Modelling the spread of *Ambrosia artemisiifolia* across Europe

Daniel Chapman*, James Bullock, Tom Haynes, Stephen Beal, Mikhail Sofiev & Marje Prank

* Centre for Ecology & Hydrology, Edinburgh, UK, dcha@ceh.ac.uk

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ENV.B2/ETU/2010/0037: “Assessing and controlling the spread and the effects of common ragweed in Europe”

Talk structure

Mapping ragweed distribution in Europe

Linking phenology and distribution

Modelling the invasion

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Mapping the invaded distribution

Global Biodiversity Information Facility (http://www.gbif.org/)

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Prof. Denes Bartha, Flora Mapping, Hungary, The University of West Hungary, Faculty of Forestry

Alessandro Alessandrini (pers. comm.) 30/6/2011

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Viesturs Šulcs, Institute of Biology of the University of Latvia

FLORON, Stichting Floristisch, Onderzoek Nederland

Netherlands Centre for Biodiversity Naturalis (section NHN), Leiden University / Nederlands Centrum voor Biodiversiteit Naturalis (sectie NHN), Leiden Universiteit

Charlotte Sletten Bjorå, Natural History Museum, University of Oslo, Vascular Plant Herbarium, Oslo

Solfrid M. Hjelmtveit, Herbarium BG, Dept. of Natural History, University of Bergen

Torbjörn Alm, Tromsö museum, University of Tromsö

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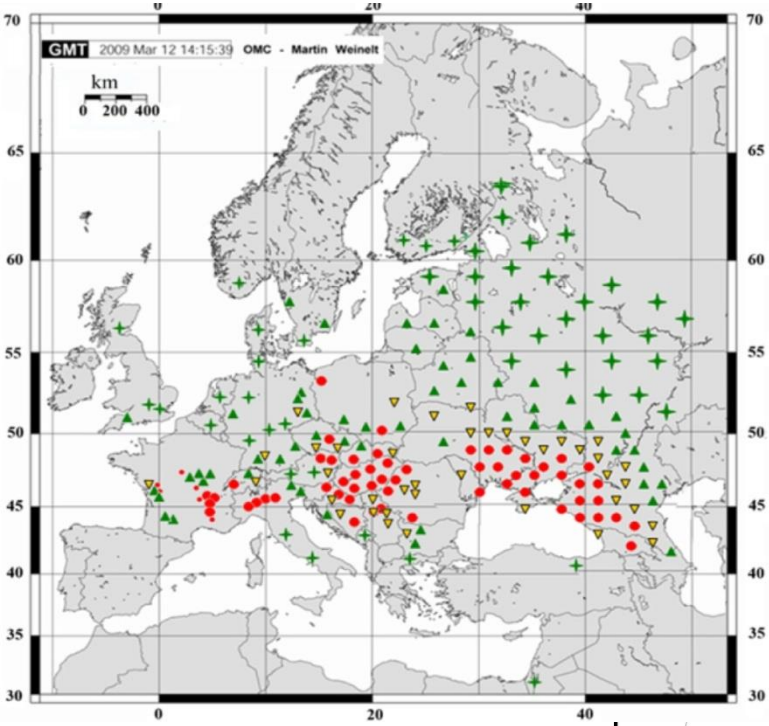
AWEL, Amt für Abfall, Wasser, Energie und Luft, Abteilung Abfallwirtschaft und Betriebe Sektion Biosicherheit.

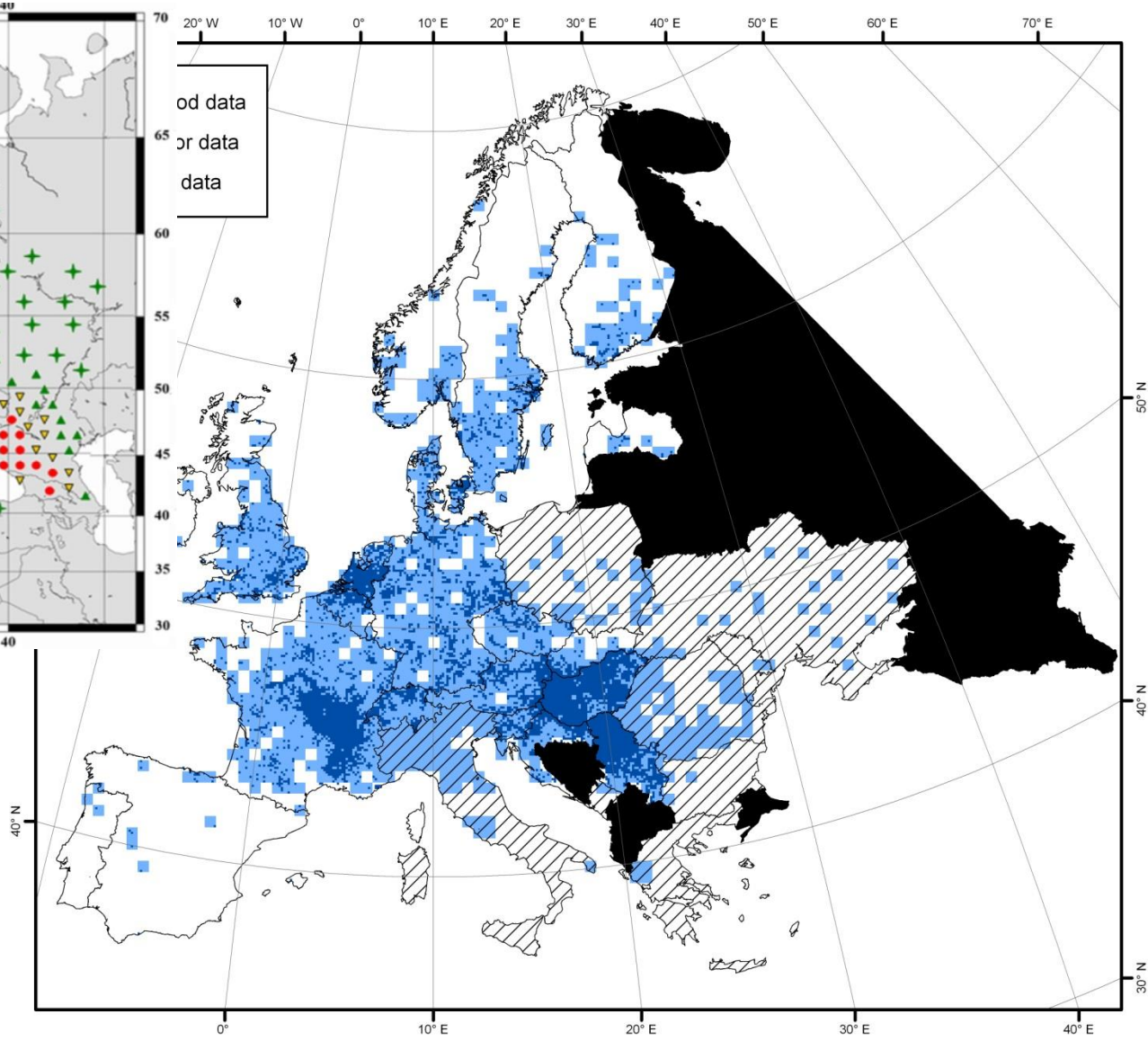
CRSF/ZDSF - Center of the data network of the Swiss flora.

Olga Umanets, pers. comm.

National Biodiversity Network (http://data.nbn.org.uk/)

Mapping the invaded distribution





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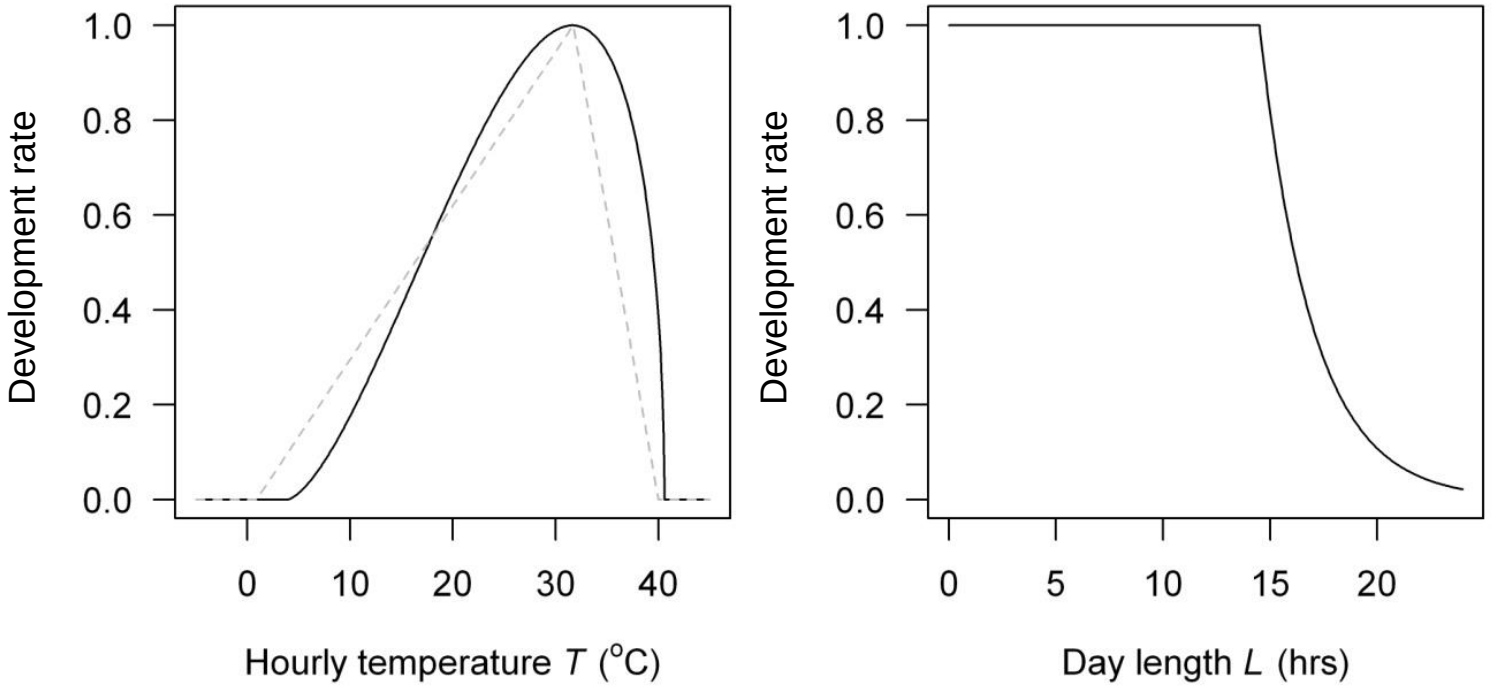
Linking phenology and distribution

Development rate depends on hourly temperature and photoperiod (Deen et al. 2001)



Where can ragweed reproduce before frost?

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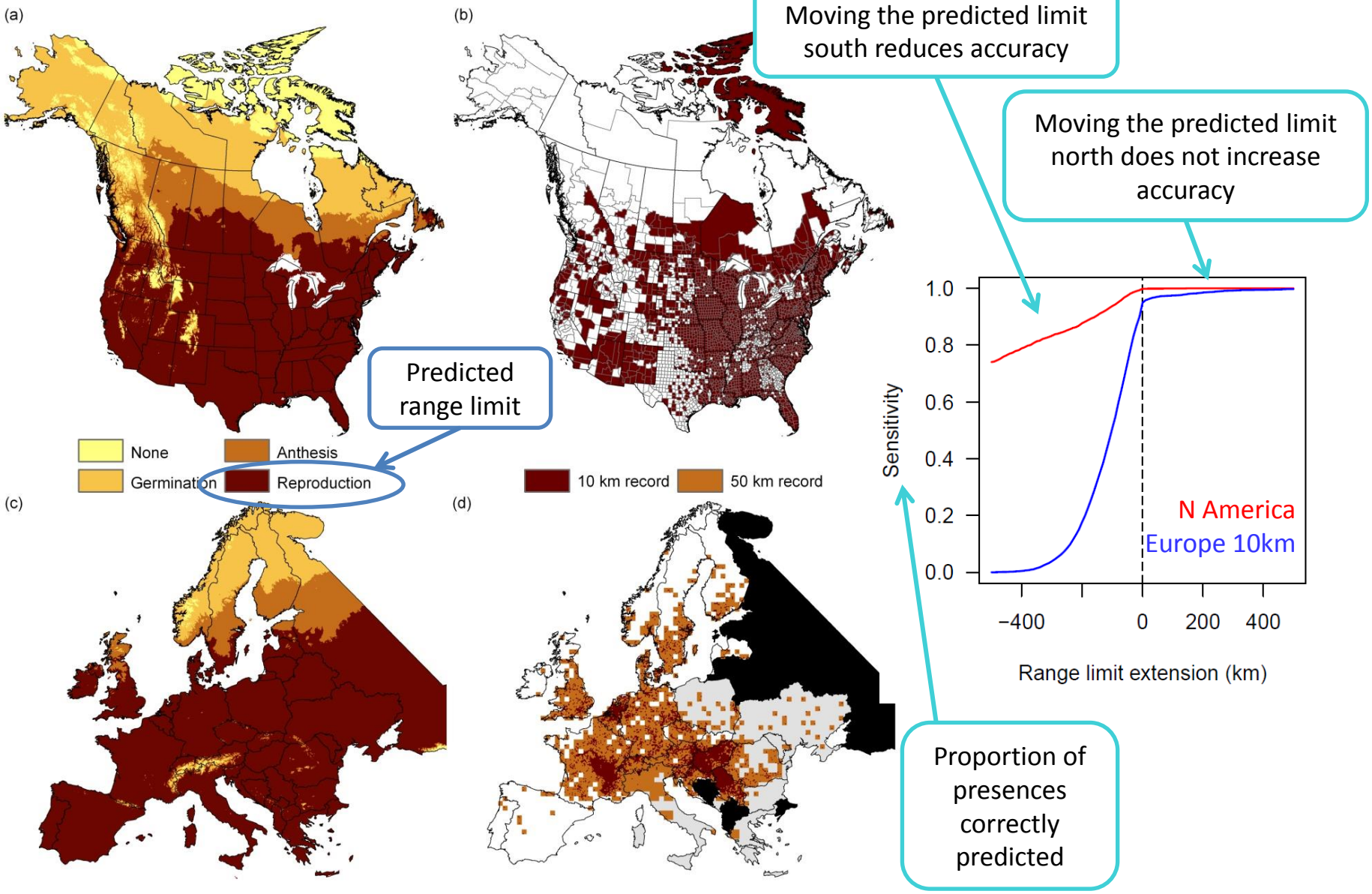
Phenology predicts the northern limit



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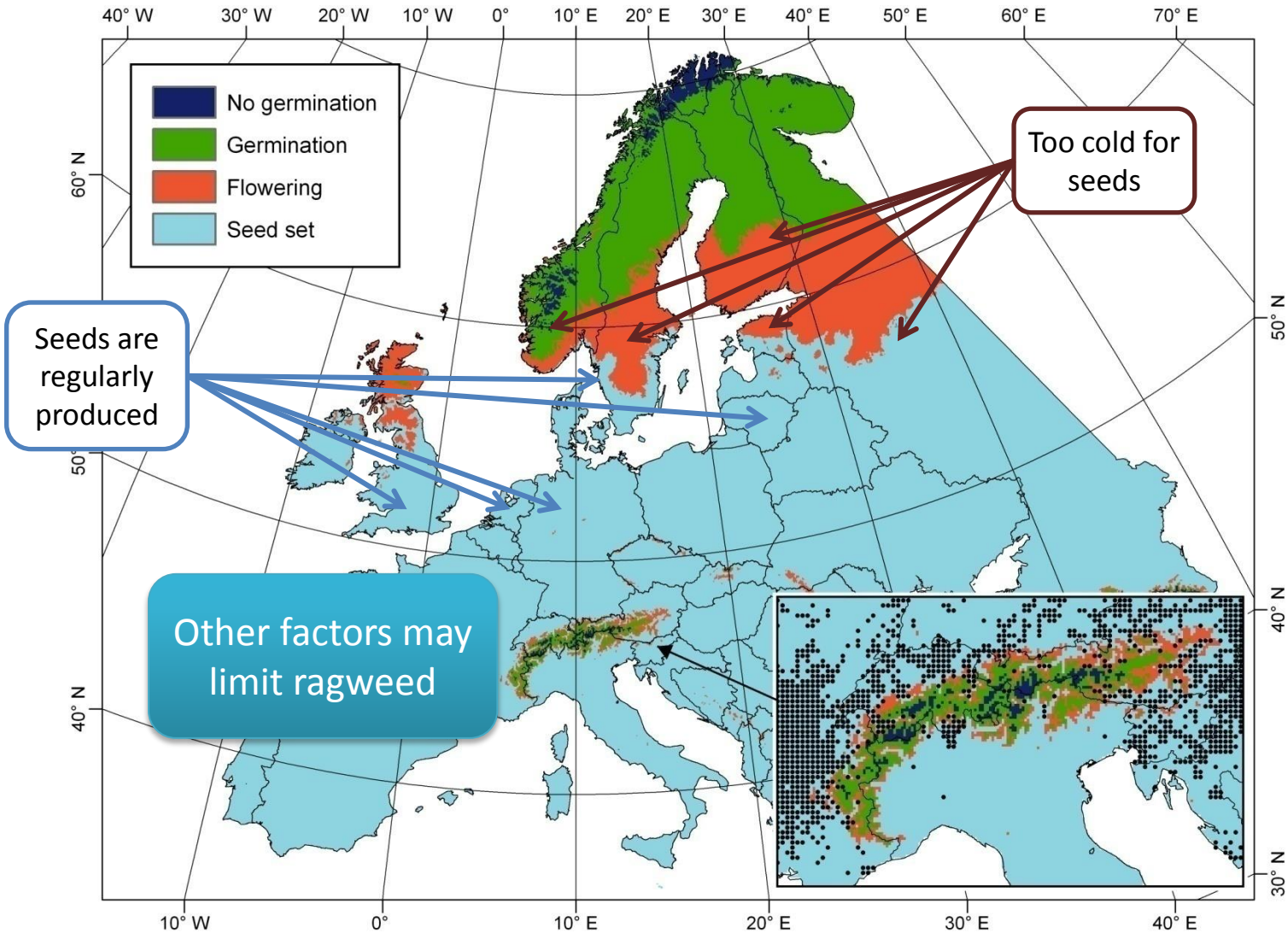

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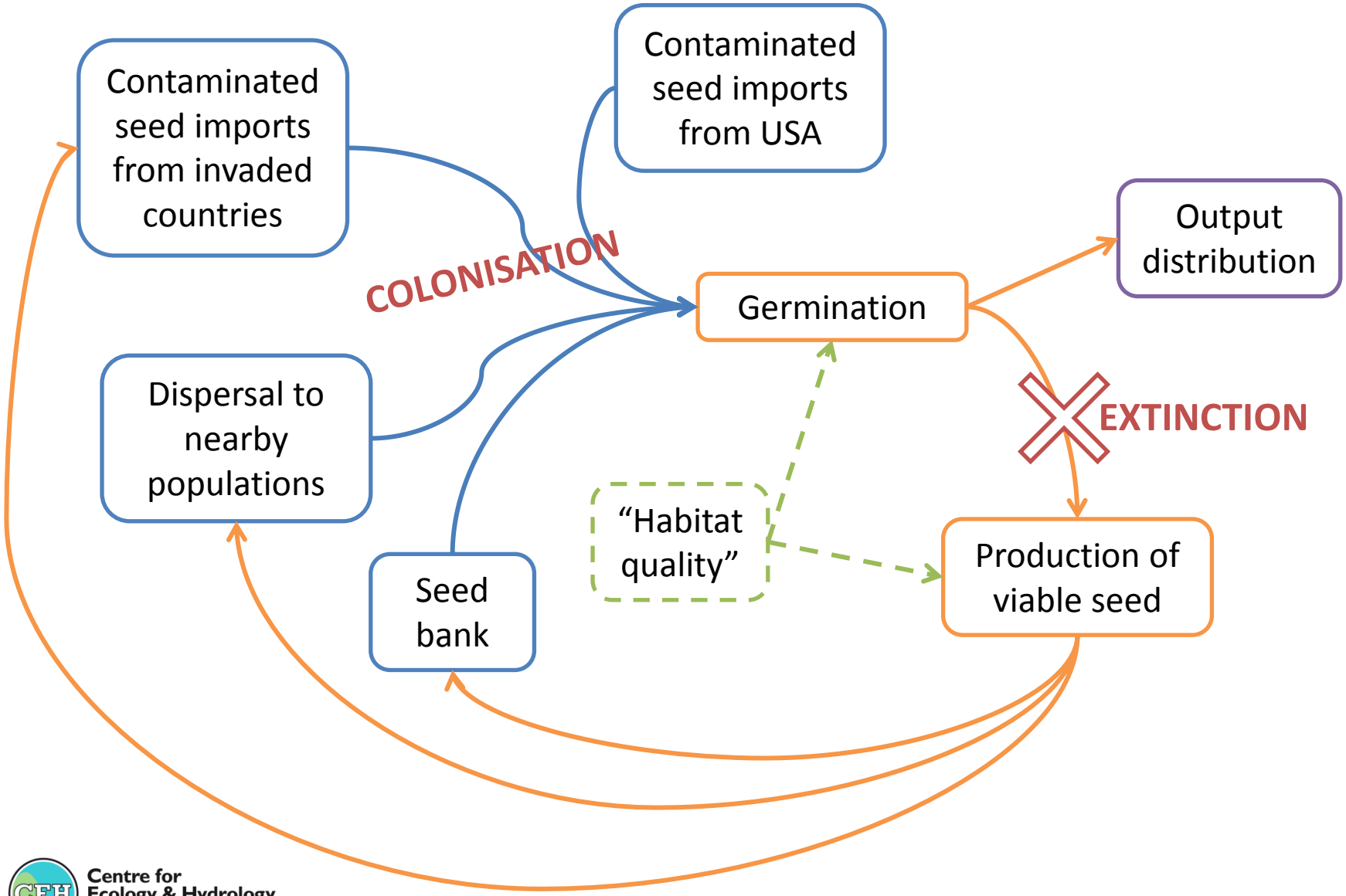
Dynamic model of ragweed invasion



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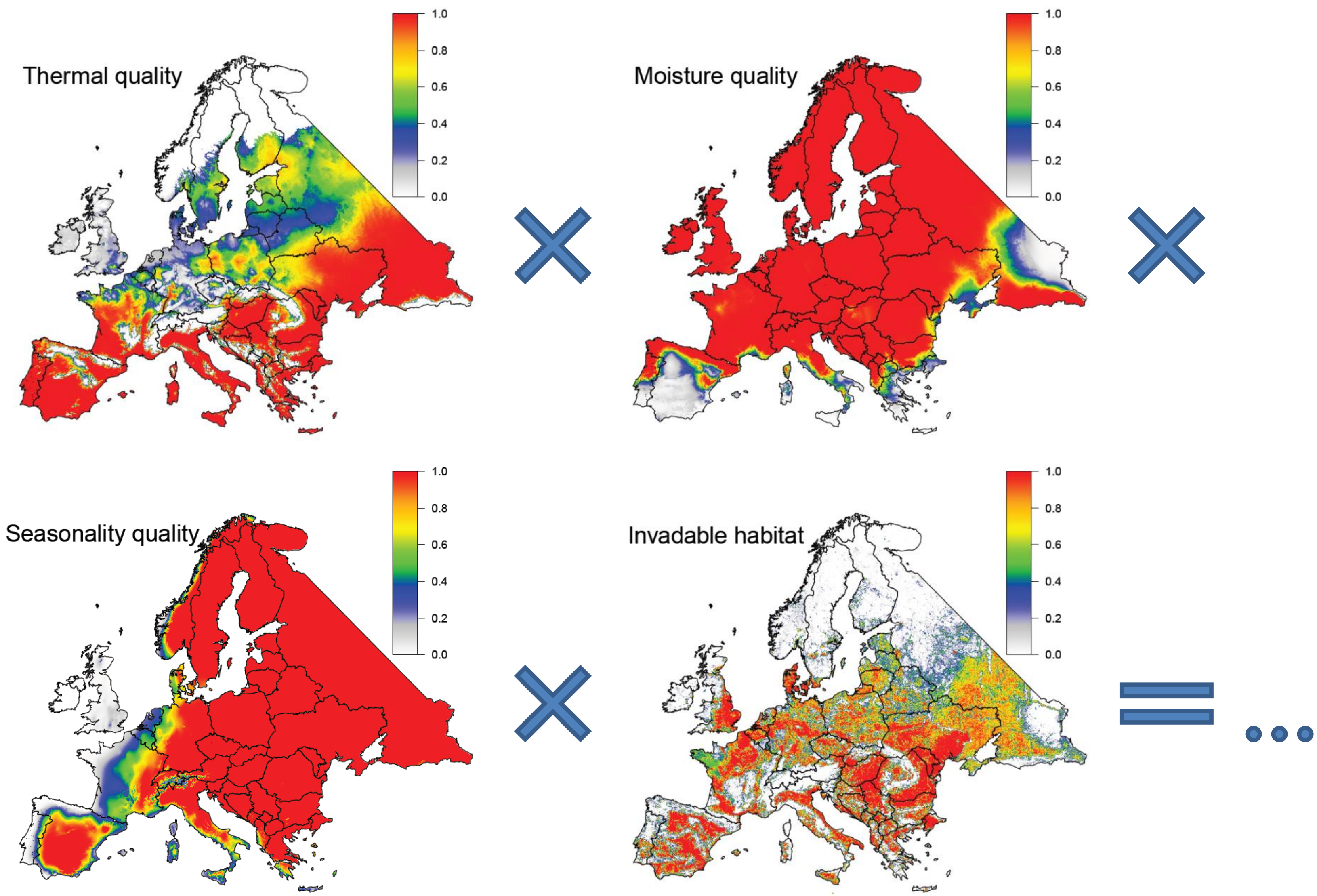
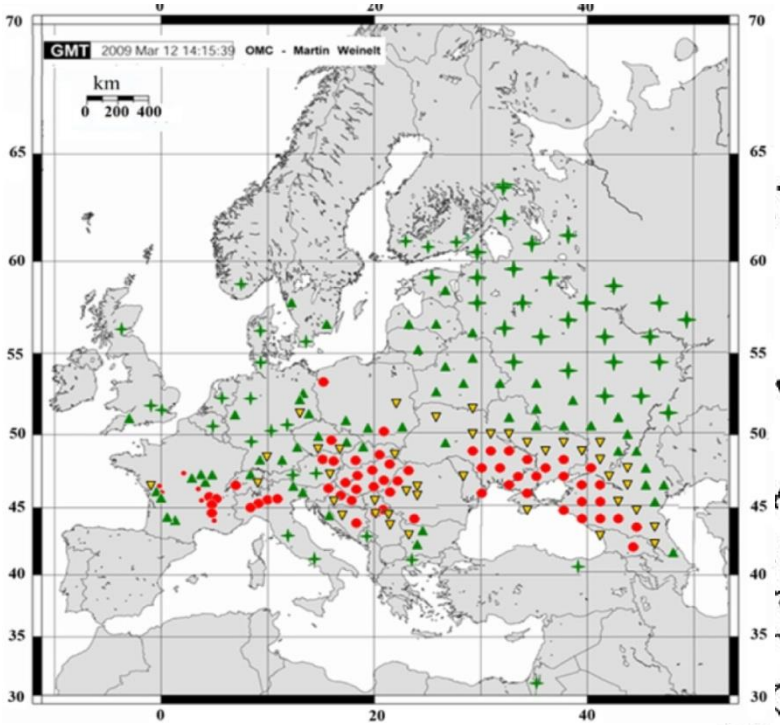
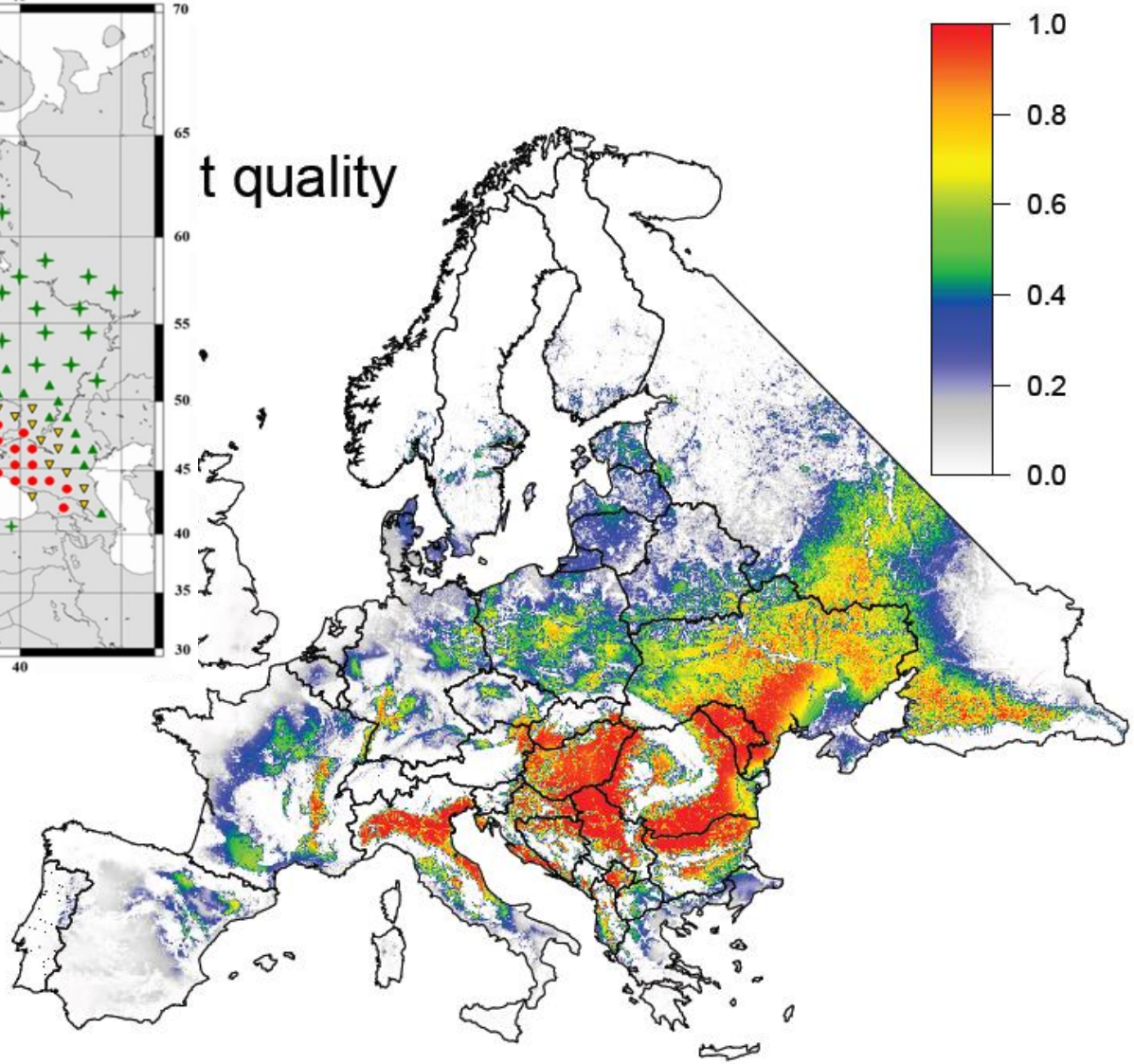
The habitat quality model



The habitat quality model





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Simulated spread over 60 years

History of spread may not be produced (no data to test).

The model should show where ragweed can invade.

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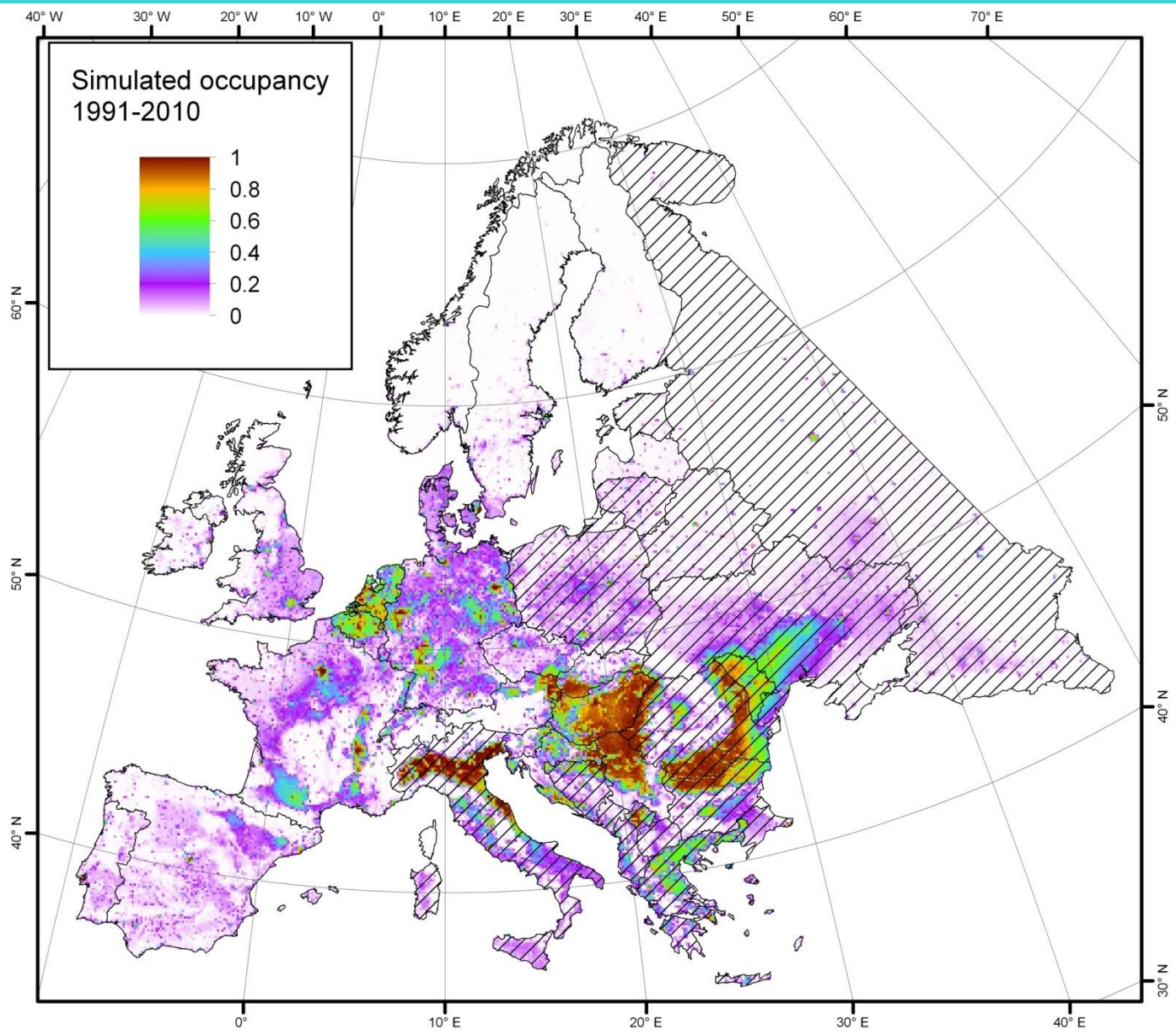
Simulated current distribution



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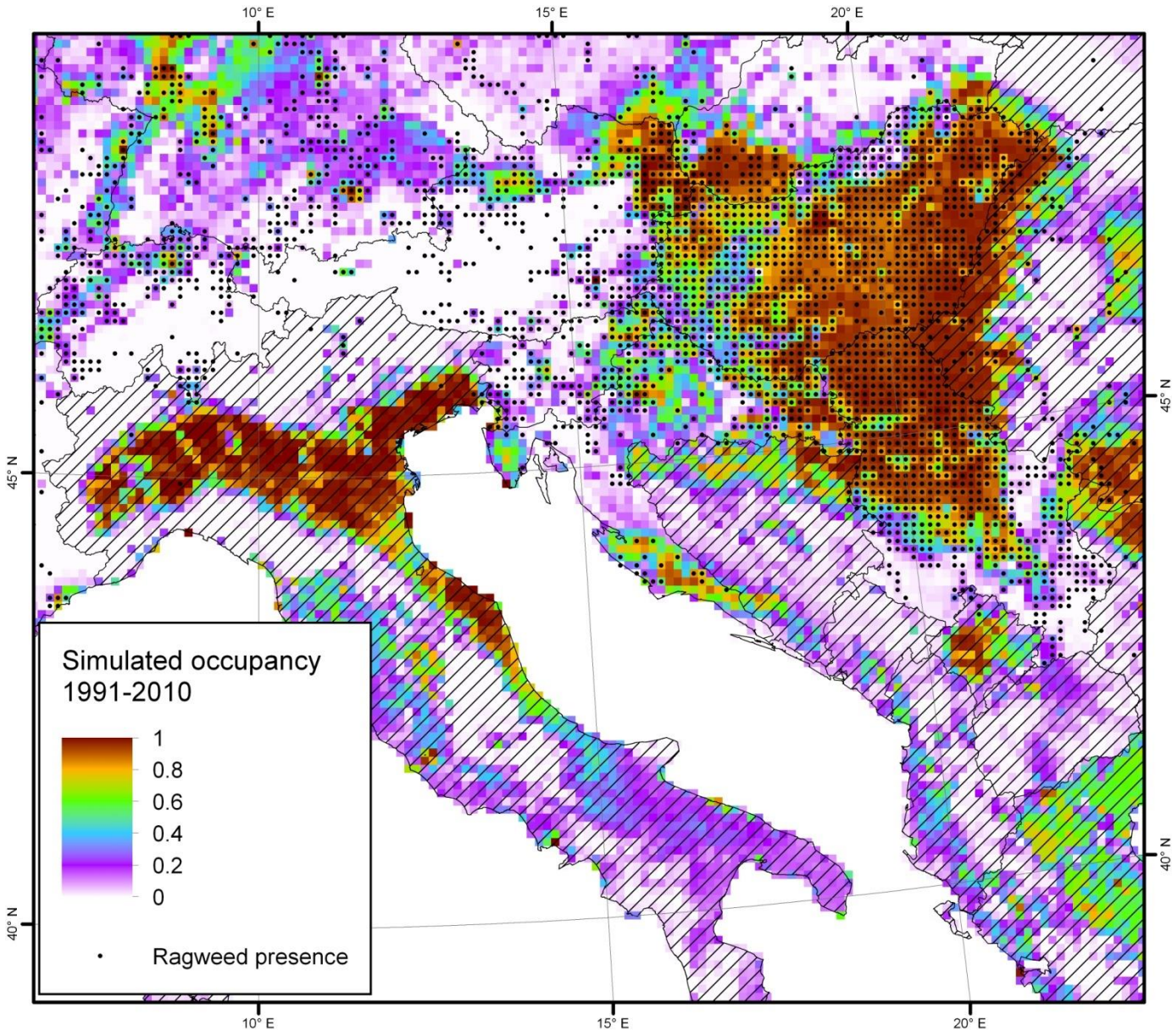
Infestation in south east Europe



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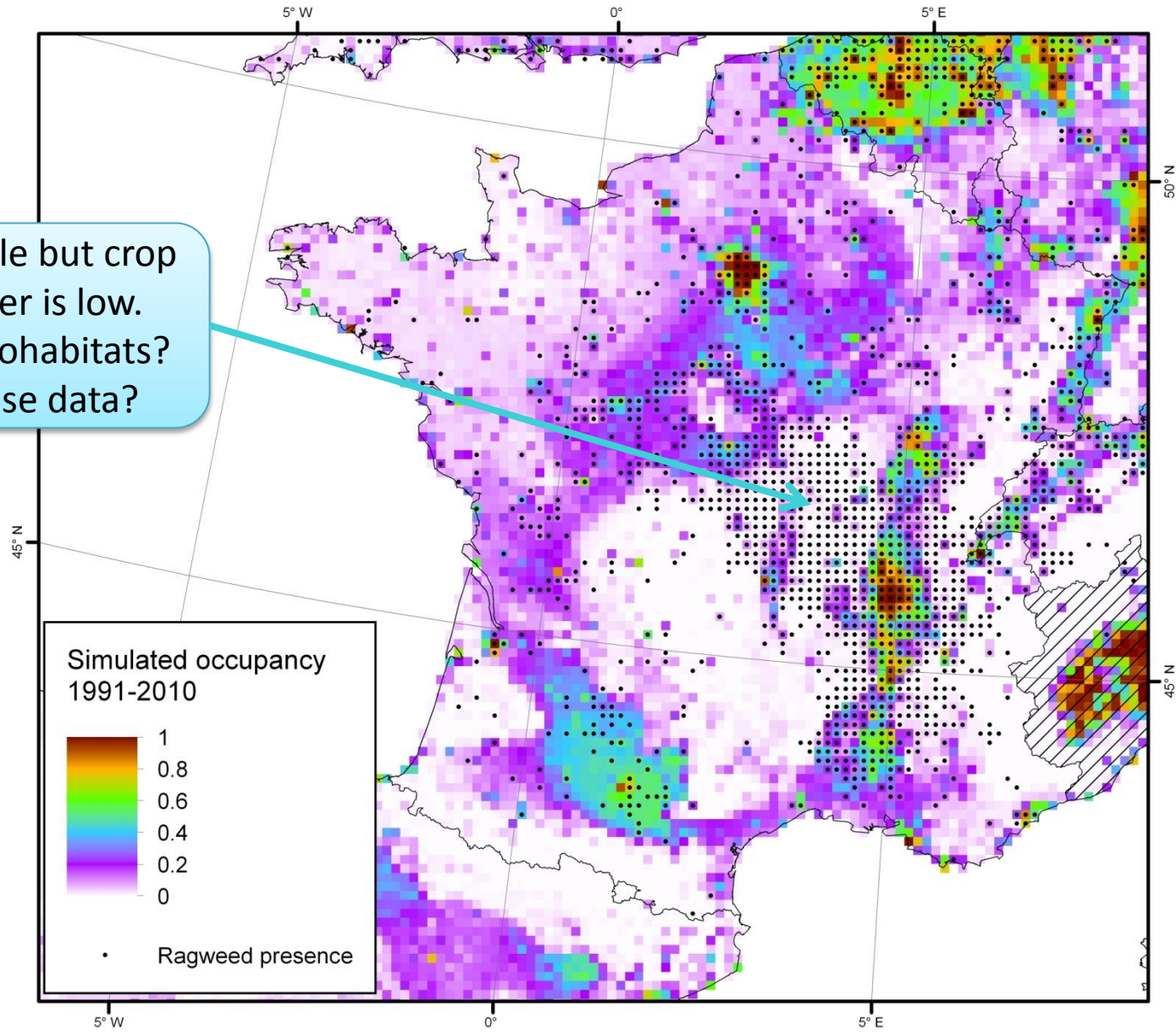
Rhône Valley invasion



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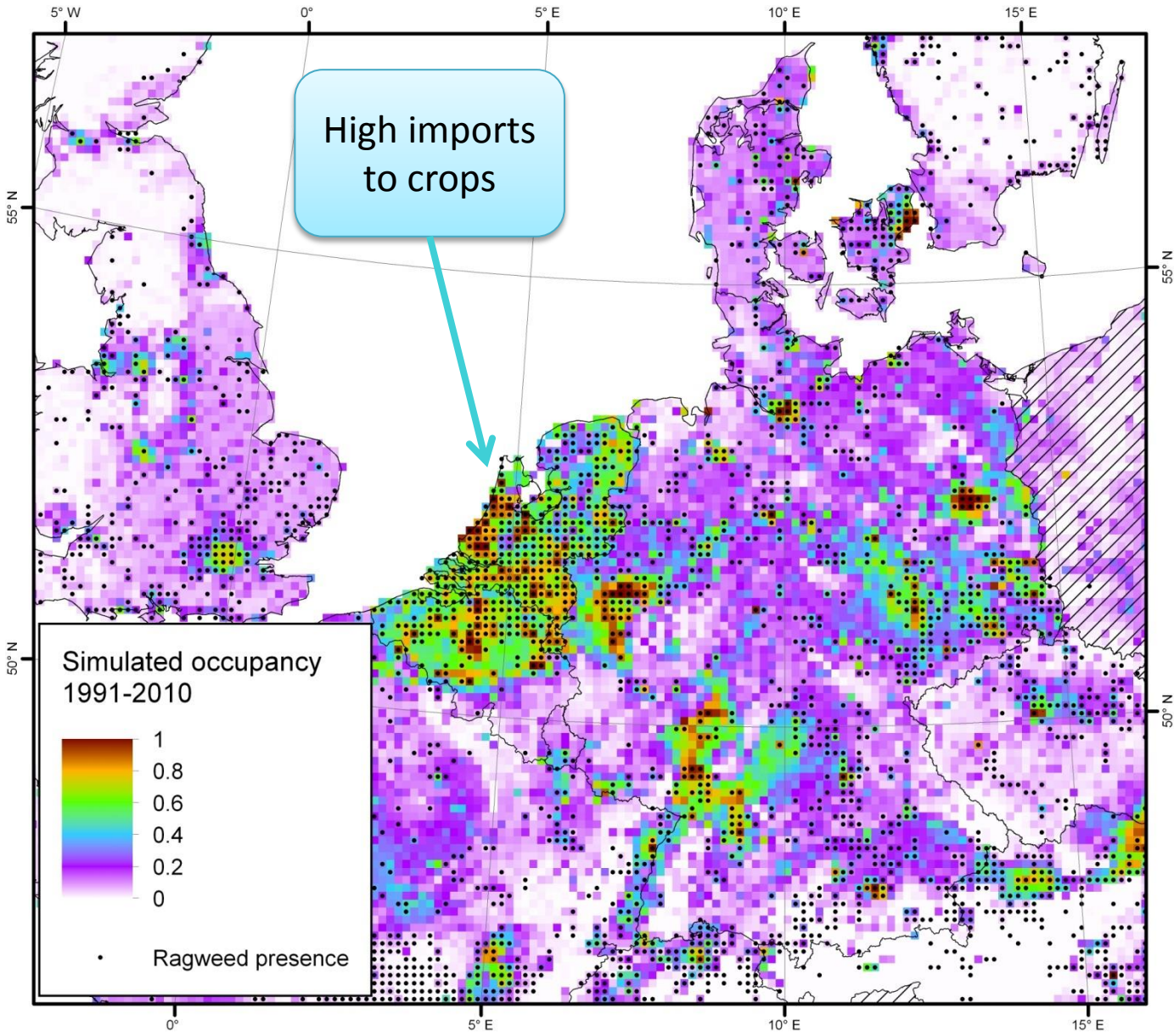
Casual weed in north west Europe



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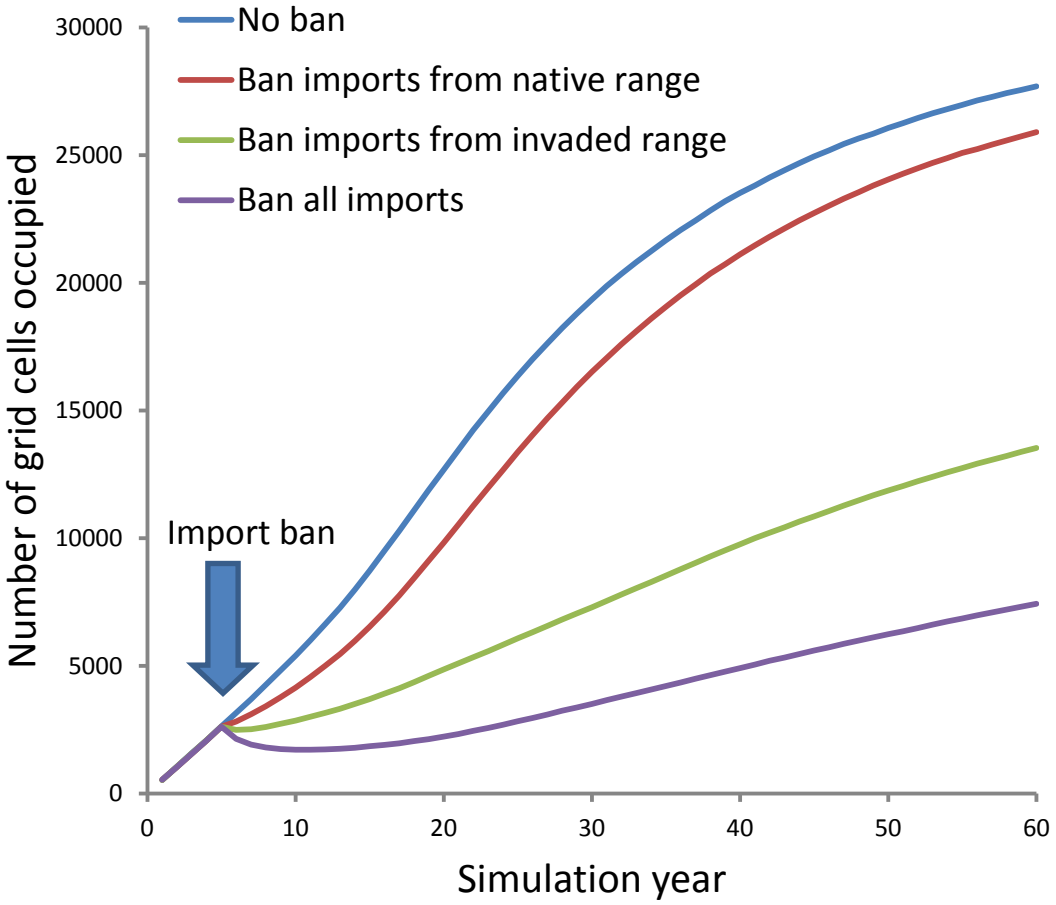
Contaminated seed imports drive spread

Banning contaminated seed imports reduces spread.

Trade within Europe more important than imports from USA.



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Conclusions

We have mapped ragweed's distribution in a good part of Europe.

Phenology is a key determinant of distribution.

Modelled ragweed invasion:

- Good fit to the distribution where we have data.
- Populations establish and spread in SE Europe.
- Imports sustain populations in the north, mainly as an urban weed.
- Biosecurity action should prioritise seed trade within Europe.

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Conclusions

WARNING – many simplifications had to be made in the model:

- No data on actual history of spread.
- Crude seed trade model based on recent national import volumes.
- No weather or climate change.
- No land use change.
- No variation in agricultural practices.

Next steps:

- Predict pollen dispersal with SILAM (see poster by Prank *et al.*).
- Run the model with climate and land use change scenarios.
- Run the model with control scenarios.

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The wider project team

Paul Goriup for photos

Data providers and national experts

You, for listening!

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