

***Phytophthora ramorum* and  
*Phytophthora kernoviae* in  
Scotland: A Status Report,  
Spring 2015**

# *Phytophthora ramorum* and *Phytophthora kernoviae* in Scotland: A Status Report, Spring 2015

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*Phytophthora ramorum* and *Phytophthora kernoviae* are fungus-like plant pathogens which attack a wide range of trees and shrubs and have the potential to cause significant damage in gardens, woodlands and heathland. This paper sets out the history of these diseases in Scotland, the current situation and the actions being taken to control them.

This paper is an updated version of the status report on the two organisms issued by the Scottish Government in summer 2010.

## 1. Background

### History

*P. ramorum* was identified in 2000 as the pathogen responsible for the sudden death of oak trees in California and Oregon and for dieback of rhododendron nursery stock in The Netherlands and Germany, both of which had been observed since the early 1990s. It has since been found in the nursery trade and the wider environment in Europe. It was first found in GB in the nursery trade in 2002.

*P. ramorum* is regulated under EU emergency measures (2002/757/EC) to prevent its spread. This is implemented in national legislation through the Plant Health (*Phytophthora ramorum*) (Scotland) Order 2004 and the Plant Health (Forestry) (*Phytophthora ramorum*) (Great Britain) Order 2004.

In 2009, *P. ramorum* was found infecting Japanese larch (*Larix kaempferi*) in south west England and outbreaks were found in Wales, Northern Ireland and the Republic of Ireland in 2010. In late 2010 a small infection was also detected on Japanese larch in Scotland. Information on outbreaks, biology and epidemiology of the pathogen and measures are available on the Forestry Commission web site (see section 8).

*P. kernoviae* was first discovered in Cornwall 2003 during inspections for *P. ramorum* (EPPO, 2013). *P. kernoviae* has also been identified in New Zealand and was found in Ireland in 2008. There has been very little spread outwith GB and it is rarely found in nursery stock. There is no specific EU legislation dealing with *P. kernoviae*, but in GB the same measures have been taken against it as are required for *P. ramorum*.

### Biology

Both pathogens cause leaf blights and dieback on a wide range of shrub hosts and some trees, and bleeding bark cankers on certain tree hosts. They spread by producing spores which can be dispersed to other plants by water (rain-splash, irrigation, wind-blown rain or fog) or in soil or plant debris moved on footwear or vehicles. Movement of infected plants is a significant source of long-distance spread. Both pathogens can also persist for several years in soil and plant debris, infecting re-growth or replacement plants.

There are no currently available chemical treatments which can reliably kill *P. ramorum* or *P. kernoviae*, although some fungicides can reduce symptoms and sporulation. For this reason the use of fungicides is prohibited in nurseries where infection is found, to ensure that symptoms are not masked and infected plants can be identified. Eradication requires removal and secure disposal or burning of all infected plants, monitoring of regrowth and replacement with non-susceptible species. However, in established gardens, parks etc. the use of fungicides could be used to reduce inoculum or to protect valuable specimens.

The amount of spores produced varies between host plants. In most cases, spores are not produced on bark cankers, only on leaves. *Rhododendron ponticum* is one of the most significant sporulators in GB and until 2009 was a major source of spread, but generally limited to a few metres. Japanese larch, however, is an even more prolific sporulator of *P. ramorum* (and potentially at much greater height) as *R. ponticum* and evidence suggests it can sometimes be aeri ally dispersed up to 50 km or more.

## 2. Control measures

### EU requirements

The current measures required by EU legislation (2002/757/EC) aim to eradicate *P. ramorum* from commercial plant production and to at least contain outbreaks in the wider environment. The legislation requires that:

- host plants may only be imported into or moved within the EU if they are free of the pathogen;
- nurseries growing certain host plants for planting must have a plant passport and be inspected at least twice a year during growing season;
- if any infected material is found at a nursery or garden centre, it must be treated by:
  - destruction of the infected plants and all susceptible plants within a 2m radius;
  - holding all susceptible plants within 10m radius for 3 months of growth with at least two inspections in that time;
  - inspection of all other susceptible plants on the premises for signs of disease.
  - no treatments to be applied to suppress symptoms;
- Member States must undertake and report annually surveys of cultivated and uncultivated plants for evidence of the disease;
- if the pathogen is found at sites other than nurseries, measures must be taken at least to contain it.

There is, as yet, no specific EU legislation relating to *P. kernoviae*, but as with any new disease problem, we are required to notify findings and prevent its spread to other Member States.

EU requirements were due to be reviewed in 2014, but we do not yet know whether the requirements will be modified.

### Initial Controls in GB

From the first findings of *P. ramorum* in England, plant health authorities in GB agreed to take stronger action than the EU minimum on outbreaks at sites other than nurseries, aiming at eradication wherever possible, and to take the same measures against *P. kernoviae* as against *P. ramorum*. This was managed initially through a GB Programme Board which

included the Scottish Government, Defra and Forestry Commission and subsequently during the Defra project (2009-2014) by a Project Board.

The Scottish Government (includes Forestry Commission Scotland (FCS)) continues to maintain contacts with Defra, The Animal and Plant Health Agency (APHA) and Forestry Commission in other parts of GB to exchange information about current outbreaks, control measures and research.

### 3. Current situation in Scotland

The following information provides an update on the increased activity introduced by Scottish Government in 2010, along with a brief overview of early developments following the first finding in Scotland in 2002:

#### Nursery Trade (includes nurseries and garden centres):

In 2010, the Scottish Government committed to inspect all Scottish nurseries growing susceptible species 3 times each year. Those considered to present a higher risk, due to previous infections or proximity to other outbreaks, would be inspected 4 times. From 2012, the number of inspections was reduced to 2, plus 1 additional if deemed at risk.

Table 1, below, provides details of *P. ramorum* and *P. kernoviae* findings in the nursery trade. Since 2003 the nursery trade has been largely free from outbreaks with occasional interceptions on non-Scottish material making up the majority of cases. A total of 52 outbreaks/interceptions have been made in Scotland from June 2002 to December 2014.

- Outbreaks in nurseries, garden centres and newly landscaped sites are usually restricted to specific consignments and can be eradicated within a few months, by destruction of infected plants and quarantine of susceptible species;
- There has been one finding of *P. kernoviae* in nursery stock in Scotland;
- Where an infection is found at a nursery, it is treated according to the EU requirements and the area where infected plants were grown or stored must be cleaned and disinfected;
- Nurseries which experience an outbreak are likely to suffer a significant financial impact from the destruction of infected stock and quarantine of other plants which may miss their market. However, in most cases it is reasonably straightforward to arrange for destruction and for disinfection of the growing area. Managing pests and diseases is a regular activity for traders, but biosecurity advice is provided along with other standard plant hygiene measures which should prevent spread to other lots.
- Garden centres are also routinely monitored and those handling host plants are particularly targeted.

Table 1. Number of cases of *P. ramorum* and *P. kernoviae* in nursery trade (2002-2014)

Year	02	03	04	05	06	07	08	09	10	11	12	13	14	Total
Outbreaks and interceptions of <i>P. ramorum</i> and <i>P. kernoviae</i> in trade	18	2	5	2	0	5	6	0	0	3	2	4	5	52

#### Established gardens and public green spaces:

Many ornamental shrubs in heritage and botanic gardens are susceptible to *P. ramorum* and *P. kernoviae*. As such, Scottish Government has undertaken annual surveys at gardens and landscaped sites since 2003. There was a particular focus on gardens open to the public

and those known to have collections of susceptible plants, and the survey was weighted towards the west of the country which climate modelling shows to be the area at the highest risk. However, a sample of gardens in central and eastern areas were also included.

The first finding of *P. ramorum* in an established garden in Scotland was in September 2007, followed by *P. kernoviae* in another garden in January 2008. In 2010 the Scottish Government committed to annually survey 100 established gardens and public green spaces (such as parks and the grounds of public buildings). Despite the increase in surveillance, the number of new outbreak areas detected per year has remained relatively consistent (see Table 2 below). In light of this evidence the Scottish Government has revised the annual surveillance commitment and from 2014 will undertake a survey of 50 gardens and landscape sites throughout Scotland as part of annual monitoring activities. This will be reviewed annually.

Figure 1: Outbreaks of *P. ramorum* and *P. kernoviae* in gardens and landscaped sites

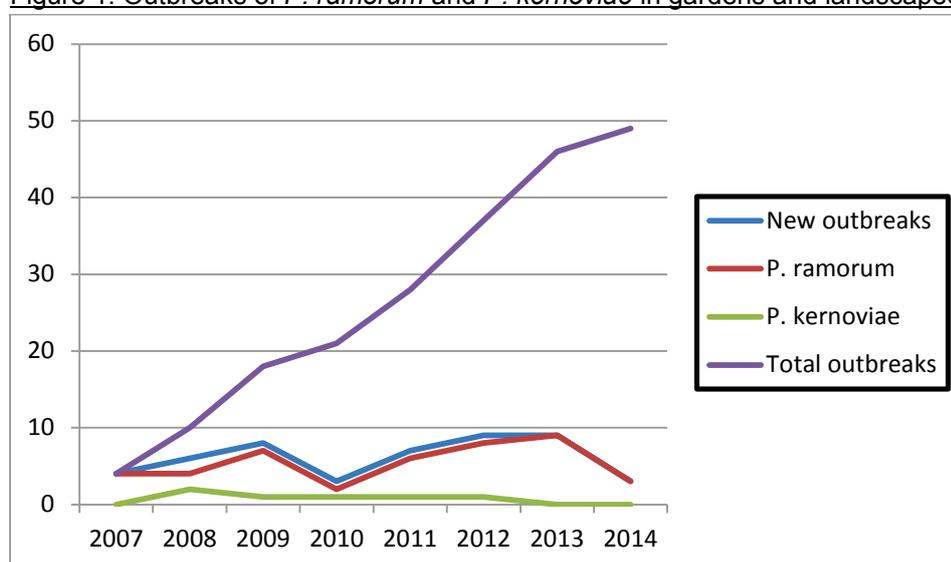


Table 2. New outbreaks areas since 2007

Year	New outbreaks	<i>P. ramorum</i>	<i>P. kernoviae</i>	Total outbreaks
2007	4	4	0	4 (62)
2008	6	4	2	10 (52)
2009	8	7	1	18 (31)
2010	3	2	1	21 (101)
2011	7	6	1	28 (100)
2012	9	8	1	37 (100)
2013	9	9	0	46 (108)
2014	3	3	0	49 (50)

Note: The number of sites surveyed per year are shown in brackets

### Overall position

By December 2014, 45 distinct active 'outbreak areas' had been identified in Scotland, covering 66 premises ranging from large country house grounds and woodland to individual domestic gardens. 47 premises are infected with *P. ramorum*, 10 with *P. kernoviae* and 9 with both.

## Action taken

Where an infection is found in an established garden, the following measures are taken:

- all infected plants must be destroyed;
- other host plants within 2 m radius of infected plants must also be destroyed;
- restrictions are placed on any plant material being moved from the site. Plant sales may be allowed to continue provided there is strict separation between the nursery and sales area and the rest of the garden;
- conditions are imposed to limit the risk of spread, including removal of plant debris from paths, restrictions on access if appropriate, and disinfection of tools, footwear and equipment;
- inspectors revisit the site monthly, monitoring the garden for any new infection and checking that requirements are complied with. If three inspections pass without new infection being found, the frequency is reduced to quarterly inspections, and after three clear quarterly inspections it falls to one inspection annually. After three annual inspections without new infection being found, the outbreak will be considered 'non active' and statutory controls are lifted from the site;
- Scottish Government was pleased to declare 16 sites had moved to a 'non-active' in the end of December 2014. Yearly monitoring of these premises is still undertaken;
- A survey of 1.5 km radius around the garden is carried out as soon as possible after the initial finding to check for any wider infection. The Forestry Commission assists in this survey if there is any woodland in the surveyed area. The survey is not repeated, but inspectors will informally monitor other premises if the infected area is close to the boundary of the garden. Additional infection sites have been found in 8 of the 45 existing outbreak areas.

Removal of infected ornamental plants may be physically straightforward, however it is recognised that it can have severe impacts on valuable collections of specimens or historic garden and landscape designs. There are also economic effects from reduced visitor numbers if the garden is significantly changed, and from the need to re-plan and re-plant. Non-symptomatic plants around the infected plant are also normally required to be destroyed to prevent spread, however in a carefully managed garden, vigilance for symptoms and good practice in plant hygiene may be permitted as an alternative.

## Heathland/wider environment

In 2010 the Scottish Government committed to annually survey heathland/wider environment sites to check whether *P. ramorum* or *P. kernoviae* were present in the wider environment where they have the potential to have a negative impact on the important native habitats. This activity would be carried out by Scotland's Environment and Rural Services (SEARS) partners, specifically Scottish Environment Protection Agency (SEPA) and Scottish Natural Heritage (SNH). No infections have been found, see Table 3 and Figure 2.

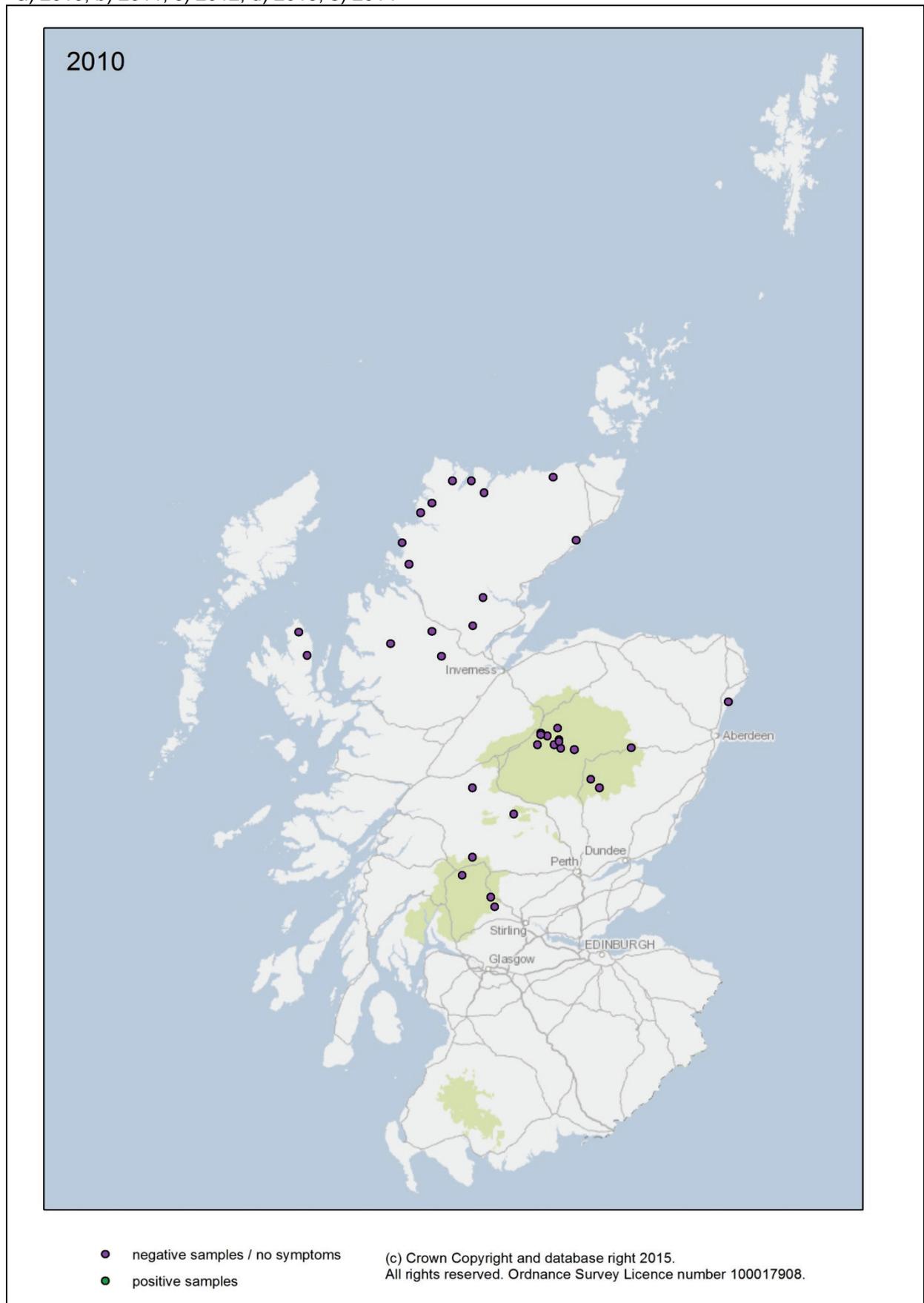
Table 3 Surveillance of wider environment sites

Year	Number of sites visually inspected	Water baiting
2010	53	n/a
2011	107	n/a
2012	19	45 samples (3 positives)
2013	25	17 samples (0 positives)
2014	38	n/a

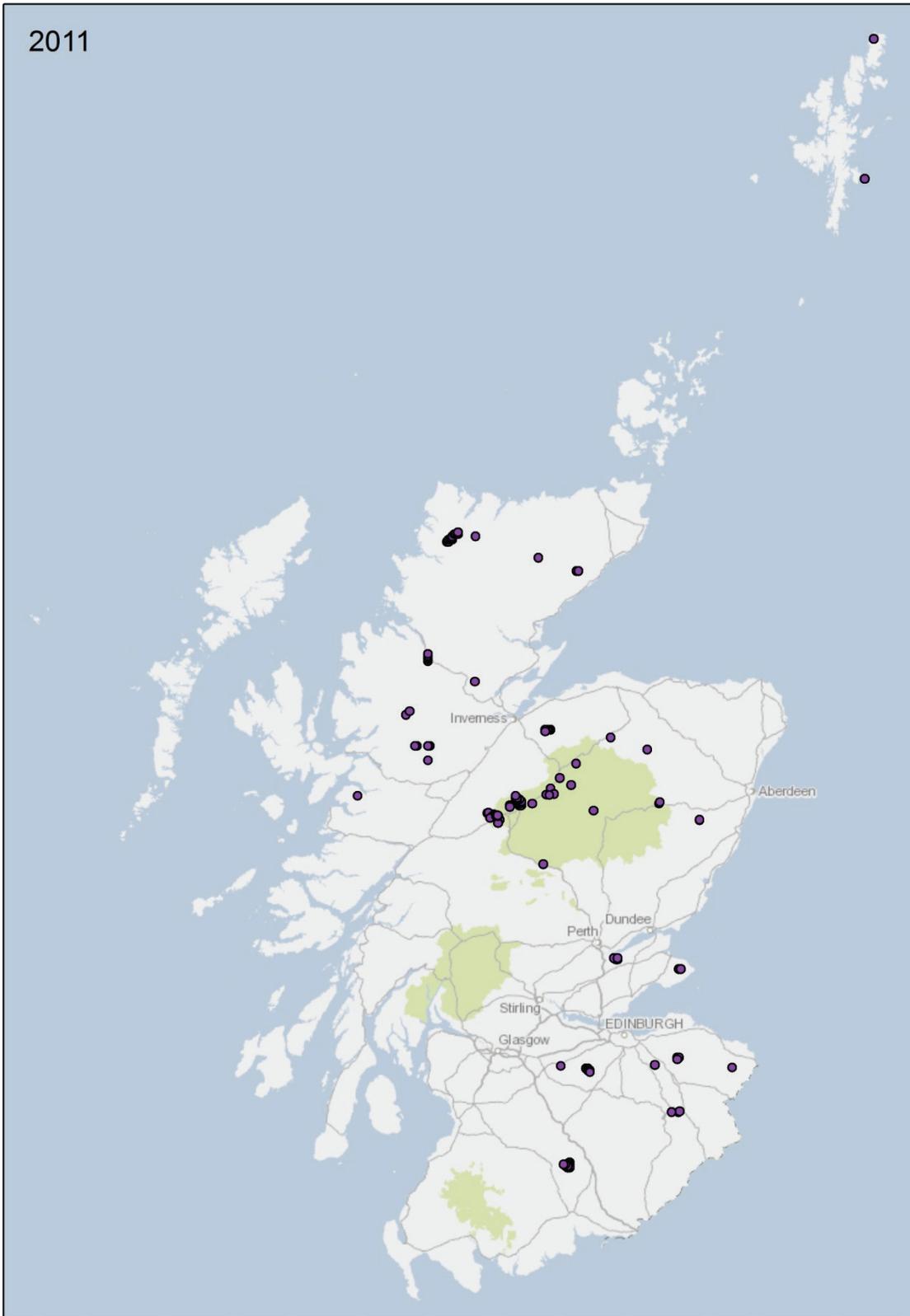
In addition to inspection of plants for infection, baiting tests in river water were undertaken in late 2012 and early 2013. Locations were sampled focussing on areas identified as high risk for *P. ramorum*. Two positives were found in water samples in the vicinity of larch outbreaks in Galloway, south west Scotland and the pathogen was also found in one stream in Renfrewshire. Follow up inspections by Forestry Commission Scotland in this area did not reveal any infected plants. A number of other *Phytophthora* species were detected in the samples, with more diversity in south west than in north east Scotland.

Surveillance in 2008 also found that *Vaccinium myrtillus* (blaeberry) located in a broad leaf woodland on Arran was infected with *P. kernoviae*. Control measures put in place have prevented further spread to other hosts and the area is now viewed as non-active. In 2013, *P. ramorum* was found on *Vaccinium* in Galloway in an infected larch plantation.

Figure 2. SEARS survey for Phytophthora in heathland/wider environment locations by year: a) 2010, b) 2011, c) 2012, d) 2013, e) 2014



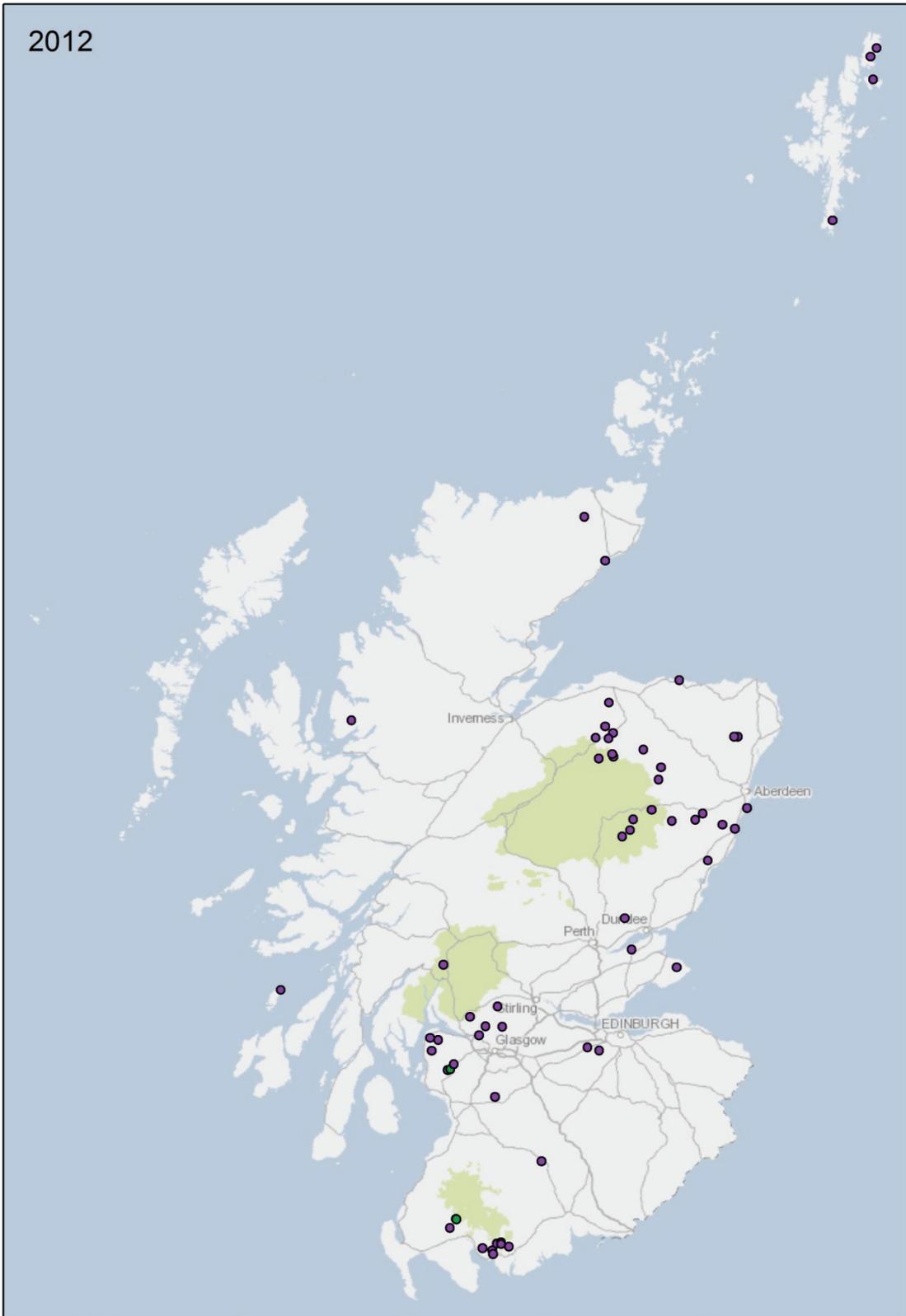
2011



- negative samples / no symptoms
- positive samples

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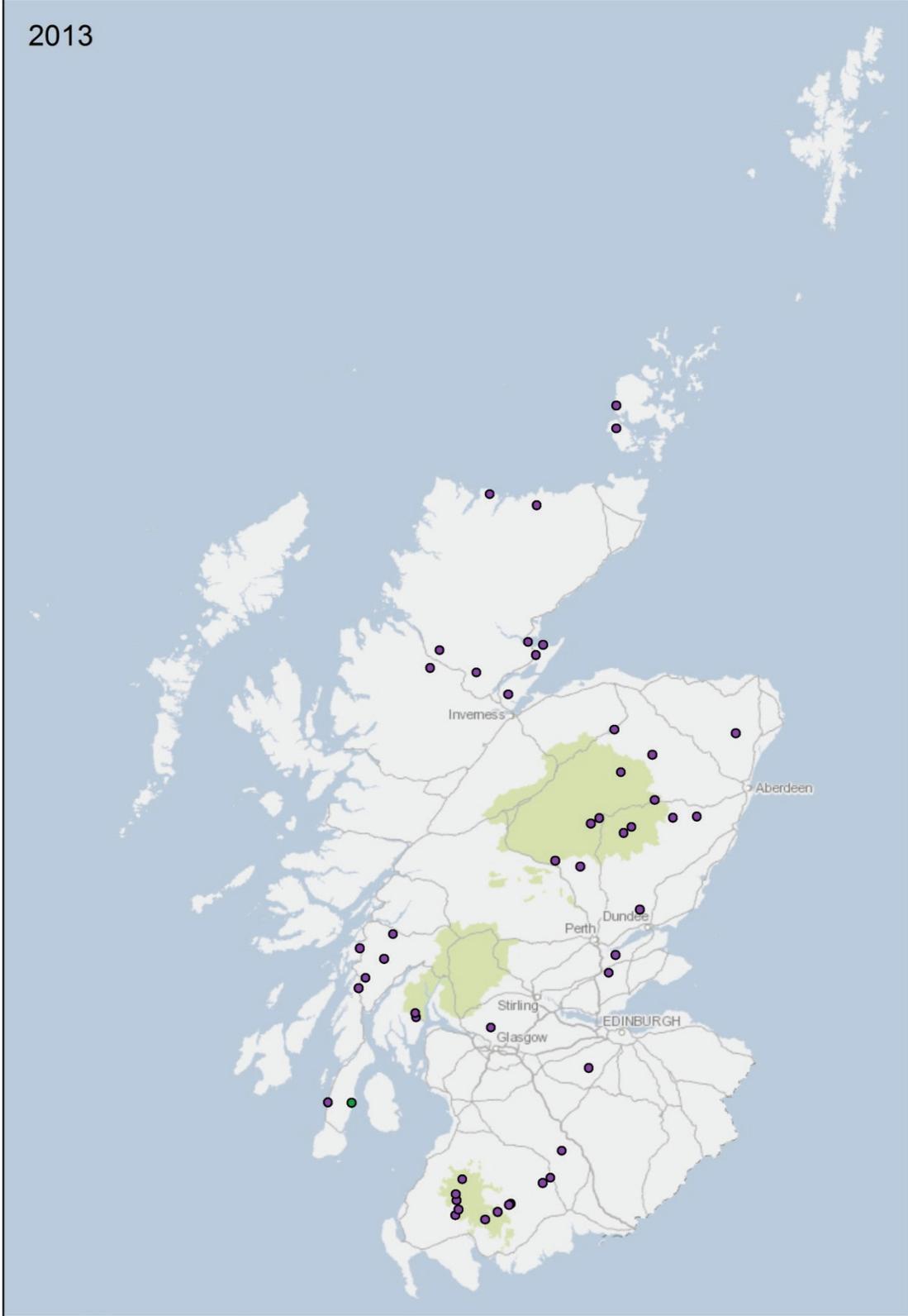
2012



- negative samples / no symptoms
- positive samples

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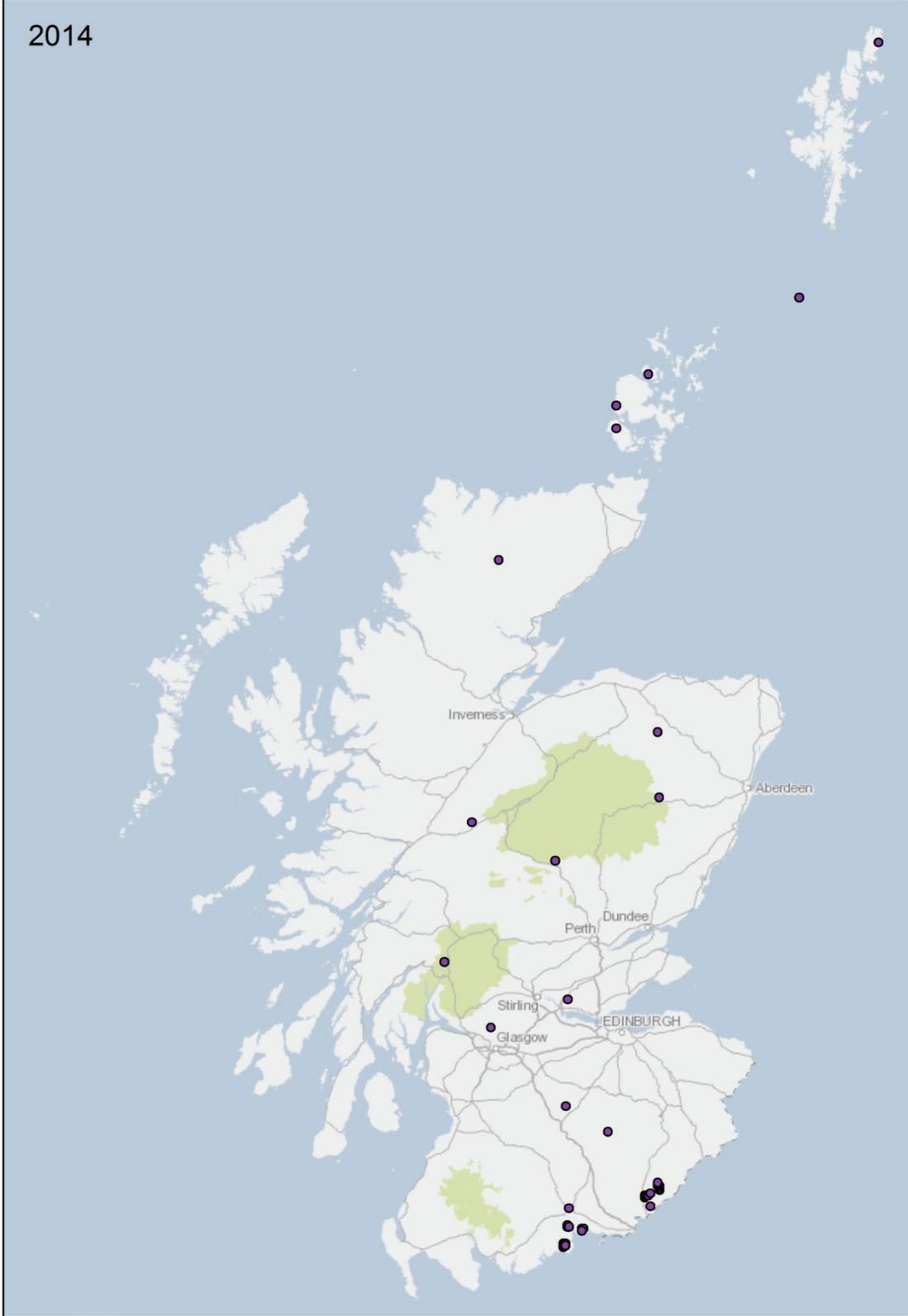
2013



- negative samples / no symptoms
- positive samples

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2014



- negative samples / no symptoms
- positive samples

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## Woodlands and forestry

In 2009 the pathogen was detected on larch trees in south west England, the first time in the world that a commercial conifer species had become infected. In late 2010 1.5 ha of Japanese larch was found to have been infected on the Craignish peninsula south of Oban. Subsequently, several new sites were detected through FCS's bi-annual aerial surveillance programme, primarily in the west of Scotland. Wet and windy conditions in 2012 in the south west of Scotland were extremely conducive to the spread of *P. ramorum* and gave rise to a major increase in the rate, area and severity of outbreaks in the Galloway area in 2013, with some 5000-6000 ha now thought to be harbouring infection in that area. Subsequently, it was considered to be no longer feasible or appropriate to continue with mandatory felling/killing of all infected larch stands in this area.

Following much drier conditions in the summer of 2013, surveillance flights over Scotland confirmed limited expansion of the disease in 2014. Outside of the Galloway Management Zone, there were just 20 detections (at 13 locations), totalling 50 ha, all within 10 km of previously known infections. Between May and September 2014, 15 flight days were completed, covering 77,000 ha of larch in a forestry setting, which represents approximately 93% of the larch resource in Scotland. From this nearly 400 sites were identified for field survey. The follow-up investigations confirmed 21 positives, resulting in 14 new Statutory Plant Health Notices (SPHNs).

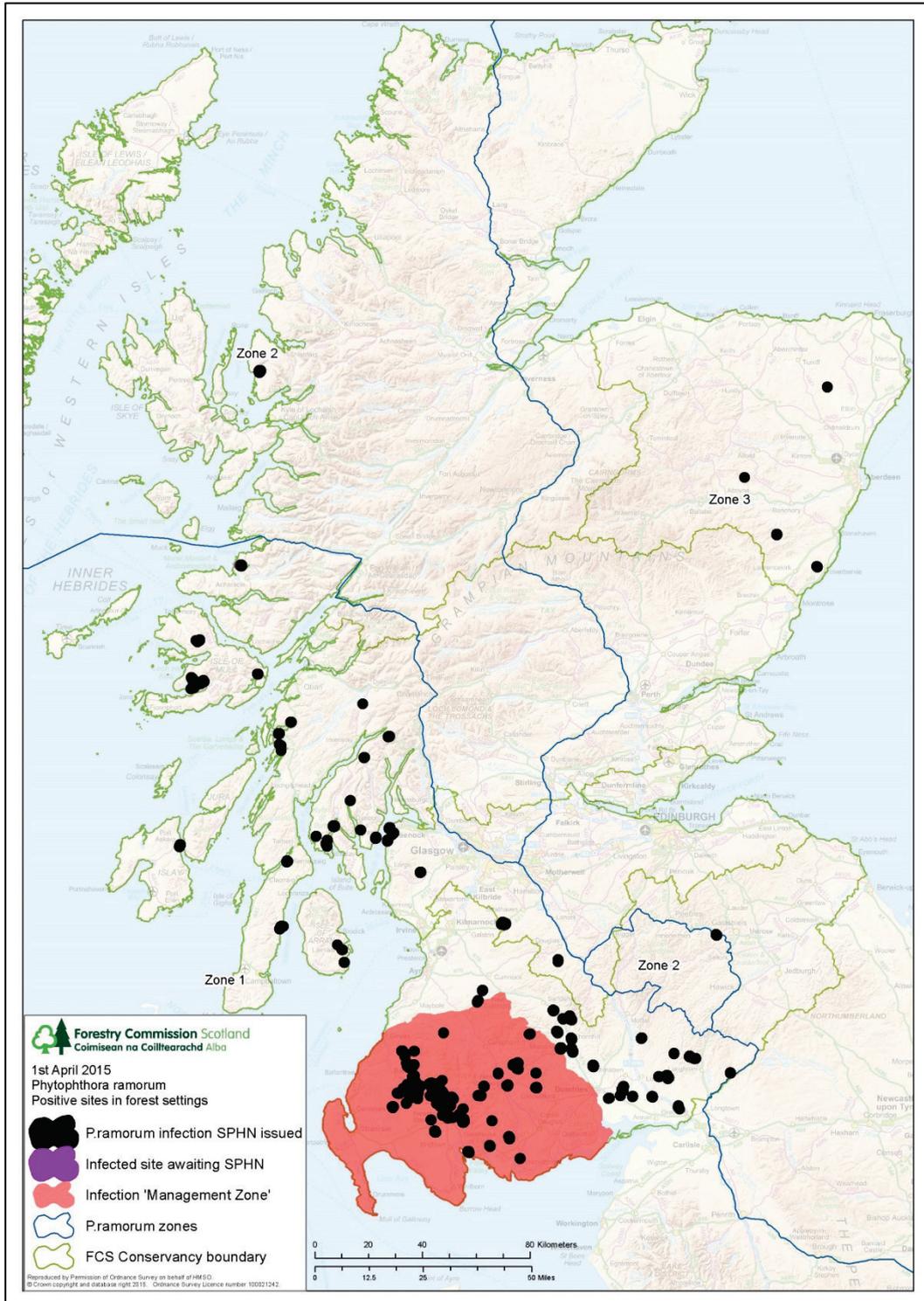
Given that the summer of 2014 was also relatively dry, a similar pattern of limited disease expansion on larch is expected for 2015, but this will need to be validated during the aerial surveillance programme.

Figure 3: Aerial surveillance routes (May – September 2014), shown in green



Within the core infected area, the Management Zone (formerly known as the Red Zone), it is now the case that the only statutory plant health controls normally applied to larch relate to the movement of timber, bark and other susceptible material. Where such material is moved outside the Zone it can only be sent to approved facilities and a record of that movement needs to be kept – as provided in the Plant Health (Forestry) (*Phytophthora ramorum* Management Zone) (Scotland) Order 2014. However, FCS retains the ability to issue statutory notices requiring the felling/killing of infected larch stands in this area where such actions are felt to be necessary.

Figure 4: Known distribution of *P. ramorum* infection on larch in Scotland (1 April 2015)



In the rest of Scotland, to help reduce the extent, rate of spread and severity of *P. ramorum* infections, statutory plant health notices will continue to be issued and will now require the felling of infected stands of larch and all surrounding larch within a 250m radius. The movement and processing of timber and other susceptible material from such sites is regulated through a licensing system operated by the Forestry Commission, which includes the application of biosecurity measures.

Although *P. ramorum* infections generally do not affect the quality or end use of the timber, they often still have significant financial impacts because trees may need to be felled before their planned removal date and, in some cases, well before they are fully mature (in which case they may have less, or sometimes no, commercial value). Infections also have implications for the cost of access to and felling/killing of infected stands and there are additional costs for biosecurity, transport and utilisation of susceptible material. A further issue is that *P. ramorum* and *P. kernoviae* have such a wide host range that options for replanting may be constrained on some site types.

Findings of *P. ramorum* and *P. kernoviae* on other tree species in Scotland have been very rare and invariably associated with immediately adjacent, high inoculum loadings. Of the broadleaved tree species in Scotland, individual oak and beech trees have been found to have become infected (as non-sporulating hosts), whereas a slightly wider range of conifers (including Douglas fir, Western hemlock, Grand fir and even Sitka spruce) are known to be occasional, non-sporulating hosts as part of the collateral damage associated with adjacent larch infections. Despite such trees being non-sporulating hosts, statutory action requiring their felling/killing remains a precautionary option.

### Wider prophylactic clearance

*R. ponticum* is involved in many garden and wider environment outbreaks. Removal of rhododendron to control *P. ramorum* or *P. kernoviae* is normally beneficial to the habitat, enabling native species to re-colonise the area. It is, however, physically difficult and expensive; rhododendron often grows densely on steep and inaccessible terrain, and is persistent, requiring regrowth to be treated for at least 3 years after removal. There may also be other consequences to consider, for example where *Rhododendron ponticum* is planted to protect less hardy plants from wind or sea-spray, or where its removal may impact on short-term soil stability on steep hillsides.

In December/January 2010, Forestry Commission Scotland undertook a desk-based assessment of the cost implications of prophylactic clearance of all potential sporulating host plants within a 100m radius of each known *P. ramorum* and *P. kernoviae* infection in Scotland. This suggested a total, direct cost of some £500,000. The epidemiological impact of such work cannot readily be quantified.

At a meeting in April 2010, the Scottish Government Phytophthora Steering Group agreed that in most cases, heightened control and surveillance activity would enable any new infections to be dealt with quickly and effectively. Two outbreaks were identified where the scale of infection on *Rhododendron ponticum*, coupled with the extent of dense stands of that species, was such that prophylactic clearance of potential sporulating host plants would be a sensible precaution. However, subsequent work by Forestry Commission Scotland to facilitate such clearance through SRDP funding indicated that this was not regarded by land managers as an effective support measure for such circumstances. The forthcoming FCS/SNH strategy for controlling invasive rhododendron in Scotland will seek to address this and other funding issues relating to the management of *R. ponticum*.

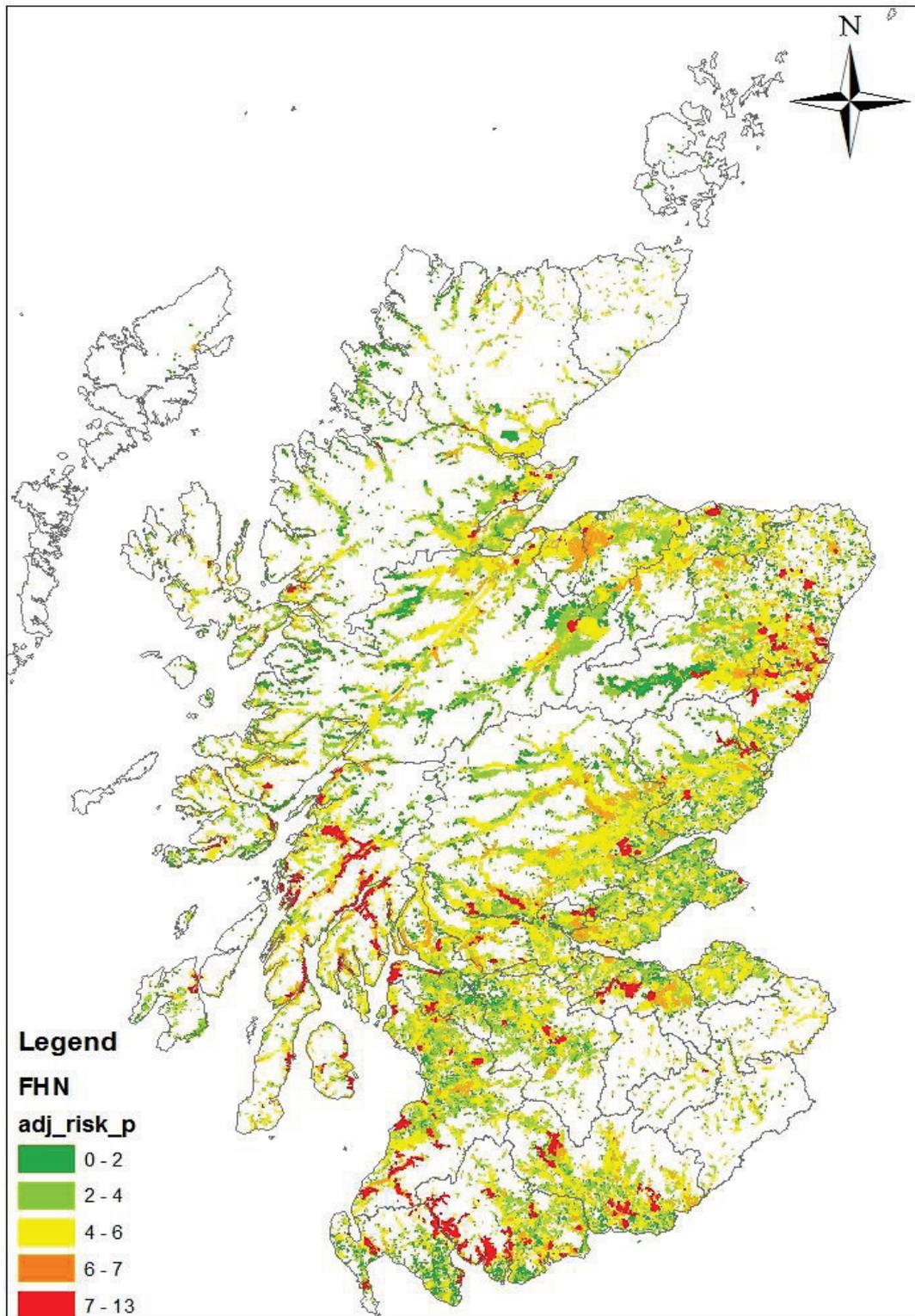
## 4. Research

### Established gardens and landscaped sites

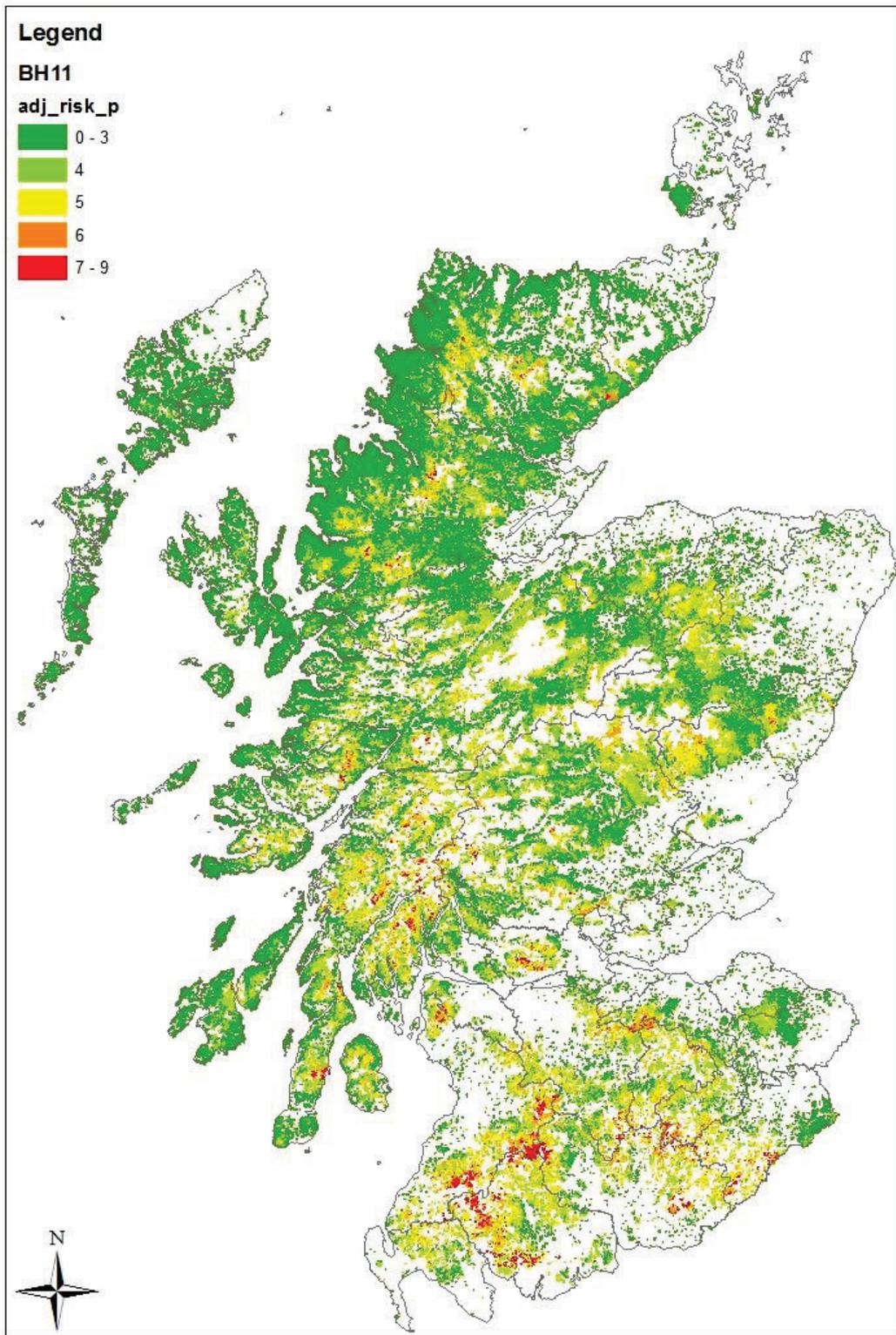
In 2009 the Scottish Government funded a 3-year study into the epidemiology of *P. ramorum* and *P. kernoviae* in managed gardens and heathland in Scotland. This examined the behaviour of the pathogens in Scottish habitats and climate conditions, and outbreaks on heathland in England to improve our understanding of the impacts of these diseases. The full report is available at [www.gov.scot/PhytophthoraResearch](http://www.gov.scot/PhytophthoraResearch).

The project was a collaboration between Scottish Government Science Advice for Scottish Agriculture (SASA), Centre for Ecology and Hydrology (CEH), St Andrews University, James Hutton Institute (JHI) and The Food and Environment Research Agency (Fera). Spore trap data from two historic garden outbreak sites showed that both pathogens were dispersed throughout the year and are active in a wide climatic spectrum, which is wider for *P. ramorum* than for *P. kernoviae*. Both pathogens were recovered frequently from soil samples even after the infected plants had been removed. There was no depletion of soil inoculum over the duration of the study. Some infected areas in one of the gardens could be tracked to the use of contaminated compost. *P. ramorum* was detected in water courses, drainage channels and ponds but water baiting for *P. kernoviae* was largely unsuccessful. Data about host distribution, local climate, vicinity of water courses and human activity were used to map the disease risk for the study sites and for native woodland, heathland and Larch for the whole of Scotland. This is shown in Figure 5.

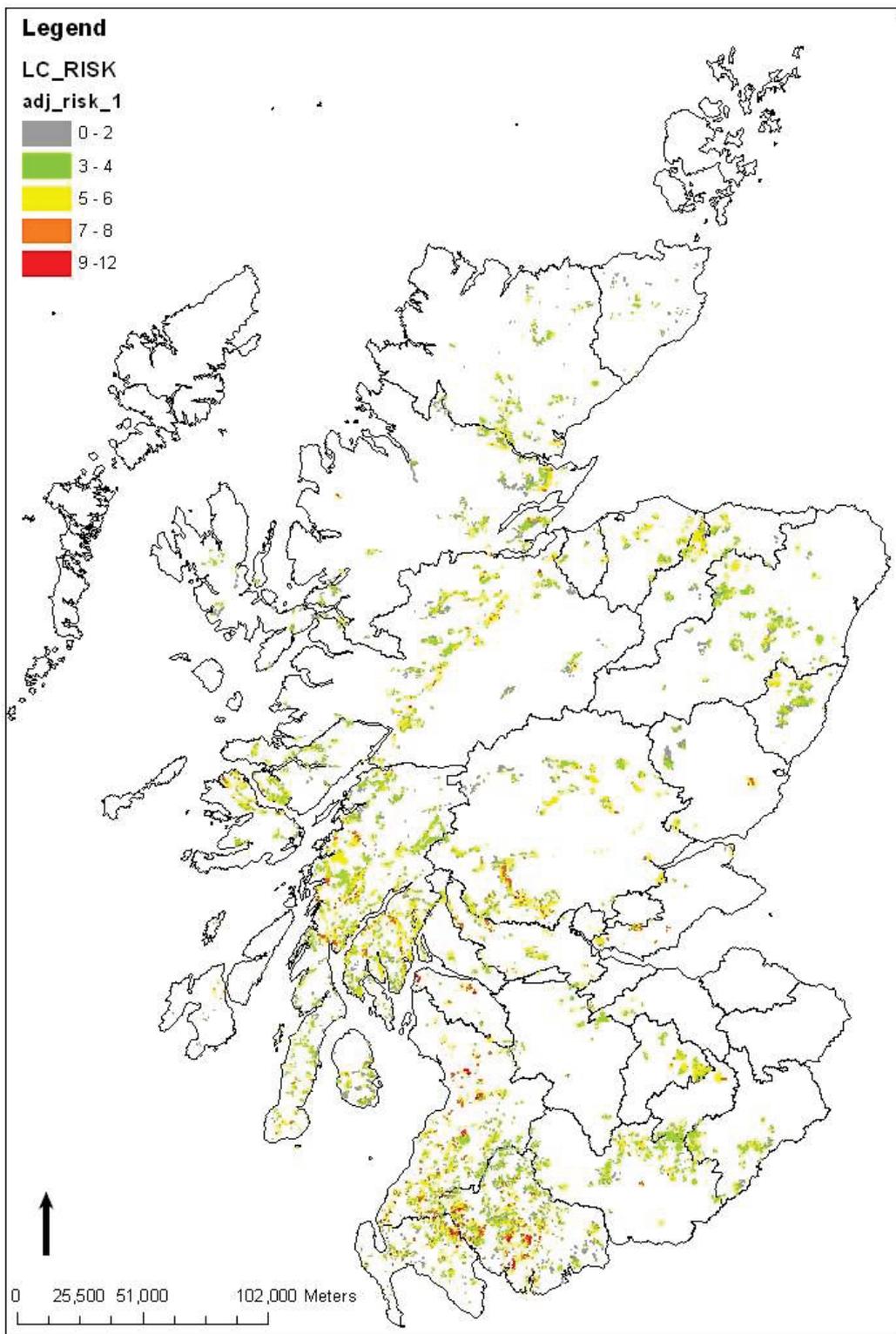
Figure 5. *Phytophthora ramorum* risk scores for a) native woodland, b) heathland and c) Larch fragments across Scotland in April 2013



a) Woodland: Fragments in green had low risk of *P. ramorum* infection whilst fragments in yellow to red had medium to high risk of *P. ramorum* infection.



b) Heathland: Fragments in green had low risk of *P. ramorum* infection whilst fragments in yellow to red had medium to high risk of *P. ramorum* infection.



c) Larch: Fragments in grey have low risk of *Phytophthora* infection whilst fragments in green to red have medium to high risk of *Phytophthora* infection.

Key heathland species were tested for their susceptibility to *P. ramorum* and *P. kernoviae*. With the exception of blaeberry (*Vaccinium myrtillus*, highly susceptible), cowberry and bearberry (*Vaccinium vitis-idaea* and *Arctostaphylos uva-ursi*, both slightly susceptible) all hosts were resistant to both pathogens.

When *P. ramorum* was detected on larch in Galloway the Scottish Government extended the project for eight months for monitoring of the pathogen in heathland in the vicinity of infected larch plantations. The extension report is available at [www.gov.scot/PhytophthoraResearch/Extension](http://www.gov.scot/PhytophthoraResearch/Extension).

The results from this project and research carried out elsewhere have already helped inform the development of surveillance and management strategies for outbreaks in forestry and managed gardens. The results will also be used to inform actions at outbreaks in native woodlands and heathlands, should they occur in Scotland.

### **Genetic diversity of *P. ramorum* strains**

SASA's historic collection of *P. ramorum* isolates comprising 228 isolates, going back to the very first outbreaks in Scotland in 2002, was genotyped using seven microsatellite markers. Thirty different genotypes were discriminated. Although the genotyping confirmed that the Scottish *P. ramorum* population is clonal, it showed a higher genetic diversity than on the European continent with 13 genotypes unique to Scotland. Ten of those genotypes were site specific, often represented by single isolates. All but one of these were found in gardens or parks with some evidence that they had developed locally. The *P. ramorum* population in nurseries and garden centres showed a lower diversity. This was attributed to the fact that outbreaks in nurseries are usually detected earlier and quickly eradicated.

Three isolates collected in a garden in Galloway in 2011 showed a deviating microsatellite profile. These belonged to the new, recently described EU2 genetic lineage of the pathogen, which is so far only present in Northern Ireland and the south west of Scotland. Work by Forest Research has confirmed the presence of the [EU2 strain](#) (as well as the 'common' EU1 strain) in larch in Galloway.

## **5. Cooperation between partners**

Actions on *P. ramorum* are coordinated by a Scottish Phytophthora Steering Group with membership drawn from Agriculture Food and Rural Communities Directorate (policy, inspectorate and science), the Forestry Commission, Forestry Commission Scotland, Scottish Natural Heritage and SEPA. The Scottish Tree Health Advisory Group (which provides advice to Forestry Commission Scotland on tree health matters) provides an additional forum for discussing actions relating to *P. ramorum* and draws on the experience of representatives from across the forestry, land use, environmental and public sectors.

## **6. Future Programme of Activity**

The Scottish Government will maintain the current level of activity for nurseries, established gardens & public green spaces and heathlands (refer to the Annex). This will continue to be overseen in co-operation with the partners highlighted in section 5.

Future actions for sites outwith the Management Zone will continue, with the aim of eradicating all outbreaks. In some garden situations progress to date suggests that the current measures are effective, although vigilance is required over several years and some outbreaks are more persistent than others.

In the wider environment, where infection is established in *R. ponticum*, eradication may no longer be possible and a shift to preventing spread rather than eradication may be the only appropriate option.

## **7. Ongoing/future Research**

Scottish Government has agreed to fund additional research on potential risks of *Phytophthora* species in Scotland and on improving detection methods for these species in soil, water and plant samples. The results of this research will help inform future risk assessments, monitoring activities and input to management strategies for future outbreaks, should they occur in Scotland. The Forestry Commission, through its research agency (Forest Research), is also continuing to fund additional research on Phytophthoras and, like other colleagues in the Scottish Government, is closely involved with related research within the LWEC (Living with Environmental Change) Tree Health and Plant Biosecurity Initiative.

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## **Practical Guidance and leaflets**

*Phytophthora ramorum*: A Practical Guide for Established Parks, Gardens, Amenity Landscape & Woodland Areas [www.gov.scot/Resource/Doc/278281/0101025.pdf](http://www.gov.scot/Resource/Doc/278281/0101025.pdf)

*Phytophthora ramorum*: A Practical Guide for the Nursery Stock and Garden Centre Industry [www.gov.scot/Resource/Doc/278281/0101024.pdf](http://www.gov.scot/Resource/Doc/278281/0101024.pdf)

*Phytophthora ramorum* Factsheet: [www.gov.scot/Resource/Doc/278281/0101020.pdf](http://www.gov.scot/Resource/Doc/278281/0101020.pdf)

*Phytophthora kernoviae* Factsheet: [www.gov.scot/Resource/Doc/278281/0101021.pdf](http://www.gov.scot/Resource/Doc/278281/0101021.pdf)

## Current Levels of Activity

### Nurseries

Scottish Government (Horticulture and Marketing Unit (HMU)) inspectors will:

- continue to work to prevent the spread of *P. ramorum* in traded plants and undertake official inspections twice per year at registered nurseries handling specified hosts (including trees);
- issue statutory notices requiring destruction of infected plants if found at nurseries, along with the other plant health measures required by the EU and domestic legislation;
- conduct trace-forward and trace-back exercises to establish pathways and liaise where necessary with other Plant Health Authorities;
- check plants traded within Scotland by inspecting plants at garden centres and retail premises;
- respond to enquiries and undertake follow up activities when notified of infected consignments or potentially infected plants.

### Established Gardens & Public Green Spaces

Scottish Government (HMU) inspectors will:

- undertake a survey of 50 gardens and landscape sites throughout Scotland as part of annual monitoring activities;
- issue statutory notices at premises found to have infections. These will require removal of infected plants, recommend biosecurity measures and prohibit movement of infected plants or cut branches from the premises;
- undertake surveys within a 1.5 km radius of infected premises to determine the extent of the disease outbreak;
- continue to monitor sites within the Management Zone and will be able to assist with advice on how to manage and control the spread of the pathogen.

### Heathlands

SNH and SEPA will:

- monitor *Vaccinium* sp and other heathland and woodland species at designated sites for symptoms of *P. ramorum* to determine whether infection is present in heathlands and on woody species in Scottish woodlands. Samples will be sent to Scottish Government (SASA) for analysis;
- monitoring will be informed by the risk mapping models;
- undertake water baiting in water courses to determine whether *P. ramorum* is present with pathogen diagnosis undertaken by Scottish Government (SASA).

Scottish Government (HMU) will:

- issue statutory notices and require eradication measures if infected *Vaccinium* is found in heathland.

Scottish Government (FCS) will:

- issue a statutory plant health notice and require eradication measures if infection is found on woodland/forest trees (except in the 'Management Zone' - see action plan for trees).

For infection on *R. ponticum*, non-woodland/forest trees and other hosts, HMU and FCS, in collaboration with SNH, will liaise to decide who is best placed to require statutory action aimed at eradication or containment.

### Trees

Scottish Government (FCS) are responsible for Scotland's trees, woods and forests and are managed within the context of the overarching, sustainable forest management principles set out in the UK Forestry Standard and the Scottish Forestry Strategy.



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