

Alnus incana

Description of model and ensemble projections

The current distribution of *Alnus incana* is modelled to cover most of the montane to upper montane belt of Switzerland irrespective of climate zone. Rather, the species primarily grows in valley bottoms in close distance to rivers and waters, primarily. This generates a quite patchy distribution, now and into the future. In general the current distribution of the species is very well captured. Due to its spotty and unsteady appearance in climate conditions that are generally well suited, the statistical models show some uncertainty at low altitude on the Plateau and in the Northeastern Jura Mountains, as to whether the species has a sound potential to grow in these regions. Yet, this is not so much a question of true uncertainty. Rather it reflects the fact that the species is unsteady under these climate conditions, and does not appear always when the climate is favorable.

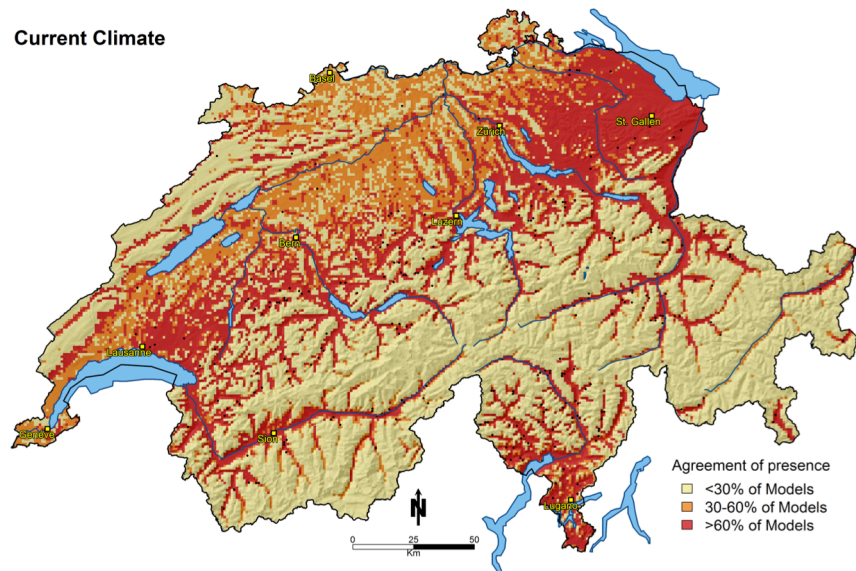


Figure 1. Current distribution (black dots) from the Swiss National Forest inventory (LFI 1) and simulated habitat suitability under current climate as calibrated from LFI forest inventory data of Switzerland.

Under projected climate change using the A1B scenario, most combinations of statistical and regional climate models predict an upward shift of *A. incana* in all these regions, representing soon climate conditions, under which *A. incana* is likely to grow well. The Swiss Plateau is not considered a highly suitable habitat in the future. The species best growth in close distance to running (and partly standing) waters, and is not a strong competitor for light.

Synthesis and Conclusions

The model fits the distribution of *Alnus incana* well, and can be considered a credible model to project the future habitat suitability of the species. The ensemble models project a 90% overlap between the current and the future range in Switzerland, yet a much smaller overlap (10%) in Europe. This can be considered a sufficient overlap to thrive into the future without threat of extinction. Yet, at the European scale, the overlap is quite low, and may cause problems for the species to cope with future climates.

The species is projected to increase its range in Switzerland quite considerable (+31%) while in Europe, it is projected to lose see a shrinking range by the end of the century (-54%). Yet, the species is not particularly threatened, and will still find sufficient suitable habitat, both in Switzerland and in Europe. As a non-preferred timber, it will not profit from assisted migration to higher and more Northern altitudes, but it might also not depend on it, due to large spatial range overlaps between currently and future suitable habitats. As a pioneer and early successional species, it is also likely to rapidly colonize new suitable areas in the future.

Alnus incana is a light-demanding, fast growing tree species that grows well on initial soils. It grows in many places on the northern hemisphere, primarily in cool temperate regions. Through nitrogen fixation, it can help improve soil fertility. It primarily grows in alluvial regions, along mountain brooks and streams. Several subspecies have been described for different northern hemisphere regions. Several species of *Lepidoptera* with its caterpillars feed on *A. incana* as food source

Range change statistics

	CH	Europe
Current range size [km²]	11'742	55'602
Future (2080) range size	15'368	25'710
Range Change 2080/2000 [%]	130.8%	46.2%
Overlap 2000/2080 [km²]	10'536	5'747
Overlap/current range [%]	89.7%	10.3%

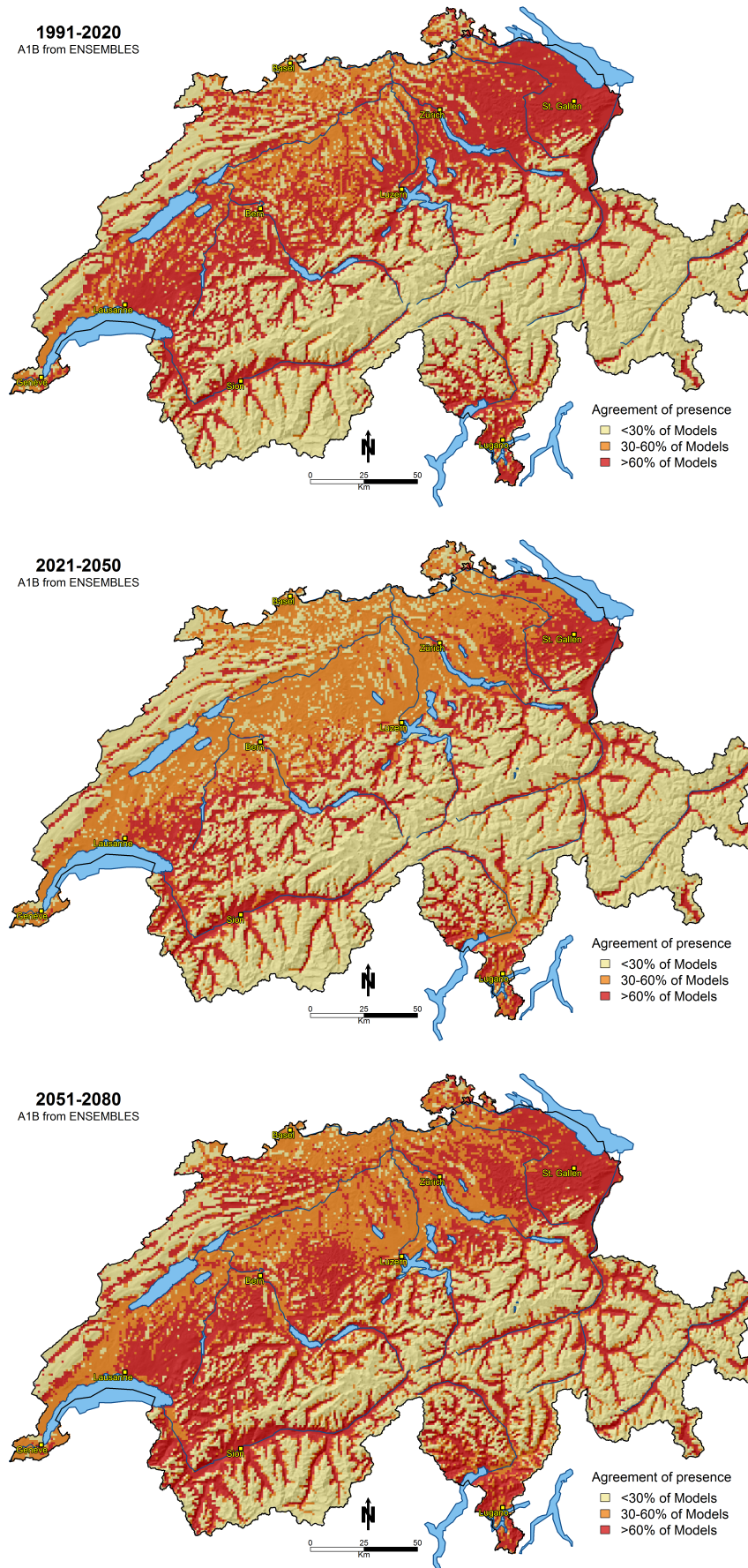


Figure 2: Ensemble of projected future ranges of suitable habitat as modeled from six RCMs and six statistical models. Light yellow colors indicate that all climate & statistical model combinations project absence of the species, while dark red colors indicate presence. Orange colors indicate uncertainty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