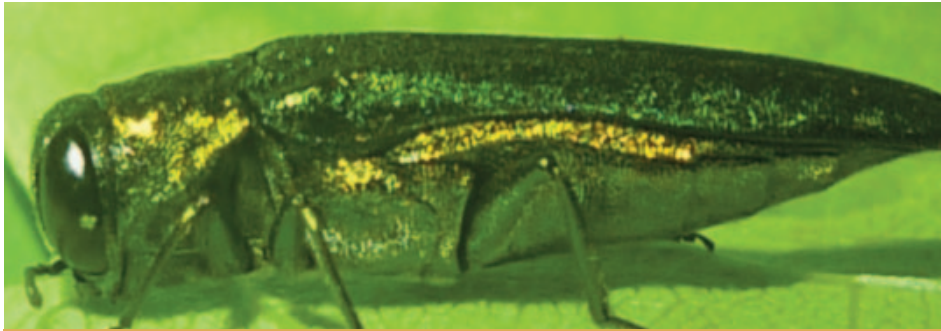
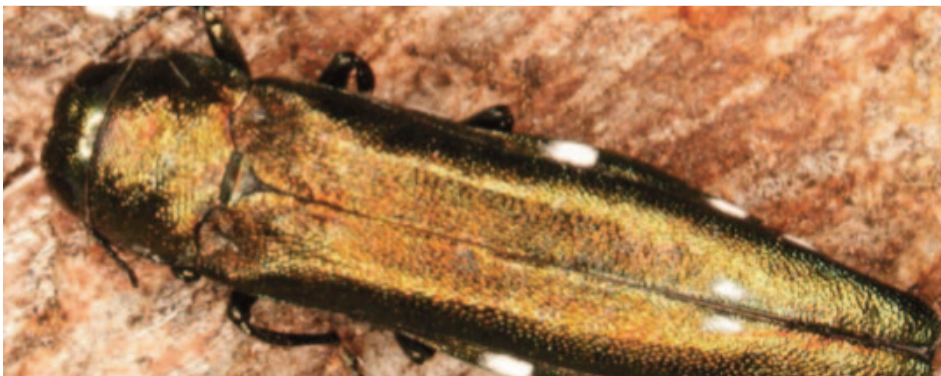


# THE WELSH PLANT HEALTH SURVEILLANCE NETWORK



*Agrilus planipennis* (Emerald ash borer)



*Agrilus biguttatus* (Two-spotted oak bupresid)



*Ips typographus* (Larger eight-toothed European spruce bark beetle)



*Thaumetopoea processionea* (Oak processionary moth)

Figure 1. Four of the insect pests under surveillance by the WPHSN

The Welsh Plant Health Surveillance Network (WPHSN) is a Welsh Government funded plant health initiative. Launched in 2022 by Forest Research (FR) its primary aim is to monitor the presence and absence of native and invasive pests and pathogens that can pose a threat to the health of plants and trees across Wales, acting as an early warning system and monitoring tool.

The WPHSN collaborates with the Wales Plant Health Sentinel Site Network, the Welsh Government Woodland Estate, and private landowners to gather data which is used to inform the development of priority goals and policies relating to woodland management in Wales.

## Welsh woodland surveillance

The Welsh Plant Health Surveillance Network (WPHSN) primarily consists of a network of pheromone insect traps and mechanical spore traps strategically situated in woodlands, parks and gardens around Wales to detect organisms which have historically been detected in the region, and to detect new arrivals which have the potential to thrive in Wales as the climate changes. Biological samples are collected from the traps on a fortnightly cycle between April and December each year. The insect samples are typically analysed by FR staff in Wales, while spore samples are sent to our state-of-the-art plant health facilities at Alice Holt for in-depth laboratory testing. This allows for the recording of the presence and absence of specific pests and pathogens, such as, non-native bark beetles and fungal diseases (Fig. 1).

Additionally, tree health visual surveys are conducted where disease is suspected. For example, oak trees are examined for symptoms of Acute Oak Decline - a disease caused by an aggregation of bacteria - where crowns are showing signs of thinning, where resin-like bleeds are observed on tree stems, and/or where *Agrilus biguttatus*: a jewel beetle associated with the causal bacteria of the disease (Reed et al., 2018).

Where diseases affecting conifers are suspected, such as *Phytophthora pluvialis* – a fungal pathogen of Douglas fir and western hemlock – potentially susceptible stands within a 5 km radius of an identified fungal pathogen outbreak undergo visual surveys for signs and symptoms of disease. These visual surveys are undertaken in conjunction with the Natural Resources Wales (NRW) tree health team.

Secondary aims of the WPHSN are to raise awareness of plant and tree health issues, educate stakeholders and the public of the species likely to cause stress and disease to trees, to share advice and information to support “citizen scientist” observations and identification, as well as to promote good biosecurity practices to minimise the future spread of disease.

Engagement with landowners and land managers at public events, like the Royal Welsh Show, highlighted that the narrative around tree disease is typically focused narrowly on ash dieback disease and Dutch elm disease. This has caused us to accelerate the collaboration with external agencies to broaden the public perception of tree disease to incorporate other pathogenic diseases, such as those caused by *Phytophthora* species as well as expanding the knowledge sphere around woodland pests, such as *Ips typographus* and oak processionary moth.

**The need to widen the knowledge sphere in the public domain around woodland pests and pathogens [from ash dieback and Dutch elm disease] became apparent at networking events, like the Royal Welsh Show.**

Established as a unique venture between Forest Research and Welsh Government in 2022, the WPHSN is a new initiative for Wales. The project lead, Racheal Lee, was keen to ensure the pilot phase (2022 – 2025) of the surveillance network incorporated sites that were deemed ‘at higher risk of invasion’; subsequent phases will observe the network to spread across the country. Higher risk sites were determined from research published by Professor Hugh Evans in his research report (Evans, 2021), in which he proposed the likelihood of the distribution of *Ips* species



Figure 2. Infographic illustrating public access sites collaborating with the WPHSN (Lee & Olivieri, 2024).

(bark beetles) specifically to be from the East of England (where these have colonised and been detected) in a westward direction as climatic suitability for colonisation improves across the UK, i.e., higher summer temperatures and more frequent windstorms. These variables provide conditions for multiple generations of the insect to occur in a single 12-month period and assist with its migration (Evans, 2021). This distribution model has been adopted in the WPHSN to monitor potential colonisation of *Ips typographus* in Wales, together with other insect pests with the potential to cause disease and tree mortality in Welsh woodlands. Examples include *Ips cembrae* (large larch bark beetle), *Thaumetopoea processionea* (oak processionary moth), *Agrilus* species (jewel beetles), *Monochamus alternatus* (Japanese pine sawyer beetle), and *Lymantria dispar* (Gypsy moth) and this work has informed the location of site selection for inclusion in the trapping network.

**Change in climatic conditions in Wales can improve colonisation opportunities for invasive pests, such as *Ips typographus* and Oak processionary moth, which can be detrimental to commercial spruce plantations and oak parklands respectively.**

*Ips typographus* is an important insect pest as it poses a significant health risk to spruce stands when established (Blake et al., 2024). With the commercial forestry industry in Wales worth an approximate £499.3 million

per year (NRW, 2024), collaboration with NRW for access to the Welsh Government Woodland Estate was of paramount importance for the surveillance of spruce. Similarly, oak processionary moth (OPM) and *Agrilus* beetle colonisations pose a serious threat to the health of oak and ash trees (Fig. 2), thus collaboration with the Sentinel Site Network and private landowners provides access for surveillance to broadleaf trees in parks and gardens.

Fungal pathogens being monitored by the WPHSN include:

- *Hymenoscyphus fraxineus* - responsible for ash dieback disease
- *Neonectria neomacrospora* - responsible for causing cankers in fir trees
- *Heterobasidion* and *Phytophthora* species – parasitic pathogens of conifer trees, e.g., *Picea* species (spruce trees) and *Tsuga heterophylla* (western hemlock) respectively, which are important because of their value to the commercial forestry industry.

**Sentinel site collaboration**

Within the WPHSN, the term ‘Sentinel Site’ not only applies to the 22 sites (one in each local authority region in Wales) which make up the Wales Plant Health Sentinel Site Network (Welsh Government, 2022), but refers also to sites with public access and private landowners which are collaborating with the WPHSN for the purposes of monitoring for invasive pest and disease species (Fig. 2).



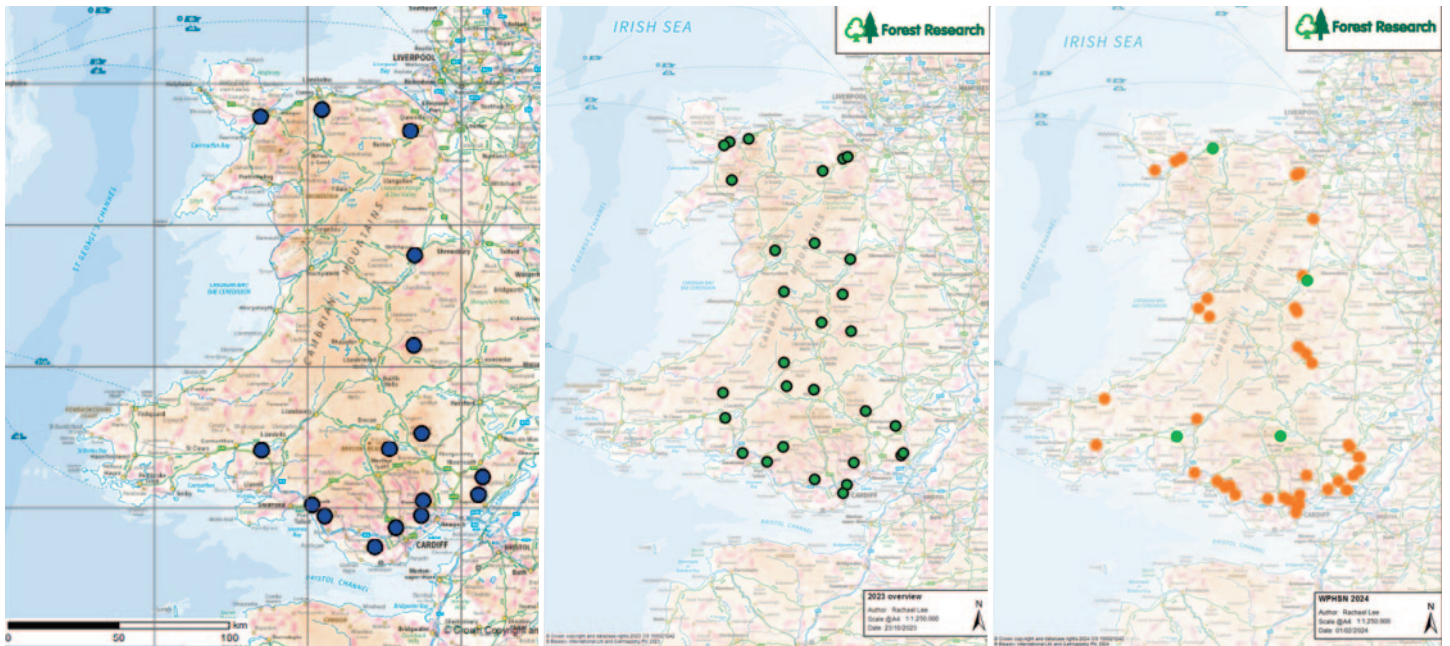


Figure 3. Map of Wales illustrating the trapping network 'J' formation which established following guidance from the report by Professor Evans (2021) and the development of the network through the pilot phase: Year 1 - 2022 (left), Year 2 - 2023 (centre), Year 3 - 2024 (right).

Working with external agencies has facilitated the growth of the WPHSN by affording access to a range of woodlands, maximising the range of organisms we can survey for, and allowing the sharing of information and advice. Moreover, active and ongoing collaboration delivers mutual operational support in the event of a suspected interception.

*Collaboration with sentinel sites is a multifaceted enterprise that supports the WPHSN in the ongoing monitoring for damaging, species and the sharing of plant health information.*

### Project achievements

In Year 1 of the pilot project, the higher risk sites formed a 'J' formation across Wales – starting at Swansea in the south, moving eastwards along the M4 corridor to southeast Wales, incorporating Cardiff and Chepstow, up the Wales/England border to Denbighshire, and then westward along the

A55 corridor towards Bangor, ending on Anglesey. A total of 33 insect traps and 2 spore traps were deployed across 23 sites.

To expand the network for a greater coverage of Wales, years 2 and 3 continued to use the 'J' formation network with the addition of traps through the centre of Wales in a south to north trajectory (Fig. 3). A total of 66 insect traps and two spore traps were deployed across 32 sites in year 2, and 84 insect traps and five spore traps were deployed across 40 sites in year 3.

Sites are a combination of conifer plantations managed by NRW, sentinel sites consisting of parks and gardens with public access, and privately owned mixed woodlands.

Data collected from the traps has been used to build a distribution map of pests and pathogens. It is important to note, recording a negative in this pilot project is as equally important as recording a positive as it illustrates the absence on non-native invasive species. Furthermore, incorporating an abundance record from a positive result

will allow for the monitoring of the disease to establish whether it is increasing and/or spreading, or indeed, decreasing in abundance and geographical distribution.

### Conclusions

During the pilot phase (2022 – 2025), the WPHSN expanded its surveillance network geographically, forged working relationships with sentinel sites and external agencies to support data collection, and built a 'real time' map detailing the detection of insect and fungal pathogens. It has been well received by the sentinel site network as a tool for them to use to protect their trees, parks and gardens. Public engagement at events, such as the Royal Welsh Show, has flown the flag for this initiative and has helped to broaden the discussion around tree diseases.

[Racheal.lee@forestresearch.gov.uk](mailto:Racheal.lee@forestresearch.gov.uk)  
<https://www.forestresearch.gov.uk/research/monitoring-tree-pests-and-diseases-in-wales/>