

Fraxinus spp

Description of model and ensemble projections

The current distribution of the genus *Fraxinus* is simulated to cover most of the Swiss Plateau, the lower altitudes of the Jura range, the Northern Pre-Alps, the interior valleys, as well as the Ticino. Some of the higher altitudes of the Jura range, the Valais and the Northern Pre-Alps are not modelled well for the genus. Obviously, there is not sufficient support in the model that these locations consistently harbor *Fraxinus* under these climate conditions. Also, all other regions where *Fraxinus* is projected to occur are prone to uncertainty, which is a common modelling problem for early successional species that do not persist long in forests during succession.

Under projected climate change using the A1B scenario, most combinations of statistical and regional climate models predict a consistent spread of the genus *Fraxinus* everywhere to higher locations, meaning that these regions represent soon climate conditions, under which we currently observe presence of *Fraxinus* species. Only the region of Geneva is projected to harbor no suitable habitat conditions for the genus by the end of the Century. This is a bit surprising, since the genus contains a warm-adapted species (*F. ornus*).

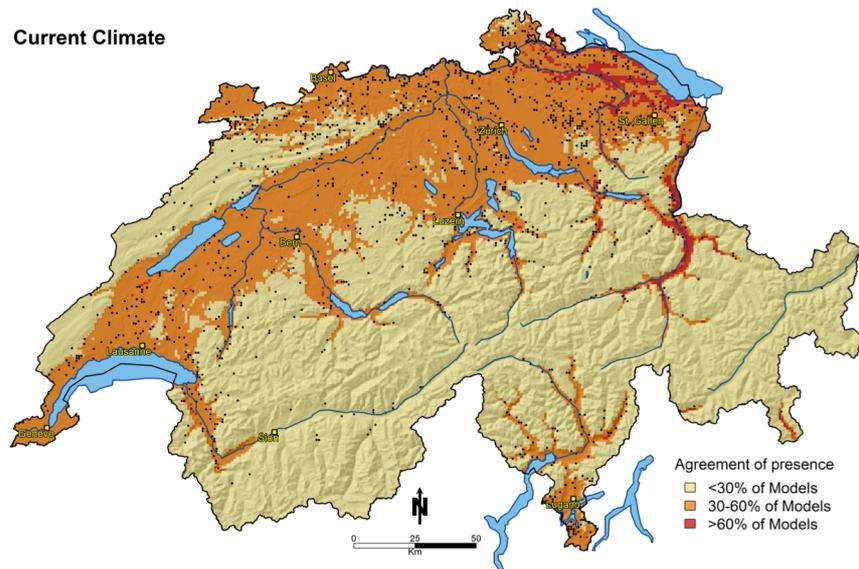


Figure 1. Current distribution (black dots) from the Swiss National Forest inventory (LFI 1) and simulated habitat suitability under current climate as calibrated from forest inventory data across the Alps (MANFRED project).

Synthesis and Conclusions

The model fits the distribution of the genus *Fraxinus* moderately well, and can be considered a fairly credible model to project the future habitat suitability of the *Fraxinus* genus. The ensemble models project a 91% overlap between the current and the future range in Switzerland, which can be considered very high. In addition, the genus will gain >50% in range size throughout Switzerland. This means that the genus is not particularly threatened, and will still find sufficient suitable habitat, both in Switzerland and likely also in Europe. As an early successional, rapid growing and migrating species that is capable of growing on a wide range of soils and under a broad range of climate conditions, it will not require assisted migration and likely can track climate change quite considerably (Meier *et al.* 2012).

The genus (especially *F. excelsior*) is threatened by some pests, notably by the fungus *Hymenoscyphus pseudoalbidus* that is causing significant ash diebacks in Northern and Central Europe. The wood of some ash species is used for many different purposes due to its hard but elastic characteristics and its great finishing quality. Uses encompass bows, tool handles, electric guitar bodies, baseball bats, etc.

The genus is modelled with quite some uncertainty. This has likely two reasons: (i) it is common that early successional tree species do not exert a high probability of occurrence in most statistical models due to their ruderal nature. They simply do not steadily occur where conditions are suitable, and are therefore more difficult to model; (ii) the genus *Fraxinus* spans a very wide range of climate and soil conditions, partly due to the differing preferences of the two species *F. ornus* and *F. excelsior*. Yet, even on the common ash (*F. excelsior*) already encompasses a wide range of conditions, preferring moist or even wet, and deep soils to grow best on the one hand, but still growing in some regions on very shallow, highly insolated and dry slopes. It is therefore not easy to project exactly the locations and conditions where the genus with its differing species is most likely to occur. The overall model quality is therefore not very high.

Range change statistics

	CH	Europe
Current range size [km²]	15'249	–
Future (2080) range size	23'900	–
Range Change 2080/2000 [%]	156.8%	–
Overlap 2000/2080 [km²]	13'895	–
Overlap/current range [%]	91.2%	–

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.

