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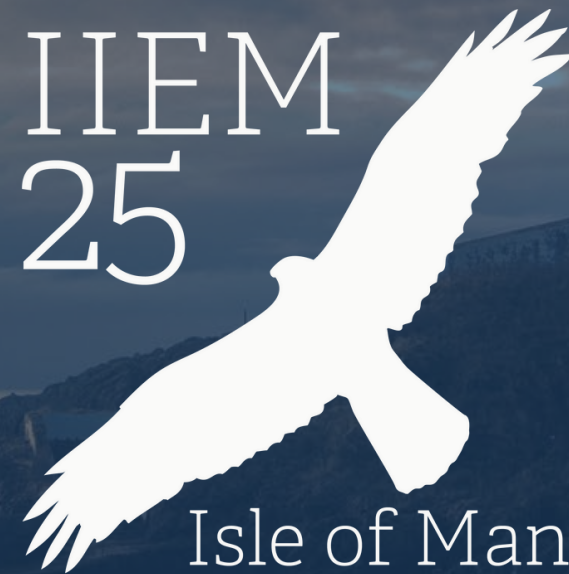## Isle of Man

Plant Health Across the Pond

Nathan Hayes, Biosecurity Team, Government of Jersey

EPPO Jens Georg Unger Plant Health Fellowship

Research into the Asian Longhorn Beetle (*Anoplophora glabripennis*) & Conducting a Pest Risk Analysis on the oak ambrosia beetle *Platypus quercivorus* the causal agent of Japanese Oak Wilt.

Focused on the detection, management, and eradication of the Asian longhorn beetle in Charleston, South Carolina

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ALB Detection

Types of detection:

- **Lure trapping**
- **Visual Surveys**
- eDNA
- Remote Sensing
- Acoustics
- Sniffer dogs

ALB detections in North America

ALB Detection

Public outreach becoming
increasingly effective

eDNAdetection

- eDNA = Environmental DNA
- Faeces, skin, hair, carcasses, etc.
- This can be used to detect organisms
- Previous research found the probability of detection for spotted lantern fly was 84% using eDNA compared to 36% for visual surveys
- It's being tested in Charleston to detect ALB which are present in low numbers

Can ALB be detected using a paint roller and some molecular science?

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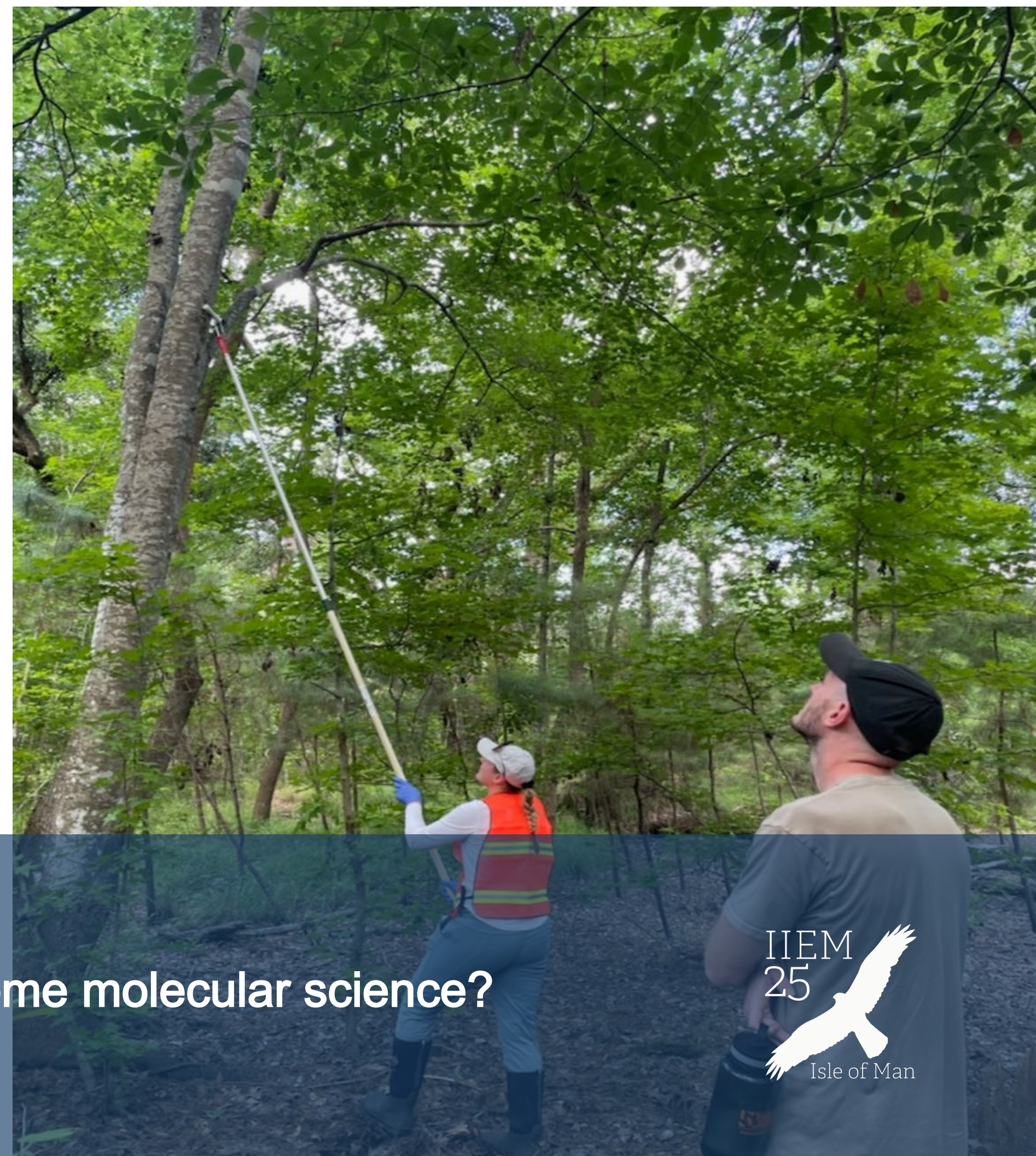
ALB management & Eradication

- 'Drop & Leave'
- Quality Control
- Sparse Population
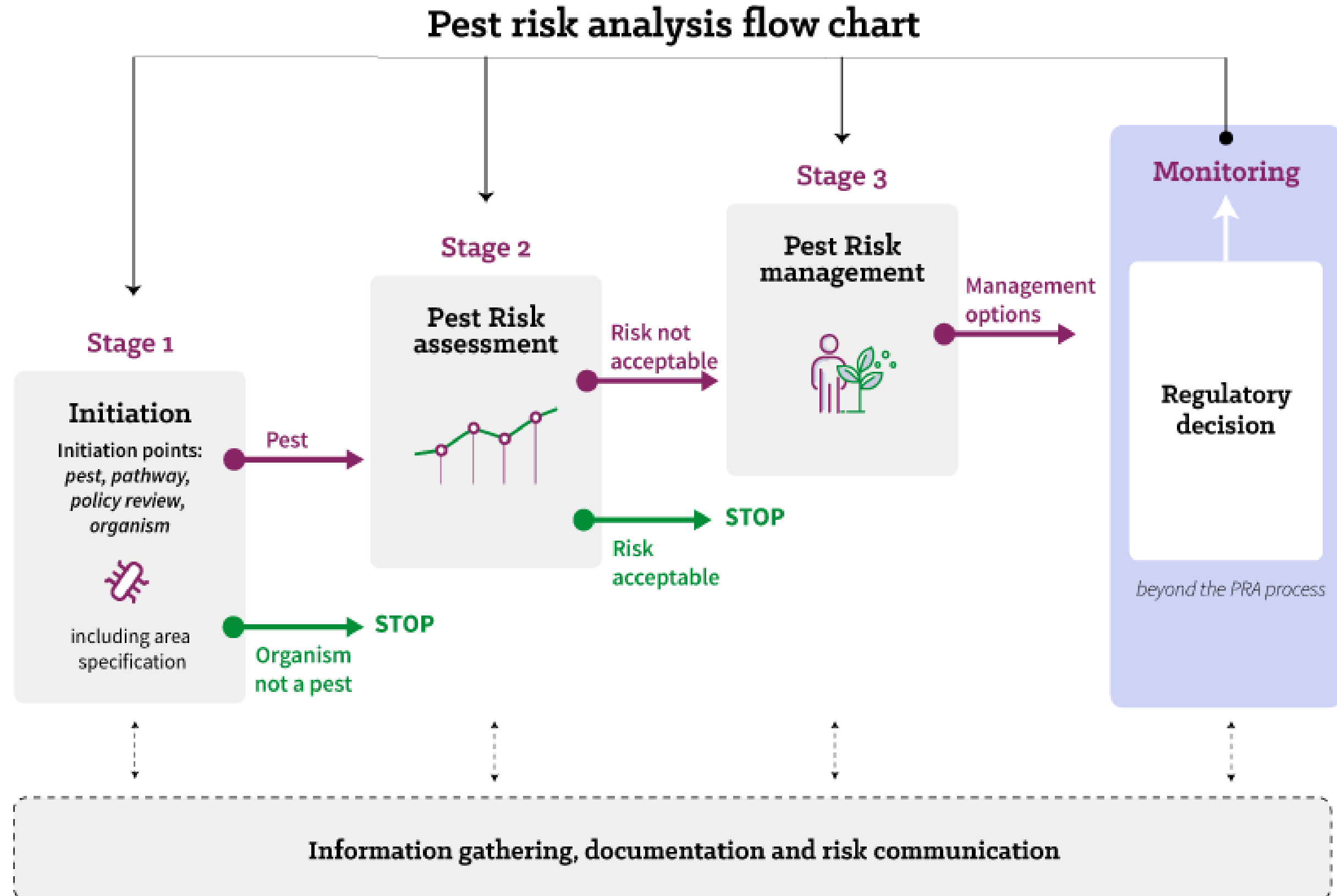- How does the position of host material influence oviposition?

ALB eradication efforts

- Italy – 2 beetles caught
- UK – 0 beetles caught
- U.S. Charleston - 2 beetles (1 in a control trap!)
- Switzerland - 0 beetles caught

Pest Risk Analysis

- Systematic approach used to assess and manage the risks posed by plant health pests and diseases
- It evaluates the likelihood of a pest's introduction, establishment, and spread in an area
- Whilst determining the potential environmental, social, and economic impacts

Pest risk analysis flow chart

Stage 1

Initiation

Initiation points: *pest, pathway, policy review, organism*

including area specification

→ **Pest**

→ **STOP** Organism not a pest

Stage 2

Pest Risk assessment

→ Risk not acceptable

→ **STOP** Risk acceptable

Stage 3

Pest Risk management

Management options →

Monitoring

Regulatory decision

beyond the PRA process

Information gathering, documentation and risk communication

Pest Risk Analysis

- No PRA's published by Jersey... yet!

Pest Risk Analysis

- The oak ambrosia beetle *Platypus quercivorus*, and it's fungal symbiont *Dryadomyces quercivorus*
- The causal agent of Japanese oak wilt
- Not currently regulated in Jersey, the UK or EU
- This PRA will help determine its regulatory status
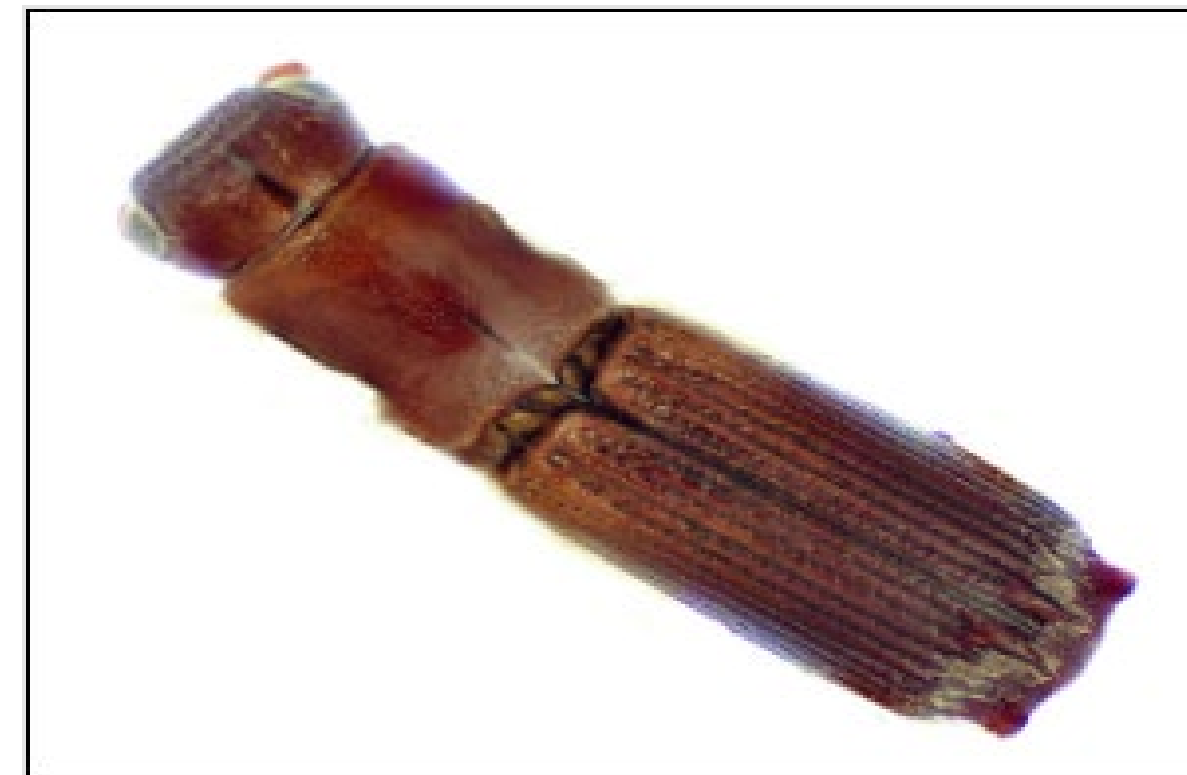
Pest Risk Analysis *P.quercivorus* biology

- Wood-boring ambrosia beetle
- Ambrosia beetles carry fungus in specially evolved mycangia
- The fungus *Dryadomyces quercivorus* is the causal agent of Japanese oak wilt
- The two major susceptible hosts are *Quercus mongolica* and *Quercus serrata*
- Monogamous, creating and living in one gallery in their lifetime
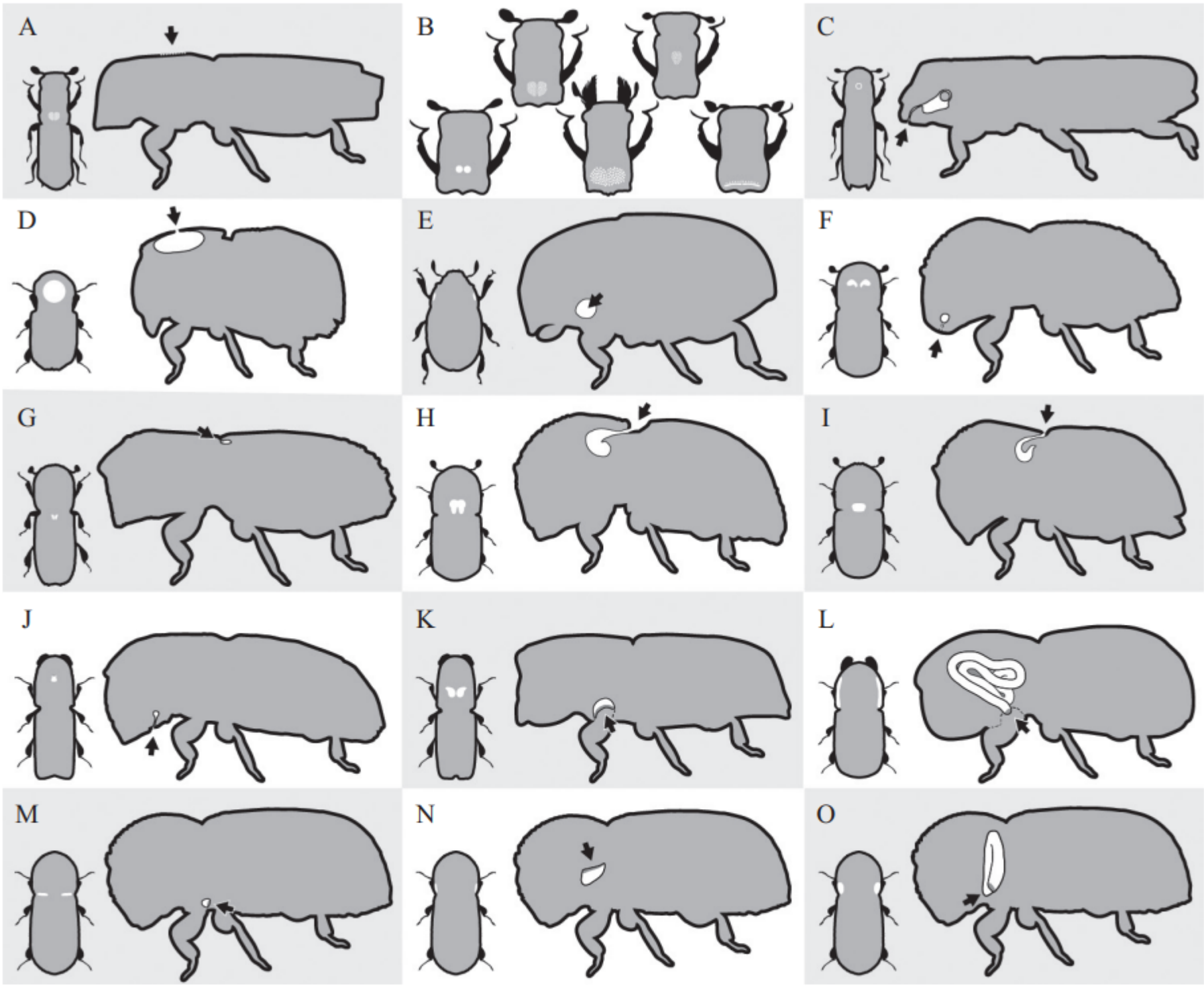- Pheromones play a key role in mass infestation of hosts

A

B
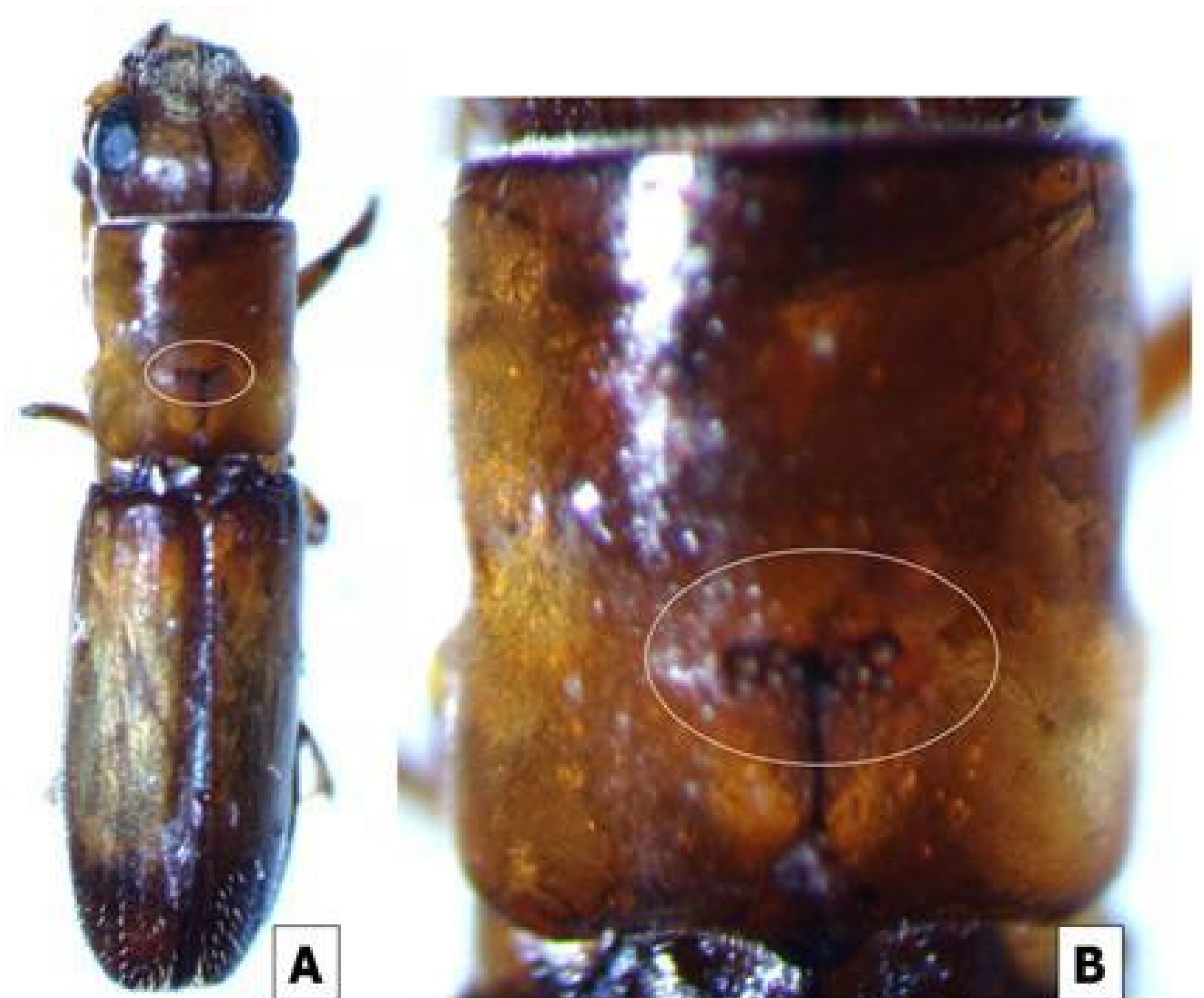
Figure 7.4
Beetle silhouettes showing representative mycangium types in white. (A) Pronotal pits (*Platypus*). (B) Pronotal pit arrangements. From left to right: *Oxoplatypus quadridentatus, Platypus cylindrus, Ganyocerus papuanus, Austroplatypus incompertus, Diapus quinquespinatus* (accompanied by pronotal crevices). (C) Cranial sphere (*Crossotarsus niponicus*). (D) Pronotal disk (*Scolytoplatypus*). (E). Setose patch (*Phloeoborus*). (F). Dual preoral pockets (*Euwallacea*). (G) Elytral notches (*Xyleborinus*). (H) Mesonotal pouch, lobed (*Xylosandrus*). (I) Mesonotal pouch, unlobed (*Anisandrus*). (J) Single oral pocket (*Monarthrum bicallosum*). (K) Procoxal; dotted black line represents procoxal cavity (*Monarthrum*). (L) Prothoracic tubes; dotted black line represents procoxal cavity (*Corthylus*). (M) Prothoracic basins (*Xyloterinus politus*). (N) Pleural cavities (fin type) (*Indocryphalus*). (O) Pleural cavities (horseshoe type) (*Trypodendron*). Beetle body silhouettes are traced from photographs of whole beetles; legs are generic illustrations. Black arrows point to the locations of mycangia and generally follow the direction of propagule entry. Mycangium shapes and locations are approximate.
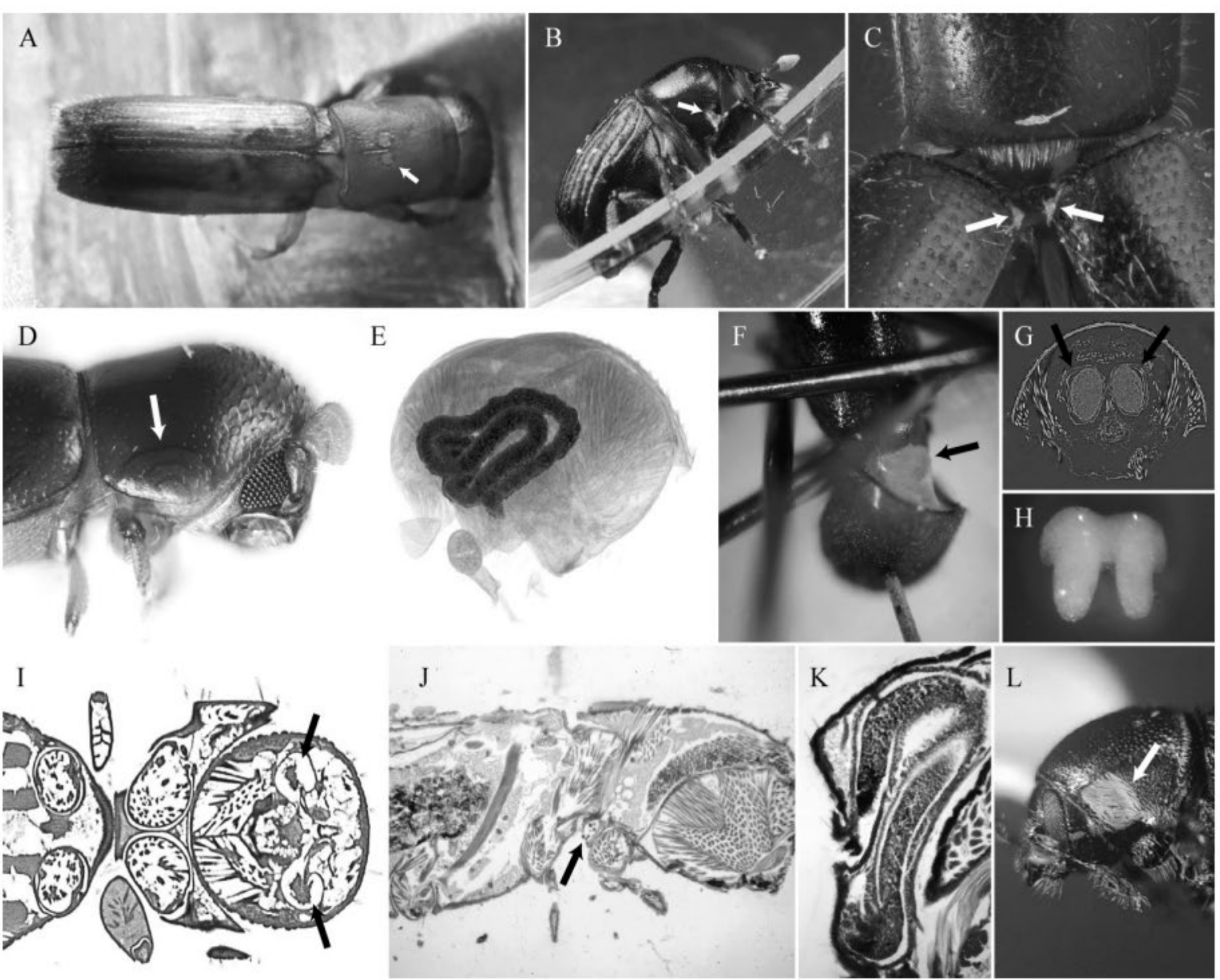
Figure 7.2
Different types of mycangia and mycangium imaging techniques. (A) Pronotal pit mycangia of *Oxoplatypus quadridentatus*. (B) Setose patch mycangia of *Phloeoborus* cf. *niger*. (C) Elytral notch mycangia of *Xyleborinus saxesenii*, with overflowing hyphae of ambrosia fungus *Raffaelea*. (D, E) Prothoracic tube mycangia of *Corthylus punctatissimus*. (D) Mycangium visible through exoskeleton. (E) Mycangium 3D model constructed from Micro-CT scanning. (F–H) Mesonotal pouch mycangium of *Xylosandrus amputatus* (F, G) and *X. germanus* (H). (F) "Draculian method" to expose mycangium (arrow). (G) Dual lobes visible in cross section using Micro-CT. (H) Excised mycangium/spore mass. (I) Dual preoral pocket mycangia of *Premnobius cavipennis*. (J) Prothoracic basin mycangia of *Xyloterinus politus*. (K) Prothoracic horseshoe cavity mycangia of *Trypodendron betulae*. (L) Setose patch mycangium of unidentified Bothrosternini. When present, arrows indicate mycangia. E, G, I by Micro-CT. J, K by microtome sectioning. A, B, D-G, I provided by Craig Bateman, You Li, and Jiri Hulcr. J, K provided by Lawrence Abrahamson. L provided by Luana de Souza Covre.

Pest Risk Analysis

Japanese oak wilt has Spread significantly since the 1980s

A map of the spread of Japanese oak wilt in Japan is given in Kuroda *et al.* (2012) (the black shading highlights the spread).

A: Before 1980   B: 1981 to 2009
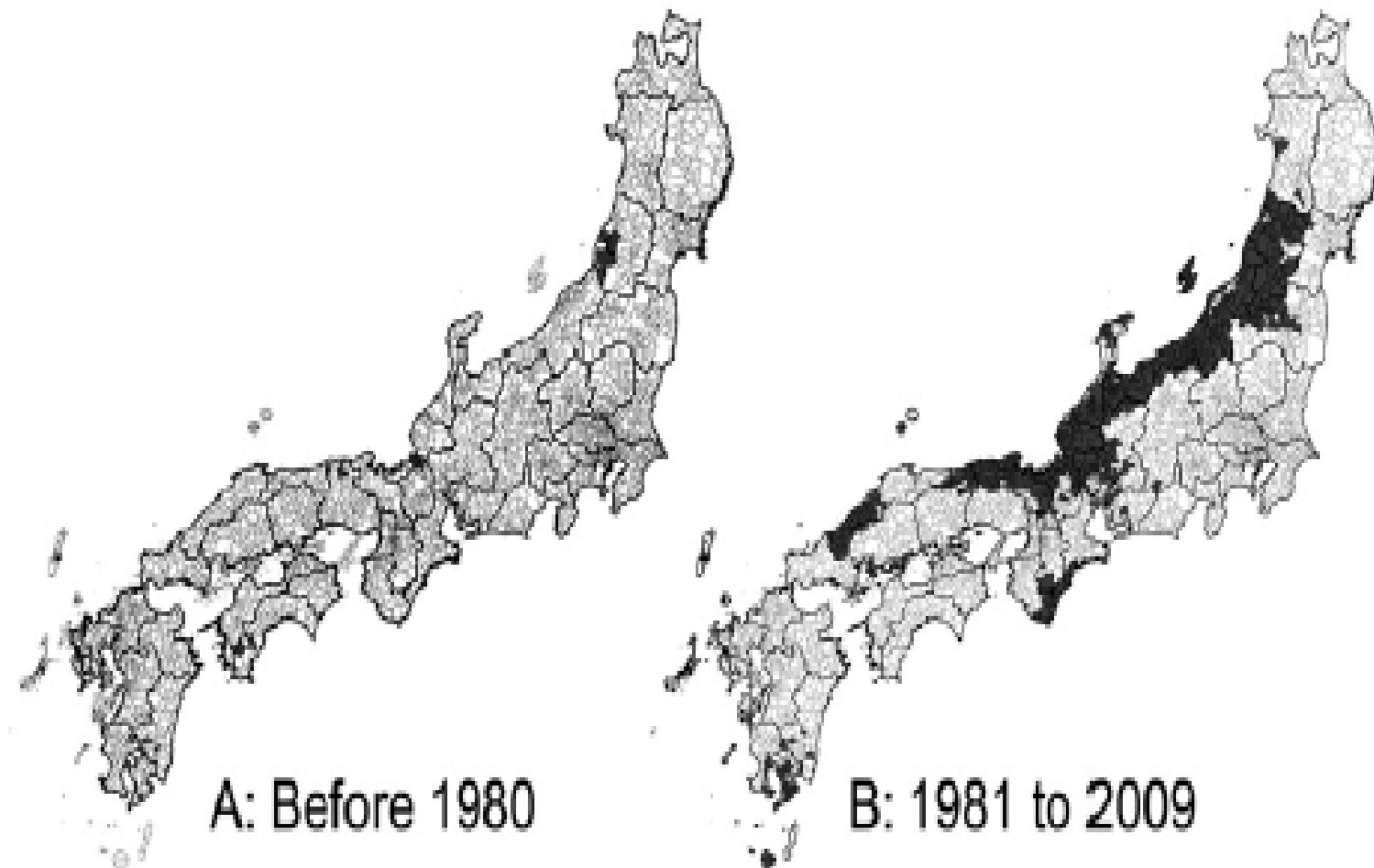
Pest Risk Analysis – What is the risk and how do we know?

- Current distribution
- Likelihood of entry
- Likelihood of establishment
- Economic, environmental and social impacts
- Endangered area
- Risk management options
- Key uncertainties

Pest Risk Analysis
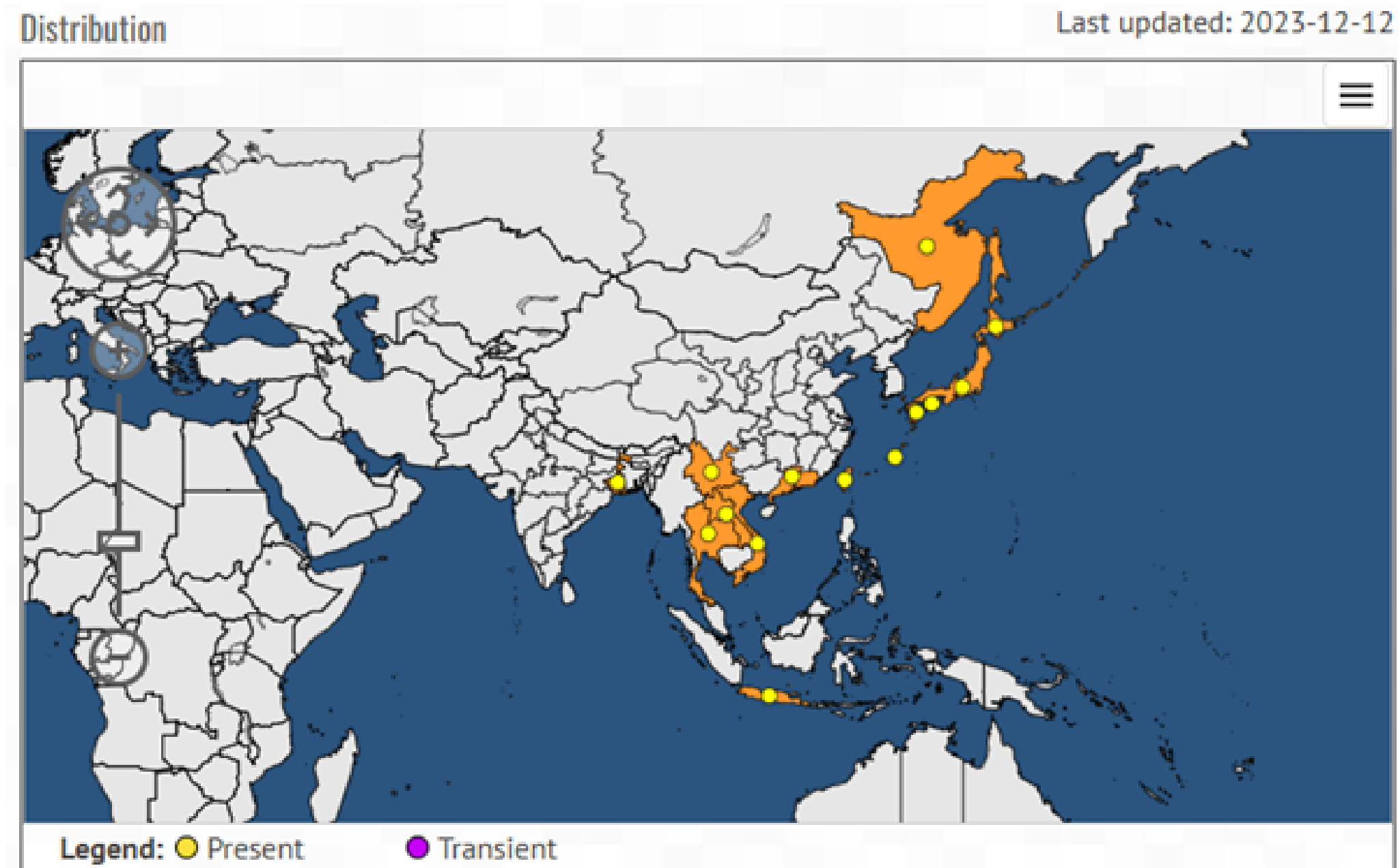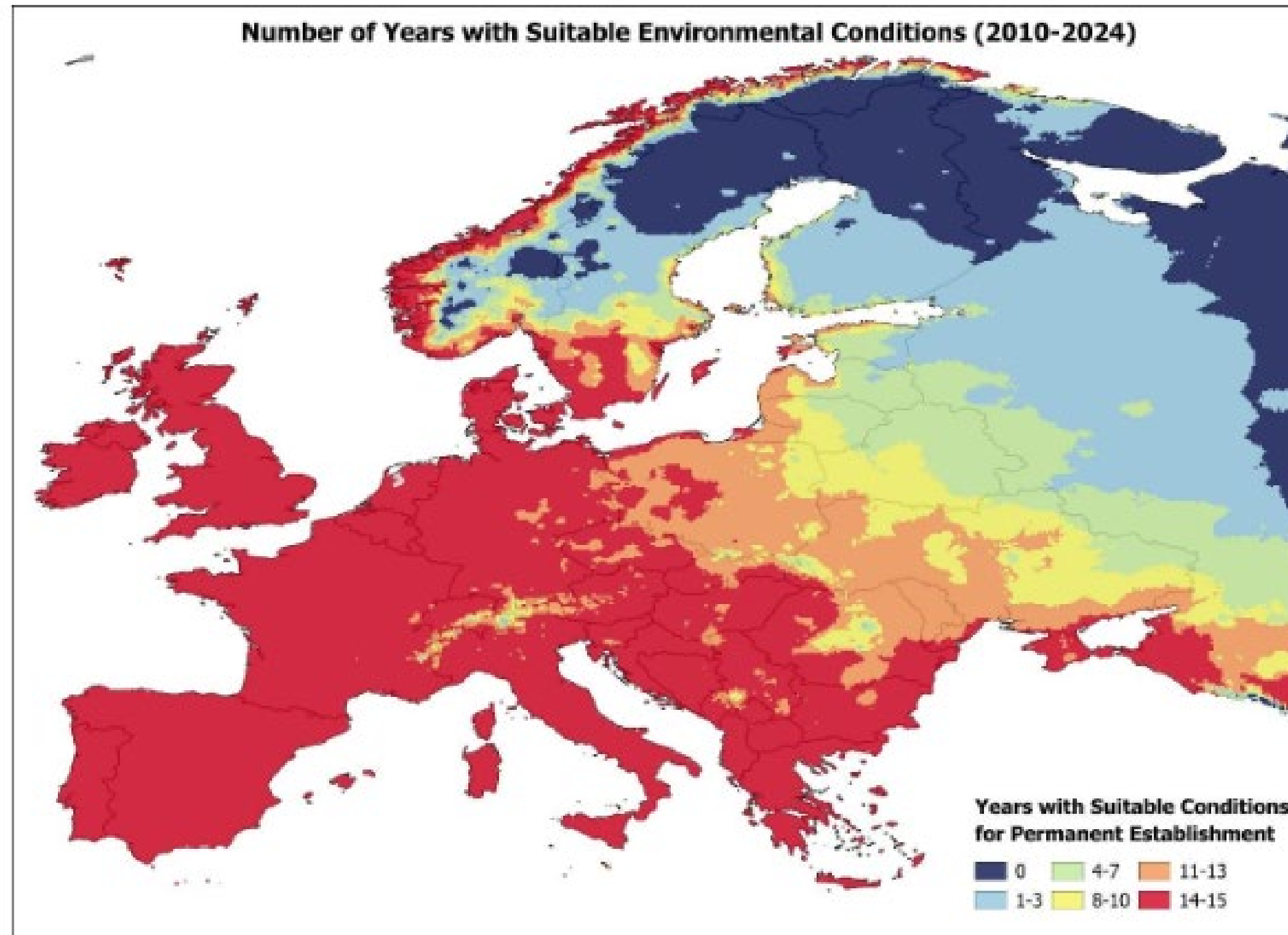
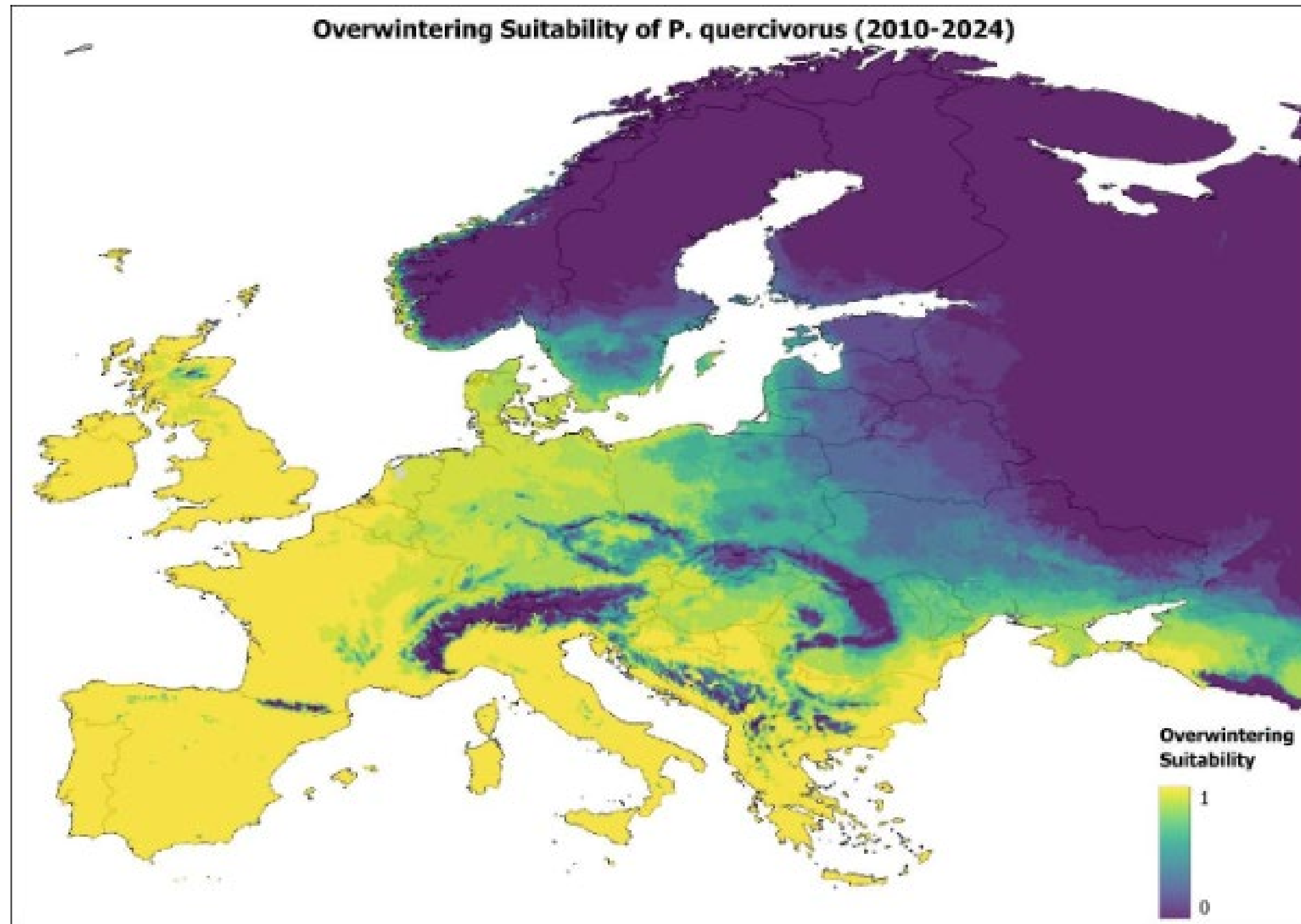Oak ambrosia beetles current distribution

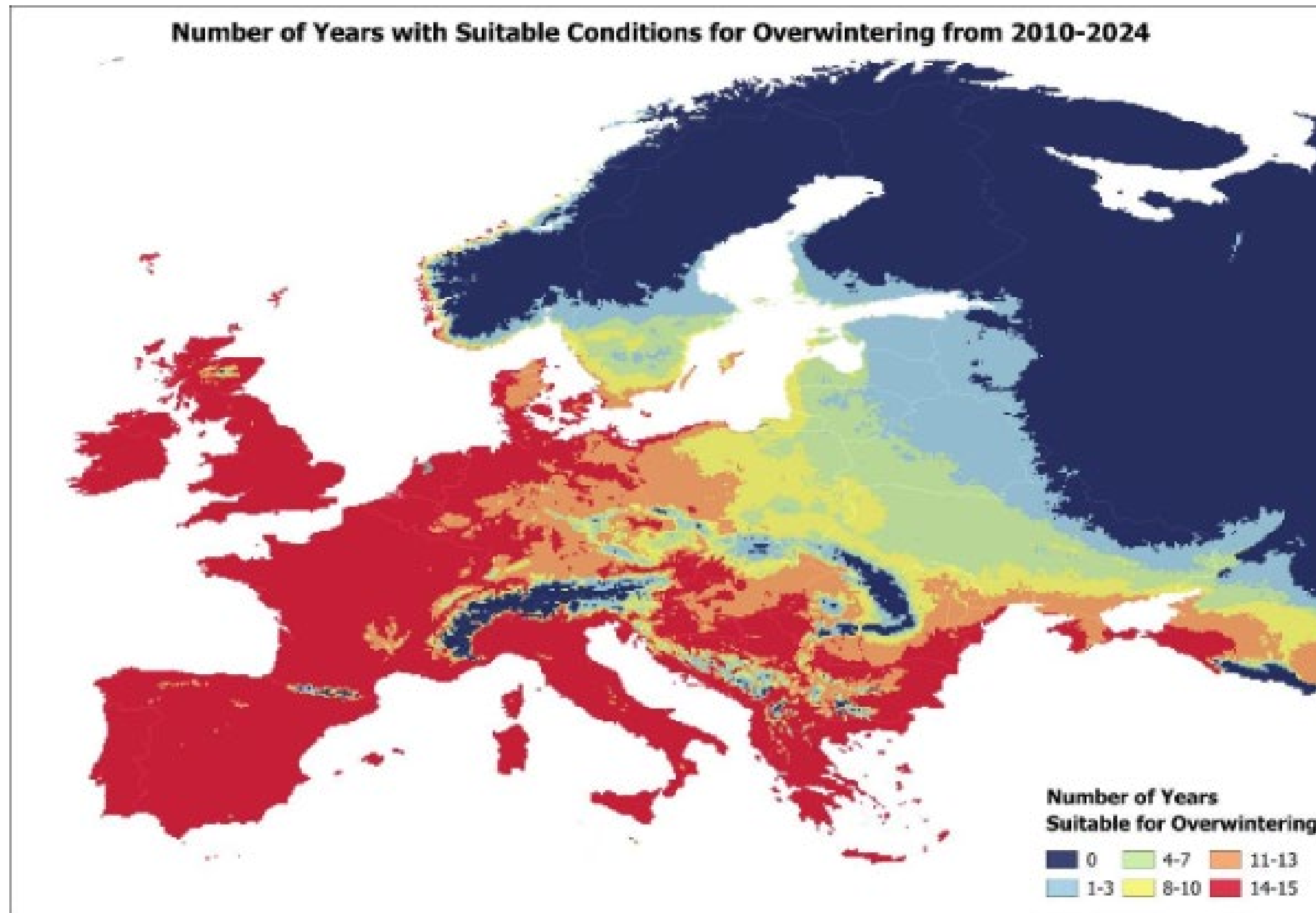Figure 1. Platypus quercivorus distribution (EPPO global database, accessed 04/04/2025.

Pest Risk Analysis – Likelihood of establishment

Number of Years with Suitable Environmental Conditions (2010-2024)

Years with Suitable Conditions for Permanent Establishment
- 0
- 1-3
- 4-7
- 8-10
- 11-13
- 14-15

Pest Risk Analysis – Likelihood of establishment

Overwintering Suitability of P. quercivorus (2010-2024)

Pest Risk Analysis – Likelihood establishment

Number of Years with Suitable Conditions for Overwintering from 2010-2024

Pest Risk Analysis - spread

P. quercivorus Average Number of Generations Possible per Year from 2010-2024

Avg. Generations per Year
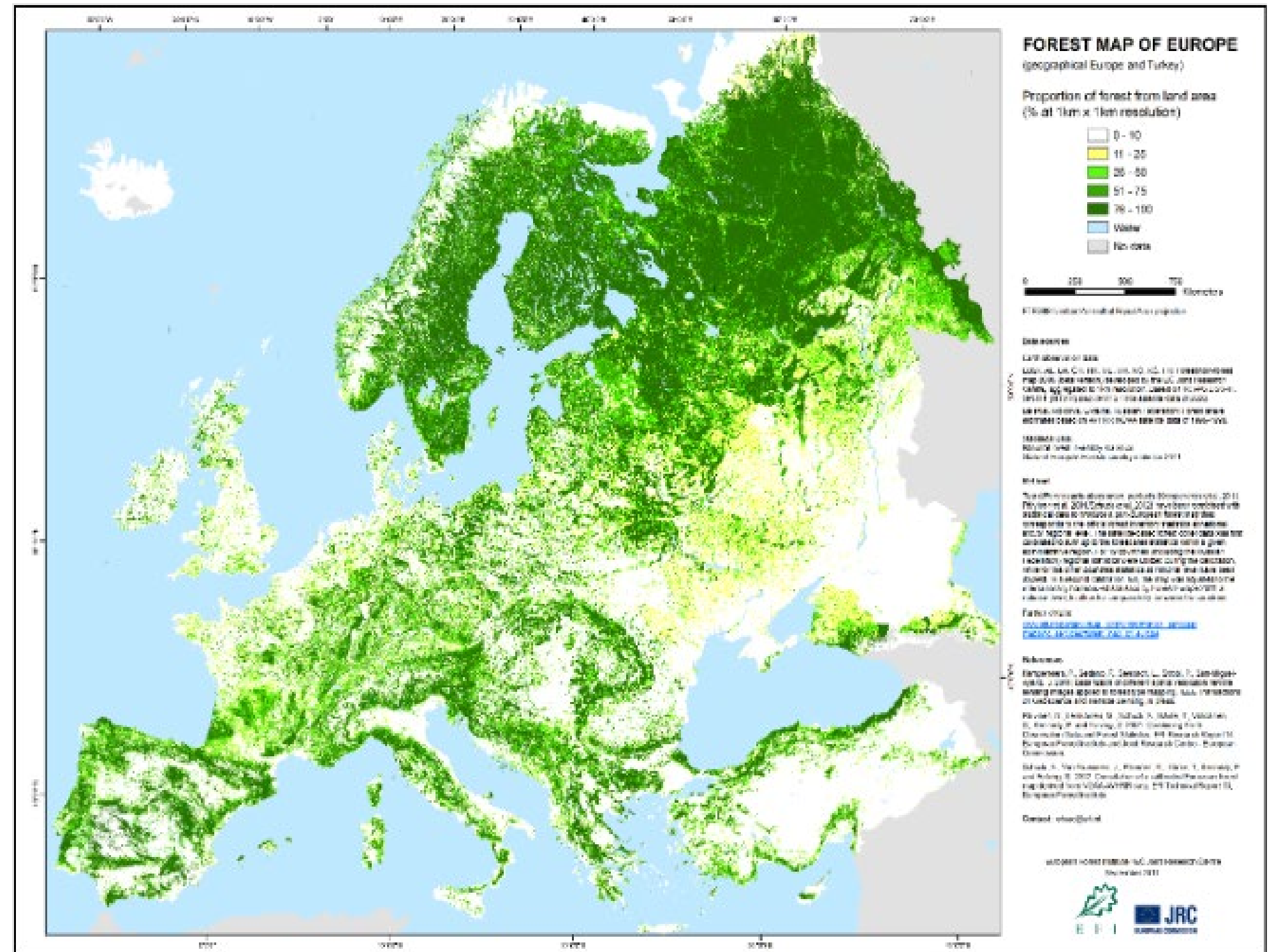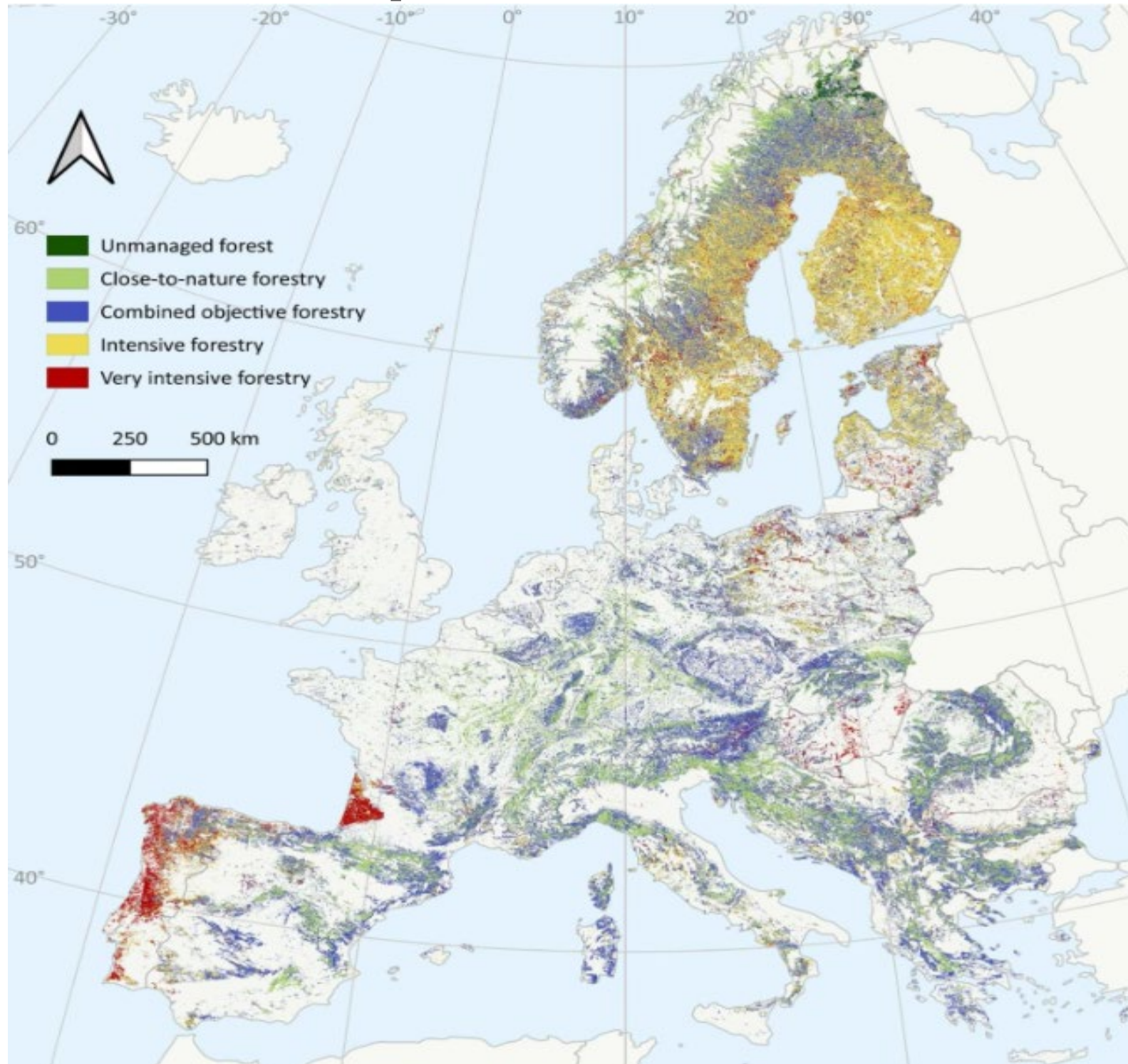- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
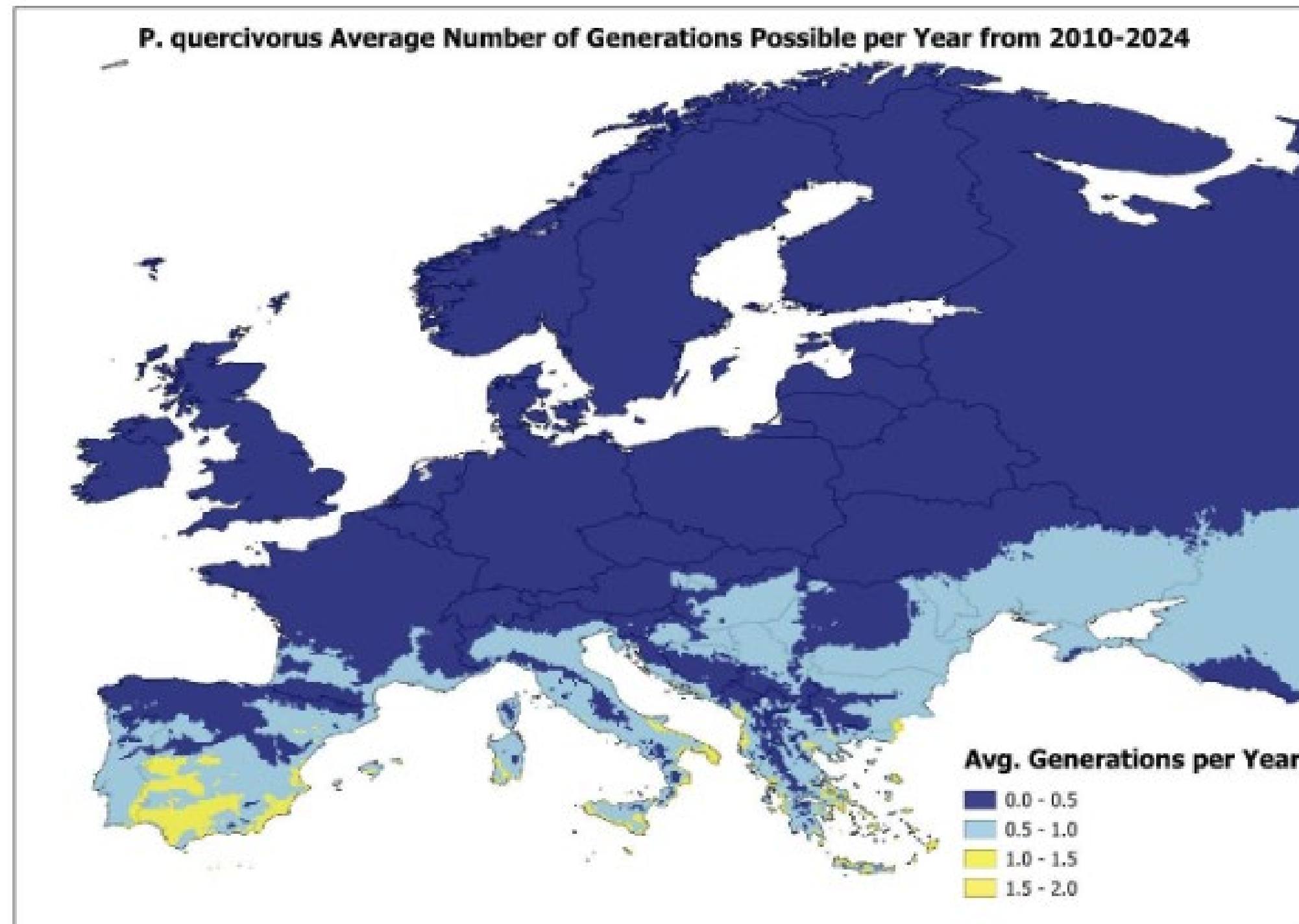
Pest Risk Analysis – susceptible hosts
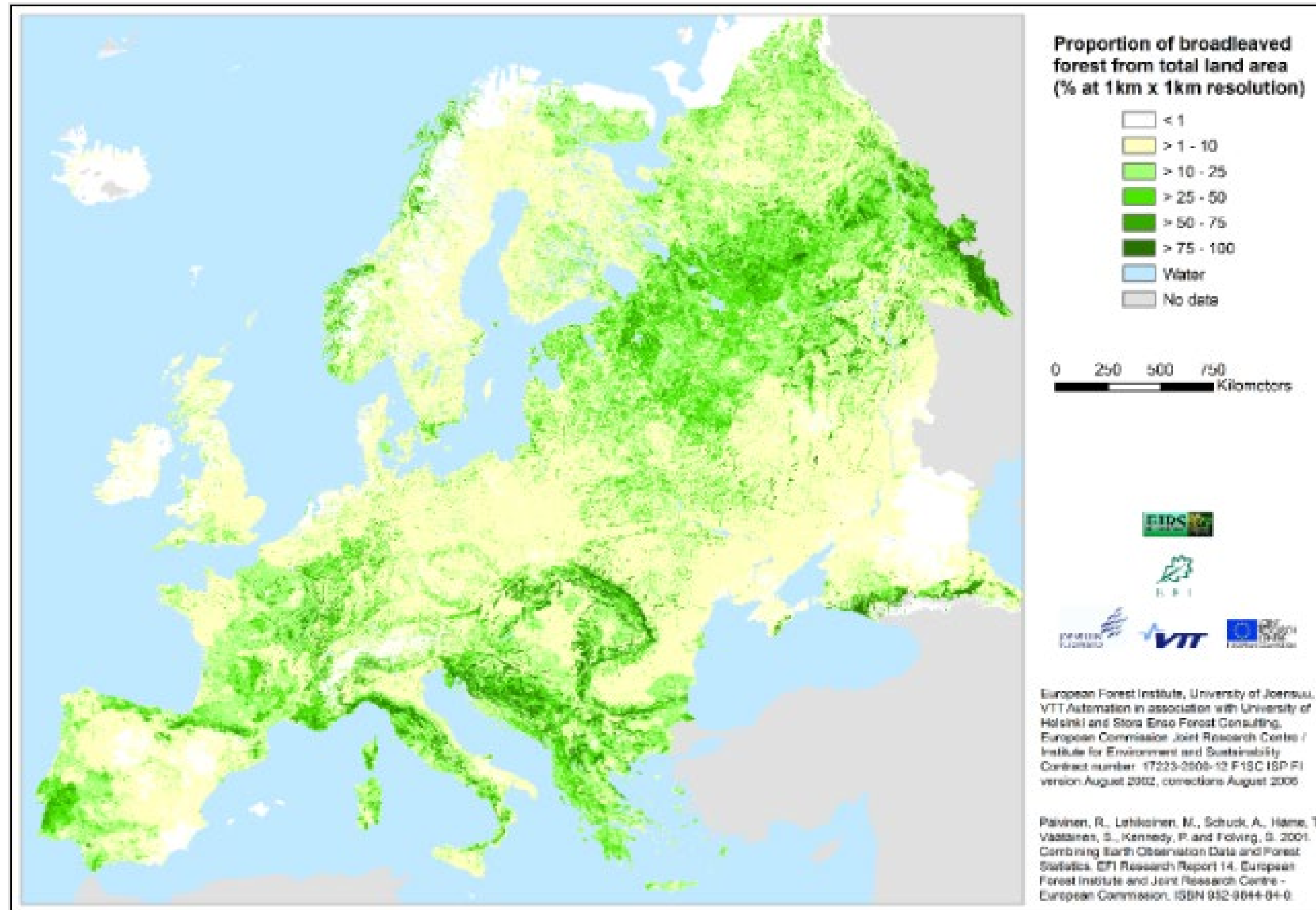
Are there relevant hosts in the PRA area?

Pest Risk Analysis
susceptible hosts

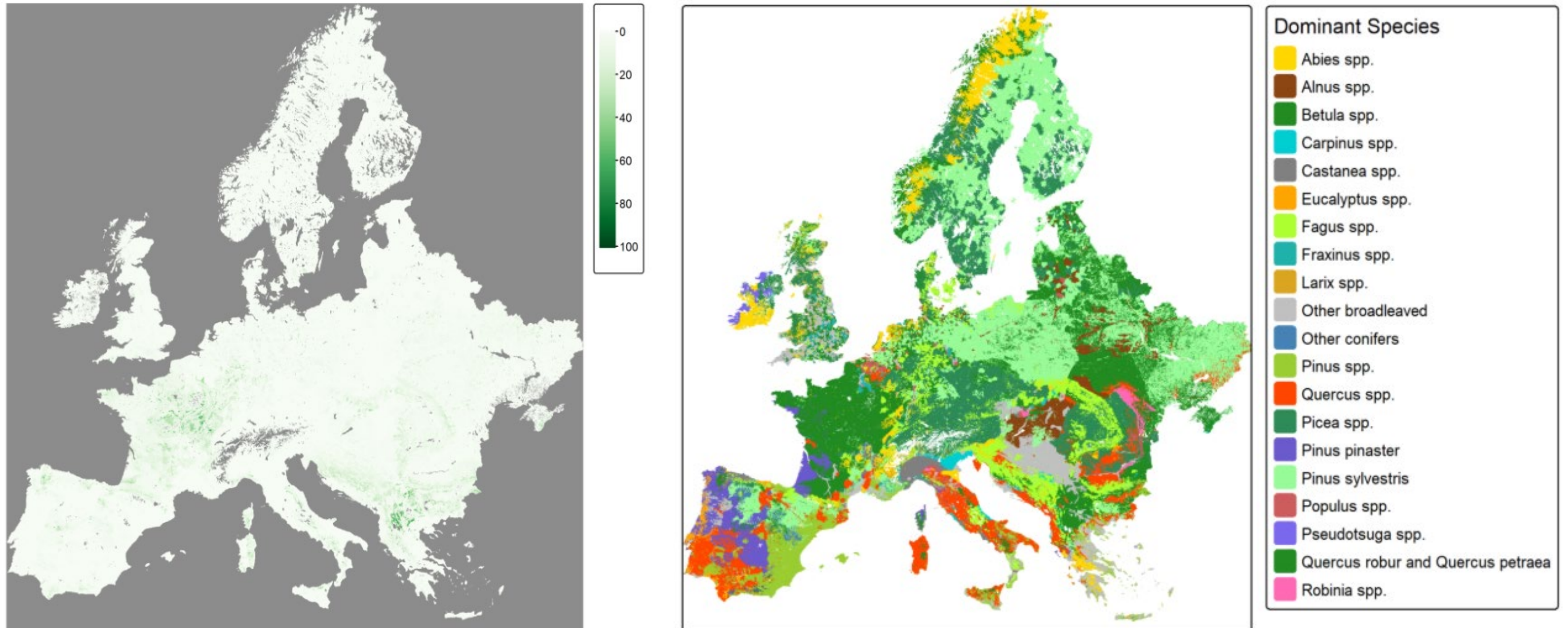# Pest Risk Analysis – susceptible hosts

Pest Risk Analysis – susceptible hosts

Q. robur and Q. petraea Distribution in Europe

Dominant Species
- Abies spp.
- Alnus spp.
- Betula spp.
- Carpinus spp.
- Castanea spp.
- Eucalyptus spp.
- Fagus spp.
- Fraxinus spp.
- Larix spp.
- Other broadleaved
- Other conifers
- Pinus spp.
- Quercus spp.
- Picea spp.
- Pinus pinaster
- Pinus sylvestris
- Populus spp.
- Pseudotsuga spp.
- Quercus robur and Quercus petraea
- Robinia spp.

Pest Risk Analysis – risk management options

Preventative measures - Exclusion

- Ban the import of *Quercus* material?

- Maximum sizes for *Quercus* material entering the EU?

- Testing requirements for material entering the EU?

If the pest arrives - Containment options

- Traps

- Insecticides

- Biocontrol

- Removal

Eradication measures

- Destruction of infected plant material

- Designation of Pest free areas

- Eradication programmes

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To be continued…

Pest Risk Analysis – What about Invasive Plants?

- Can INNS take lessons from Plant health?
- Preventative measures are key
- Pest Risk Analysis for Invasive plants can be done using IPPC/EPPO frameworks
- Leading to the regulation (preventive measure) of invasive plants
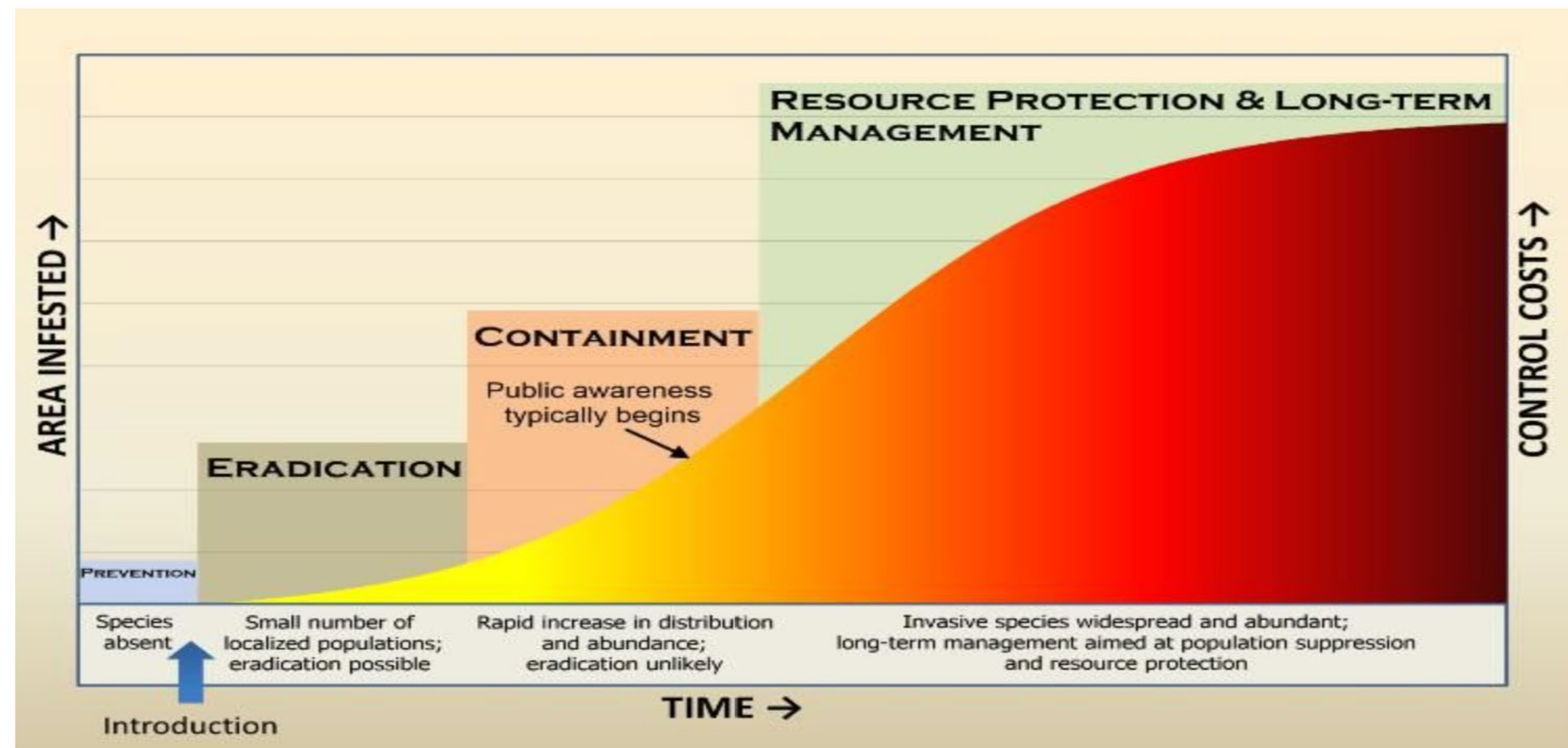
Pest Risk Analysis – What about Invasive Plants?

- Our Wildlife & Plant Health laws 'regulate' INNS, Pests and Diseases
- Some may not be aware of EPPO A1/A2 lists that recommend regulation of invasive species across the EU
- Could we use Horizon scanned species and EPPO alerts lists as a basis for PRA?
- How can we (INNS & Biosecurity) work together?
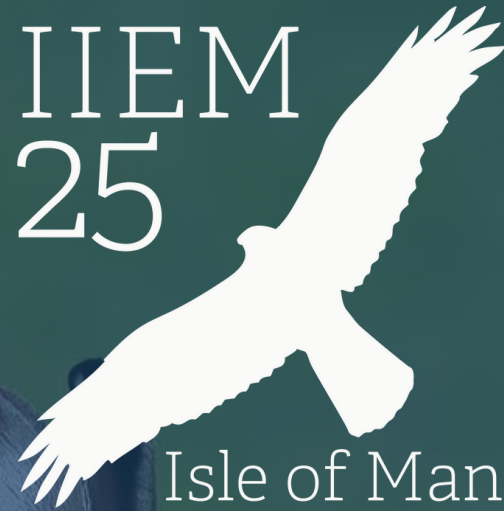
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Thank you!

Nathan Hayes
N.hayes@gov.je

Manx Wildlife Trust Treisht Bea-Feie Vannin