Ticino will, in many places, become too dry for the species to survive. Once the climate becomes warmer and drier in summers, as it has in many sub-mediterranean and colline regions already. It is an invasive, light-demanding species that rapidly colonizes ruderal habitats and forest canopy gaps. Due to its nitrogen high fixation (*Fabaceae*), it can generate nutrient rich soils that – in combination with the high light levels on the ground under *U. glabra* canopies – are soon overgrown by dense herb and liana coverage, which inhibits further the regeneration of other forest trees.

The species need massive support through forest management, as it only grows well on humid, nutrient rich soils and is not a very good competitor. It is outcompeted in many locations and rarely reaches high abundance in forest plots, which makes it difficult for the species to accumulate critical mass for migration.

Range change statistics		
	CH	Europe
Current range size [km ²]	5'954	–
Future (2080) range size	4'607	–
Range Change 2080/2000 [%]	77.4%	–
Overlap 2000/2080 [km ²]	311	–
Overlap/current range [%]	5.2%	–

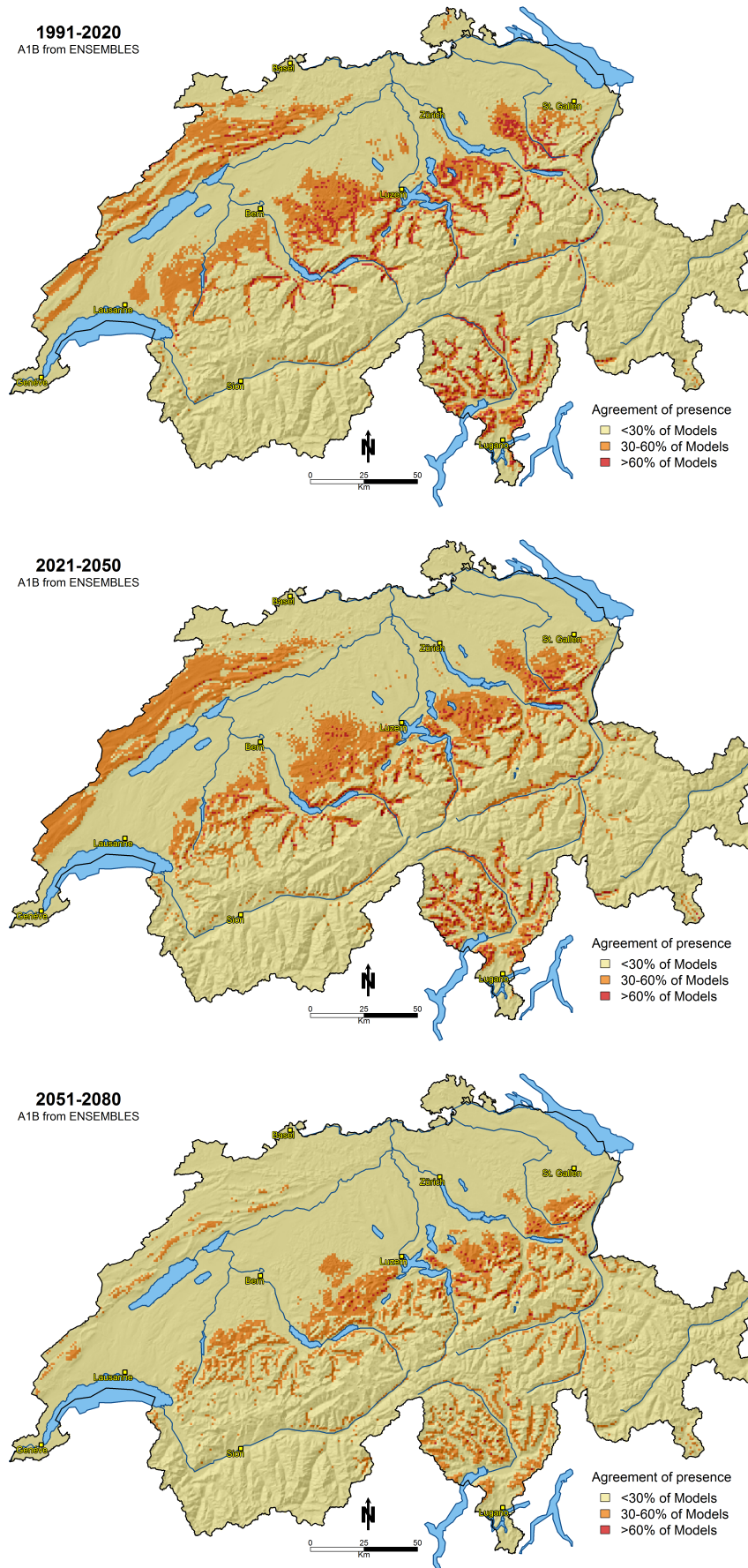


Figure 2: Ensemble of projected future ranges of suitable habitat as modeled from six RCMs and six statistical models. Light yellow colors indicate that all climate & statistical model combinations project absence of the species, while dark red colors indicate presence. Orange colors indicate uncertainty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