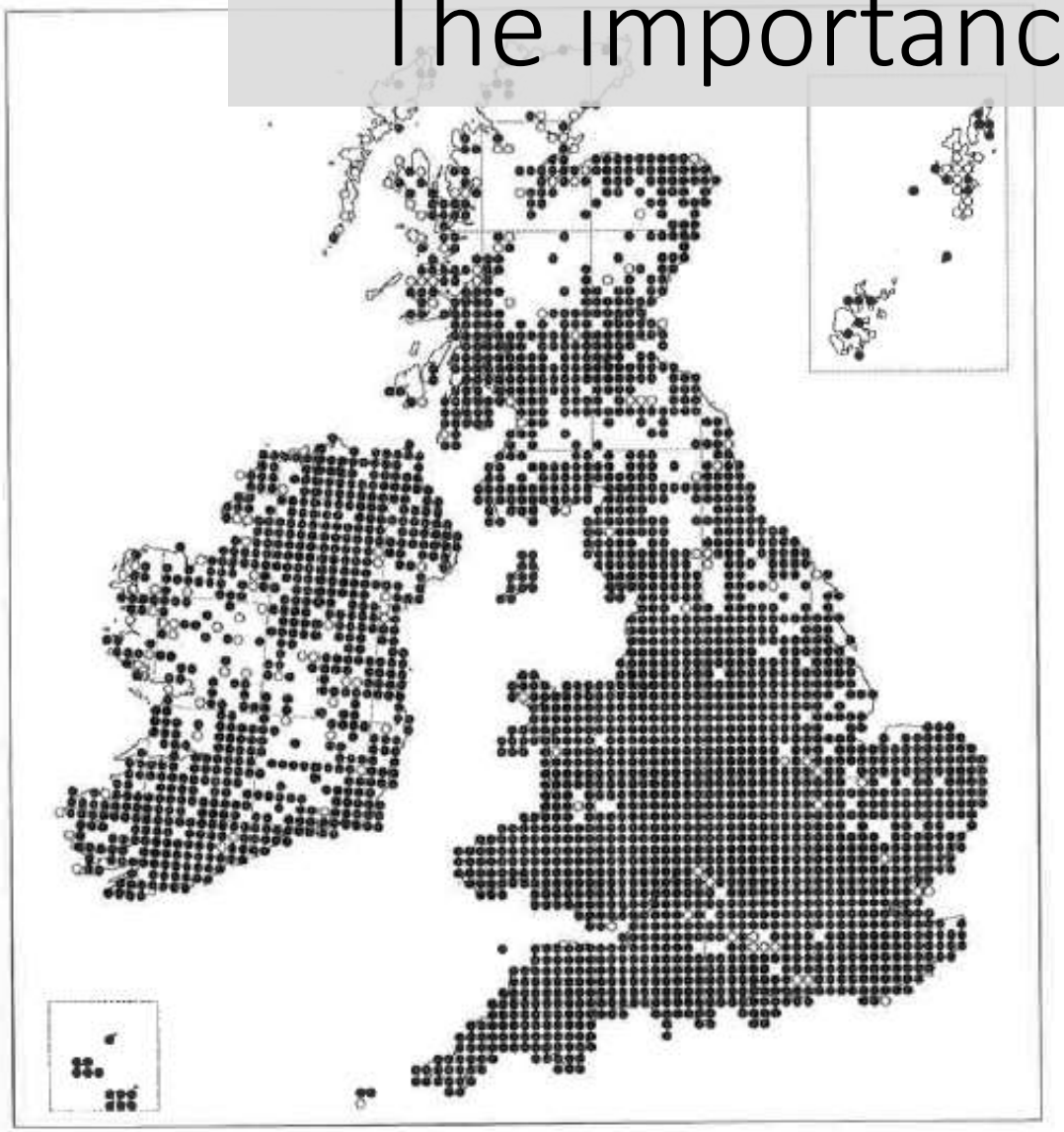
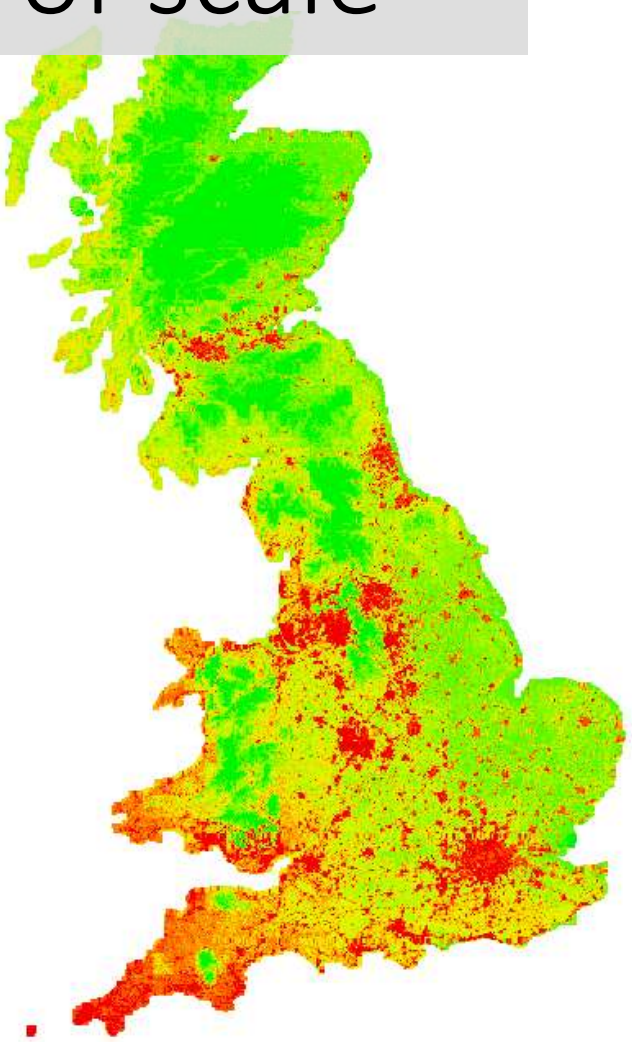
The importance of scale



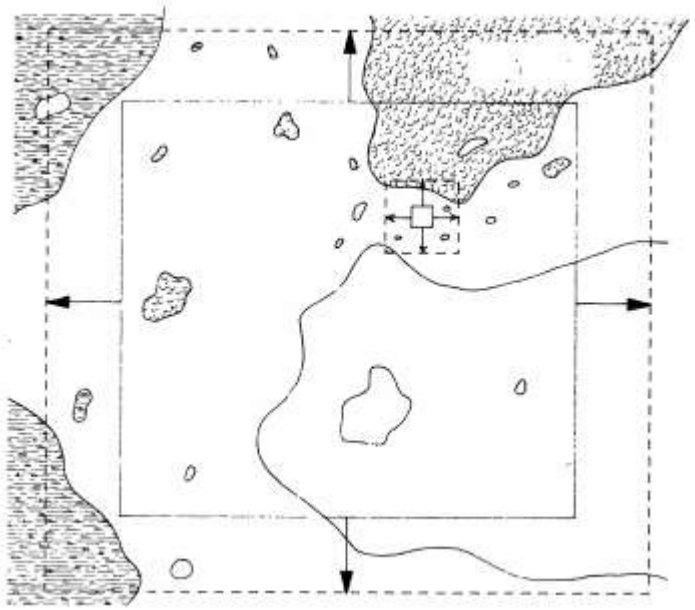


O.L. Pescott, CEH Wallingford,
olipes@ceh.ac.uk

Scale in ecology

"Investigators addressing the same questions have often conducted their studies on quite different scales. Not surprisingly, their findings have not always matched, and arguments have ensued."

- J. Wiens (1989)



e.g. changing spatial scale can change variation within/between samples

Practicalities for invasion biology

- Understanding distributions
  - Spread
  - Conservation
- Communicating risk
  - Maps
  - Indicators
  - Prioritisation
- Understanding patterns
  - Species richness
  - ‘Impacts’

Scale in British/Irish plant recording

10 x 10 km

2 x 2 km

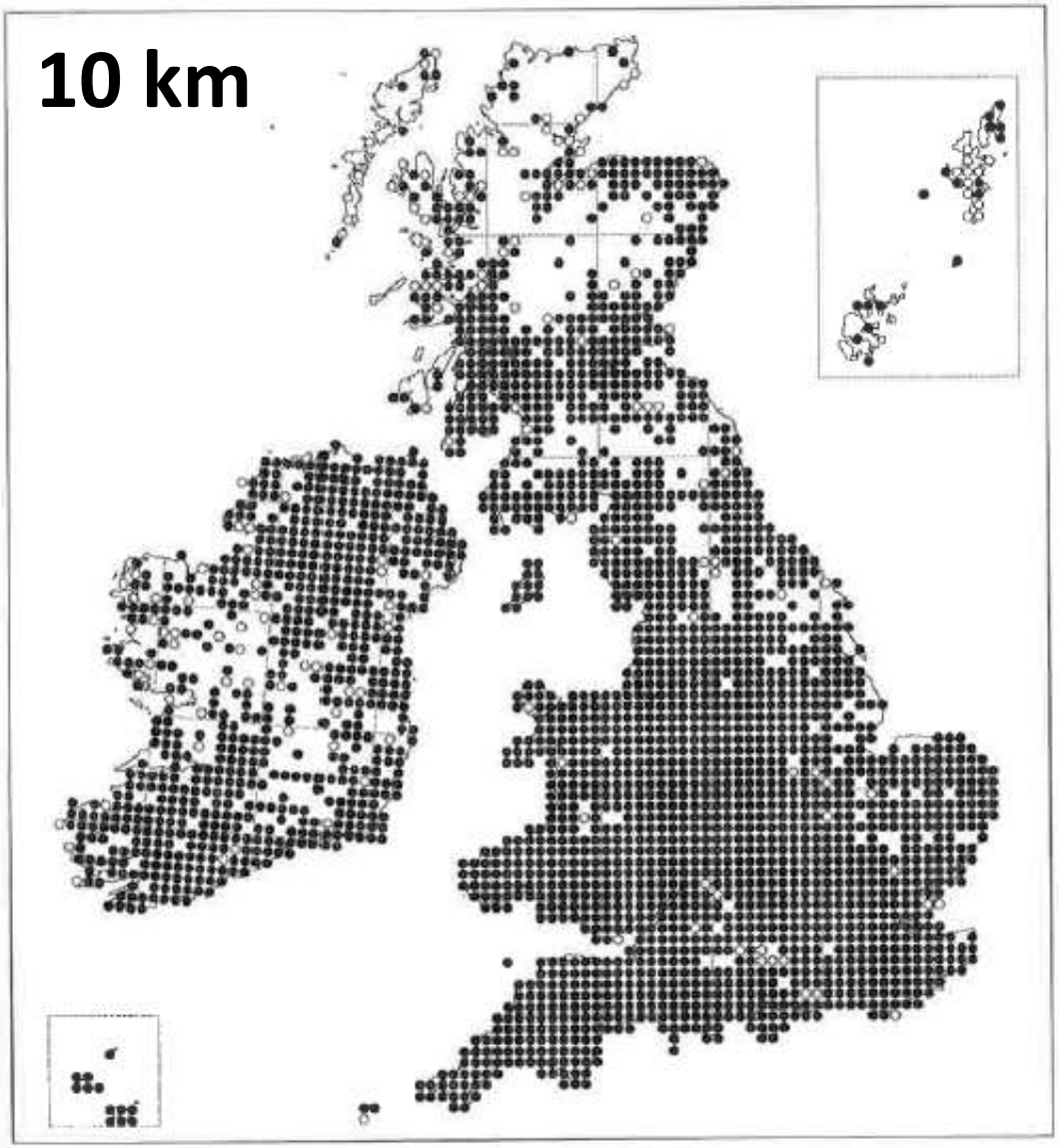
1 x 1 km

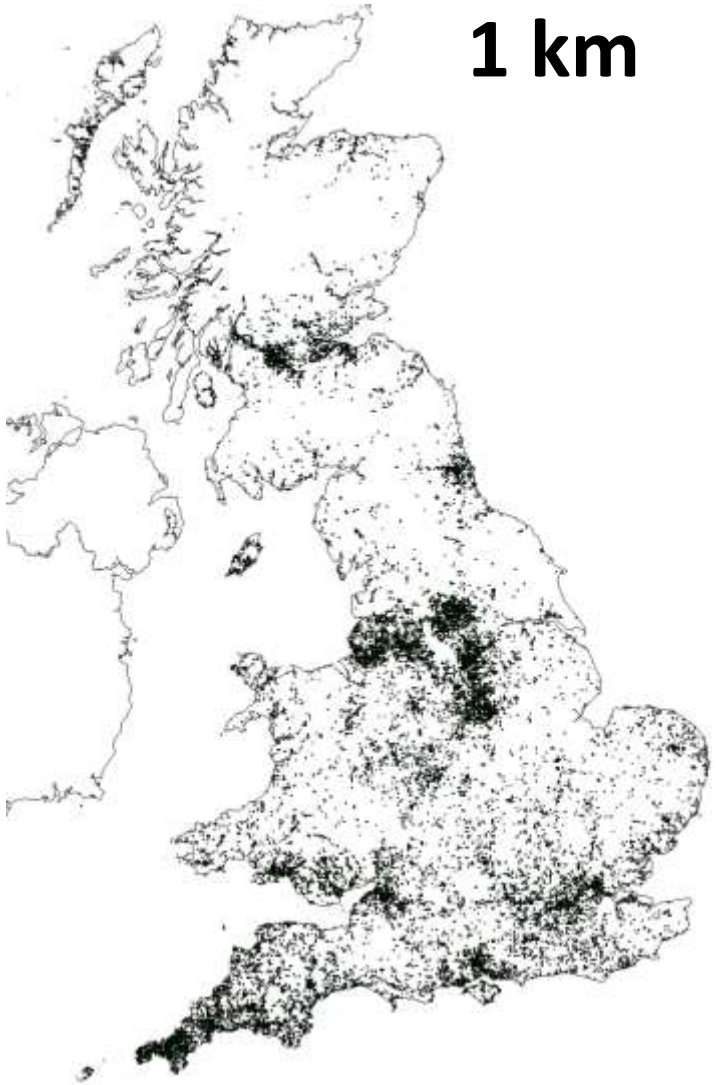
+ plots

Changing recording practices relate to scale

iRecord App

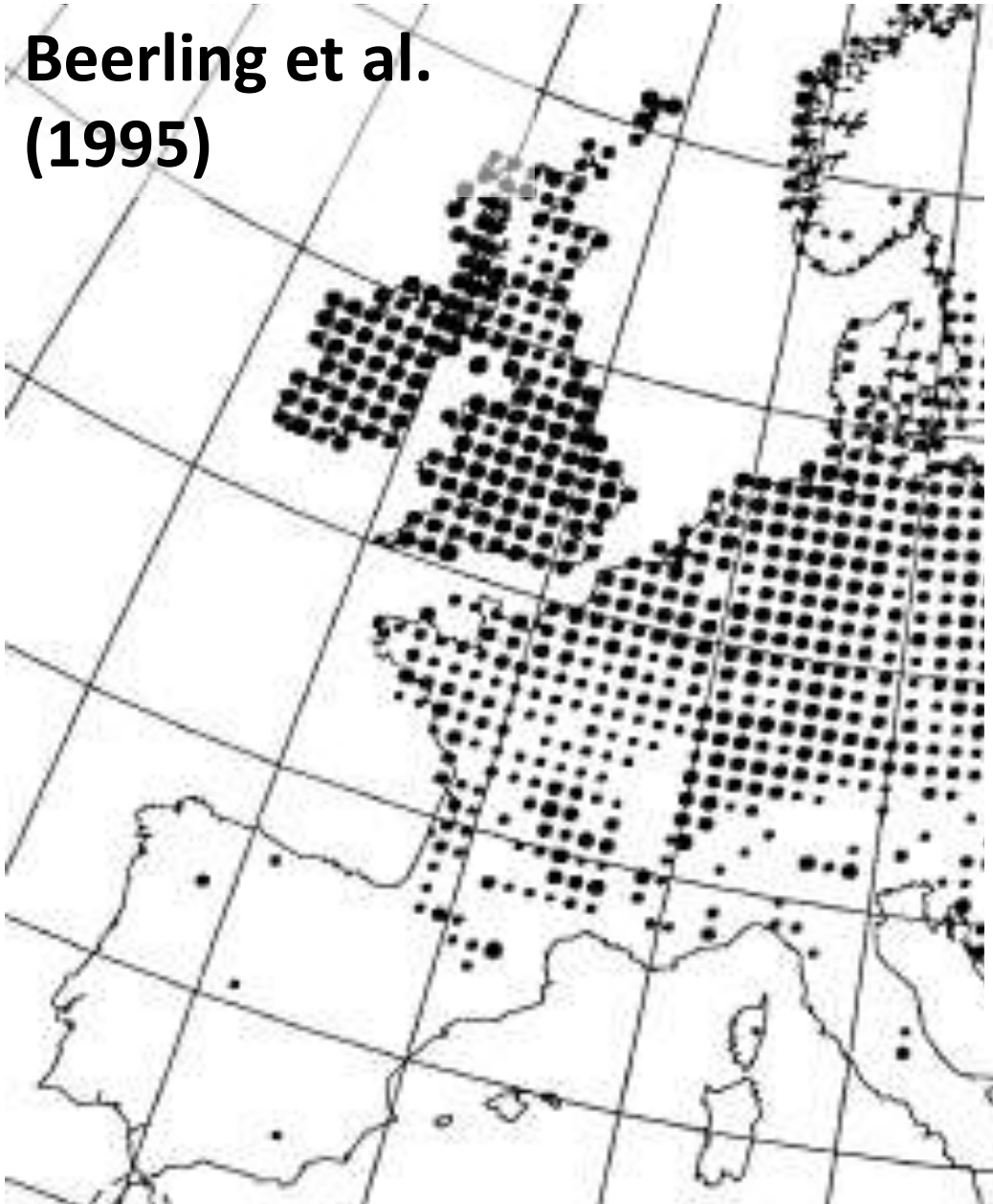
Understanding (recorded) distributions



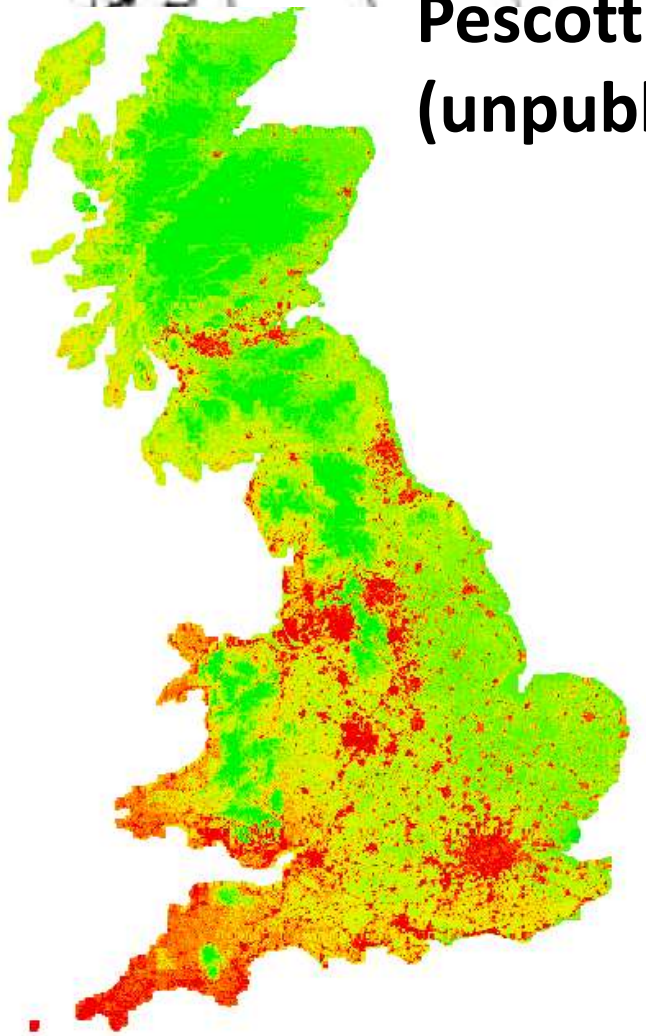


Fallopia japonica

Understanding (modelled) distributions

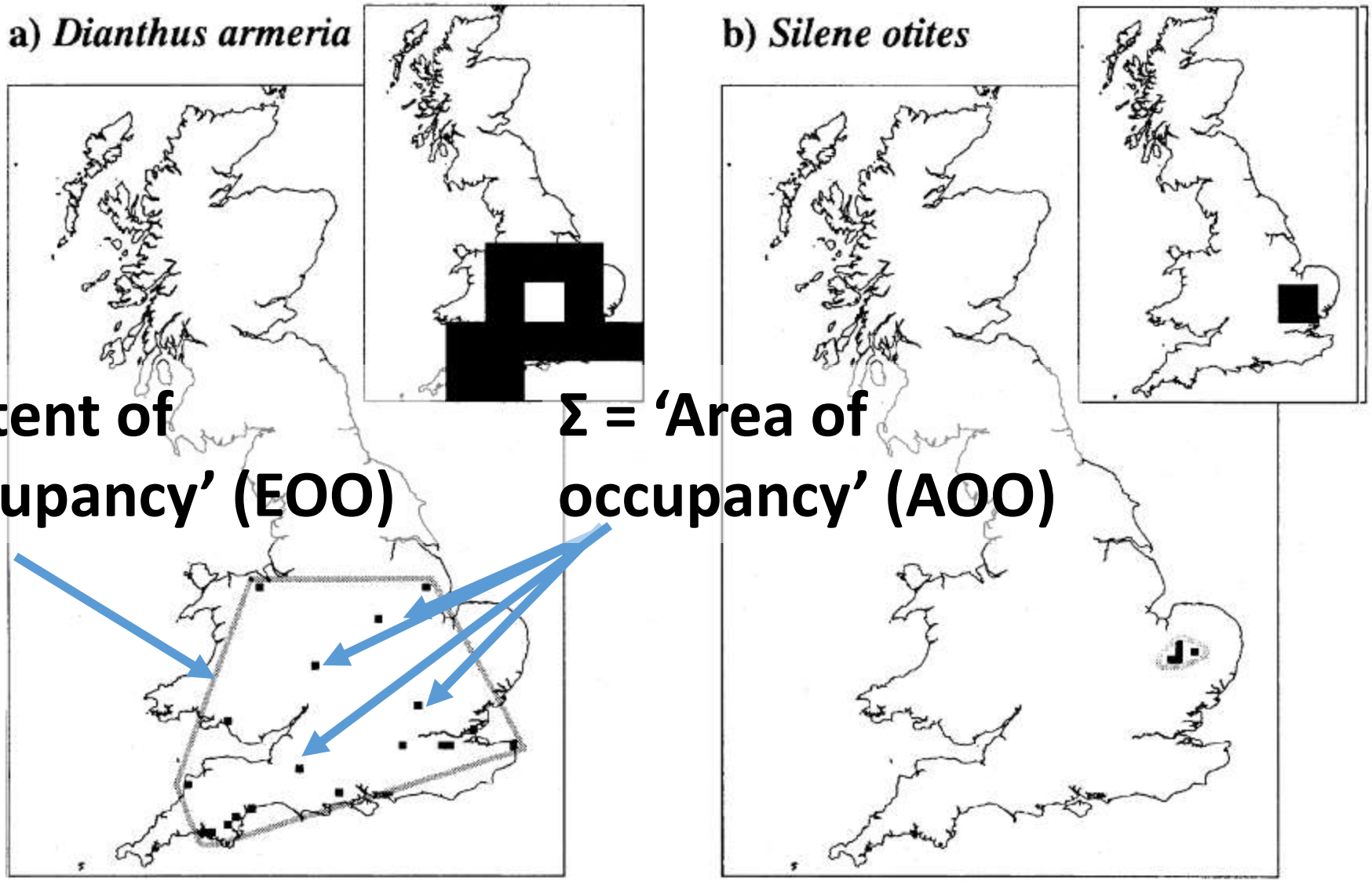


Beerling et al. (1995)



Pescott et al. (unpubl.)

Some typical measures



'Extent of occupancy' (EOO)

Σ = 'Area of occupancy' (AOO)

Hartley & Kunin (2003)

Invasive alien plant ‘indicators’

- Measure indicating some aspect of the environment
- A proxy for ecological ‘quality’
- Mark Hill et al. (2009) considered an occupancy indicator as a proxy for impact in the UK



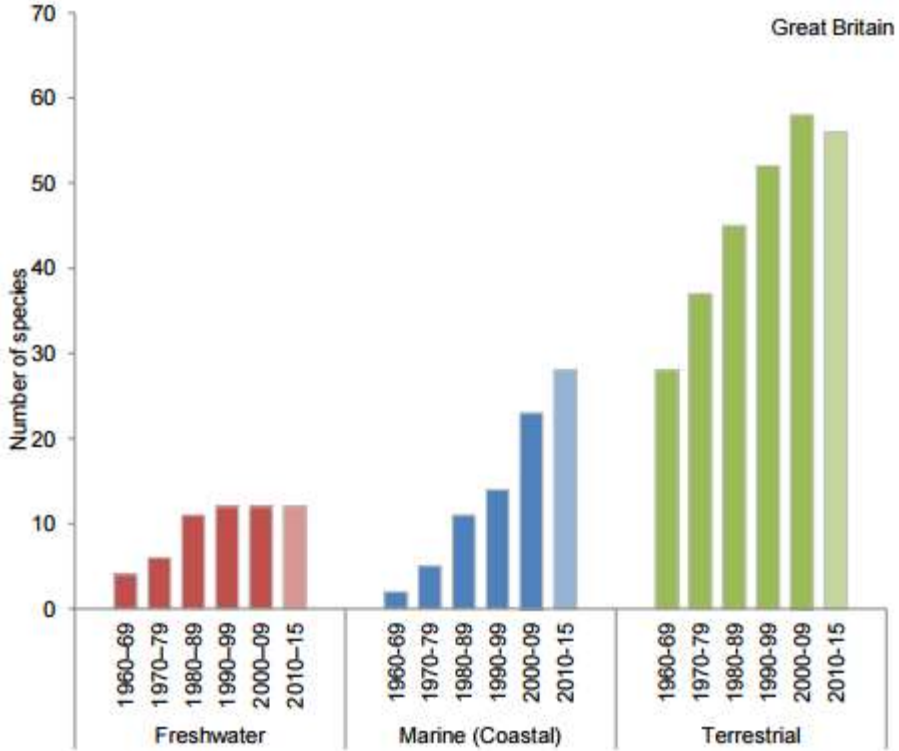
Invasive alien plant ‘indicators’

- Area (>10%) and count based

c. Terrestrial invasive species

Type: Pressure Indicator

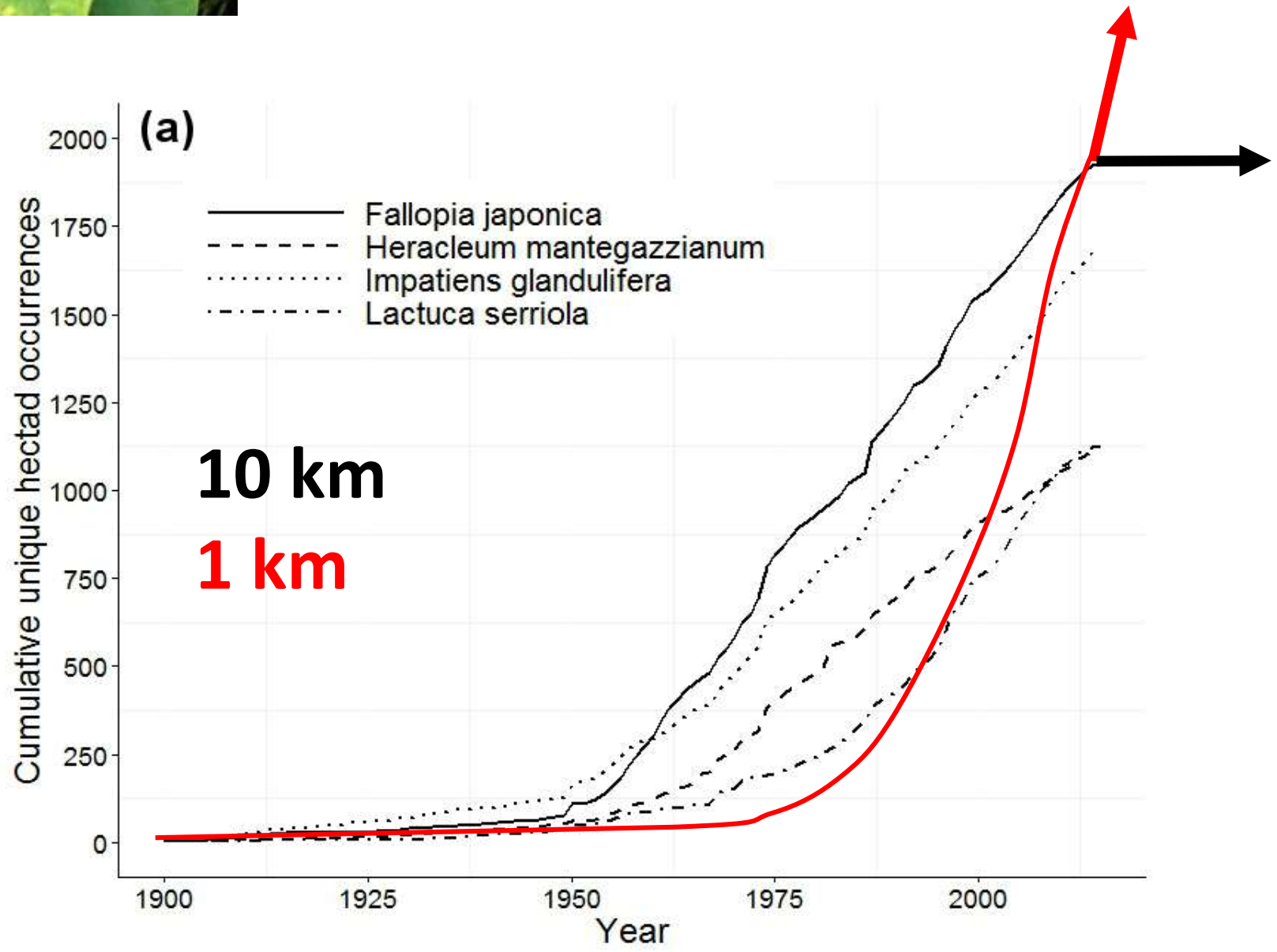
Figure B6i. Number of non-native invasive species established in or along more than 10 per cent of Great Britain's land area or coastline, 1960 to 2015.



Notes: The last time period covers a shorter period than the other bars (2010–2015).

Source: Botanical Society of Britain & Ireland, British Trust for Ornithology, Centre for Ecology & Hydrology, Marine Biological Association, National Biodiversity Network Gateway.

Rates of change: *F. japonica*



Evaluating spread for prioritisation

Bulletin OEPP/EPPO Bulletin (2016) **46** (3), 603–617 ISSN 0250-8052. DOI: 10.1111/epp.12336

A prioritization process for invasive alien plant species incorporating the requirements of EU Regulation no. 1143/2014

E. Branquart[1], G. Brundu[2], S. Buholzer[3], D. Chapman[4], P. Ehret[5], G. Fried[6], U. Starfinger[7], J. van Valkenburg[8] and R. Tanner[9]

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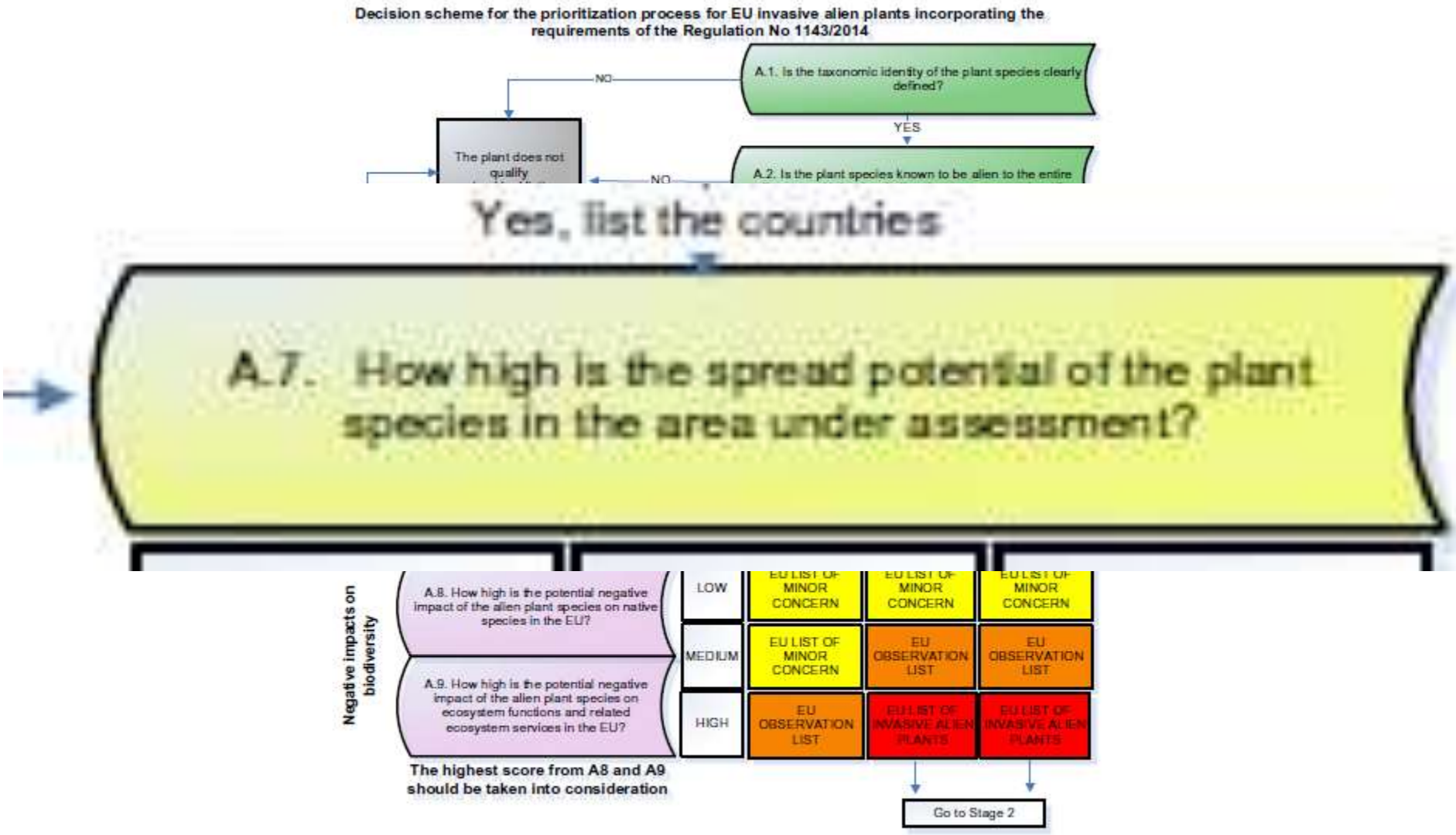
[7]*Julius Kühn Institut (JKI), Federal Research Centre for Cultivated Plants, Institute for National and International Plant Health, Braunschweig (Germany)*
[8]*National Plant Protection Organization, Wageningen (The Netherlands)*
[9]*European and Mediterranean Plant Protection Organization, Paris, France*

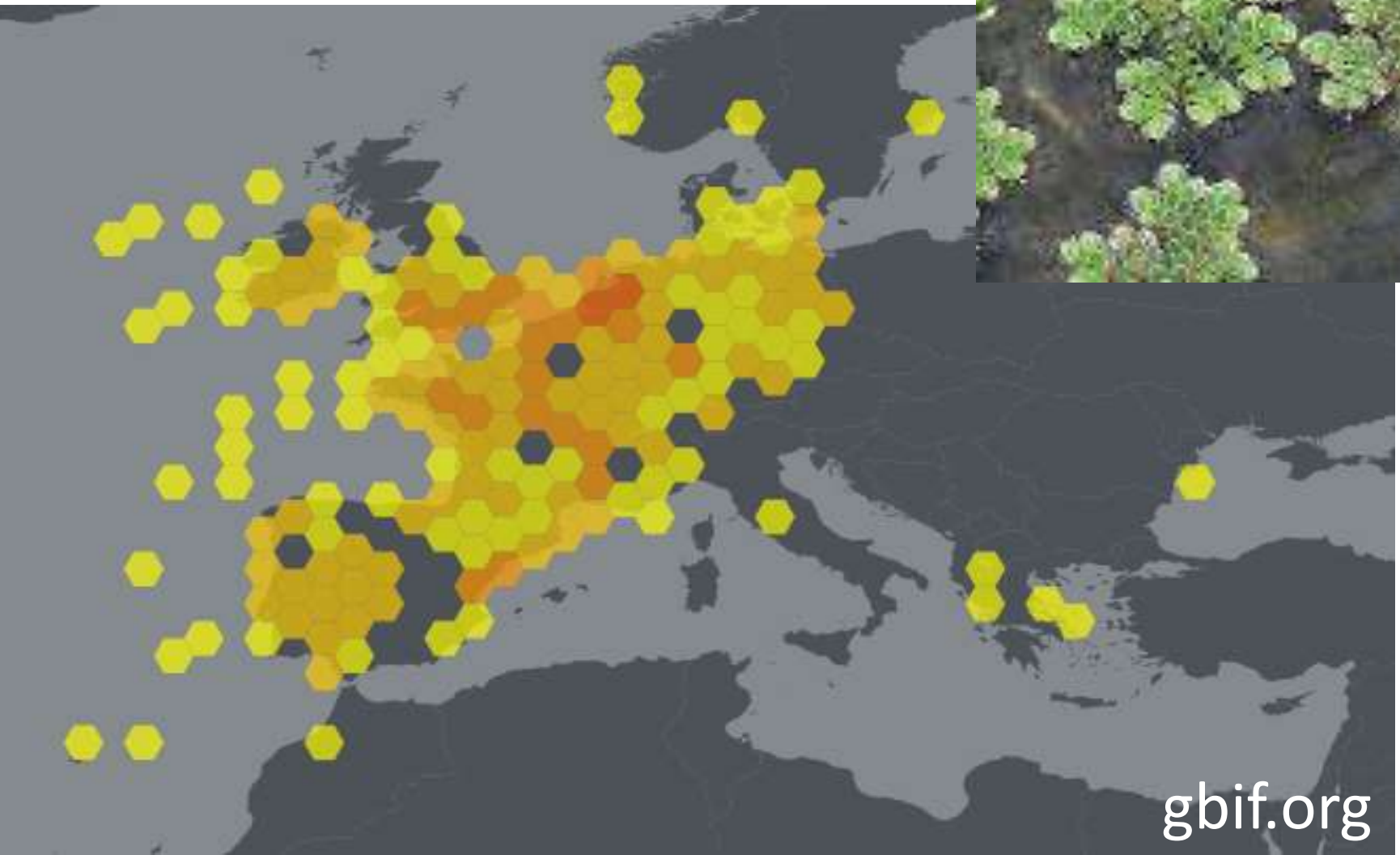
When faced with a large species pool of invasive or potentially invasive alien plants, prioritization is an essential prerequisite for focusing limited resources on species which inflict high impacts, have a high rate of spread and can be cost-effectively managed. The prioritization process as detailed within this paper is the first tool to assess species for priority for risk assessment (RA) in the European Union (EU) specifically designed to incorporate the requirements of EU Regulation no. 1143/2014. The prioritization process can be used for any plant species alien to the EU, whether currently present within the territory or absent.

Evaluating spread for prioritisation



Evaluating spread for prioritisation

Azolla filiculoides



Impacts can be hidden by scale

Countryside Survey

- **Maskell et al. (2006)**
  - Weak negative relationship between changes in alien cover and native diversity.
  - Invaded communities different
- **Thomas & Palmer (2015)**

PNAS

Non-native plants add to the British flora without negative consequences for native diversity

Chris D. Thomas[1] and G. Palmer

Department of Biology, University of York, York YO10 5DD, United Kingdom

Edited by James H. Brown, University of New Mexico, Albuquerque, NM, and approved February 24, 2015 (received for review December 15, 2014)

Plants are commonly listed as invasive species, presuming that

extinctions on centennial or millennial timescales. Introduced

Impacts can be hidden by scale

- **Maskell et al. (2006)**
  - 25 m plots paired over time within 1 km squares
- **Thomas & Palmer (2015)**
  - Plots not paired, all changes averaged to 1 km

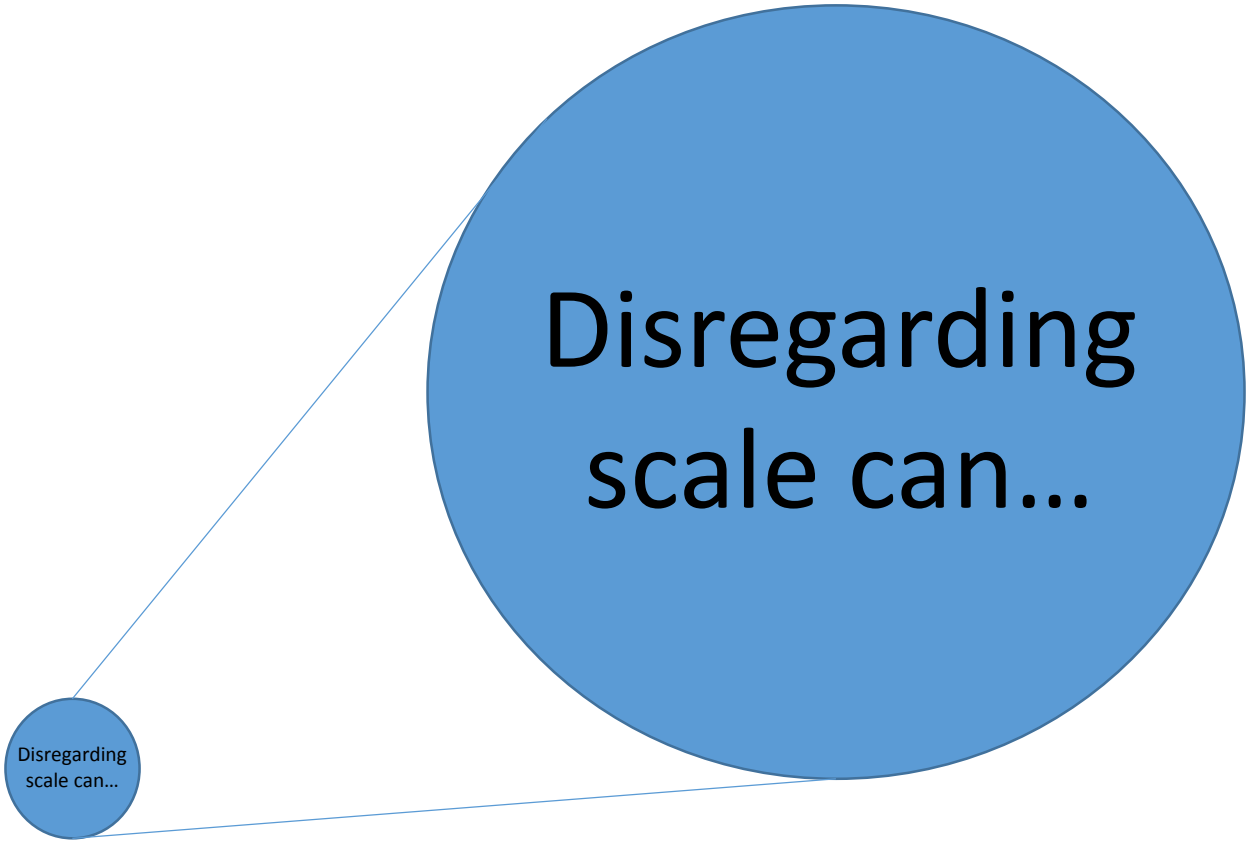
PNAS

Challenging the view that invasive non-native plants are not a significant threat to the floristic diversity of Great Britain

Conservation scientists and practitioners communities, and pirri-pirri burr (*Acaena* *Facultad de Ciencias Forestales,*

…hinder communication

…create confusion (and conflict)



…affect decision making

…result in different patterns