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Erroneous conclusions about current geographical distribution and future expansion of forest insects in Northern Sweden: Comments on Hof and Svahlin (2015)

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Abstract

We question the validity of the results and the conclusions from a study entitled “The potential effect of climate change on the geographical distribution of insect pest species in the Swedish boreal forest” that was recently published in Scandinavian Journal of Forest Research. The main problem is that for several of the species the current geographical distributions presented in the paper (based on modeling of a limited set of occurrence data) are vastly underestimated compared with distribution maps in standard reference literature and other available occurrence data. As a consequence of that the predicted major future range expansions of these important pest species are also erroneous.

Keywords: climate change, geographical distribution, Norway spruce, pest insects, Scots pine, species distribution modelling.

We have read the article by Hof and Svahlin (2015) that deals with the potential effects of climate change on the geographical distribution of insect species in the Swedish boreal forest in the region of Norrland. They focus on 30 species, including some important pests, which are associated with spruce and pine (the most important tree species for Swedish forestry). They start with predicting the species’ current geographical distribution in Norrland based on occurrence data from the Global Biodiversity Information Facility (GBIF, http:data.gbif.org) and a Species Distribution Modelling algorithm (Max Ent version 3.3.3.k (Philips et al. 2006). Then they predict the future distributions, at two different climate scenarios, and compare these predictions with the predicted current distributions. The main problem is that for several of the species the current geographical distribution (Supplementary Material in Hof and Svahlin (2015)), predicted as described above, is largely underestimated compared with distribution maps in standard reference literature and other available occurrence data (e.g. Ehnström and Axelsson, 2002; Ehnström and Holmer, 2007; Lekander et al. 1977; Lindhe et al. 2011). This applies to e.g. the cerambycid beetles *Acanthocinus aedilis*, *Tetropium castaneum* and *T. fuscum*, and the bark beetles *Ips acuminatus*, *I. typographus*, *Pityogenes chalcographus*, *P.*

quadridens, *Tomicus piniperda* and *Trypodendron lineatum*. Thus, since these species already have a wide distribution in the Swedish boreal forest in Norrland we cannot find support for the predicted major range expansions.

Knowledge about the future geographical distribution of forest pest insects is, as the authors states, potentially valuable for the forestry sector for decisions regarding proactive management strategies to reduce the impact of future risks. E.g. for three of the investigated pest species, i.e. *Ips typographus*, *Pityogenes chalcographus* and *Tomicus piniperda*, the Swedish Forestry Act regulates handling of potential host material to reduce the risk for damages (Anon. 2014). These regulations currently apply to all of Sweden. Efficient pest management regulations require knowledge about the geographical distribution of the pest species they apply to. It is therefore concerning also from an applied perspective that the current distributions presented in the paper (based on modeling) are vastly underestimated and, as a consequence, that the predicted major range expansions of these important pest species are erroneous.

The study by Hof and Svahlin (2015) provides an example of the problem of modeling current species distributions based on one database of occurrence data without validating the results with other available sources of occurrence data. When trying to predict changes in geographical distribution it is of utmost importance that the used current distribution is as accurate as possible.

References

Anon. 2014 Swedish Forest Agency. Skogsvårdslagstiftningen: Gällande regler 1 September 2014. Available from http://www.skogsstyrelsen.se/Aga-och-bruka/Lagen/Skogsvardslagen/ (Cited 1 June 2015)

Ehnström B and Axelsson R. 2002. Insektsgnag i bark och ved. ArtDatabanken, SLU, Uppsala, Sweden, ISBN 9188506266.

Ehnström, B., & Holmer, M. 2007. Nationalnyckeln till Sveriges flora och fauna. Skalbaggar: långhorningar. Coleoptera: Cerambycidae. ArtDatabanken, Sveriges lantbruksuniversitet: Uppsala, Sweden. ISBN 9789188506627.

Hof, A.R and Svahlin A. 2015. The potential effect of climate change on the geographical distribution of insect pest species in the Swedish boreal forest. Scandinavian Journal of Forest Research, DOI:10.1080/02827581.2015.1052751

Lekander B, Bejer-Petersen B, Kangas E and Bakke A. 1977. The distribution of bark beetles in the Nordic countries. Acta Ent. Fenn. 32: 1 – 37.

Lindhe A, Jeppsson T and Ehnström B. 2011. Longhorn beetles in Sweden – changes in distribution and abundance over the last two hundred years. Entomologisk Tidskrift 131: 241 – 508.

Phillips S, Anderson R, Schapire R. 2006. Maximum entropy modeling of species geographic distributions. Ecol. Model. 190: 231-259.