



Challenges faced by risk managers - can models help?

Martin Ward

European and Mediterranean Plant Protection Organization

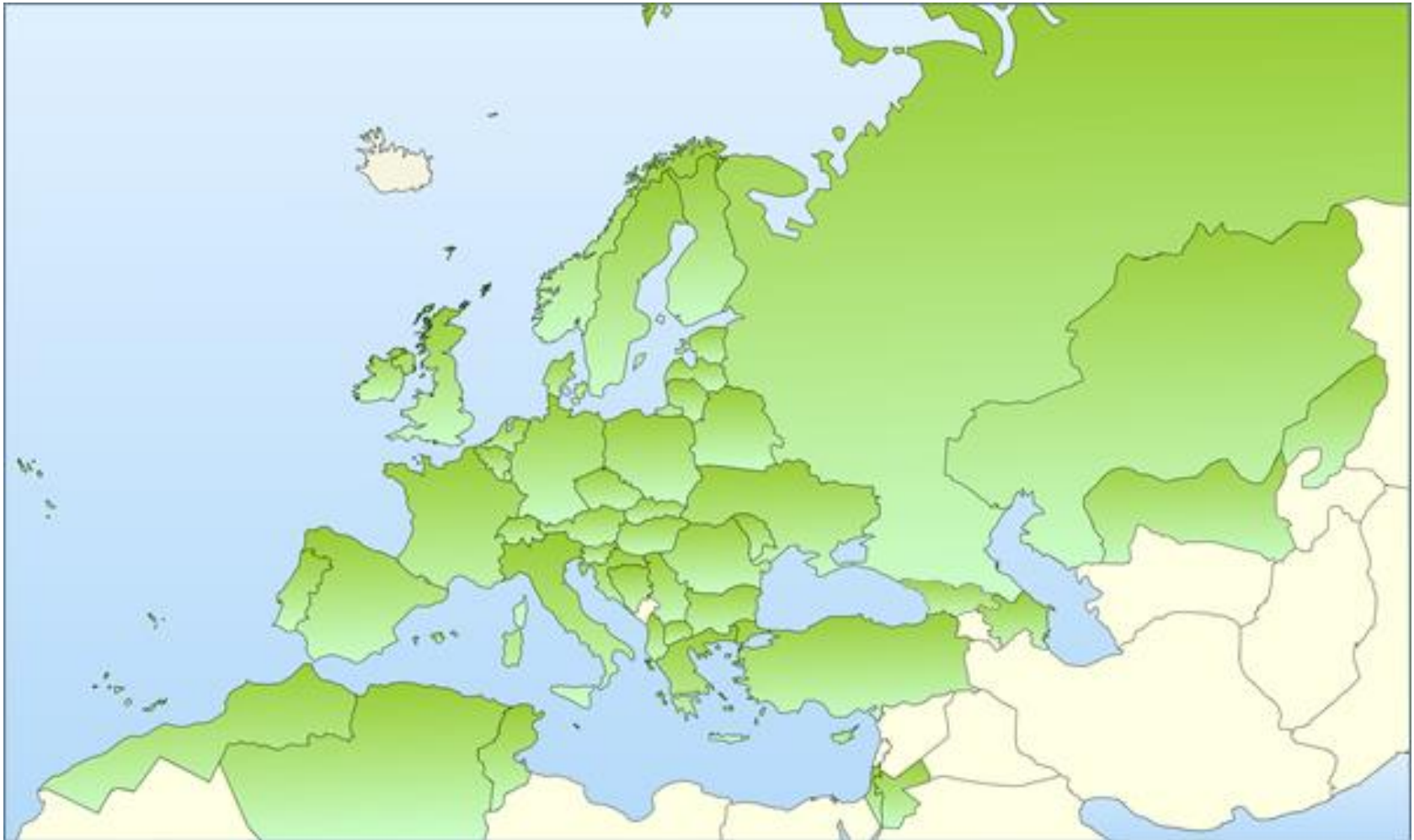
**EFSA -EPPO Workshop on
Modelling in Plant Health**

Parma

2016-12-12



1951 EPPPO Convention – 15 countries
Now 51 member countries
One of 9 RPPOs



Definitions

- Risk Manager: Person who makes decisions on the phytosanitary measures that alone or in combination reduce the risk to an acceptable level (adapted from ISPM 2)
- Phytosanitary Measure: Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests (ISPM 5)
- Model: A simplified description of a system, process, etc., put forward as a basis for theoretical or empirical understanding (OED)
- Help: Help (= easier, better, quicker decisions)

Challenges

- Prioritising allocation of resources
 - between pests
 - between activities (risk assessment, survey, import inspection, compliance)
 - between sites
- Assessing risks
 - probability of introduction (entry and establishment)
 - probability and speed of spread
 - potential impact (economic, environmental and social)
 - areas at risk
- Choosing measures
 - predicting efficacy and feasibility
 - justifying choice to trading partners and stakeholders
- ... in good time
- ... in the face of uncertainty
- ... with limited resources

Measures

On trade pathways

- **Origin**
(e.g. inspection, treatment, Pest Free Area, Pest Free Production Site)
- **Consignment**
(e.g. inspection, treatment)
- **Destination**
(e.g. inspection, treatment, conditions)

Against natural spread

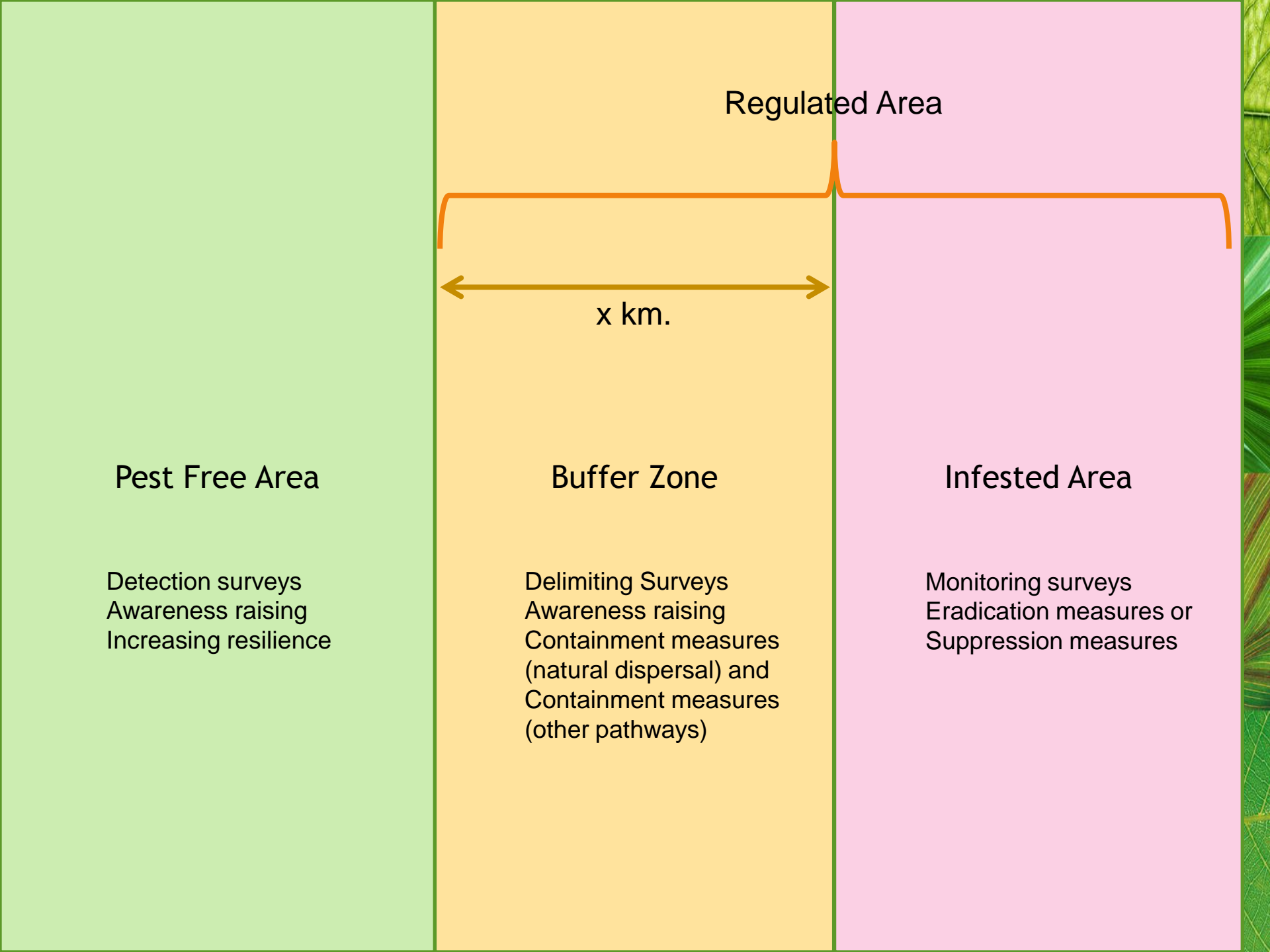
- **Infested zone**
(e.g. treatment, movement controls, host removal)
- **Buffer zone**
(e.g. preventive treatment, monitoring, movement controls, host removal)
- **Free zone**
(e.g. monitoring, increasing resilience)



Size of buffer zones, for example

- Buffer Zone: An area surrounding or adjacent to an area officially delimited for phytosanitary purposes [as infested or as free from a pest] in order to minimize the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate (ISPM 5)
- Setting and justifying the size of buffer zones is a significant challenge.





Regulated Area

x km.

Pest Free Area

Detection surveys
Awareness raising
Increasing resilience

Buffer Zone

Delimiting Surveys
Awareness raising
Containment measures
(natural dispersal) and
Containment measures
(other pathways)

Infested Area

Monitoring surveys
Eradication measures or
Suppression measures

Examples of buffer zones

- Thousand cankers disease
- *Heterobasidion irregulare*
- *Epitrix* damaging potatoes
- *Popillia japonica*
- *Leptinotarsa decemlineata*
- *Agrilus planipennis*
- *Bursaphelenchus xylophilus*



Thousand cankers disease

- Disease of walnut caused by *Geosmithia morbida* and the vector *Pityophthorus juglandis*. Outbreak in one country in Europe.
- PRA: "the flight capacity of *P. juglandis* is unknown, other small bark beetles of similar size are capable to fly long distances, and the EWG considered that this data could be used for *P. juglandis*. For example in Nilssen (1984), distances of 86 km was noted for *Pityogenes chalcographus* by trap logs situated at a range of distances north of spruce forests. Comparable distances ...were observed in Belgium for *P. chalcographus*."
- Conclusion: EWG consequently proposed that a PFA should be separated by a distance of 100 km from the nearest infested area.
- Question: Can it be justified that the buffer zone extends into neighbouring countries? How to account for the fact that travel in some directions is more likely than in others?



Heterobasidion irregulare



- Causes disease of pines. Limited spread over the 70 years since introduction to Europe, but increased felling now risks increased dispersal. Related species are managed routinely in Europe.
- PRA: "99% of spores deposit within 100 m of the source (Korhonen and Stenlid, 1998). In a model describing the dispersal gradient of *H. annosum* s.l., only 0.1% of spores travelled 100 m (Stenlid, 1994). Spore dispersal is ... minimal at 80 km (Gonthier et al., 2014a) ... [who] assume that *H. irregulare* has been able to cross gaps up to 20-30 km but not 50 km."
- Conclusion: buffer zone should extend 80 km beyond the infested area. All host stands should be subject to specific measures -
 - stump treatment
 - forestry operations to be carried out when spore production is lowest
 - avoidance of logging injuries
- Question: What is the cost of the measures in a large buffer zone, compared with the costs if spread occurs?
Are the measures just good practice?

Epitrix damaging potatoes

- Damage on potato tubers noted in two countries since 2004 and 2009 respectively. Initially thought to be *E. similaris*, now *E. papa*.
- PRA/PM9 Standard: "Scientific data on potential for natural spread is lacking... adults tend only to fly short distances when in search of a new food supply. Observations in Canada with *E. tuberis* and in Portugal with *E. papa* confirm that these species will fly short distances to colonise potato crops nearby if, for example, the haulm of a potato crop is destroyed. This demonstrates that adults can probably fly several hundred metres but there is considerable uncertainty as to how far they could potentially fly in search of a suitable host. "
- Conclusion:
 - 1km buffer zone, where eradication is undertaken
 - 3km buffer zone, where no eradication, but effective insecticides available
 - 10km buffer zone, where no eradication and no effective insecticides
- Question: How to justify these from the limited data available?



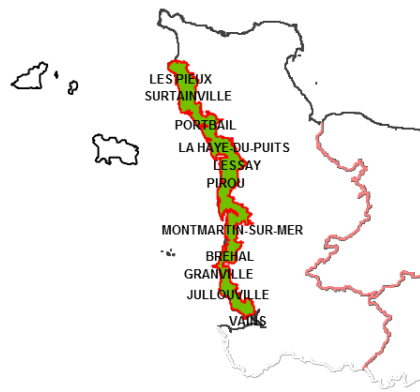
Popillia japonica

- Polyphagous beetle, native to Far East, has become established in America and more recently Europe. Eggs laid in moist grassland.
- PM9 Standard: "In the USA, adults move between plants frequently and marked beetles have been found 3.2 km away from their original point of capture (Fleming, 1972). ... Holmes and Barret (1997) recorded the longest distance of 400 m following a mark and recapture experiment. ... adult beetles are capable of flying 8 km over water in sustained flights (Fleming, 1972). Outward spread ... from the point of introduction has been reported in the USA at a rate of 16 to 24 km per year (Smith and Hadley, 1926). ...In the Azores, the original spread was slow but between 1984 and 1985, the infested area increased by a minimum of 2 km each year (Martins et al., 1988)."
- Conclusion:
 - Suppression in the infested zone
 - Containment measures
 - Buffer zone of at least 3 km.
- Question: Will this be enough?



Leptinotarsa decemlineata

- Co-ordinated campaign against Colorado beetle led to creation of EPPO in 1951. Still absent from the UK and Channel Islands.
- > 40 years of data on population levels in the Cotentin Peninsula, overwintering potential, emergence dates, observed flight, wind direction, findings
- Buffer zone = 15 - 22 km of sea!
- Question: Could this data set be useful for validating models?



Leptinotarsa decemlineata (LPTNDE) - <https://gd.eppo.int>

Constraints on use of models

- **Time** - some measures may take years to develop, in other cases decisions are needed within hours
- **Money** - several pests risk analyses each year. Cannot afford to develop new models for each new pest.
- **Data** - usually lacking or limited
- **Understanding** - of needs of risk managers by modellers, of what modellers can and can't do by risk managers
- **Accountability** - experts are, in principle, accountable for their judgements. What about models?

Overcoming constraints

- Communication between modellers and risk managers?
- Adapting generic models for new pests?
- Knowing what data is important and how to get it?
- Experts using models but retaining their judgement?



Concluding thoughts

- Models are ubiquitous, whether explicit or implicit
 - ("outbreak", "invasion", "bridge", "firebreak", "buffer zone", "bottleneck", "pathway", "suppression", "containment")
- "If you do not learn how to use models, you will have modelling done to you!"
- Risk managers must become more confident customers for models (sceptical, challenging, open minded).



Thank you!

**Thanks also to Françoise Petter and Muriel Suffert
at EPPO for their input to the presentation**

For picture credits see <https://gd.eppo.int>

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