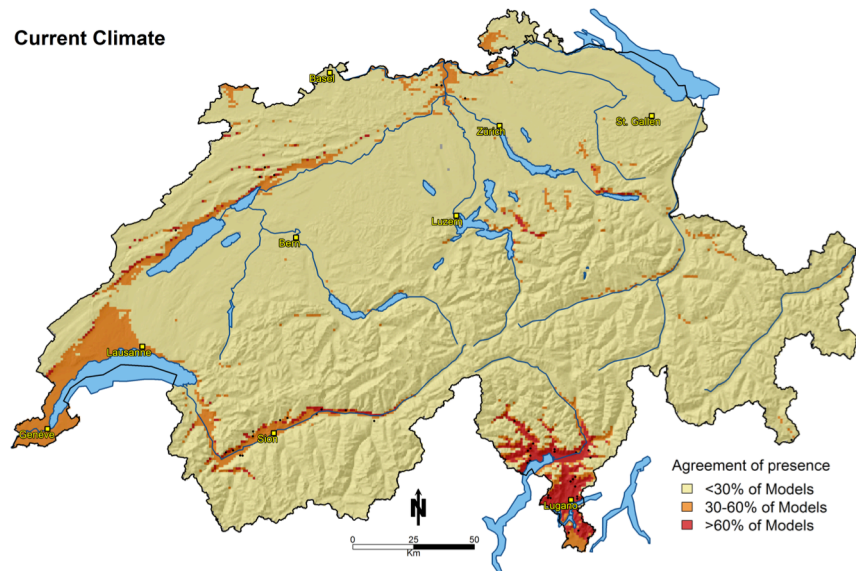


## Quercus pubescens

### Description of model and ensemble projections

The current distribution of *Quercus pubescens* is projected to cover most of the low altitudes of the Ticino, and the Valais, as well as some South-facing regions of the Jura and Geneva regions. The rest of the Swiss Plateau is not modelled to harbor suitable habitats, with the exception of very few sites close to big lakes. In addition, the species also grows at slightly higher altitudes in the inner Alpine valleys and in the Northern part of the Ticino. The species naturally inhabits primarily the colline region, and is not used commercially on the Swiss Plateau. North of the Alps, the sites that are colonized by *Quercus pubescens* are usually azonal rocky habitats that provide low water availability and productivity with high insolation, which increases water stress.



**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.

Under expected climate change using the A1B scenario, most combinations of statistical and regional climate models predict a spread of the species on the Swiss Plateau, meaning that these regions represent soon climate conditions, under which no presence of *Q. pubescens* is currently being observed. The species thus spreads much and increases its range in Switzerland. However, these predictions of spread are associated with a comparably high degree of uncertainty.

### Synthesis and Conclusions

The model fits the current distribution of *Q. pubescens* well, despite being based on few observations only. It can therefore be considered a credible model to project the future habitat suitability of *Q. pubescens*. The ensemble models project a 100% overlap between the current and the future range in Switzerland and still an overlap of 71% in Europe. The range is expected to expand a lot in Switzerland, due to a massive spread onto the Swiss Plateau and to higher elevations. In Europe, the species is also expected to increase its range size, but only to a smaller degree, adding 43% in addition to its current range.

Most likely, the species is not particularly threatened by climate change, and will find sufficient suitable and additional habitat, both in Switzerland and in Europe. The species is more often found on calcareous soils, but also grows (less well) on acidic soils. *Q. pubescens* is also very tolerant to browsing, and can recover more easily from such damages than other species. It can thus be considered very tolerant to different forms of stress and to climate change in general. On the other hand, the species is not very competitive in multispecies communities, and will thus only be able to spread on the Plateau, if the other – more dominant – species such as *Fagus sylvatica* are suffering from increasing drought due to increase heat and reduced summer precipitation. Also, the species will not easily spread where *Q. robur* and *Q. petraea* find suitable habitats, as *Q. pubescens* is more drought tolerant but less competitive than the other two oak species (Bonfils *et al.* 2015).

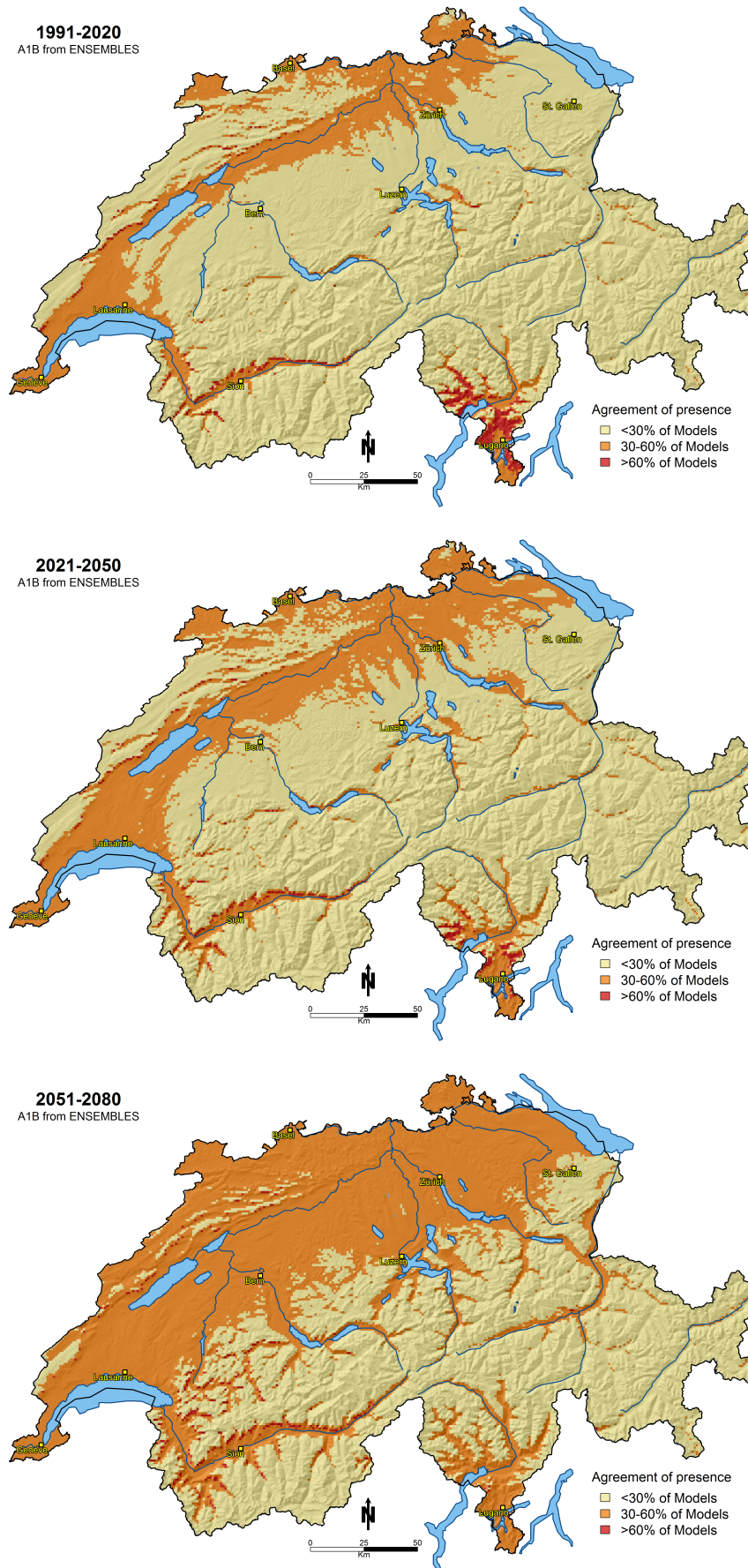
*Quercus pubescens* is often hybridizing with *Q. petraea* and therefore many populations consist of hybrids among the two proper species. It is thus not often easy to identify locally, what “species” is present, or to what degree the two closely related species contribute genetically to the local population.

#### Range change statistics

	CH	Europe
<b>Current range size [km<sup>2</sup>]</b>	281	55'660
<b>Future (2080) range size</b>	12'088	79'602
<b>Range Change 2080/2000 [%]</b>	>999%	143.0%
<b>Overlap 2000/2080 [km<sup>2</sup>]</b>	281	40'039
<b>Overlap/current range [%]</b>	100%	71.9%

## References

Bonfils P, Rigling A, Brändli U-B, *et al.* (2015)  
Die Eiche im Klimawandel - Zukunftschancen einer Baumart. In: *Merklblatt für die Praxis*, Nr. 55, p. 12. Eidg. Forschungsanstalt WSL, Birmensdorf.



**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.