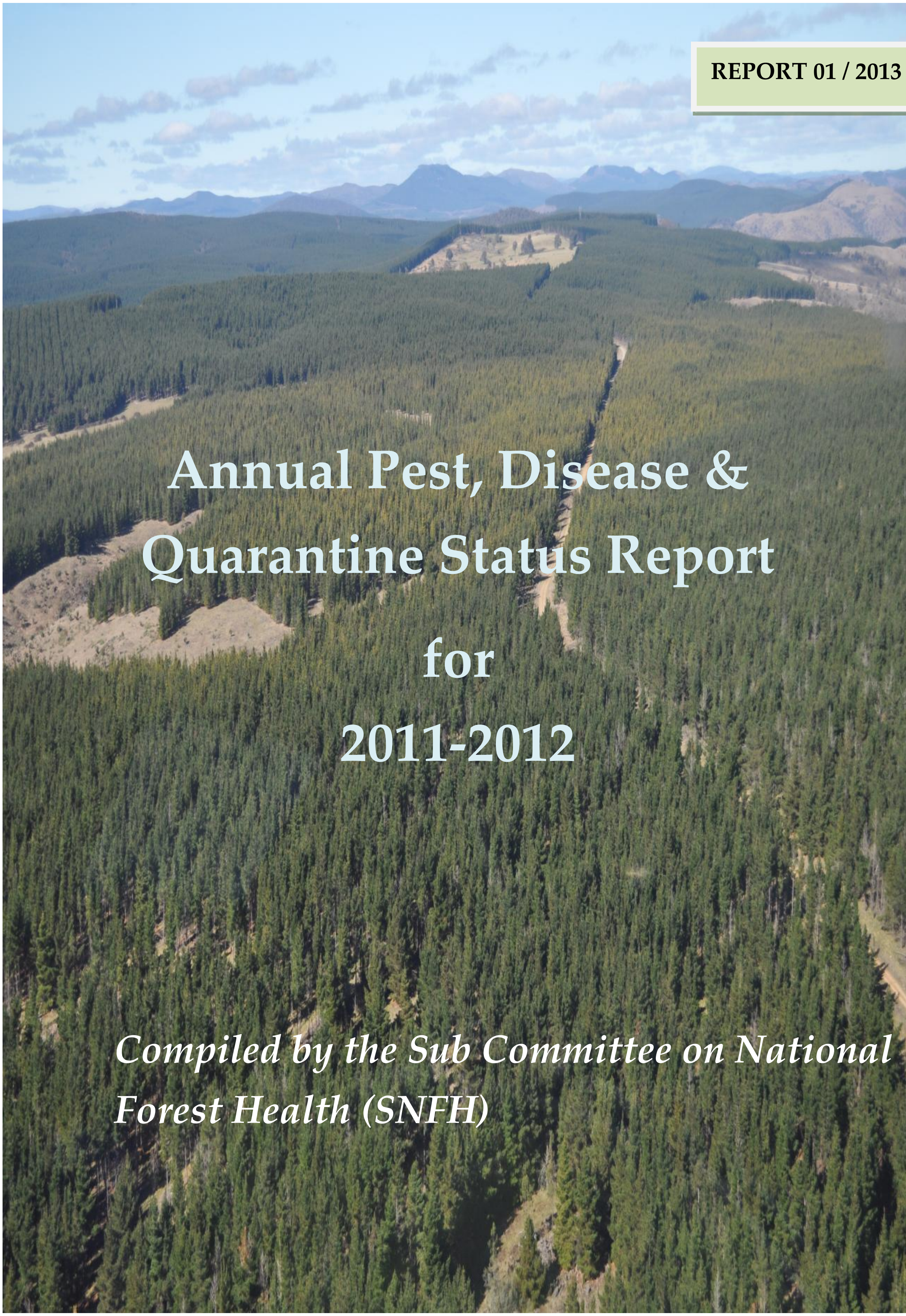


REPORT 01 / 2013

Annual Pest, Disease & Quarantine Status Report for 2011-2012

Compiled by the Sub Committee on National Forest Health (SNFH)

Table of Contents

1.0 SNFH ANNUAL REPORT

1.1 Introduction

Presented here is a state-by-state overview of the status for 2011-12 of pest, disease and quarantine issues in Australia's forests. The report has its major focus on the approximately 2 million ha of plantation forestry in the country, but, where appropriate, issues in native and urban forests and the built environment are included. As an observer on the Subcommittee on National Forest Health and Plant Health Committee, New Zealand also contributes with a report on key forest health issues in that country.

1.2 Background

The former Research Working Group 7 and its predecessors under various previous national committee structures have for around 30 years produced the "Annual Pest, Disease and Quarantine Report" as a key part of their terms of reference. The past twenty years have seen major changes in the structure of the forest industries particularly with a change from state to private ownership. This has inevitably impacted on the way forest health surveillance and R & D is carried out in Australia. Most expertise in forest health in Australia still resides within the relevant state agencies which contract surveillance and R & D with private or corporatized forest growers. There is also an increasing trend for some of this expertise to be housed within Australian Universities. This report reflects these trends within a funding environment that is seeing a decline in forest health capacity within Australia.

1.3 Purpose of report

The purpose of this report is to:

provide an annual snapshot of the health status of Australia's forests that also becomes part of a longer term view of trends in forest health.

- communicate this information via Plant Health Committee (PHC) to plant health stakeholders nationally.
- act as a source of information on forest health for Australia's reporting obligations under Criterion 3.1a "Scale and impact of agents and processes affecting forest health and vitality" of the State of the Forests reporting.
- assist in defining the key forest pest, disease and quarantine issues for the country.

2.0 KEY ISSUES AND THREATS

2.1 New South Wales

The full extent and impact of spotted gum canker is not known, and is currently being determined. In some plantations a large proportion of trees are affected, resulting in significant volume losses.

Sirex wood wasp (*Sirex noctilio*) continues to be a threat in softwood plantations.

The impact from Dothistroma needle blight caused by *Dothistroma septospora* has increased in recent years due to a return to normal (or above average) rainfall regimes in many plantation areas.

2.2 Victoria

Dothistroma needle blight (*Dothistroma septospora*) defoliation levels have increased across the state in 2011-12. Above average rainfall has provided conducive conditions for disease development. There were some localised areas above the economic threshold where management actions were required.

Kirramyces eucalpti has become an increasingly significant disease of juvenile and adult foliage within *E. nitens* plantations in Victoria. Damage has been observed across the state with some plantations being entirely defoliated. This is the second year where this pathogen has been identified as a significant threat to plantations in Victoria.

Two species of exotic long horned beetles -Black spruce longhorn beetle (*Tetropium castaneum)* and Brown spruce longicorn beetle *(Tetropium fuscum)* were detected at the Melbourne ports. *Tetropium* is a large genus of long horned woodborers found in conifer forests of Asia, Europe and North America. Intercept panel traps were deployed around the interception at the port but to date no more beetles have been detected. Trapping will continue into the 2012-2013 season.

Myrtle rust was identified in Victoria in late December 2011. As at the 31 July 2012 Myrtle rust has been detected at 69 sites which included production nurseries, wholesale outlets, private residences and public parks in metropolitan Melbourne, the Mornington Peninsula, Shepparton, and Ballarat and near Bairnsdale. The spread of Myrtle rust is expected if wet/warm conditions continue in the coming 2012/13 season.

2.3 South Australia

The key issue in South Australia in 2011-12 was the outbreak of *Diplodia pinea*. The main threat to forest health in the next 12 months is the increase in Sirex activity following the Diplodia outbreak.

Another threat is the possible increase in Ips population (*Ips grandicollis*) numbers and damage to standing trees, if residue from non-commercial and pre-commercial thinning operations remains in the forest due to lack of markets for the timber.

2.4 Tasmania

A large proportion of the privately-owned eucalypt plantation estate has suffered from the lack of pest management over the past year due to severe financial difficulties experienced by plantation owners. Fortunately, there was no evidence of any spill-over of unmanaged pest populations spreading to damage adjacent managed plantations.

Protecting mid and late-rotation *Eucalyptus nitens* plantations on high altitude sites from defoliation (principally by leaf beetles - *Paropsisterna bimaculata*) and assisting the recovery of plantations with chronically thin crowns is a high priority. This requires a better understanding of shoot phenology and timing of damage in relation to key periods of the leaf beetle life-cycle, particularly the period either side of when adult beetles overwinter.

Maintaining Tasmania's area freedom from myrtle rust (*Puccinia psidii*) remains a priority. We need to make good use of this period while the pathogen is absent to develop an understanding of the rust susceptibility of Tasmania's species within the Myrtaceae as well genotypes of the key commercial species.

Protecting young, established *Pinus radiata* plantations from bark-stripping damage by wallabies remains an ongoing problem that is difficult to manage using currently available techniques. For the first time in 40 years Tasmania is without any specialist forest entomologists and remaining specialists in forest pathology are largely working in other areas.

2.5 Western Australia

No new major pest or disease outbreaks were reported in Western Australia 2011-12. The key issues continue to be forest decline associated with stress events such as drought and frost. Phytophthora-dieback and research on newly recorded species of *Phytophthora* continues to command attention. The gum leaf skeletoniser (*Uraba lugens*) outbreak reported in 2010-11 continues to be monitored.

2.6 Queensland

Myrtle rust (*Puccinia psidii*): The range of this pathogen has extended significantly northward over the last 12 months, from southeast Queensland to include tropical coastal and tableland vegetation. The main threat at present continues to be its impact on native forest ecosystems. Laboratory screening studies have identified varying levels of resistance among the seven key plantations species of *Corymbia* and *Eucalyptus* in Queensland, with the potential to select for resistance at the family level within species and provenances. These results suggest the potential for *P. psidii* to impact on young eucalypt plantations developed using unimproved seed from all provenances studied, including some commonly used in plantation development in Queensland.

Sirex wood wasp (*Sirex noctilio*): Continues to pose a threat to pine plantations in southeast Queensland. Numbers of wasps trapped and struck trees continue to increase in the Stanthorpe area following the initial detection in February 2009. Biological control is being implemented according to the National Sirex Coordination Committee (NSCC) guidelines.

3.0 SUMMARY

3.1 New South Wales

The majority of softwood (pine) and a large proportion of hardwood (eucalypt) plantations were surveyed by helicopter in winter–spring 2011. All aspects of forest health were mapped, including damage from pests, diseases, vertebrate pests, climatic disorders, nutritional imbalances and weeds. Follow-up ground surveys were carried out where necessary, such as to further diagnose tree mortality and detect Ips bark beetles (*Ips grandicollis*) and Sirex wood wasp (*Sirex noctilio*) in pine plantations and to survey for stem canker and stem borer damage in eucalypt plantations. Ground surveys for softwoods were carried out in winter–spring 2011 and for hardwoods in winter 2011 and summer–autumn 2012.

Damage from *Cardiaspina* and *Creiis* psyllids was slightly lower than last year, and still restricted to several plantations of *Eucalyptus grandis* and *E. dunnii*, respectively. The area affected by psyllids has decreased from the peaks in 2007 and earlier, due to a reduction in Creiis damage in young *E. dunnii* plantations. Frost damage occurred to several *Corymbia* plantations. Damage from herbivorous insects was lower than last year, but spread over more plantations. The general trend for area affected by herbivorous insects has been a steady decline since the early years of reporting, due mainly to the estate ageing, as herbivorous insects tend to cause more damage in younger stands. Similarly, there were only small areas of damage from leaf and shoot fungi, which tend to cause more damage in younger stands. The area affected by Bell Miner Associated Dieback (BMAD) and stem borers remained static. The general trend for stem borers, however, has been a steady increase, which is related to the increasing age of the hardwood estate (stem borers tend to cause more damage in older stands). A new emerging canker disease in spotted gum (*Corymbia*) plantations has recently been detected, with significant damage (including tree death) in numerous plantations. Winter bronzing bug (*Thamastocoris safordi*) affected 1.3% of the estate, only in *Corymbia* plantations. Myrtle rust (*Puccinia psidii*) has been identified in several of the second rotation hardwood plantations, but at very low levels at this stage.

Sirex wood wasp (*Sirex noctilio*) continues to cause tree mortality in several areas in Hume and Macquarie Regions, with slightly more damage than last year. The general trend for area affected by *Sirex*, however, has been decreasing from the peak in 2006 and 2007, which was associated with drought and significant outbreaks in Hume Region. This decrease in Sirex damage has been associated with increased management in these outbreak areas, including biological control and silviculture (thinning). Damage from Essigella pine aphid (*Essigella californica*), was significantly lower in all regions, due mainly to improved rainfall, but also because surveys were not undertaken during the optimum time of year to fully detect Essigella damage. Damage by

Essigella in the past few years has been significantly lower compared to the peak in area affected in 2006 and 2007, due to improved rainfall. Similarly, due to good rainfall, tree mortality associated with drought was relatively restricted to localised areas across the estate and significantly lower than the peak of damage in 2007 that was associated with severe drought. The area affected by Dothistroma needle blight (*Dothistroma septospora*) increased significantly, due mainly to large areas of damage in Hume Region, but there was also *Dothistroma* in Macquarie and Monaro Regions (levels in Northern Region remained static). This trend of increased *Dothistroma* will continue with above average rainfall across the estate. Significant nutrient deficiencies were observed in approximately 0.5% of the estate, occurring in both mature and young stands. Hail storms caused localised damage in Monaro Region (0.18%), and wind damage occurred in several areas (0.07%), especially in Macquarie Region. Management intervention included chemical control of Dothistroma needle blight (*Dothistroma septospora*), biological control for Sirex wood wasp (*Sirex noctilio*) and Essigella pine aphid (*Essigella californica*) and salvage logging of wind-throw.

3.2 Victoria

The Victorian Forest and Timber Biosecurity Framework has been published and is available on the Department of Primary Industries (DPI) website – www.dpi.vic.gov.au. The framework provides detailed information on Victoria's biosecurity arrangements, and will enhance coordinated efforts by government and industry across all land tenures to address the pests and pathogens that impact on forests and timber.

DPI has been working closely with industry and state government and local government agencies to develop and conduct ongoing targeted forest health surveillance programs for established and exotic pests and pathogens. DPI also responds to pest and pathogen reports from the community. Forest health surveillance programs include road-side surveys, plot monitoring, diagnostic surveys and aerial surveys.

Dothistroma needle blight (*Dothistroma septospora*) is the most significant pathogen attacking young Radiata pine plantations in Victoria. The defoliation level is the highest recorded since 1994 with some isolated pockets above the economic threshold.

Monterey pine aphid populations decreased across Victoria with average defoliation levels between nil to moderate. The biological control agent, *Diaretus essigellae*, continues to be released across Victoria and its efficacy in controlling aphid populations is being assessed. Cyclaneusma needle cast (*Cyclaneusma minus*) is widespread across all *Pinus radiata* growing areas in Victoria but damage was at trace to moderate levels.

Kirramyces eucalypti have become a significant pathogen in *Eucalyptus nitens* of Victorian plantations due to three warm and wet summers. Outbreaks appear to be at the compartment level but the pathogen was found in all *E. nitens* sites. Mycosphaerella leaf disease (*Mycosphaerella* sp) was also seen across the state. Infection levels increased from low to severe in some locations due to the warm and wet weather.

Cup moth has become a significant pest over the past three years within managed natural forests due to increasing population levels. Significant infestations have defoliated large areas of native forest. Natural predators have not reduced the populations.

A ports monitoring program was undertaken for Asian gypsy moth and pheromone traps have been deployed to help monitor for two recently intercepted exotic long horned beetles. The City of Melbourne commissioned the Department of Primary Industries (DPI) to undertake surveys for the exotic Dutch elm disease in parkland under their management.

Sycamore lace bug was found in Victoria for the first time in several north-east towns in March 2012 and Myrtle rust was detected in December 2011. As at the 31 July 2012 Myrtle rust has been detected at 69 sites which include production nurseries, wholesale outlets, private residences and public parks in metropolitan Melbourne, the Mornington Peninsula, Shepparton, Ballarat and near Bairnsdale. The spread of Myrtle rust is expected if wet/warm conditions continue in the coming 2012/13 season.

3.3 South Australia

The main forest health issue in 2012 was the outbreak of the disease *Diplodia pinea*. Damage was widespread across the Green Triangle Region with mainly only single scattered trees affected. In most areas, less than 5% of trees were affected, however in a few areas >20% of trees in compartments were affected. *Sirex* (*Sirex noctilio*) has now been detected in many of the affected trees.

Plantations in the Ranges and Mid-North Regions showed evidence of *Diplodia* in some areas but overall there was much less damage than in the Green Triangle Region.

Thinning status and age class appeared to be important factors in incidence of the disease. Most affected areas were unthinned or had had a first thinning and were due for a second thinning. Most affected compartments were in the 1995 and 2000 age classes, which are due for thinning in the next 1-4 years.

Sirex numbers are low in all areas but there is concern that there will be an increase in *Sirex* numbers in the Green Triangle following this outbreak of disease. As a consequence there has been an increase in the number of trap tree plots set up to detect *Sirex* and an increase in the number of nematodes to be released in 2013.

Also of concern is the possibility of Ips (*Ips grandicollis*) population numbers increasing and leading to significant damage if non-commercial thinning is carried out and large amounts or residue remain in the forest. None and pre-commercial thinning is likely to be carried out due to the lack of markets for the timber.

Monterey pine aphid (*Essigella californica*) numbers have remained low throughout South Australia. There have been further releases of the biological control agent, *Diaretus essigellae*, in the Green Triangle Region.

In eucalypt plantations, Cup moths (various species) again caused damage that necessitated spraying.

3.4 Tasmania

The unusually wet summer in 2010-11 was the dominant factor influencing the health of the *Pinus radiata* estate in 2011-12. There was a marked increase in the area with needle blight caused by *Dothistroma septosporum* and a marked reduction in the area suffering *Sphaeropsis sapinea* damage associated with drought stress. Bark-stripping of young, established trees by wallabies remains the most damaging problem affecting the *P. radiata* plantation estates in Tasmania. Sirex populations, while detectable by static trapping, did not cause sufficient mortality to be detected during routine aerial inspections.

Return to more typical summer rainfall conditions in northern Tasmania saw good crown recovery in many of the *Eucalyptus nitens* and *E. globulus* plantations that suffered severe defoliation from the *Kirramyces eucalypti* / *Teratosphaeria* spp. epidemic of 2010-11. The lower than normal populations of leaf beetles (principally *Paropsisterna bimaculata*), state-wide, assisted crown recovery of plantations defoliated in 2010-11. However, those *E. nitens* plantations in the north-eastern highlands that had chronically thin crowns made poor crown recovery. The leaf beetle IPM saw a major shift in 2011-12 with the introduction of risk-based targeting of plantations to include in the IPM (based on the study by Sophie Edgar reported in 2010-11). Only plantations predicted to have a medium or high risk of above-threshold leaf beetle populations, or plantations that suffered severe defoliation the previous season, were monitored. As a consequence of this change there was a 50% increase in the proportion of the monitoring effort devoted to older plantations (9 years or older).

Quarantine efforts were focussed strongly towards protecting Tasmania's freedom from myrtle rust. In support of quarantine restrictions on the movement of plants of the family Myrtaceae into Tasmania, Forestry Tasmania collaborated with the Department of Primary Industries, Parks, Water and the Environment in conducting regular inspections of nurseries and young plantations to confirm the State's freedom from myrtle rust.

Research effort supporting the management of forest pest and diseases in Tasmania declined to an historical low following the wind-up of the CRC for Forestry and the retirement of

Tasmania's remaining specialists in forest entomology.

3.5 Western Australia

In native forest, dieback in jarrah forest caused by *Phytophthora cinnamomi* and tree decline in tuart and wandoo woodland continues to command attention. Research on the taxonomy and ecological implications of new *Phytophthora* records and taxa from WA continues.

The outbreak of Gum Leaf Skeletonizer (GLS) continued in Dec-March 2011–12. It appears that the area subject to defoliation has contracted but moved into forest adjoining areas which had been defoliated the previous year. Although population levels have declined since 2010–11, they were still high compared with non outbreak periods, and some areas of forest experienced nearly 100% defoliation again.

Frost and drought damage in susceptible stands in the northern jarrah forest and coastal pine plantations continue to be monitored, and a new project has been started to examine the impact and management of *Quambalaria* canker in *Corymbia calophyla* (marri) trees.

A blue gum plantation industry-wide collaborative surveillance program was initiated in 2011–12. The surveys were conducted between October 2011 and January 2012 and involved the use of "mobile devices" and software to record all data. Liparetrus beetles and Chrysomelid species (*Paropsisterna m-fuscum* and *P. variicolis*) continue to be the species most commonly reported affecting seedlings and juvenile trees, while Heteronyx beetles, and eucalypt weevils (*Gonipterus* spp.) continue to be the most frequently reported insect pests in +3 year-old plantations.

3.6 Queensland

The distribution of Myrtle Rust (*Puccinia psidii*) now extends from subtropical coastal and drier inland areas east of the Great Dividing Range to tropical coastal and tableland vegetation. *P. psidii* has not so far established, despite several detections in nurseries, west of the Great Dividing Range. The host list in Queensland now exceeds 150 species from 35 genera. Forty–six host species have been rated as being highly or extremely susceptible. To date *P. psidii* has been identified from seven species of eucalypts (=*Eucalyptus* and *Corymbia*) in Queensland, occurring mainly on seedlings and generally at low incidence and severity levels.

Sirex wood wasp (*Sirex noctilio*) numbers continued to increase in the Stanthorpe region of southeast Queensland in 2011-12. It has not yet been detected outside this region, but has expanded its range within the region from the point of the initial detection. An unconfirmed detection was made near Allora, approximately 50 km north of the initial detection, indicating its potential for rapid spread toward the key plantations to the north of Brisbane. A research program has been initiated to pre-emptively examine key questions concerning the threat of *Sirex* in Queensland and the potential effectiveness of biocontrol programs. i.e.

(1) How will climatic conditions in Queensland impact on the wasp's lifecycle?

(2) How susceptible are subtropical pine taxa?, and

(3) Will traditional biocontrol work effectively within this new system?

Dr Angus Carnegie and Mr Matt Nagel

Forest Science Centre, PO Box 100, Beecroft, NSW 2119, Australia

E-mail: angus.carnegie@industry.nsw.gov.au

4.0 NEW SOUTH WALES

4.1 Summary:

This report focuses on plantations managed by Forests NSW (now Forestry Corporation NSW), including the softwood estate (*Pinus* spp. and *Araucaria* spp.) and the post 1994 hardwood (*Eucalyptus* and *Corymbia*) plantations. Aerial and ground surveys in softwood plantations were conducted in winter–spring 2011, and for hardwood plantations aerial surveys were conducted in winter 2011 and ground surveys in winter 2011 and summer – autumn 2012. Aerial surveys in softwood plantations cover all planted areas (Figure 1) whereas only a proportion of the hardwood estate is covered during the aerial surveys (Figure 2).

Each Region was provided with a debrief immediately following the aerial and ground surveys, either verbally or via email, highlighting the main issues and indicating any likely management options. Forest Health Survey Reports were provided detailing the key issues observed and recommending management options where appropriate. GIS maps (and shape files) of key health issues were supplied, including maps for control of Dothistroma needle blight, wind damage and risk maps for Sirex wood wasp to assist in location of trap tree plots for the biological control program. *Ad hoc* discussions were held with regional staff throughout the year relating to specific issues, including the Sirex biological control program, Dothistroma needle blight control and myrtle rust. Data on area affected by key damaging agents is supplied for national reporting requirements (Appendix I).

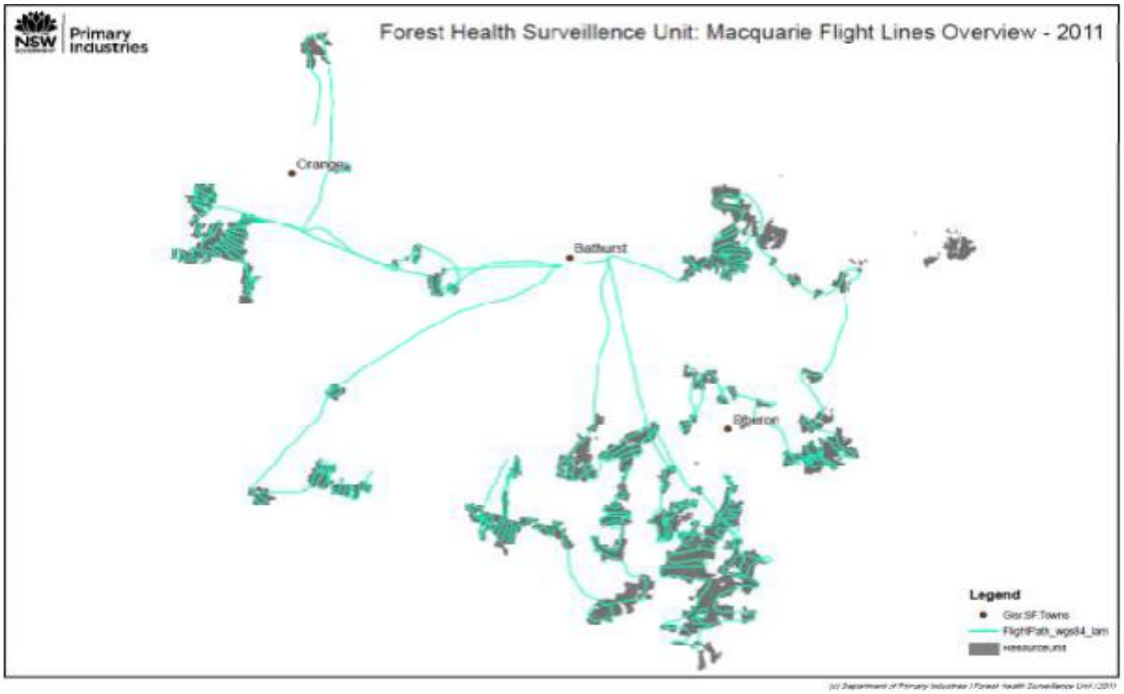


Figure 1: Flight lines of aerial survey in Macquarie region in 2011 for softwood plantations.

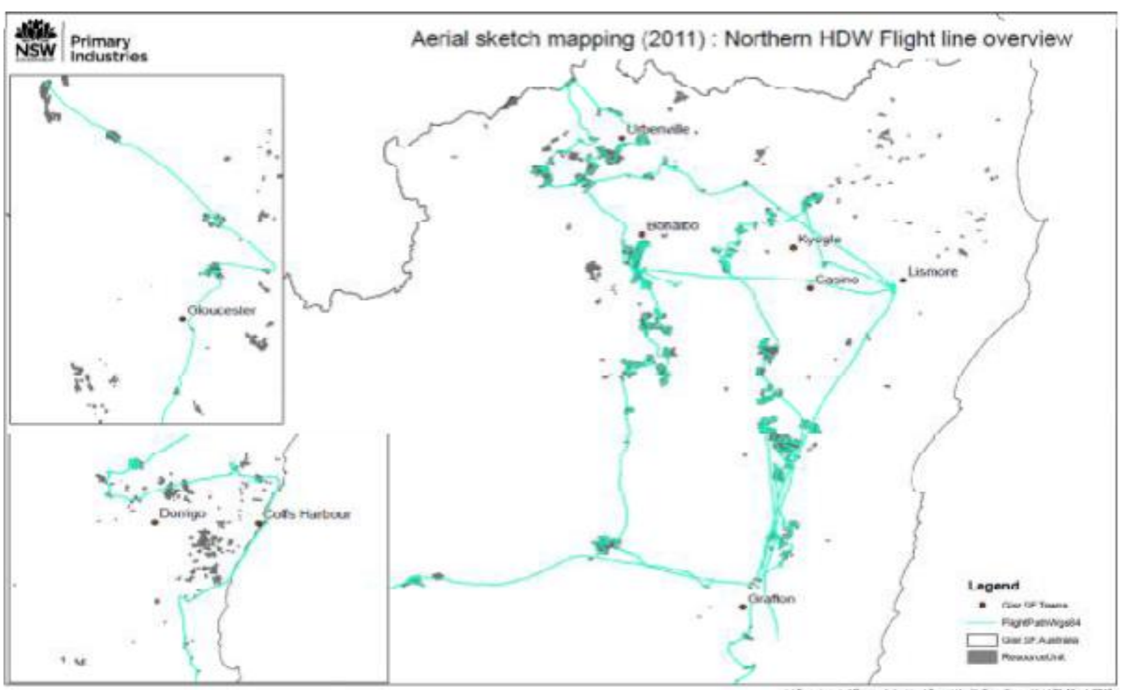


Figure 2: Flight lines of aerial survey of hardwood and softwood plantations on the north and central-coast in 2011.

4.2 Softwood plantations

4.2.1 Insect pests:

a). Sirex wood wasp

Hume Region:

The outbreak in Green Hills north continues, with many compartments in the 1996–1997 Age Class (AC) with up to 10% attack (Figures 3 & 4); lower levels (1–5%) were observed elsewhere in the plantation. Much of these areas is now being thinned, and has had a high concentration of trap tree plots, and so we expect a crash in the population. Areas in Blowering State Forest also had 1–5%, especially in areas with wildlings. There were 425ha of reportable damage from *Sirex* in Hume Region. Emergence from naturally struck trees in Green Hills State Forest had exceptionally high parasitism (95%+), with variable but acceptable parasitism from inoculated trees.

Monaro Region:

No Sirex attack was observed in Monaro Region in 2011. Emergence data from trap trees indicates 1.5:1 male:female ratio, with good parasitism (95-100%).

Northern Region:

Very low levels of *Sirex* (1%) were observed in a small plantation outside of Walcha (Croft Knoll). No *Sirex* was observed in plantations around Glen Innes (Mount Mitchell State Forest) or the subtropical plantations (southern pine species and hybrids) in north-east coastal NSW. There is no data from trap tree plots from northern tablelands due to very low emergence. No trap tree plots were established in the subtropical plantations because of previous issues with Ips bark beetles; panel traps have been established in this region for several years and have yet to detect any *Sirex*.

Macquarie Region:

The outbreak in Canobolas State Forest has continued (up to 10% attack) and expanded to a second area with 5% attack. Although we observed many trees attacked and killed by *Sirex* with up to 10% tree mortality we were unable to find any larvae within these trees once they were felled. This indicates that the biological control has been effective in this area. These trees are likely to have been attacked by nematode-infected wasps that have emerged from inoculated trap trees. There were 55ha of reportable damage in the region. Emergence data from Macquarie trap trees indicate a 3.5:1 male: female ratio, with high parasitism for both sexes (90–95%) and moderate numbers of *Ibalia* wasp species. No data for naturally struck trees.

Ips bark beetles (*Ips grandicollis*) are a continuing concern to the Sirex biological control program, with beetles attacking trap trees in all regions in NSW. Research funded by the Australian Research Council and the National Sirex Coordination Committee, with industry support, is examining the impact and management options of this issue.

Figure 3: Sirex attack in Green Hills State Forest in 2011.

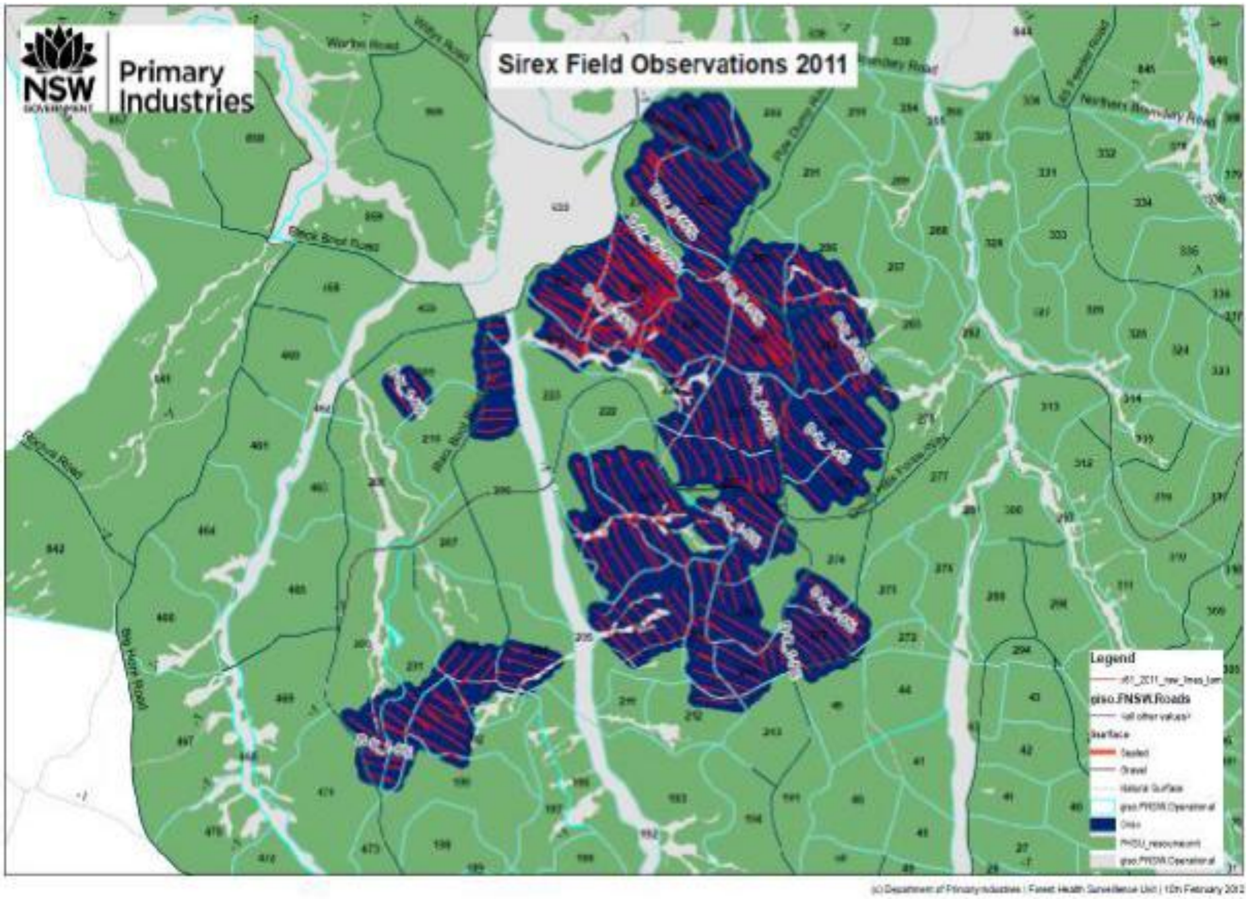


Figure 4: Map of Sirex attack in Green Hills State Forest in 2011

b). Essigella pine aphid

The Monterey pine aphid, *Essigella californica*, has caused widespread and severe damage in NSW in most years since it was first detected in Australia in 1998. Damage from Essigella this year, however, was significantly lower than in previous years in all Regions in NSW. This is most likely due to good rainfall across the pine-growing areas of NSW. There was very little evidence of Essigella activity when conducting ground surveys specifically for aphids. Surveys, however, were conducted late in some regions (November) and would have missed the peak period for detecting Essigella damage (autumn–winter). The reportable area of Essigella damage in Forests NSW pine plantations was only 1.5% of the estate, which was significantly lower than other years (e.g. 47% in 2007–08).

Releases of the Essigella biological control agent, the parasitoid *Diaeretus essigellae*, has continued in many forests in NSW. Follow-up monitoring at release sites reveals that only low levels of wasps have been detected.

c). Ips bark beetles

Attack by *Ips grandicollis* was restricted to damaged trees (wind damage) or in areas where recent harvesting had occurred (e.g. T1 (first) thinning where retained trees had been attacked). Levels of damage were low, and did not warrant management intervention.

4.2.2 Pathogens:

a). Dothistroma needle blight

The area affected by Dothistroma needle blight increased significantly (2% of the estate, cf 1% last year), due mainly to large areas of damage in Hume Region, but there was also *Dothistroma* in Macquarie and Monaro Regions; levels in Northern Region remained static. Extensive areas in the northern tablelands plantations again had severe *Dothistroma*, with up to 2,790ha affected. Approximately 1800ha were targeted for control (aerial application of copper oxychloride). *Dothistroma* was significantly more widespread and severe in Hume Region (Figure 5) than has been observed over the past 15 years of surveys; with 1670ha in 2011 (there have been no reportable levels in Hume in the previous 10–15 years). Similarly, significant levels of *Dothistroma* were observed for the first time in many years in Macquarie Region (320ha), and small areas in Monaro Region (125ha).

Previous research by Forest Health has shown *Dothistroma* Resistant (DR21) breeds are significantly less damaged by *Dothistroma* than currently planted breeds (e.g. GF19, GF23), although DR21 did not have a significantly greater Mean Annual Increment (MAI) than GF19. Planting DR21 would be expected to (1) reduce the overall level of spore inoculum in the forest, (2) lower disease levels, and (3) increase the proportion of stands having disease levels below the fungicide control threshold.

Historical records reveal the potential of Dothistroma needle blight on the northern tablelands. In 1989–1990 (a particularly good year for Dothistroma infection), 7,750ha were reported as having severe Dothistroma needle blight, which equated to over 75% of the plantation estate on the northern tablelands at that time (Glen Innes, Nundle and Walcha plantations).

Of the remaining estate, the majority (16%) were too old (18-23+ years old) and ~5% were too young (<3 years old) at the time to have significant Dothistroma infection. Thus, the vast majority of susceptible stands had severe *Dothistroma* in 1989–1990. Move forward ~20 years and many of these stands now are too old to have an issue with *Dothistroma*, and the overall proportion of affected stands is low (2,790ha affected in 2011). However, as these older stands are harvested, and are replanted, the proportion of susceptible stands will increase in the Region.

b). Cyclaneusma needle cast

Relatively large areas of “spring yellows” associated with *Cyclaneusma minus* were observed in Macquarie Region. This was due partly to surveys occurring in November (later than usual); this disease is not commonly observed during winter surveys.

Figure 5: Dothistroma needle blight in Bago State Forest, Hume Region, 2011.

4.2.3 Drought-associated tree mortality

Very low levels of tree mortality associated with drought stress were observed this year, due to good rains, with only 0.01% of the estate affected (e.g. compared to 15% in 2007–08).

4.2.4 Wind damage

Small localised patches of wind damage were observed in several regions, often adjacent recently harvested areas (Figure 6). Salvage operations were conducted in some areas in Macquarie Region where harvesting operations were still in the area.

4.2.5 Wet feet

Tree mortality in young stands was observed in low lying, poorly drained areas, and associated with increased rainfall.

4.2.6 Possum damage

Possums continue to cause issues in Monaro Region, but levels of damage are lower than previous years. In Northern Region north coast plantations, possum damage is also an issue in areas adjacent native forest.

4.2.7 Hail damage

Hail storms had caused damage and subsequent diplodia canker (*Diplodia pinea*) to 365ha in Monaro Region, including tree mortality and dead-topping.

Figure 6: Wind damage in Sunny Corner State Forest, Macquarie region

4.3 Hardwood plantations

4.3.1 Insect pests:

a). Psyllids

Cardiaspina psyllids, *Cardiaspina fiscella* and *C. maniformis*, caused severe and extensive damage again in *E. grandis* in one plantation (Figures 7-8), with damage more severe than in previous years. This plantation has experienced severe damage from *Cardiaspina* psyllids for many years, with dieback now evident. *Cardiaspina* psyllids are present in the adjacent native forest, and Bell-Miner Associated Dieback (BMAD) is also present in the adjacent native forest.

Several other plantations had small areas affected. A total of 215ha were affected by *Cardiaspina* psyllids this season.

Figure 7: Damage from *Cardiaspina* psyllids in flooded gum plantation

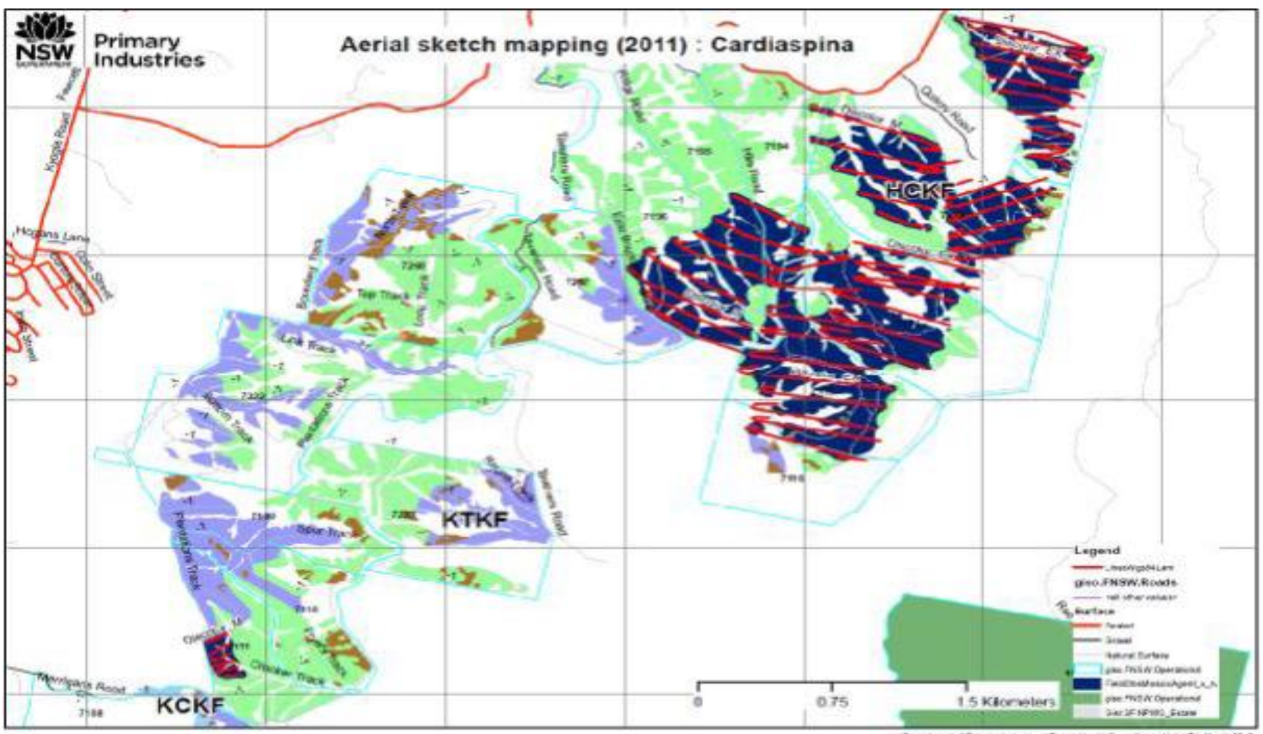


Figure 8: Map of extensive distribution of *Cardiaspina* damage in flooded gum plantation

Creiis psyllids, *Creiis lituratus,* caused severe damage in *Eucalyptus dunnii* in only two plantations, in similar areas to last year. Damage was not as extensive or severe this year though, with a total of 65ha affected. Some dieback in these areas is evident, due to progressive outbreaks. The area affected by *Creiis* has significantly decreased from the mid-2000s, where up to 1000ha were affected in some years, and plantation failure occurred. Severe damage was observed in several private plantations, including large areas in the Kangaroo (Figure 9) Creek area.

Figure 9: Extensive and severe *Creiis* damage in private *E. dunnii* plantation.

b). Stem borers

Evidence of tree mortality associated with stem borers (*Phoracantha masters*) was observed at low levels during the aerial survey in several plantations of *Corymbina variegata/maculata*. Ground surveys confirmed the causal agent and also identified several other plantations. These levels, although low (mostly <5% in a particular plantation) are higher than previous years in terms of affected plantations, and are mainly restricted to older spotted gum plantations. It appears that as these plantations age they become more susceptible to attack by this species of cerambycid beetle (i.e. *Phoracantha mastersi* - ring-barking longicorn), which can result in tree mortality due to mass-attack (Figure 10). The majority of spotted gum plantations visited during the ground surveys also had some level of damage by the two-hole borer (*Phoracantha solida*), which resulted in much less extensive damage than the ring-barking longicorn.

Figure 10: Damage from ring-barking longicorns to spotted gum

c). Winter bronzing bug (*Thamastocoris safordi)*

Winter bronzing bug, *Thamastocoris safordi*, was observed causing damage (chlorosis and defoliation, Figure 11) in the *Corymbia variegata / maculata* in 12 plantations, which is more plantations than in previous years. A total of 350ha were affected. This insect is only a recent pest of spotted gum plantations in NSW, but a related species, *T. peregrinus* is well known as a pest of street trees (especially in Sydney) and in eucalypt plantations overseas (e.g. South Africa). Feeding damage results in chlorosis and eventual defoliation, but severe defoliation rarely happens.

Figure 11: Chlorosis in spotted gum associated with winter bronzing bug.

d). Herbivorous insects

Discolouration and defoliation (Figure 12) symptoms in *Eucalyptus dunnii* were observed in 15 plantations. This is higher than in previous years. A range of insects and fungi have been identified from affected trees (including weevils [*Gonipterus scuttelatus* & *Oxyops* spp.], chrysomelids [*Paropsisterna cloelia*, *Paropsis atomaria*], Christmas beetles [*Anoplognathus* spp.] and leaf spot fungi [*Aulographina eucalypti* & *Mycosphaerella marksii*]), and although on their own these insects or fungi now rarely cause significant damage, it appears that in combination they are causing severe discolouration and defoliation.

Most areas are localised, but some plantations have extensive damage. A total of 210ha were observed this season. Although there was an increase in the area affected by the above suite of pests & diseases, the area affected individually by Christmas beetles and gregarious sawfly larvae decreased significantly. The outbreak of sawflies that we observed in previous years was not observed, and only small areas were affected by Christmas beetles.

Figure 12: Defoliation from a suite of pests and diseases in *E. Dunnii*

4.3.2 Pathogens:

a). Leaf and shoot fungi

Foliar fungi have become less of an issue as the plantations have aged.

b). Bell-Miner Associated Dieback (BMAD)

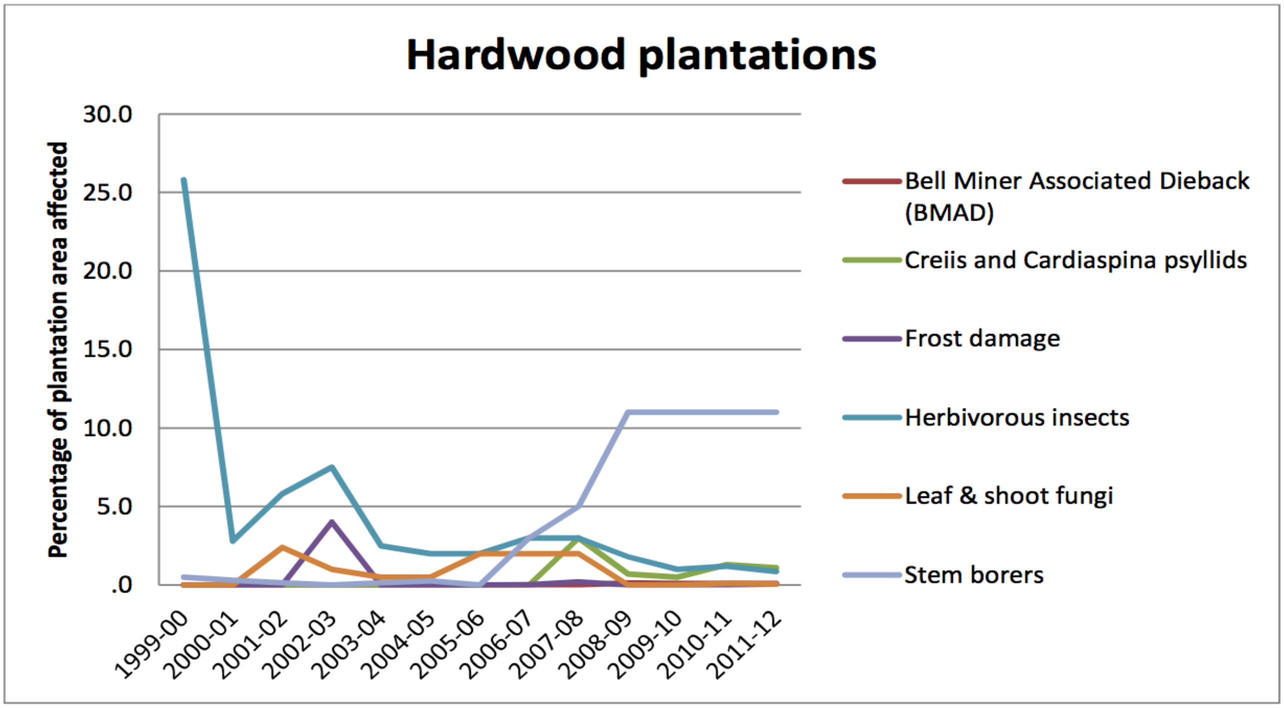
Bell Miner Associated Dieback (BMAD) was again observed in the *Eucalyptus saligna* at Tooloom. Other plantations with a history of BMAD were not covered in the aerial survey.

c). Spotted gum canker

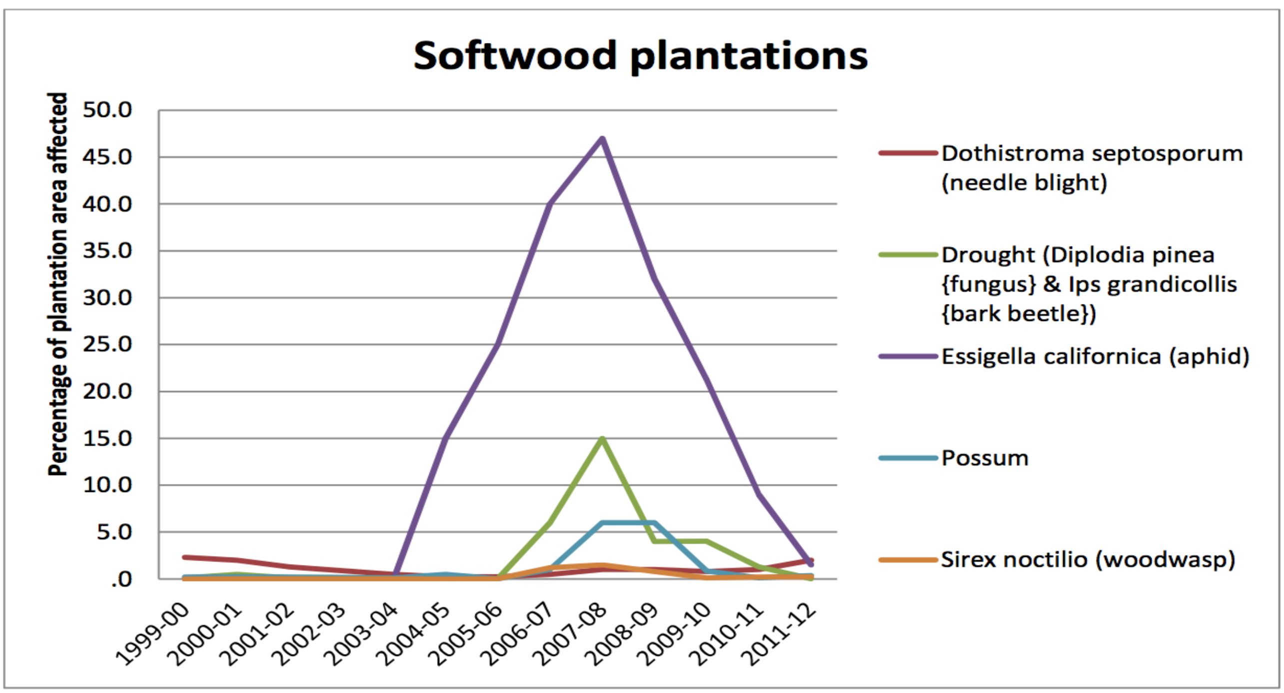
Spotted gum canker is an emerging issue recently identified (since ~2009) affecting only spotted gum plantations. Resinous, bark-cracking cankers begin in branches and appear to migrate to the stem (Figure 14), eventually killing the tree. Two fungi have been isolated from affected trees; one is a known pathogen (*Caliciopsis pleomorpha*), and the other appears to be a new genus and its pathogenicity is unknown.

Figure 13: Spotted gum canker on branches and stem of plantation spotted gum.

Caliciopsis is common in plantations but has not previously been associated with these symptoms. Work continues to determine the causal pathogen(s). Ground surveys to identify plantations affected by spotted gum canker continue, with approx. 50 surveyed so far. The majority of plantations have some level of canker, but mostly at low levels (<5%). Some plantations have high levels of damage, where over half the trees are affected and a moderate proportion has severe damage. Surveys will continue to map the extent and severity of the disease. Permanent plots have been established in Emu Creek to study the progression and impact of spotted gum canker, as well as investigate site factors that may influence disease severity. Laboratory work continues to gain and understanding of the pathogenicity and taxonomy of the associated fungi.



Graph 1: Change in reportable areas affected for key pests and diseases (hardwood).



Graph 2: Change in reportable areas affected for key pests and diseases (softwood).

d). Mistletoe

Mistletoe was again observed in plantations as in previous years, especially spotted gum plantations. Several plantations had high levels of mistletoe (>35% trees affected). Tree mortality associated with severe infestation of mistletoe was observed in a localised area of *Corymbia maculata* at Waterford with up to 15% incidence of tree death. Up to 65% of trees in this area had mistletoe.

Mr David Smith

Forest Biosecurity, Plant Biosecurity and Product Integrity Branch, Department of Primary Industries, 621 Burwood Highway, Knoxfield, Victoria 3180

Email: david.smith@dpi.vic.gov.au

5.0 VICTORIA

The Victorian Forest and Timber Biosecurity Framework (the framework) has been published and is available on the Department of Primary Industries (DPI) website – www.dpi.vic.gov.au. The framework describes the key processes in a biosecurity system for addressing the pests and diseases that threaten forest and timber industries and impact on the environment, biodiversity and amenity forests. It also describes the Victorian forest and timber biosecurity context, including legislation, policy standards, and other arrangements.

5.1 Forest health surveillance

DPI is contracted to undertake targeted forestry surveillance for:

- A private plantation company -predominantly to monitor established pest and pathogens,
- The Commonwealth government-Asian gypsy moth around high risk sites,
- City of Melbourne-Dutch elm disease

These programs are supported by general surveillance whereby pest and pathogen reports from industry, state government forest agencies and the general public are followed up.

5.2 Plantation Health Surveillance 2011-12

5.2.1 Insect pests of *Pinus radiata*:

a). Sirex (*Sirex noctilio*)

Sirex remained at relatively low levels across Victoria in areas previously infested over summer. Remedial action such as thinning and nematode inoculation (Kamona strain nematode) has reduced Sirex population levels. The parasitoid wasp *Ibalia* continues to provide a secondary means of Sirex control. Three years of above average rainfall in Victoria has reduced tree moisture stress and subsequent susceptibility to Sirex attack.

b). Monterey pine aphid (*Essigella californica*)

Monterey pine aphid populations decreased across Victoria with average defoliation levels between nil to moderate. Levels of discolouration (active aphid infestation) were also at trace levels. Maximum defoliation caused from previous aphid damage remained at high to severe levels. This is attributed to the lag in foliage replacement and timing of assessment. *Diaretus essigellae* was again released this year across the *P. radiata* estate. The success of biological control cannot be determined until favourable environmental conditions for increased aphid population occurs.

c). Five-spined bark beetle (*Ips grandicollis*)

Five-spined bark beetle continues to cause localised tree decline in four Victorian districts. Active infestations were found in trees stressed by lightning strikes, water logging, and next to recently harvested coups with large piles of slash. Five-spined bark beetle remains an issue with Sirex trap trees established for the biological control program in Victoria. A research program is being undertaken to investigate the interaction of five-spined bark beetle and *Sirex* through the National Sirex Coordination Committee.

5.2.3 Pathogens of *Pinus radiata*:

a). Dothistroma needle blight (*Dothistroma septosporum*)

Dothistroma needle blight continues to cause high levels of defoliation (not recorded since 1994) due to wet and mild weather. Discoloration (current infection) remained at moderate to high levels with some trees at 60-80% defoliation. There were some isolated pockets of severe infection above the economic threshold. Some small Christmas tree farms were also affected and chemical treatment was applied to reduce the inoculum level.

b). Cyclaneusma needle cast (*Cyclaneusma minus*)

Cyclaneusma needle cast is widespread across all *Pinus radiata* growing areas in Victoria. Damage varied across the state and within growing areas and generally ranged from trace to moderate levels. Isolated severe discolouration was found at the tree level and occasionally at the compartment scale. Little impact on tree growth is expected because it generally affects older needles and is primarily located in lower crowns.

c). Diplodia (*Diplodiapinea*)

Diplodia damage was primarily found in un-thinned stands across Victoria. The damage was mainly at trace levels with isolated trees affected on some water logged sites. Damage was mostly confined to individual trees or small groups of trees around areas affected by other environmental stresses.

5.2.3 Insect pests of *Eucalyptus* spp.:

a). Autumn gum moth (*Mnesampela privata*)

Autumn gum moth caused isolated damage with remedial sprays applied to a small number of plantations.

b). Chrysomelid leaf beetles (*Chrysophtharta* and *Paropsis*) and Christmas beetles (*Anoplognathus* spp.)

Christmas beetles and chrysomelid leaf beetles caused defoliation to both *Eucalyptus globulus* and *E. nitens* plantations across Victoria. Defoliation levels ranged from nil to high at surveillance sites. Damage was across all age-classes with no tree species preference.

c). Sawflies (*Perga* spp.)

Sawflies caused low levels of damage in the south of the state in native forest and eucalypt plantations. Damage was also identified in parks and gardens around Melbourne causing significant defoliation at some sites. Defoliation was mainly in the upper half of the tree canopy, although some trees were entirely defoliated.

d). Cardiaspina rotator

Cardiaspina rotator continues to cause significant discolouration in Sydney Blue Gum (*Eucalyptus saligna*) plantations in Gippsland. Low to high levels of *E. camaldulensis* defoliation was found in plantings along roadsides and paddock trees in the North Central and North East districts of Victoria. The defoliation tended to be isolated to certain trees rather than over a wider area. Some trees were entirely defoliated.

e). Other insect pests of eucalypts

Trace levels of gumtree scale (*Erioccus*) was found in plantations and urban forests across Victoria, with significant branch dieback in some trees.

Leaf blister sawfly (*Phylacteophaga froggatti*) caused trace to low levels of defoliation to *Eucalyptus grandis* and *E. globulus* plantations in northern Victoria over late spring and early summer. Significant growth losses are not expected as damage was generally confined to foliage on lower branches.

5.2.4 Pathogens of *Eucalyptus* spp.:

a). Corky leaf spot (*Aulographina eucalypti*)

Corky leaf spot has caused nil to severe levels of defoliation across Victoria. Damage was mainly found in the lower crowns. Significant defoliation events have occurred in the native forests of the Central highlands previously but not normally in plantations. Corky leaf spot can be a significant defoliating pathogen because it attacks the leaves and the petioles of the new and old growth and causes premature leaf drop reducing photosynthesis.

b). Mycosphaerella leaf disease (*Mycosphaerella* sp.)

Many species of Mycosphaerella leaf disease were identified in *Eucalyptus globulus* and *E. nitens* plantations across Victoria. Levels have continued to rise due to increased rainfall and warm weather. Damage levels were from low to severe in both the upper and lower crowns and some sentinel site trees were completely defoliated. Continued infection may impact directly on tree growth.

c). *Kirramyces eucalypti*

Kirramyces eucalypti have become a significant disease in *Eucalyptus nitens* plantations due to three warm and wet summers. Some outbreaks cover areas up to 65ha with some plantations entirely defoliated. Susceptible trees range from 4 to 11 years. This is the second year this pathogen has caused significant damage to plantations in Victoria. If environmental conditions remain conducive, the pathogen may spread to natural strands of *E. nitens*.

5.3 Managed Natural Forests and Native Plant Communities

5.3.1 Insect pests

a). Cup moth (*Doratifera* spp.)

Cup moth has become a significant pest over the past three years due to increasing population levels. Significant infestations have defoliated large areas of native forest (e.g. 25,000ha in the Otways). Natural predators have not reduced the populations. No control programs have been undertaken.

5.3.2 Fungal leaf pathogens

Mycophaerellas, Allographina and *Kiramyceses* were the key species causing significant damage in localised areas of the state.

a). *Phytophthora cinnamomi* (PC)

Reports of *Phytophthora cinnamomi* damage in native forests increased and new areas of infection were recorded due to above average summer and autumn rainfall. Management of PC continues to be a focus for the Department of Sustainability and Environment and Parks Victoria. The state wide model for PC risk and impact is being reviewed to help prioritise forest management activities.

b). Myrtle wilt (*Chalara australis*)

Myrtle wilt continues to cause the death of some mature *Nothofagus cunninghamii* primarily in the Central Highlands of Victoria. Damage was found along roadsides and in undisturbed natural ecosystems. Outbreaks were associated with mechanical disturbances except for one natural infection site in the Central Highlands.

5.4 Biosecurity

5.4.1 Insect pests:

a). Sycamore lace bug (*Corythucha ciliate*)

Sycamore lace bug was found in Victoria for the first time in several north-east towns in March 2012. Thirty four high risk sentinel sites across Central and North East Victoria were surveyed. Nine sites near the NSW border were infested.

b). Asian gypsy moth (*Lymantria dispar*)

Asian gypsy moth was not detected in 2011-12. Thirty trap sites around the ports of Melbourne were monitored in summer as part of the national program. An increased number of native *lepidopteran* species were trapped this year which may have been a result of delta traps being replaced with bucket traps.

c). Longhorn/longicorn beetles

Two species of exotic long horned beetles - Black spruce longhorn beetle (*Tetropium castaneum*) and brown Spruce longicorn beetle (*Tetropium fuscum*) were found at the Melbourne port. *Tetropium* is a large genus of long horned woodborers found in conifer forests of Asia, Europe and North America. Intercept panel traps were deployed around the interception at the port but todate no more beetles have been detected. Trapping will continue into the 2012-2013 season.

The Black spruce longhorn beetle has a wide host range including several species of spruce, fir, common juniper and sometimes larch. Occasionally hardwoods including oaks and walnuts are attacked. In Europe, the beetle is typically a pest of spruce and in Siberia, pines are the preferred host.

The Brown spruce longicorn beetle attacks conifers, primarily spruce, pine, and fir. In Europe, it is a pest of Norway spruce. Typically, wind-thrown trees, trees damaged by lightning or exposed to fire and freshly cut logs are attacked.

5.4.2 Pathogens:

a). Dutch elm disease (*Ophiostoma novo-ulmi*)

Dutch elm disease (DED) surveys were completed across eight of the main gardens and boulevards managed by the City of Melbourne. Symptoms resembling DED such as branch flagging and wilting were attributed to damage caused by possums, elm bark beetles and fruit tree borers. The DED fungus was not identified in samples of wood collected from trees exhibiting flagging. Elm leaf beetle populations are low in comparison to the high level of activity observed over the past 5-10 years.

b). Cypress canker (*Seridium* sp.)

The community has reported large numbers of dead and dying cypress trees in rural Victoria to the Department of Primary Industries (DPI) in recent years. DPI has tested cypress tree samples from south and west Gippsland and the Mornington Peninsula. Results were positive for various fungal pathogens, including Cypress canker, *Botryosphaeria* sp., *Phomopsis* sp. and *Pestalotiopsis* sp. These fungi can cause dieback symptoms, especially when environmental conditions have caused stress to the tree. It is assumed that the last drought weakened the trees and left them vulnerable to infection. This has been exacerbated in some areas by water logging after substantial rainfall over the past 12-18 months, and by warm, humid conditions favouring disease development.

c). Myrtle rust (*Uredo rangelii*)

Myrtle rust was first identified in Victoria in December 2011. As at 31 July 2012 Myrtle rust has been detected at 69 sites which include production nurseries, wholesale nursery outlets, private residences and public parks in metropolitan Melbourne, the Mornington Peninsula, Shepparton, Ballarat and near Bairnsdale. The transfer of Myrtle rust into Victoria was via infected plant material.

Prior to Myrtle rust being identified in Victoria a pre-incursion Victorian Myrtle Rust Response Plan (Version 1) was developed to assist local industries, land managers and the community manage the disease if it spread to Victoria. Following detection of Myrtle rust in Victoria an Emergency Response Plan (Version 1) was enacted in an attempt to eradicate/contain the disease. The emergency response phase was followed by a phase of active management (Response Plan Version 2) when it was determined the disease was not eradicable from Victoria.

The aim was to slow the spread while preparing potentially affected industries to manage the disease's impact.

From 1 July 2012 (when the disease was declared endemic), Phase 3 Disease Monitoring activities have focused on providing training and technical advice to help the nursery industry, other host plant distributors and forest land managers manage and minimise the impact of the disease. Priorities for this phase will be on confining investigatory activities to incidents involving new areas and host species where the disease has not been previously detected. This phase is likely to last a further 6 to 12 months and taper off when the disease becomes well and truly established across the state and the demand for technical assistance declines.

Dr Charlma Phillips (Principal Forest Health Scientist, Forestry SA)

PIRSA Forestry, PO Box 162, Mount Gambier SA 5290.

Email: phillips.charlma@forestrysa.com.au

6.0 SOUTH AUSTRALIA

6.1 Summary

This report summarises forest health issues in South Australia in 2012. Due to the many changes of ownership and restructuring in the past year in the Green Triangle Region (SE South Australia and Western Victoria), obtaining information on the health of plantations has been difficult. Information on the health of pine plantations has come from Forestry SA, Timberlands (Pacific) and Green Triangle Forest Products. Little information on the health of Eucalypt plantations has been available.

6.2 *Pinus radiata*

Annual aerial surveys of plantations in the Green Triangle were carried out by several companies. Forestry SA also conducted surveys of the plantation estate in the Ranges and Mid-North forests in June 2012. Follow-up on-ground inspections were carried out to determine/verify the cause of unhealthy trees detected in these surveys.

6.2.1 Insect pests of *Pinus radiata*:

a). Sirex wood wasp (*Sirex noctilio*)

Sirex has been at a low level throughout the Green Triangle for many years and some companies have become complacent about the continuing need for control measures. However the outbreak of *Diplodia* (see later) led to concern that many trees were suitable for *Sirex* attack. This together with the subsequent finding of *Sirex* in *Diplodia* affected trees, led to increase in the number of nematodes that were inoculated in 2012. More Trap Tree Plots were put in December 2012 and significantly greater numbers of nematodes have been ordered for release in 2013.

b). Five spined bark beetle (*Ips grandicollis*)

It was expected that *Ips* would be present in *Diplodia* affected trees in the Green Triangle, but there have been no reports of infestations. There is concern that *Ips* may become an issue if non-commercial thinning is carried out and large amounts of residue remain in the forest (non and pre-commercial thinning is likely to be carried out due to the lack of markets for the timber).

c). Monterey pine aphid (*Essigella californica*)

Aphid numbers have generally been low again this year. Releases of the biocontrol agent, *Diaeretus essigellae*, have continued despite the low aphid numbers (Fig. 14). The biological control program is due to end early in 2013. Some mummies have been found but the success of the program may not be determined for several years.

Figure 14: Releasing parasitoid wasps - Essigella control program

d). Black pine bark beetle (*Hylastes ater*)

Hylastes ater attacked 1 year old pines in a plantation that was re-established on a site that had been planted less than 12 months after clear felling. Large amounts of residue remained on the site. This attack reinforced the importance of allowing time between clear felling and replanting.

6.2.2 Pathogens of *Pinus radiata*:

a). Diplodia dieback (*Diplodia pinea*):

In early 2012, reports were received of dead and dying trees across the Green Triangle Region. An aerial survey showed widespread damage. In most areas, only single scattered trees were affected and most compartments had less than 5% of trees affected but in other areas there were large patches of dead/dying trees (Fig. 15). A small number of compartments had 20% or more trees affected. In some cases only the tops of the trees appeared to be dying, but in many cases the whole canopy was affected. All trees examined showed similar symptoms (dead needles, resin bleeding, blue stain and dry wood) and all were diagnosed as being infected with the fungal disease, *Diplodia pinea*. At this stage there was no evidence of *Ips* or *Sirex* infestations, however later, *Sirex* was found in many of these trees.

Plantations in the Ranges and Mid-North Regions also showed evidence of *Diplodia* in some areas but overall there was much less damage than in the Green Triangle Region.

Good rains in the spring of 2011, after a long period of drought, led to a rapid increase in canopy size. Significant rainfall events in November and mid-December 2011, when temperatures and humidity in the canopy were high, in conjunction with this increase in canopy size, provided ideal conditions for disease outbreak.

Several site factors, such as age class, thinning status and soil type, were investigated with respect to disease incidence. Thinning status and age class appear to be important factors. Most affected areas were unthinned or had had a first thinning and were due for a second thinning. Most affected compartments were in the 1995 and 2000 age classes, which are due for thinning in the next 1-4 years. This is to be expected as unthinned trees and trees approaching thinning age are likely to be stressed by competition for nutrients and moisture and therefore more susceptible to disease. Most affected areas were on sandy soils.

Figure 15: Outbreak of *Dipolodia pinea* in the Green Triangle 2012.

6.3 *Eucalyptus* spp.:

6.3.1 Insect pests of *Eucalyptus* spp.

The usual minor pest and disease issues occurred in the Green Triangle in 2012. Cup Moths were the main insect pests causing significant localised damage. Some areas required spraying.

6.3.2 Pathogens of *Eucalyptus* spp.

No reports of disease.

6.3.3 Nurseries

No major pest or disease problems in 2012.

Dr Tim Wardlaw, Mr Karl Wotherspoon and Ms Nita Ramsden

Forestry Tasmania, GPO Box 207B, Hobart TAS 7001.

Email:

Tim.Wardlaw@forestrytas.com.au; Karl.Wotherspoon@forestrytas.com.au; Nita.Ramsden@forestrytas.com.au

7.0 TASMANIA

7.1 Summary

7.1.1 Quarantine

Tasmania continues to maintain strict quarantine restrictions on the importation of any Myrtaceous species from interstate. State-wide surveillance of nurseries and young Eucalyptus plantations for myrtle rust (*Uredio rangelii / Puccinia psidii*) were done by staff from the Department of Primary Industries, Parks, Water and the Environment and Forestry Tasmania to support the State's area freedom. There were no detections of myrtle rust in those surveys.

7.1.2 Research and development

There has been a substantial decline in research and development activities over the past 12 months coinciding with the wind-up of the CRC for Forestry and the retirement of Forestry Tasmania's remaining two forest entomology specialists. The State is now without a specialist forest entomologist for the first time in nearly 40 years and forest pathology specialists at the University of Tasmania and Forestry Tasmania have seen an almost complete shift in their responsibilities to other areas. Forestry Tasmania's forest health team has the last remaining capacity to undertake limited pest and disease research.

A major project in the CRC was the lethal trap tree project as a proof-of-concept for an attract-and-kill approach to leaf beetle management. This was previously identified as the most prospective alternative to broad-spectrum insecticides for managing damaging populations of leaf beetles. The results achieved at the conclusion of two years of field evaluation of lethal trap trees found that a small, but significant, attract-and-kill effect was provided by the lethal trap trees. However, the level of protection provided was insufficient to be operationally viable.

Further measurements (defoliation and growth) of mid-rotation *E. nitens* plantations, being evaluated as part of a CRC Forestry project to validate Cabala Health[1], were undertaken in May 2012. Recovery has been slow in the most heavily defoliated coupe and growth is still only around 12% of predicted peak Mean Annual Increment (MAI)[2]. The Current Annual Increment (CAI)[3] of another coupe dropped from 26.3m^3/ha/yr in 2010-2011 to 4.1m^3/ha/yr in 2011-2012. This followed defoliation levels of 56.4% and 63.5% in 2010-2011 and 2011-2012 respectively.

7.2 Plantations (Exotic pines / *Pinus* species especially *P. radiata,* surveillance season mid to late 2011)

7.2.1 Insect pests of *Pinus* species:

a). Sirex wood wasp (*Sirex noctilio*)

No *Sirex* activity was detected during standard aerial and roadside health surveillance of the softwood plantation estate in the north of the state.

Kairomone charged static traps were placed in the same four blocks as last year between January and March. This was the third year in a three year trapping cycle. Next year a new three year cycle will commence and four new high risk blocks will be selected. Sirex females were caught in Long Hill (6), Saddleback (7) and Branch's Creek (2). At the end of the season a tree mortality survey was conducted where 4 struck trees were detected in Long Hill and 5 in Saddleback. From these results there is enough evidence of Sirex attack present to recommend the installation of trap trees in Dec 2012 followed by nematode inoculation in April 2013. Trap trees will be located in the vicinity of the 2012 struck trees. All female Sirex caught in this flight season were dissected to see if nematodes were present or not. It was found that 50% of them had nematodes present.

b). *Ips grandicollis*

Ips continues to be absent from Tasmania.

c). Monterey pine aphid (*Essigella californica*)

There remained little evidence of *Essigella* damage across the north of the state and no damage symptoms were observed in the south.

---

[1] CABALA (CArbon BALAnce) is a growth model for predicting forest growth developed by the CSIRO. The HEALTH component is being developed to help predict the impact of pests and climate in carbon stores.

[2] Average growth per year a tree or stand has exhibited to a specified age - m3/ha/yr.

[3] The increment a tree or crop puts on in a single year.

d). Pine aphid (*Eulachnus thunbergii*)

Not recorded from Tasmania.

e). Pine aphid (*Pineus laevis*)

This insect pest has widespread distribution in Tasmania but seldom causes commercial damage. Mainly present on young roadside wildlings.

7.2.2 Vertebrate pests of *Pinus* species:

Bark stripping by browsing mammals was the most prominent problem by area across the softwood plantation estate on State Forest. After a drop in the area experiencing bark stripping by browsing mammals last year this year has seen an increase to 656ha, similar to the area affected in 2008-2009. Severe damage (>50% trees affected) was found in 320ha which is 49% of the total area affected. This was primarily due to substantial increases since the previous year in Oonah (central northwest), Saddleback and Tower Hill (northeast). Oonah and Saddleback have consistently had the greatest area of bark stripping damage in recent years and this trend continues (Figure 16).

The area of young plantations affected by mammal shoot browsing was down again this year to 63ha from 150ha last season and 229ha in 2009-2010. The area of most prevalent, active damage was Smith's Plains in the central north of the state.

The area of dead tops caused by possum bark-stripping in the mid-upper crown had dropped substantially this year to only 20ha. Scattered, localised pockets of damage were observed in *Oldina* and *Pruana* in the Central Northwest.

Figure 16: Localised bark stripping damage on young *P. radiata* seedling in the Central Northwest of the State

7.2.3 Pathogens of *Pinus* species:

a). *Cyclaneusma* needle cast/spring needle cast

This remains the most significant disease of *P. radiata* in the State, affecting all high, wet (>400 metres and >1200mm rainfall) plantation areas. Management strategies remain the same as reported previously and include the use of resistant genotypes and appropriate silvicultural regimes.

b). *Dothistroma* needle blight

The wet summer across the north of the State in 2010-2011 saw another increase in the area affected by needle cast fungi such as *Dothistroma* through 2011. As usual Ringarooma (Fig. 17) in the Northeast featured prominently in the areas affected (101ha). However, the increase in area was primarily due to the level of infection observed in Oonah in the central northwest (228ha).

c). *Diplodia* / *Sphaeropsis* shoot blight/crown wilt

Continued good rainfall across the north of the State meant that no significant areas of top death caused by *Sphaeropsis* were through 2011.

d). Drought & *Phytophthora*

Possible instances of Phytophthora mortality were reported for coupes in Long Hill and Branch's Creek in the central northeast. Root decay was evident on excavated young trees and *Phytophthora* has been confirmed in Long Hill in the past. Planting issues and/or rocky soil cannot be ruled out as contributing factors.

Figure 17: Severe Dothistroma needle-cast along an internal track in Ringarooma plantation in the Northeast.

7.2.4 Environmental and site related problems

a). Fire

No fire damage was observed during this surveillance season.

b). Wind

The area of wind damage dropped from 92ha last year to around 70ha this year. The main areas of wind damage were detected during aerial surveillance following storms on 14 & 15 of June 2011 in the Northeast. Damage appeared to be limited to the south of Lisle block close to Mt Arthur and the western section of Sideling block.

c). Lightning damage

No lightning damage was detected this year.

d). Boron deficiency

Shoot health and apical dominance of coupes affected by putative boron deficiency in *Payanna* in the Northeast seemed to have improved since last season. Fused and/or shortened needles were still to be seen in localised patches or scattered at low incidence through this area but dead shoots were uncommon and crown colour was generally good.

e). Frost/cold

No frost or cold damage was detected in *P. radiata* plantations this year.

f). Exotic weeds

Scattered gorse (*Ulex europaeus*) and broom (*Genista* spp.) plants were detected in several locations in the Central North and Northeast. A single, large pampas (*Cortaderia* sp.) plant was detected in Retreat in the Central Northeast. The gorse infestation along Chatwins Rd. in Oonah in the Northwest persists.

7.3 Plantations (Eucalyptus species, surveillance season early to mid 2012)

7.3.1 Insect pests of Eucalyptus species

a). *Mnesampela privata* (Autumn gum moth)

No significant outbreaks of autumn gum moth (AGM) were detected this year.

b). *Paropsisterna bimaculata* and *P. agricola* as primary leaf beetles

Leaf beetle populations were lower in 2011-2012 than in recent years. In 2011-2012 the monitoring program covered 26,959ha of plantations between 3 and 13 years old on state forest. Monitoring techniques were modified this season to make operations more efficient and address the emerging issue of mid-rotation crown thinning in high elevation plantations. Some 2742ha, or 11% of the monitored area, were sprayed. Most of the area over the threshold was sprayed with the broad-spectrum insecticide α-cypermethrin, with a small area (4%) sprayed with the Biological Farmers Australia - registered product Entrust® (spinosad). Product registration has been removed for Entrust® so only the reserves in stock were used on those coupes in the most sensitive areas. Nearly 900ha were not sprayed because of natural control following heavy rain and/or strong wind events, or by the activity of the leaf beetle's natural predators.

Monitoring is now targeting medium and high risk areas across a wider spectrum of age classes. The state-wide FT area monitored in 2011-2012 was in plantations 9 years old and older and was 54%. This was an increase from the 34% monitored in 2010-2011. Plantations that are 2-4 years old are not as vulnerable to chrysomelid attack as they have a much longer growth window to compensate for loss of productivity. However, this season saw some high populations of *Paropsisterna agricola* (southern eucalyptus leaf beetle) which primarily attacks juvenile foliage. Approximately 215ha were sprayed to protect a plantation established in 2008 in the North East.

Despite low beetle populations the reported area of plantation exhibiting moderate levels of leaf beetle damage was similar to recent years. Chrysomelid defoliation severe enough to cause an impact on growth was detected in 3007ha. Of this 2774ha was assessed as moderate and 233ha as severe. Much of this damage coincided with areas affected by last year's *Kirramyces* and *Mycosphaerella* outbreak where crown density was already poor. Consequently what would have been negligible damage in healthy, dense crowns became a significant amount of damage in crowns with greatly reduced leaf area. This particularly seems to be the case in high elevation areas where recovery has been slow and cold, windy conditions can contribute to further defoliation and shoot death.

c). Eucalyptus weevils (*Gonipterus* spp.)

No significant *Gonipterus* damage was detected this season.

d). Gum leaf skeletoniser (*Uraba lugens*)

Chronic defoliation by the gum leaf skeletoniser *Uraba lugens* continued this year in areas previously mapped. Damage remains limited and only extends a short distance into the plantations. However, stressed trees are often stunted and mortality caused by borer infestation following consecutive defoliation events is common.

e). Beetles (Christmas (*Anoplognathus* spp., scarab, spring [*Liparetus*] etc.)

No significant damage was observed on State Forest this season.

f). Sawflies

No significant damage was observed on State Forest this season.

g). Borers

Ongoing good rainfall has seen little borer related mortality across the state. However, cerambycid and buprestid larvae were associated with significant mortality in two mid-rotation plantations in the north of the State (Figure 18).

h). Psyllids

No significant damage was observed on State Forest this season.

i). Tortricids

No significant damage was observed on State Forest this season.

j). European Wasps

Management to reduce populations at operational sites or tourism facilities is no longer conducted.

k). Vertebrate Pests

Intensive pre and post-plant management of browser populations coupled with the use of seedling stockings was largely effective in preventing significant browsing damage. However, there were areas where 25-60% of the planted stock was either missing or reduced to browsed "sticks" in one plantation in the Northeast of the state.

7.3.2 Pathogens of *Eucalyptus* species

a). *Mycosphaerella* (*Teratosphaeria*) and other leaf diseases

A return to more typical spring/summer rainfall patterns across the north of the state in 2011-2012 saw a dramatic drop in the incidence of defoliation from fungal leaf infection. There was strong crown recovery from the 2010-11 fungal epidemic (*Kirramyces eucalypti* and *Teratosphaeria* spp.) in the northwest and central north of the State. However, there was limited recovery of affected mid-rotation plantations in the north-eastern highlands. Significant defoliation in young (2006-2009) plantations was only reported to be affecting some 217ha this year. However, fungal activity is still suspected to be contributing to defoliation in the Northeast highlands following higher than normal rainfall in parts of northern Tasmania in November 2011. The interaction of a suite of factors has resulted in much of this area being reported as having severe crown thinning due to multiple causes as reported below.

b). *Botryosphaeria* top death

No substantial damage was observed on State Forests this season.

c). *Holocryphia* stem canker

Holocryphia eucalypti (Syn. *Endothia gyrosa, Cryphonectria eucalypti*) was associated with mortality in the same two plantations affected by borer attack reported above (Figure 18).

Figure 18: ***Holocryphia*** **fruiting bodies and cankers** ***(left)*** **and borer galleries** ***(right)*** **in recently dead trees in a mid-rotation plantation in the north of the State.**

d). *Phytophthora* root rot

No significant mortality (>1%) caused by *Phytophthora* was recorded this year.

e). *Armillaria* root rot

Armillaria was associated with significant mortality in three mid-rotation plantations covering around 100ha in the north of the State. Two of these were also affected by borers and *Cryphonectria* as reported above.

7.3.3 Environmental and site-related problems

a). Windthrow

An isolated region of windthrow was detected across <3ha along a plantation boundary.

b). Drought/desiccation

Mortality caused directly by drought effects was not observed this year. However, past drought stresses were involved in the mortality caused by borer, *Armillaria* and *Cryphonectria* attack reported above.

c). Cold/exposure

Exposure to wind and cold were thought to have been the primary cause of damage across 217ha. This included 164ha of shoot death in mid-rotation, high elevation plantations as well as stunted performance in a number of younger (2007-2010) plantations. However, these factors are also implicated in the development of chronically thin crowns in mid-rotation, high elevation plantations as discussed further below.

d). Frost

Frost damage, consisting primarily of foliar scorch and shoot death, was largely restricted (<10 ha) to a low-lying section of a 2008 plantation in the south of the State.

e). Waterlogging

Small, localised areas around drainage lines were suffering symptoms such as stunted performance and foliar discolouration in a number of two plantations. The total area mapped around 15ha.

f). Copper deficiency

Limited new plantings in vulnerable areas saw no new copper deficiency symptoms during this season.

g). Weeds

Grass was contributing to stunted or variable performance and foliar discolouration across 127ha of young plantation and cutting grass (*Gahnia grandis*) was contributing to similar symptoms on a further 82ha. Over-topping woody weeds were also having a growth impact on 55ha of 2008 plantation. California thistle (*Cirsium arvense*) was causing stunted performance and reduced stocking in areas of a 2011 plantation in the south of the State (Fig. 19). Scattered instances of the exotic, invasive weeds gorse (*Ulex europaeus*) were detected in various locations.

Figure 19: Stunted seedling overtopped by thistles and thick thistle cover a young *E. nitens* plantation.

h). Soil fertility

Symptoms associated primarily with nutrient limited soils were recorded in 786ha of eucalypt plantations. Consequences included reduced (359ha) or variable growth (198ha), early branch death (89ha), foliar discolouration (8ha) and thin crowns (132ha).

i). Multiple causes

Problems are placed in this category when there is a suite of factors contributing to particular symptoms and it is difficult to tease out primary causal factors. This year over 4500ha was determined as having health issues due to multiple causes. This will include some of the area already mentioned in previous sections (e.g. cold/exposure, fungal infection, limited soil nutrients) but refer to different symptoms caused more by the interaction of multiple factors (e.g. early branch death due to an interaction of poor soil, elevation and fungal infection as opposed to defoliation caused primarily by fungal infection). Symptoms included early branch death (637ha), stunting (382ha) and variable performance (414ha).

However, the main symptom currently of concern is the development of what appear to be chronically thin crowns putatively caused by an interaction of leaf beetle feeding, *Mycosphaerella / Kirramyces* infection, cold and exposure. This syndrome is developing in mid-rotation, high elevation coupes in the north of the State. During 2011-2012 over 1800ha of mid-rotation plantation >10 years old, at an average elevation of 638m, were recorded as having severely thin crowns due to these multiple causes (Figure 20).

The aetiology of this syndrome is still unclear. It is often difficult to apportion causal agents after the damage has occurred. Chrysomelid feeding was certainly evident in many plantations but there are some areas that have developed poor crown density but have little evidence of beetle damage and have recorded low beetle populations for the last few years. Damage is typified by senescence/absence of older foliage, common missing early season foliage and low levels or lack of fully expanded foliage, often accompanied by shoot death. Fungal lesions are sometimes apparent.

Figure 20: Mid-rotation plantations in the northeast highlands showing poor crown density in 2011 (*left*) and very little recovery in 2012 (*right*)

7.4 Plantations - Managed natural forests (*Eucalyptus* species)

7.4.1 Insect pests:

There were no reports of significant pest outbreaks during the past year.

7.4.2 Pathogens:

There were no reports of significant disease epidemics during the past year.

7.4.3 Nurseries and Seed orchards

a). Conifer species

There were no reports of significant pest or disease problems of conifers in production nurseries during the past year.

b). Eucalyptus species

There were no reports of significant pest or disease problems of eucalypt seedlings in production nurseries during the past year.

7.4.4 Urban and rural

a). Insect pests

No pest outbreaks were reported.

b). Pathogens

No disease outbreaks were reported.

Table 1: Summary of the activity of the main pests and diseases of *Eucalyptus* and *Pinus* plantations in Tasmania.

Eucalyptus spp.

Pest	Area with moderate damage (ha)					Area with severe damage (ha)					Approx. area inspected (ha)	Area treated (ha)	Hosts
	<10	10-100	100-500	500-1000	>1000	<10	10-100	100-500	500-1000	>1000			
Browsing mammals								✓			1320 (<3yo)		*E. nitens* & *globulus*
Autumn gum moth											30000		
Christmas beetle											30000		
Paropsines					✓			✓			26959	2742	*E. nitens* & *globulus*
Gum leaf skeletoniser		✓					✓				30000		*E. nitens*
Sawfly											30000		
Leaf blister sawfly											30000		
Spring beetles (scarabs)											30000		
Jarrah leaf miner											30000		
Phasmatids											30000		

Weevils (defoliating)											30000		
Psyllids											30000		
Phoracanthines											30000		
Wood moths											30000		
Wood borers cerambycids							✓				30000		
Wood borers buprestids							✓				30000		
Wingless grasshopper											30000		
Mycosphaerella spp.		✓*					✓*				30000		*E. nitens* **&**
Kirramyces eucalypti		✓*					✓*				30000		*E. nitens*
Armillaria spp.		✓									30000		
Phytophthora spp.											30000		*E. nitens*

***Pinus* spp.**

Pest	Area with moderate damage (ha)					Area with severe damage (ha)					Approx. area inspected (ha)	Area treated (ha)	Hosts
	<10	10-100	100-500	500-1000	>1000	<10	10-100	100-500	500-1000	>1000			
Browsing mammals			✓					✓			46000		*P. rad*

Bark beetles (*Ips*; *Hylastes* spp.)											46000		*P. rad*
Sirex wood wasp											46000		*P. rad*
Monterey pine aphid											46000		*P. rad*
Wingless grasshopper											46000		*P. rad*
Armillaria spp.											46000		*P. rad*
Phytophthora spp.											46000		*P. rad*
Dothistroma septosporum			✓					✓			46000		*P. rad*
Spring needle cast / *Cyclaneusma*					✓					✓	46000		*P. rad*
Sphaeropsis sapinea											46000		*P. rad*

* These areas refer to defoliation in young plantations. Both these pathogens are suspected to be contributing to the development of chronically thin crowns in mid-rotation, high elevation *Eucalyptus nitens* plantations in the north of the State. However, the degree to which they are influencing the problem is currently unclear.

Dr Richard Robinson[1] and Mr Ian Dumbrell[2]

[1]Science Division, Department of Environment and Conservation (DEC), Manjimup, WA 6258, Australia.
[2] Forest Science and Industry Development Branch, Dept Agriculture & Food WA (DAFWA), Bunbury, WA 6231, Australia.

Email: richard.robinson@dec.wa.gov.au; ian.dumbrell@agric.wa.gov.au;

8.0 WESTERN AUSTRALIA

8.1 Summary

In native forest, dieback in jarrah forest caused by *Phytophthora cinnamomi* and tree decline in tuart and wandoo woodland continues to command attention. Research on the taxonomy and ecological implications of new Phytophthora records and taxa from WA continues.

The outbreak of Gum Leaf Skeletonizer (GLS) continued in Dec-March 2011–12. It appears that the area subject to defoliation has contracted but moved into forest adjoining areas which had been defoliated the previous year. Although population levels have declined since 2010–11, they were still high compared with non outbreak periods, and some areas of forest experienced nearly 100% defoliation again.

Frost and drought damage in susceptible stands in the northern jarrah forest and coastal pine plantations continue to be monitored, and a new project has been started to examine the impact and management of Quambalaria canker in *Corymbia calophyla* (marri) trees.

A bluegum plantation industry-wide collaborative surveillance program was initiated in 2011–12. The surveys were conducted between October 2011 and January 2012 and involved the use of “mobile devices” and software to record all data. Liparetrus beetles and *Chrysomelid* species (*Paropsisterna m-fuscum* and *P. variicolis*) continue to be the species most commonly reported affecting seedlings and juvenile trees, while Heteronyx beetles, and Eucalypt weevils (*Gonipterus* spp.) continue to be the most frequently reported insect pests in +3 year-old plantations.

8.2 Plantations (*Pinus radiata* and *P. pinaster*)

8.2.1 Insect pests of *Pinus* species

a). Borers (*Sirex* spp.)

The Forest Products Commission (FPC) in Western Australia conducts an annual monitoring programme throughout its estate. Monitoring in WA is now done using static (panel) traps, which are effective in detecting very low numbers of *Sirex*. The traps are erected in pairs in open areas of plantations that would likely be used as flight paths for the wasp. Last year they were deployed in plantations from Perth to Esperance, as well as Albany town site and a Bunbury sawmill. No Sirex wood wasps (*Sirex noctillio*) were detected in any of the traps in the 2011-12 flight seasons.

b). Monterey pine aphid (*Essigella californica*)

Although *Essigell*a is present it is still not regarded as a problem in WA. Ian Dumbrell (DAFWA) is the WA representative on the Essigella biocontrol project steering committee. There have been four releases in winter 2011 of the control agent *Diaeretus essigellae*. Follow up monitoring is yet to be conducted to see if the wasp has become established.

c). European house borer (*Hylotrupes bajulus*)

Eradication activities transitioned to ongoing management in 2011, which will carry an increased risk of European House Borer (EHB) spread to non-infested areas.

To date, EHB has been found mainly in dead sections of live pine trees, dead pinewood material and untreated pine structural timbers. However, there has been one confirmed case of structural timber infestation in a home, resulting from nearby EHB infested trees. This discovery was made early last year in a Brigadoon home.

There has also been one case of timber infestation in Albany, where the timber had been transported from Perth.

While the EHB Response has achieved significant progress in the past six years in reducing EHB populations, further strategies for stakeholder groups are needed to contain these populations to already affected areas.

The Department of Agriculture and Food is undertaking consultation with stakeholders to discuss the transition impact and future management strategies. Most importantly, the transition will require increased support from industry, government and communities in carrying out EHB surveillance, and embracing future containment.

Throughout 2011, the EHB Response Program will focus on:

- extension and improvement of current EHB training for pest controllers.
- development of a national communication strategy for EHB education and awareness.
- continued State communication activities to ensure uptake of risk minimisation strategies.
- development of interstate quarantine regulations for the movement of EHB host materials from Western Australia.

d). Wingless grasshopper (*Phaulacridium* sp.)

No unusual activity.

e). Rutherglen bug (*Nysius vinitor*)

No unusual activity.

f). 'Spring' beetle (*Liparetrus jenkinsi*)

No unusual activity.

8.2.2 Pathogens of *Pinus* species

No significant issues.

8.2.3 Abiotic factors

a). Drought

Record low rainfalls over recent years, coupled with prolonged high temperatures, have resulted in widespread tree deaths in south-west WA. This has had a significant impact on forestry production, biodiversity, and visual amenity. Additionally, the large scale deterioration of both plantation and native forests has increased future bushfire risk as the impacts of the drying climate are expected to continue. There have been extensive losses of plantation pines in recent years and the effects of the drought continue to be monitored (Ian Dumbrell, DAFWA).

8.3 *Eucalyptus globulus* (Private Eucalypt plantations summary)

In most areas insect pests and disease levels reported over 2011–12 were generally low to moderate. The weather conditions over the spring and summer of 2011–12 were generally mild; with rainfall being average to slightly above average in most areas. These conditions allowed many trees to recover from spring defoliation of crown tops. Notably, pest damage and defoliation levels were greater in growing regions away from the coast (Manjimup to Collie and Mt Barker to Rocky Gully) that received below average rainfall. Liparetrus beetles and *Chrysomelid* species (*Paropsisterna m-fuscum* and *P. variicolis*) continue to be the species most commonly affecting seedlings and juvenile trees. The increased treatment of seedlings with systemic insecticides has seen a marked reduction in reports of seedling defoliation and pest related deaths throughout the estate. Heteronyx beetles, and eucalypt weevils (*Gonipterus* spp.) continue to be the most frequently reported insect pests in +3 year old plantations.

In the past there has been no formalised estate-wide surveillance and monitoring program for pests and diseases in Western Australian plantations. However, in 2011–12 for the first time, an industry-wide collaborative surveillance program was undertaken. The surveys were conducted between October 2011 and January 2012 (the peak pest season). The surveys involved:

(i) Stratification of the WA estate into 12 growing areas and 3 target age classes (1–3 yr-old, 4–7 yr-old and +7 yr-old),
(ii) Standardisation of survey methodology across companies to ensure comparable data sets and
(iii) The use of "mobile devices" and software to record all data.

Individual companies collected data for regions they had been allocated and all data was subsequently pooled into one database and results shared across industry. At present, reports and data are still mostly of a general nature as the system is still under development in most companies.

8.3.1 Insect pests

a). Eucalyptus weevil (*Gonipterus* spp.):

Generally low levels of damage were observed throughout the estate. Moderate to severe damage was reported for western interior areas (Manjimup-Collie). Similarly a number of plantations between Mount Barker and Rocky Gully also experienced moderate to severe damage. While collaborative surveillance was undertaken from October to January (2011), in western interior areas further damage was caused in February and March (2012). Defoliation levels in these areas went from low-moderate to severe (>50%). Monitoring in these regions may need to be extended over a longer period than in other areas.

b). Eucalypt leaf beetles (*Chrysomelidae* spp.):

Chrysomelid species (*Paropsisterna m-fuscum* and *P. variicolis)* were observed causing low levels of damage to seedlings and saplings throughout the WA estate. Treatment of seedlings with systemic insecticides has greatly reduced damage reported by these insects.

c). Beetle *(Heteronyx* spp):

Heteronyx beetles continue to cause repeated damage to the tops of trees in young to mid rotation plantations from January to March (2012). Due to the large areas affected, the lack of resources and effective control options, formal surveys for this pest are not currently conducted. Plantations affected are east of Albany from Cheyne Beach to Wellstead and Esperance. It is estimated that around 3000-5000ha are affected annually.

d). Spring Beetle (*Liparetrus jenkinsi*):

Greater vigilance from foresters and the application of systemic insecticides to seedlings has led to fewer incidences of seedling defoliation by spring beetles when compared to previous years. Only one plantation near Rocky gully (about 500ha) was reported as being moderately damaged.

e). Birds:

Less damage caused by Port Lincoln parrots (commonly termed 28s) was reported in 2011–12 than in the previous year. Plantations west of Mt Barker and north of Donnybrook were reported as having moderate levels of damage.

8.3.2 Pathogens

a). *Teratosphaeria* spp. (formerly *Mycosphaerella*):

Although *Tetratosphaeria* spp. damage is observed throughout the WA estate, plantations in the southern growing districts are most affected, particularly, around Denbarker, Mount Barker and the “Great Southern” coast (Wellstead to Walpole) **(**F. Tovar, Integrated Pest Management Group).

Table 2: Area of *E. globulus* plantation estate monitored and area affected by pests and pathogens in Western Australia in 2011-2012.*

Pest	**Area with moderate damage (ha)**					**Area with severe damage (ha)**					**Approx. area inspected (ha)#**	**Area treated (ha)#**	**Hosts**
	<10	**10-100**	**100-500**	**500-1000**	**>1000**	**<10**	**10-100**	**100-500**	**500-1000**	**>1000**			
Eucalypt weevil (*Gonipterus scutellatus)*					✓				✓				*E. globulus*
Heteronyx spp. **					✓					✓			*E. globulus*
Chrysomelid beetles			✓										*E. globulus*
“Spring” beetles (*Liparetrus* spp.)			✓										*E. globulus*
Wingless grasshopper (*Phaulacridium vittatum*)			✓										*E. globulus*
Parrots (*Banardius zonarius*)			✓										*E. globulus*
Rabbits		✓											*E. globulus*
PATHOGEN													

Teratosphaeria spp.										✓			*E. globulus*
WEEDS													
Kikuya grass				✓									*E. globulus*

* Data contained in the table is of a general nature and incomplete as a number of companies are still coming to terms with the new survey methods and others were unable to collect the necessary data.
** Data concerning *Heteronyx* spp. damage is an estimate based on anecdotal observations from foresters over many years.
[#] No information was provided to IPMG regarding areas inspected or treated **(**F. Tovar, Integrated Pest Management Group).

8.4 Other *Eucalyptus* spp. (*E. cadocalyx, E. maculata* and *E. saligna*)

8.4.1 Insect pests

No new pest outbreaks reported. Leaf blister sawfly (*Phylacteophaga froggatti*) in plantations of *E. saligna* and *E. botryoide* and spring beetle (*Liparetrus jenkinsi*) at the establishment phase of *E saligna*, *E cladocalyx*, and *E maculata* plantations continue to be monitored and managed.

8.5 Sandalwood (*Santalum spicatum*) plantations

No major insect or fungal problems reported.

8.6 Managed natural forests - Jarrah forest (*Eucalyptus marginata*)

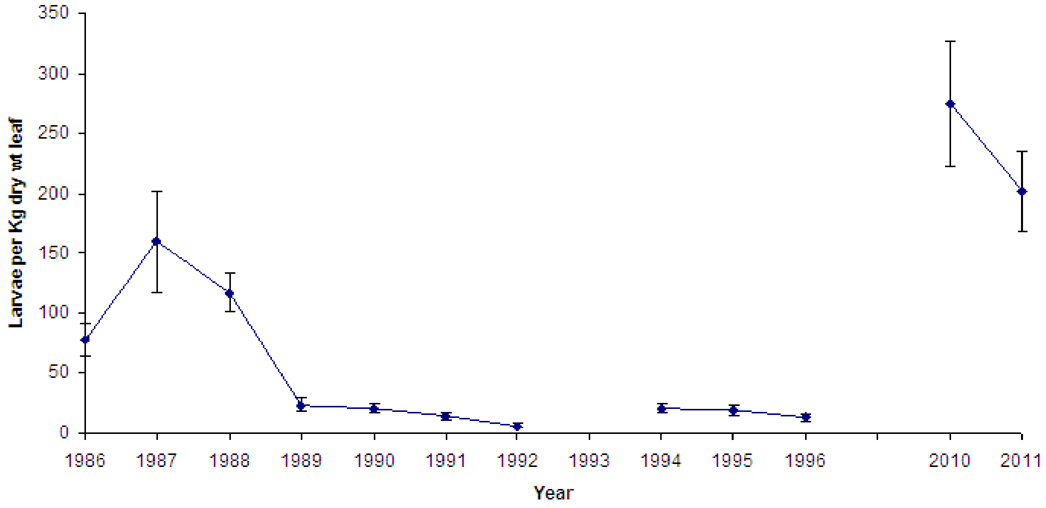
8.6.1 Insect pests

a). Jarrah leaf miner (*Perthida glyphopa*) (JLM)

A survey of the JLM cut-out boundary was undertaken in October and November 2011, and results are currently being analysed (A. Wills and J. Farr, Department of Environment & Conservation).

b). Gum leaf skeletonizer (*Uraba lugens*)

The outbreak of Gum Leaf Skeletonizer (GLS) continued in Dec-March 2011–12. Population monitoring included: branch clipping at 61 sites throughout the jarrah forest (including 45 sites originally determined in the 1982-92 outbreak), and pheromone trapping using the New Zealand pheromone lure system. Areas subject to significant defoliation were not determined due to aircraft being committed fully to fire surveillance work. However, from general visual observation, area subject to defoliation had contracted and moved to forest adjoining areas which had been defoliated in the previous year. The mean larval density measured in December 2010 was 824 larvae kg^{-1} dry weight of leaf which was equivalent to a January population of 275 larvae kg^{-1} dry weight of leaf (adjusted for appropriate survival rates). Mean larval density as measured in December 2011, declined to 607.7 larvae kg^{-1} dry weight of leaf, equivalent to a January population of 202 larvae kg^{-1} dry weight of leaf (Graph 3). Therefore, although population levels declined from the 2010–11 levels, they were still high compared with non outbreak periods, such that some areas of forest again experienced nearly 100% defoliation (J. Farr, DEC).



Graph 3: Population of GLS in the southern Jarrah forest (± SE) as measured from canopy samples taken in January of the respective year from 1986-96 (Farr, unpublished data) and for the current outbreak in 2010-11. Data for 2010 and 2011 adjusted to January survival levels for comparison.

c). Cerambycid woodborers (*Phoracantha semipunctata*)

(Honours Project - Interaction of drought and the outbreak of *Phoracantha semipunctata* on canopy collapse)

The Eucalyptus long horned borer *Phoracantha semipunctata* Fabricius is an endemic cerambycid beetle to the Northern Jarrah Forest (NJF) of south-western Australia that attacks stressed trees. The population dynamics, distribution and biology of *P. semipunctata* in its native habitat are poorly understood. Following a recent drought event in 2010 patches of jarrah and marri trees throughout the NJF suffered high mortality with a noticeable increase in the borer populations. The aims of the present study were to determine the effect of this drought on *P. semipunctata* populations in jarrah (*Eucalyptus marginata* Donn ex Smith) and marri (*Corymbia calophylla* Hill) trees across the NJF and to determine if they would attack healthy adjacent trees, when their population levels were high. The association between the health of trees and *P. semipunctata* infestation was determined in standing dead, dying or healthy trees located in intact and collapsed areas of forest. Life cycle stages of *P. semipunctata* in terms of egg clutches, neonate feeding galleries, mature larvae and pupae in heartwood and adult emergence holes were determined by felling jarrah and marri trees (Figure 21). Distribution of *P. semipunctata* across the NJF was investigated by counting adult emergence holes in the bark of dead standing trees, dying or healthy trees at a number of collapsed sites (Stephen Steaton, supervisors G. Hardy and G. Matusick, Murdoch University).

Figure 21: *Phorocantha semipunctata* larvae (*left*), galleries and damage (*centre and right*) in jarrah (photos by G. Matusick).

8.6.2 Pathogens

No new major disease problems were reported. Management and survey of Phytophthora root disease in jarrah forests continues to command attention (see Forest Health Surveillance and Diagnosis, and Research and Development).

8.6.3 Abiotic factors

a). Frost

In June/July 2010 large portions of the northern jarrah forest experienced extreme low temperatures (-4 to -6º C) resulting in rapid foliage and shoot mortality of marri and jarrah (Figs. 22 & 23). Damage was restricted to drainage lines, which likely acted as cold-air sinks. Twelve plots (6 damaged/6 undamaged, each 40m fixed radius) were installed in Wandoo National Park (Talbot Brook) to collect baseline damage and track recovery. The hardest hit areas were those pockets of jarrah/marri surrounding Darken Swamp. Trees of all size classes were affected though variation was high on each site. Some marri trees experienced 100% defoliation and shoot loss (47% average), while jarrah was slightly less affected (23% foliage damage). Marri leaves discolored, dried, and died very quickly. Affected jarrah foliage first turned purple, then eventually died in spring. Most marri trees with complete defoliation reflushed large portions of their crowns. Most affected jarrah trees simply shed their shoots, with minimal evidence of resprouting. Wandoo was not affected. Research is continuing to determine low temperature tissue thresholds. Preliminary data suggested that more cell damage occurred exponentially between -4 and -6 degrees Celsius (G.Matusick, Murdoch University).

Figure 22: Frost affected patch in April 2010 *(left)* and an affected jarrah tree in December 2010 *(right)*.

In May 2012, these stands were affected by low temperatures and frost again and re-monitoring is scheduled to help track the severity of damage and recovery. Large areas of the Monadnocks Conservation Reserve were also affected and resulted in foliage and shoot mortality in marri and jarrah. Damage was restricted to drainage lines. Two transects were established to help describe the effect of elevation on shoot mortality and to track recovery. An aerial survey was undertaken in July 2012 to determine extent of the damage and images and crown health data is currently being analyzed (G. Matusick, K. Ruthrof and N. Brouwers, Murdoch University).

Figure 23: Marri seedling (*far left*) and jarrah crown (*left)* affected by frost in the Monadnocks Conservation Park (photos: K. Ruthrof).

b). Drought

Unprecedented drought-induced deaths in the Northern Jarrah Forest (NJF) observed starting late February 2011 (Figs. 24 & 25). Most damage occurred along the Darling Scarp from northern Perth to Pinjarra and in the western forest. Mortality occurred in over storey (jarrah/marri) and mid storey (*Banksia grandis/Allocasuarina*) in noticeable patches. An aerial survey of approx. 9% of the NJF resulted in an estimate of 1.6% of the area severely affected with an additional 5% showing strong crown chlorosis in late May. The rate of progression seemingly slowed through June, however, some sites continued to lose canopies through late July. All size and age classes of trees are affected. Most canopies died very quickly (within 5-7 days), losing their shoots and leaves within a month. The Western Australian State Centre of Excellence for Climate Change, Woodland and Forest Health together with the Department of Environment Conservation's Forest Management and GIS branch undertook surveillance work to accurately map the extent of the drought affected sites across the DEC forest estate and identified that dieback occurred:

(i) In areas that received a slightly higher amount of annual rainfall compared to the surrounding landscape,

(ii) In areas that were generally slightly warmer than their surroundings,

(iii) On sites that were close to rock outcrops, and

(iv) On steep slopes.

Several papers are due to be published in 2013 on findings from research conducted following the event (K. Ruthroff and N. Brouwers, Murdoch University).

Figure 24: Jarrah canopy mortality centres near Dale (*left*) and strongly chlorotic canopies surrounding mortality centre (*right*) (Photos taken May 2011).

Figure 25: Jarrah crown collapse and leaf shed (*above*) near Dale, east of Perth (Photo taken July 2011).

Drought-induced tree mortality also was also observed in about 500ha of tuart (*Eucalyptus gomphocephala*) in February and March 2011. Tree foliage rapidly discoloured and died over this period. A combination of remote sensing and field-based approaches are being used to characterize the extent and severity of canopy dieback following the event, as well as highlighted potential pre-disposing site factors (K. Ruthroff and N. Brouwers, Murdoch University).

8.7 Karri forest (*Eucalyptus diversicolor*)

8.7.1 Insect pests

No major pest problems reported.

8.7.2 Pathogens

No new major disease problems were reported. Management and survey of Armillaria root disease in re-growth karri forests continue to command attention.

8.7.3 Nurseries

No major problems have been reported in conifer seedlings in nurseries.

An infestation of an undescribed *Phytophthora* taxon, (*P*. aff. *arenaria*), was found in a WA wheat belt nursery producing oil mallee (*Eucalyptus* spp.) seedlings, in 2012. This is being investigated further, including studies on its pathogenicity and mode of transmission.

8.8 Native plant communities

8.8.1 *Phytophthora* in natural ecosystems

Previously, large-scale aerial photography has been used to map the extent of Phytophthora dieback disease in native forests in the south-west of Western Australia, whereas currently most mapping is undertaken with intensive field survey. Validation of the observations involves routine testing of soil and root samples for the presence of *Phytophthora cinnamomi.* In addition to *P. cinnamomi*, six morpho-species of *Phytophthora* had been identified prior to 2005 using this technique (i.e. *P. citricola, P. megasperma, P. cryptogea, P. drechsleri, P. nicotianae* and *P. boehmeriae)*

In recent years many new *Phytophthora* species have been described world-wide, often with similar morphology to existing species; thus, as many of the isolates collected in Western Australia have been difficult to identify based on morphology. Therefore, molecular identification of some of the morpho-species is required. Based on amplification of the internal transcribed spacer (ITS) region of the rDNA, sequence data of over 725 isolates (both recent and historical, from the DEC's Vegetation Health Service collection) have now been compared to that of existing species and undescribed taxa. This work is continuing.

With the descriptions of *P. amnicola* and *P. bilorbang* being published in 2012, a total of eleven new species of *Phytophthora* have been described from WA natural ecosystems since 2009. The others are: *Phytophthora multivora, P. elongata, P. thermophila, P. gibbosa, P. gregata, P. litoralis, P. arenaria, P. constricta* and *P. fluvialis.* Pathogenicity has so far been tested and confirmed on native plants for *P. multivora*, *P. elongata*, *P. arenaria* and *P. constricta*. Several additional new WA taxa await formal description. In 2012, an infestation of one of these, *P*. aff. arenaria, was found in a WA wheat belt nursery producing oil mallee (*Eucalyptus* spp.) seedlings.

New records for WA of *Phytophthora* taxa known elsewhere (identified since 2005 from recent as well as historical WA isolates) have included (i.e. *P. inundata*, *P. niederhauserii*, *P. asparagi*, *P. palmivora*, *P. rosacearum*, *P. lacustris*, *P*. taxon *personii*, *P*. taxon *PgChlamydo*, and *P*. taxon *humicola-like*).

A number of hybrid Phytophthoras, with significant genetic diversity, has been identified from WA natural and plantation ecosystems: Some of these are from soil associated with dead plants, and many are from waterways in WA as well as in South Africa. Collaborative investigations of these hybrids and their origins are progressing. The presence of these hybrids (all recovered from routine soil, root and water samples being tested for *Phytophthora*) shows that they are sufficiently stable and resilient to survive in the harsh WA environment. Also it raises the possibility of hybrids with significant pathogenic capability arising in the field at any time from interactions between compatible *Phytophthora* species. Movement of infested soil and/or plant material between sites will clearly facilitate these interactions, and should be minimised.

Most of the newly-described Phytophthoras (and some of those yet to be described) have been associated with multiple species of dying native plants in WA natural ecosystems, with some DEC isolations from indicator plants dating back to the 1980s. Some Phytophthoras are active in a broader range of site conditions than those favouring *P. cinnamomi* (e.g. *P. multivora* in limestone soils). Some species (e.g. *P. arenaria* and *P. constricta*) are believed to be endemic in WA. Most of the new taxa have been associated with dying *Banksia* spp. while *P. elongata*, *P. multivora* and *P. thermophila* have also been isolated from dying *Eucalyptus marginata* (jarrah). *Phytophthora multivora* is pathogenic to bark and cambium of *E. gomphocephala* and *E. marginata* and is believed to be involved in the decline syndrome of both eucalypt species within the tuart woodland. *P. elongata* has also been isolated from dying *Corymbia calophylla* in mining rehabilitation sites. Some taxa appear to have limited distribution, while others like *P. multivora* are widespread.

Land managers are being encouraged to apply the precautionary principle in dealing with all of these soil-borne *Phytophthora* species with the aim of minimising their spread, while management and policy documents are now being updated to include the other *Phytophthora* species in the definition of Phytophthora dieback.

The previously recorded presence in WA natural ecosystems of four *Phytophthora* species other than *P. cinnamomi* (*P. cryptogea*, *P. nicotianae*, *P. megasperma*, *P. boehmeriae*) has been confirmed by DNA sequencing of stored isolates. However, two species that were previously believed to be present based on morphological studies alone (*P. citricola* and *P. drechsleri*) are not present among the isolates tested todate (T. Burgess, G. Hardy, D. White, and A. Rea, Murdoch University; M. Stukely, J. Webster and J. Ciampini, Department of Environment & Conservation).

8.9 Urban and rural

8.9.1 Pathogens and Declines

a). Mundulla Yellows (MY)

Monitoring the occurrence and symptom development of Mundulla Yellows (MY) in WA continues. Symptomatic eucalypts (both planted trees and remnant native trees) have been recorded and monitored in additional locations. Spread of symptoms within affected sites appears generally to be slow, and diseased and apparently-healthy trees can grow alongside each other. The observed distribution of MY symptoms in the south of the state is from north of Geraldton to Esperance, and it occurs on alkaline coastal sands as well as inland on acid soils including laterites. As in South Australia, MY in WA is only seen in vegetation in disturbed sites or modified landscapes such as road verges and medians, parks and gardens, and in parkland or paddock remnant stands where symptomatic trees can be several hundred metres from, and sometimes upslope from, any road. Symptoms have not been observed within undisturbed native forest or woodland stands in WA. Collaboration is continuing in the investigation of the cause(s) of MY with D.Hanold and J.Randles from the University of Adelaide (M.Stukely, Department of Environment & Conservation).

8.10 Forest health surveillance and diagnosis

8.10.1 Dieback mapping and management

Mapping the presence of symptoms of the plant disease caused by *P. cinnamomi* was carried out by accredited interpreters to determine areas suitable for protection. Hygiene requirements were specified for activities likely to result in the movement of soil (and as a consequence, *P. cinnamomi*) on lands managed by DEC. A total area of 15,900ha was mapped to assist the planning of roading and timber harvesting operations undertaken by the Forest Products Commission (FPC), while FPC also arranged significant areas of mapping by private contractors. This included 7,815ha of previous mapping that was checked for further spread. Mapping and hygiene planning were undertaken on a further 863ha for the Parks and Visitor Services, Nature Conservation Service and Sustainable Forest Management Service of DEC, and 96ha for external parties. Training programs were carried out in disease mapping and hygiene management (G.Strelein, Department of Environment & Conservation).

In the year to 30th June 2012, a total of 2,198 samples were tested for the presence of *Phytophthora* by DEC's Vegetation Health Service (VHS). These samples were associated with verification of dieback mapping for the above projects, as well as external requests. DNA sequencing has been carried out at the Centre for *Phytophthora* Science and Management (CPSM), at Murdoch University, on various recent and historical isolates of *Phytophthora* in the DEC culture collection, and from other projects, from a range of WA locations and ecosystems. This has led to the discovery of an unexpectedly large number of new *Phytophthora* taxa (eleven of which have now been formally described), as well as new records for WA of several *Phytophthora* taxa known from elsewhere, and also a swarm of *Phytophthora* hybrids (see details under *Phytophthora* in natural ecosystems, above). While the pathogenicity of many of the new taxa is still to be fully investigated, the precautionary principle should be applied by managers to ensure that the spread of all of these soil-borne *Phytophthoras* to new areas is minimised. Hygiene practices should be applied in the same way as for *P. cinnamomi* (M. Stukely, Department of Environment & Conservation).

8.11 South Coast region aerial phosphite program to mitigate *Phytophthora cinnamomi* impact

In autumn 2012, 165ha in the Stirling range and Albany coastal area were sprayed with phosphite (aerial application). The 165ha was comprised of 34 targets ranging from 1 to 72ha. The program targeted 15 threatened flora, of which 12 are critically endangered, and three threatened Ecological Communities/Priority Ecological Communities (i.e. Montane heath and thicket of the Stirling range; Montane mallee thicket of the Stirling Range and *Banksia coccinea* Shrubland/*Eucalyptus staeri*/ Sheoak woodland). Phosphite was applied at 30L/ha or 12 kg/ha using 40% phosphite. Threatened flora within targets is subject to long-term monitoring of survival and plant health. While the decline of highly susceptible taxa is ongoing, sprayed habitat continues to support threatened species and other susceptible species at higher densities than adjacent non-sprayed areas. The program has enabled the critical recovery action of ongoing collection of material for *ex-situ* conservation (S. Barrett, Department of Environment &

Conservation).

8.12 Forest health monitoring

An automated annual monitoring program has been developed to identify changes in satellite reflectance information over time and correlate this with known or past causes of changes in forest health and vigour. This information is then used to classify the changes, with levels of confidence, to causal factors. Those with unknown or low levels of confidence or changes in magnitude are then targeted for further investigation including field checks to confirm causes and recalibrate the annual data updates. The system includes spatial modeling algorithms to incorporate both known datasets (harvesting, fire, mining) and surrogate datasets (landform, soils, vegetation) that can be correlated with possible causes and inform the decisions on causes that as yet have no spatial history to guide classification (G. Strelein, Department of Environment & Conservation).

8.13 Research and Development

Marri ARC Linkage - Western Australian State Centre of Excellence for Climate Change, Woodland and Forest Health.

A new project has been started to examine the impact and management of *Quambalaria* spp. Stem cankers were first recorded on marri in Pickering Brook in 1939–40 and by the late 1960's cankers were found to occur throughout the south west of WA. Since the 1970's mortality attributed to the pathogen has increased and by the 1990's there were recommendations that immediate attention should be given to determine its cause and to develop options for disease control. Paap (2006) showed the incidence and severity was increasing and that the large bleeding cankers on the trunk and branches were caused by a novel species, *Quambalaria coyrecup* (Paap *et al*. 2008). More than 80% of trees of all age classes are infected in some areas today. More recently, *Q. piterka* has been found causing severe shoot, bud, flower and fruit diebacks in marri (Marbus 2009). *Q. piterka* is an introduced pathogen from Queensland where it causes severe crown diebacks and death in *Corymbia maculata* (spotted gum) (Pegg *et al.* 2008). The decline and loss of marri has major economic, social and ecological implications, due to the costs associated with lost honey and pollen production, tree removal, wildlife habitats, including the critically endangered Baudin's and Carnaby's Black Cockatoos, conservation of roadside verges, amenity values such as shade, and the control of salinity and erosion by reforestation.

This project aims to:

- use and develop ground-based techniques to monitor, catalogue and understand the abiotic and biotic stress factors affecting marri throughout its range,
- experimentally confirm which biotic and abiotic factors associated with marri decline are contributors and determine their interactive effects on tree health,
- examine the biology and pathology of *Quambalaria* species currently affecting marri trees and quantify their collective role in decline,
- determine whether soil-borne plant pathogens and/or environmental (soil physical and chemical) or soil microbial factors are associated with the pre-disposition of trees to the *Quambalaria* canker and blight pathogens,
- determine whether single-tree treatments (i.e. nutrients, fungicides, insecticides, watering)

or stand-management manipulations can slow, halt, or reverse the rate of marri decline.
- develop sustainable management solutions for the long-term (T. Burgess, Murdoch University).

Dr Simon Lawson[1] and Mr Michael Ramsden[2]

[1]Department of Agriculture Fisheries and Forestry Queensland, Level 3A East, Ecosciences Precinct, 41 Boggo Road, Dutton Park QLD 4102 Australia.

[2]HQ Plantations Pty Ltd[4], Bunya Centre, Old Northern Road, Bunya QLD 4055 Australia.

Email:

Simon.Lawson@daff.qld.gov.au; **Michael.Ramsden@HQPlantations.com.au**

9.0 QUEENSLAND 2011/2012

9.1 Softwood plantations (Southern Pine Plantations - *Pinus* species)

9.1.2 Insect pests:

a). Sirex wood wasp (*Sirex noctilio*)

The key aim of the 2011 - 2012 Sirex season was to ensure that Sirex populations are reduced to levels that do not significantly impact on productivity and profitability. To achieve this aim key elements were to:

- successfully establish trap trees that would continue to be attractive to *Sirex* throughout the flight season;
- initiate wide-scale introduction of nematodes into the Sirex population through the inoculation of struck trap trees and other susceptible trees;

[4] HQPlantations continues to undertake specific forest health surveys and assist in Biosecurity responses with the fundamental aims being pest and disease freedom from seed to the final plantation product. The Sirex bio-control response has been a major production focus with this work limiting general forest health surveillance during this reporting period. Surveillance methodology is based on a broad spectrum overview of plantation health although targeted pest specific surveys and responses are now tending to dominate. Priority management activities, other than the up-scaling of the Sirex bio-control and monitoring program, have been the continued management of rat populations within Araucaria plantations, feral dog control, pine aphid monitoring, participation in the bio-control of cats claw vine and surveys for the presence of myrtle rust (*Puccinia psidii*) within hardwood plantations.

- update Sirex-related operational procedures and methodologies; and
- enter all Sirex-related data into the WEEDS GUI GIS-linked database.

The late 2011 finding of plantation stems riddled with “early” emergence holes and large numbers of Sirex larvae reinforced the need to ensure that nematodes were successfully introduced to Passchendaele following the 2011-2012 flight seasons. To achieve this, trap tree plots were established each month from October 2011 through to January 2012 with 40 plots established. Panel traps were also established at Sugarloaf, Passchendaele, Pechey, Esk, Beerburrum and Toolara (predominately Passchendaele). Two additional traps were established at the QCE chipping facility (Port of Brisbane). These traps are highly efficient at attracting and so detecting *Sirex* when in low numbers or when first establishing in an area. At Passchendaele these traps were used to monitor Sirex presence throughout the nominal flight season as it has proven difficult to otherwise ascertain when *Sirex* are actually flying or striking trap trees.

To ensure that trap trees attract Sirex strike and thus be candidates for nematode inoculations the trees need to decline slowly. Rapid decline/death leads to invasion by organisms that tend to inhibit Sirex strike. To achieve this experience showed that poison rates needed to be reduced thus half of all 2012 trap trees were poisoned with half the NSCC recommended rate of Dicamba 200 with this reduced rate being applied to all stems <10 cm DBH. This strategy was widely successful in inducing the slow decline of trap trees. Subsequently evidence of strike was found within these plots, with female Sirex ovipositing on trap trees a relatively common sight.

During May 2012 the equivalent of 76 trap tree plots (10 trees per plot) were inoculated with bio-control nematodes. These plots were a combination of established trap tree plots and wind-blown and suppressed trees identified throughout the plantation as possibly harbouring *Sirex*. Bio-control nematodes were successfully recovered from *Sirex* that emerged from log billets inoculated and collected from within Passchendaele in 2011. This important finding suggests that the 2012 inoculations will also be successful. The 2012 large-scale introduction of nematodes should thus severely impact on Sirex sustainability with the aim being population collapse. It is envisaged that during the next Sirex flight season (2013) trap tree plot numbers and bio-control introductions will be scaled back. This will occur if widespread nematode infectivity is confirmed within the Sirex Passchendaele population.

b). Monterey Pine Aphid (*Essigella californica*)

Within southeast Queensland the introduced exotic pine tree aphids (*Essigella californica* and *Eulachnus thunbergi*) were commonly found inhabiting the same foliage with *Eulachnus* initially far more numerous. *Eulachnus* advanced to north Queensland some years prior to the detection of *Essigella*, but since had virtually disappeared from catch assessments throughout the State.

In order to limit or reduce the potential impact due to *Essigella* HQPlantations has participated and is a co-investor in the Forest and Wood Products Australia (FWPA) project "Introduction of the wasp *Diaeretus essigellae* for the biocontrol of pine aphid *Essigella californica* in Australia”. During the reporting period surveys in southern states established that the introduction of the bio-control wasps into Australia was effective, although somewhat more time consuming than expected. In Queensland only a few parasitised aphid “mummies” have been detected

(Stanthorpe region) with specific release site surveys within southeast Queensland (Beerburrum) unable to find evidence of establishment. HQPlantations continues to support this program although other priorities (*Sirex*) have limited further specific establishment surveys and direct participation.

9.1.3 Southern pine plantation inspections

Deaths and top-down dieback of trees within a number of harvest areas were investigated within the Fraser Coast region. Affected trees were scattered throughout harvest areas with sample trees felled and sectioned into billets. Copious resin flows were common on affected stems below dieback zones. Bark beetles *(Ips grandicollis*) were present in the upper affected tops but absent from the healthier lower stems. Some bark beetle associated fungal stains were found in stems. Contractors pointed out that affected trees all had bunchy tops and died-back to points where lateral limbs started to proliferate, twist and expand abnormally in size. The conclusion was that pests and diseases were not the causal agent due to the scattered nature of the dieback and linkage to trees with bunchy tops.

Large areas of dead pines were examined again within the Fraser Coast region. Mature trees were dead within this patch with a number of others on the margin of these in process of declining as indicated by yellowing, browning & wilting of canopy needles. Although no central earthing scar found was found in any of the stems the conclusion was that it was another lightning strike, a common occurrence within this region. These inspections are important as such sites act as attractants to bark beetles thus identification of beetle's present assists in the detection of exotic, new to the area and changing population dynamics. Previously these trees would not have been regarded as attractive to *Sirex* (if gets established in the area) but observations in Passchendaele have found *Sirex* infesting the tops of 45 year old stressed radiata.

Surveys were regularly undertaken within areas following control burns where upper canopy scorch occurred. These areas can also attract bark beetles and importantly if *Sirex* becomes established in this region they will be prone to "strike". Commonly severely scorched trees decline over an extended period and if this decline extended into the Sirex flight seasons these trees would be very attractive to *Sirex*. If this situation eventuates such trees could be used as a substitution to the establishment of formal plots used for the introduction of the bio-control nematodes.

9.1.4 Araucaria plantations (*Araucaria cunninghamii*)

a). Cats Claw

The cat claw creeper *Macfadyena unguis-cati* (Bignoniaceae) is an increasing threat to plant biodiversity within a wide range of forest habitats from plantations to native forests, and in particular to riparian zones retained as buffers and for conservation values within Araucaria plantations. Reports that this vine was rapidly expanding and was enveloping large areas of native plant species including plantation species were made on a regular basis from early 1990's. Now this vine is entrenched with a number of small scale bio-control programs being introduced in an effort to try and bring some control to its march.

A leaf-tying moth *Hypocosmia pyrochroma* (Lep., Pyralidae), a host-specific biological control agent for cat's claw creeper has been released and an application to release a leaf mining Jewel beetle *Hylaeogena jureceki* (its larvae does the mining) has been made by Queensland DAFF. The original bio-control agent that was released, the Tingid *Carvalhotingis visenda* has established but damage caused has not been controlling.

b). Root rot

Root rot caused by *Phellinus noxius* was reported to be widespread within a mature age plantation within the Imbil region. Roots rots have the potential to increase in incidence within continually rotated susceptible hosts with this the first report within mature Araucaria in south east Queensland. Although extensive research has been undertaken over a long period of time to limit the development of root rot in clearfall and thinning stumps, through the introduction of competing decay fungi, no commercially viable outcomes were ever carried through.

c). Rat damage

Pale Field Rat damage (*Rattus tunneyi* var. *culmorum*) primarily to the roots of young 2-4 year old *Araucaria* became problematic within a number of Araucaria plantation regions during the previous reporting year. Rats can cause severe tree damage, including tree death, through extensive excavation around the root system and girdling of both the roots and stems. Trees not killed are often left leaning with reduced growth. Current environmental conditions combined with silvicultural practises have attracted these native rats from riparian retention zones to plantation inter-rows where abundant succulents support rapid population growth. Plantations thus become an ideal environment that encourages their population growth and maintenance. Breeding capacity often exceeds carrying capacity during winter causing the rats to resort to eating *Araucaria* roots. These unnaturally assisted populations of rats have continued to cause widespread damage to plantation stock with the introduction of baiting being necessitated in order to reduce impact

9.2 Hardwood plantations – (*Eucalyptus* and *Corymbia*)

9.2.1 Pathogens:

a). Myrtle rust (*Puccinia psidii*):

Surveys within HQPlantations commercial nursery at Toolara found Myrtle Rust on surrounding amenity *Melaleuca leucadendra* although none has been found on any hardwood seedlings held at the time and prior. Surveys have also established that Myrtle Rust was easily detectable throughout the Fraser Coast region being found on *Melaleuca quinquenervia*. Myrtle Rust (*Puccinia psidii*) has also been detected throughout thick *Melaleuca quinquenervia* stands within the Beerburrum plantation estate as well as on a few understory *Lophostemon suaveolens* within.

Myrtle Rust (*Puccinia psidii* syn. *Uredo rangelii*) is now established throughout coastal Queensland as well as within more inland regions such as Toowoomba in the south east and

Atherton Tablelands in north Queensland. Detections within "drier" inland regions have to date been confined to Nurseries. Biosecurity Queensland has in the past eradicated these infected plants and with follow-up delimiting surveys suggesting no infections have made their way outside of the nurseries. HQPlantations has been an active participant within the dedicated "Myrtle Rust" program co-ordinated by Biosecurity Queenslands with this program providing regular updates on incidence and severity within known and new locations, co-ordination of research etc.

During this reporting period Myrtle Rust (*Puccinia psidii*) on known infected "indicator" hosts (*Melaleuca*), mainly within nature retention strips and conservation areas within production plantation areas has continued at low incidence and severity. Limited surveys for Myrtle Rust within the Burnett were carried out by Geoff Pegg (DAFF) and Michael Ramsden (PHO) late in 2011. No signs of Myrtle Rust were detected with a similar foliage and stem blight (*Quambalaria*) being found to be of more concern at the time with incidence and severity nearing 100% in young *Corymbia* plantations. The current surveys being undertaken are seeking to establish if Myrtle Rust is present within Burnett plantations and if so at what level of incidence and severity. These surveys also noted the extent of *Quambalaria* damage with this pathogen possibly limiting the ability of Myrtle Rust to germinate or develop, thus making Myrtle Rust detection far more difficult.

9.3 Biosecurity

9.3.1 Pathogens:

a). Myrtle rust (*Puccinia psidii*) - Distribution and host range:

The disease distribution now extends from subtropical coastal and drier inland areas east of the Great Dividing Range to tropical coastal and tableland vegetation. *Puccinia psidii* has not so far established, despite several detections in nurseries, west of the Great Dividing Range (Figure 26).

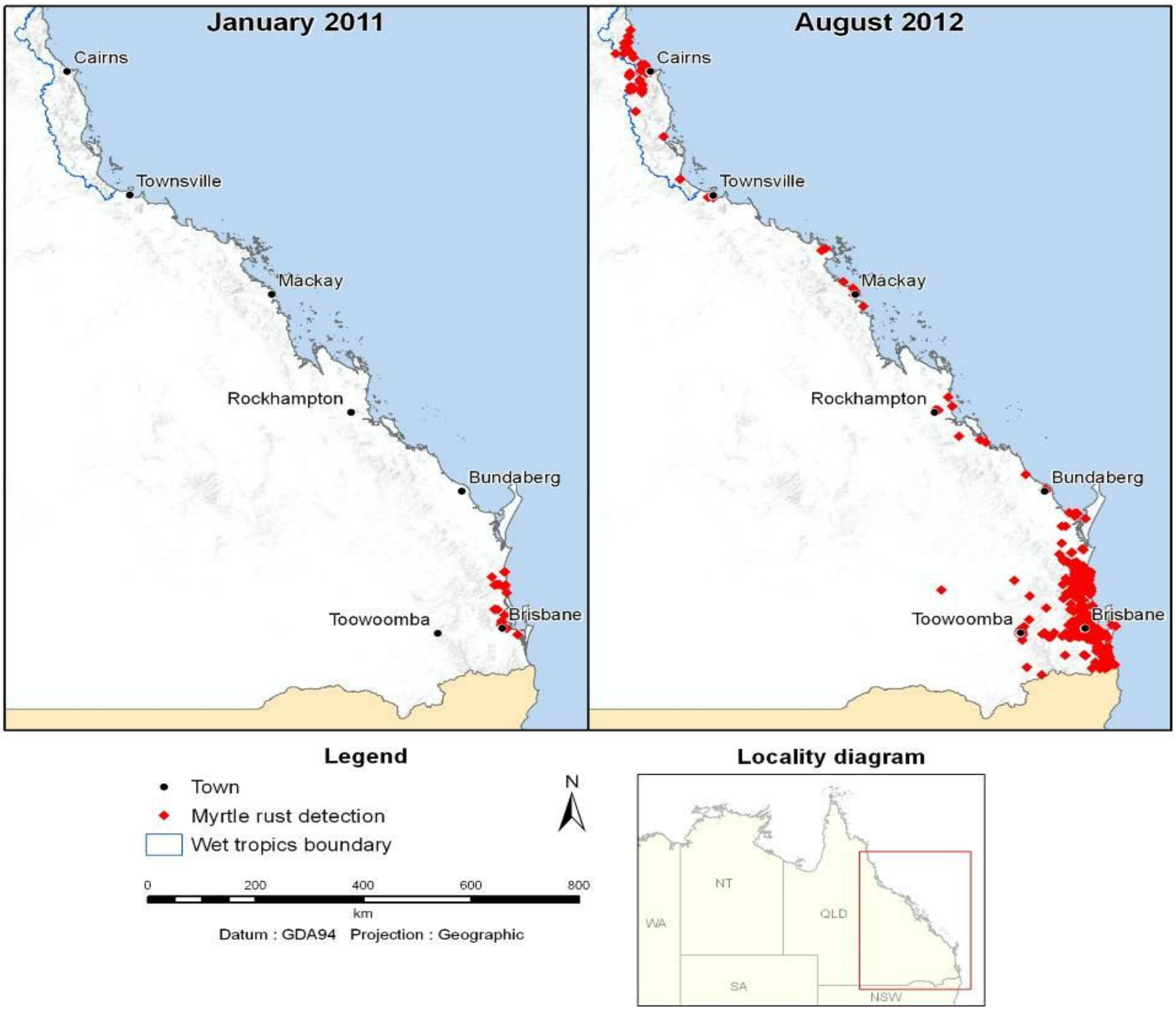


Figure 26: Change in distribution of *P. psidii* in Queensland from January 2011 to August 2012.

Myrtle rust (*Puccinia psidii*) has now been identified from a range of native forest ecosystems including coastal heath (*Austromyrtus dulcis*, *Homoranthus* spp.), coastal and river wetlands (*Melaleuca quinquenervia*, *M. viridiflora*), sand island ecosystems of Moreton, Stradbroke and Fraser Islands and littoral, montane, subtropical and tropical rainforests (*Syzygium* spp., *Rhodamnia* spp., *Rhodomyrtus* spp.). Detections of myrtle rust have also extended into the dry tropics (Mareeba) in north Queensland. The disease is prevalent in urban and peri-urban environments around major cities and towns, commonly reported from botanic gardens and nature reserves with disease impacts ranging from minor leaf spots to severe dieback and infection and premature senescence of flowers and fruits.

The host list in Queensland alone now exceeds 150 species from 35 genera. Forty–six host species have been rated as being highly or extremely susceptible with repeat infection resulting in shoot and stem dieback and, in some cases, tree death (e.g. *Rhodomyrtus psidioides*). The disease has also been identified on flowering or fruiting structures of twenty-seven species. Variability in susceptibility based on field observations has, however, been identified for a number of species indicating potential for resistance.

To date *P. psidii* has been identified from seven species of eucalypts (=*Eucalyptus* and *Corymbia*) in Queensland, occurring mainly on seedlings and generally at low incidence and severity levels. However, on mature *E. curtisii* trees significant infection levels have been observed causing shoot and stem dieback and death of coppice growth from cut stems. Infection of leaves and stems of coppice from the base of a mature *E. carnea* tree has also been recorded. Stem dieback, leaf blighting and shoot death was recorded on *E. planchoniana* seedlings, and leaf and shoot blight on *E. grandis* saplings.

9.3.2 Disease screening

Seven species of eucalypt have now been screened for patterns of resistance to *P. psidii* (*Corymbia citriodora* subsp. *citriodora*, *C. citriodora* subsp. *variegata*, *C. henryi* and *C. torelliana*, *Corymbia* hybrids, *Eucalyptus argophloia* and *E. cloeziana*). When comparing species, *E. argophloia* was the most susceptible and *E. cloeziana* the least susceptible. However, in all species inter- and intra-specific variability was observed and results clearly identify the potential to select for resistance at the family level within species and provenances tested. Relative to selection among families within provenances, selection at the provenance level alone would provide less genetic improvement for rust resistance. However, results also suggest the potential for *P. psidii* to impact on young plantations developed using unimproved seed from all provenances studied, including some commonly used in plantation development in Queensland.

9.3.3 Impact assessments

An assessment plot has been established in a regenerating stand of *Melaleuca quinquenervia* to examine impact of *P. psidii* over time (growth, survival), changes in host susceptibility with age and impact on fecundity. Results to date show a correlation between infection levels and growth rate. More significantly there is a correlation between disease level and flower production. Assessments are continuing.

9.4 Research and Development

9.4.1 Stem Defect Modelling

The project began in November 2010 and addresses ways to reduce the impact of stem defects in some subtropical hardwood species in Queensland's plantations.

Susceptibility to damage by borers varies with tree species as well as site conditions and location. The research is developing a model that assesses the risk of stem damage by insect borers in relation to hardwood species grown in different locations and site conditions. This will enable the plantation industry to match tree species with appropriate growing conditions in Queensland in the future.

Nutrition and stem borer attack

Applications of potassium to trees on low potassium sites may be beneficial for lowering the risk of longicorn beetle (*P. solida*) attack. Further investigation is needed to determine the extent to which potassium may directly affect borer severity.

Intensive borer study at one site

Corymbia hybrids were significantly more susceptible than straight spotted gum. The majority of attacks were restricted to the lower 1m of the trunk. This site had high incidence of *Culama* associated with longicorn attack. These secondary pests can also cause significant damage. Although DBHOB differed between the taxa, and hybrids were more vulnerable to longicorn attack than straight spotted gum, within hybrids Diameter at Breast Height Over Bark (DBHOB) did not differ between trees with or without borers. Height, although generally correlated with DBHOB, was significantly lower in trees with borers, although this effect may be causal rather than predictive. Basal sapwood diameter, but not area, was higher in trees with borers than without borers, while taper and relative growth rate differed between taxa but not between bored status. Mean annual increment was significantly lower in trees with borers.

Landscape study

The landscape study aims to determine the importance of landscape and site scale drivers of borer damage in spotted gum and flooded gum. Two tiers of stratification are being used. First tier stratification will be based on the percentage cover of available habitat to stem borers within a 6 km radius of plantation edge. The maximum unassisted dispersal by a *Phoracantha* sp. is known to be over just over 5 km, so a 6 km radius was selected. There will be two classes of habitat cover (0-30 %, > 30%) which represents the range of host habitat cover in the data. Second tier stratification will be age class, with two age classes currently planned (age 2 – 8 years and age ≥10 years), with five sites per age category per taxon.

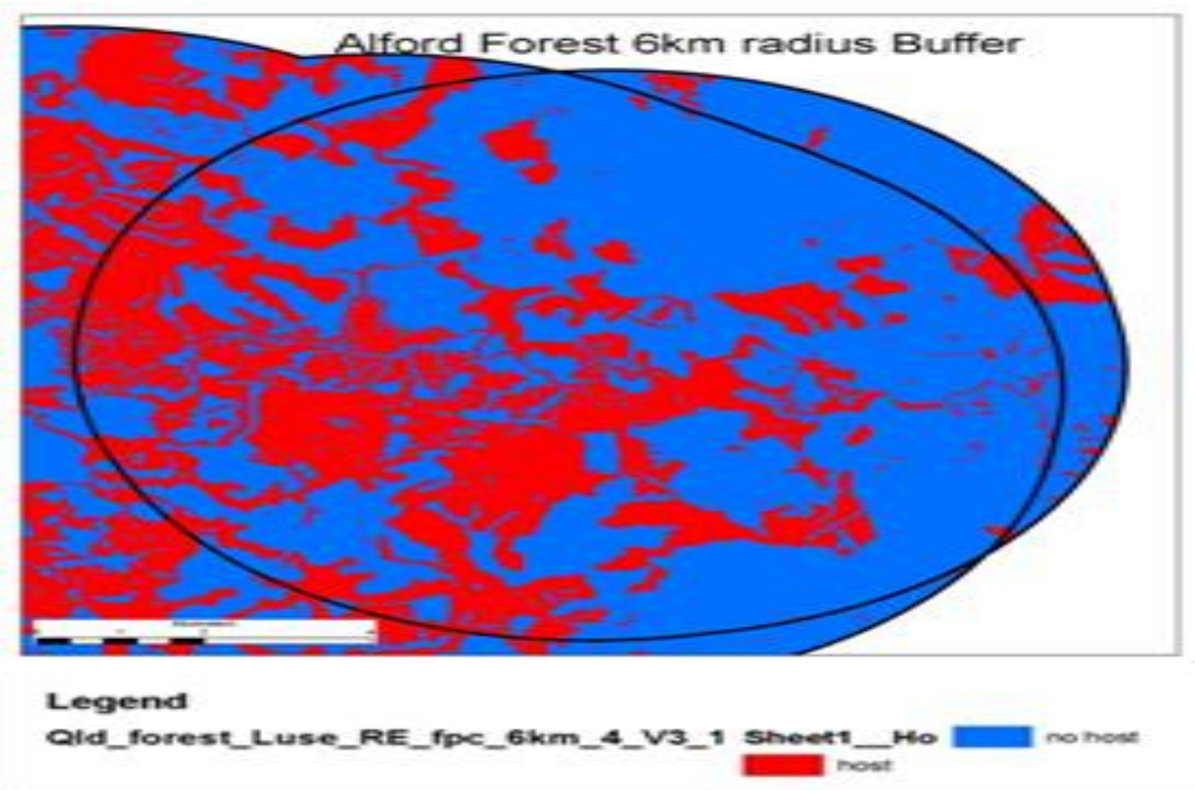


Figure 27: Landscape structure surrounding a Queensland ccv plantation (Alford Forest) indicating host vs. non-host habitat. The landscape boundary is approximately

circular shaped, being 6 km from the edge of the plantation. The more irregular boundary indicates overlapping landscapes surrounding other plantations located nearby.

We analysed the landscape composition around each plantation to derive the percentage occurrence of host habitat. Landscapes of 6 km from each spotted gum plantation edge were created and forest within each landscape were allocated a category of host probability, depending on the predominant tree species and the relative density of trees, which was derived from projected foliage cover mapping. These landscape categories were then merged into host and non-host and form the basis of our first stratification tier (Figure 27).

9.4.2 Sirex wood wasp research

Research into Sirex wood wasp in Queensland seeks to answer 3 main questions:

(1) How will climatic conditions here impact on the lifecycle?; (2) How susceptible are subtropical taxa?; (3) Will traditional biocontrol work?

(1). Females from Qld were found to be 25% bigger than females from NSW and had 3 time fewer nematodes, while males and females were equally infected with nematodes in both populations. Modelling using this data indicated that, conservatively, the reproductive potential of Sirex in Queensland in the invading population is 1.3x that of NSW and if nematode infection rates are included in the prediction, reproductive potential of Queensland populations is 5x more than NSW.

(2). The *Pinus caribaea* x *P. elliotti*i hybrids grown in Queensland appear to be equally as susceptible as *P. radiata* to Sirex based on female host acceptance, response of shoots to mucus and antennal response of wasps to host volatiles.

(3). Nematode survival and potential dispersal in hybrid pine was lower than in *P. taeda*, a preferred host.

In summary, early data suggests that current Queensland populations are predicted to reproduce & disperse very quickly, hybrids are as suitable as preferred hosts and nematode survival is lower in hybrids.

Mr John Bain[1], Mr Lindsay Bulman[2] and Dr Rebecca Ganley[3]

[1]Forest Protection, New Zealand Forest Research Institute Ltd. (SCION), 49 Sala Street, Rotorua 3046, New Zealand.

[2]Forest Protection, New Zealand Forest Research Institute Ltd. (SCION), 49 Sala Street, Rotorua 3046, New Zealand.

[3]Pathology, Forest Protection, New Zealand Forest Research Institute Ltd. (SCION), 49 Sala Street, Rotorua 3046, New Zealand.

Email: john.bain@scionresearch.com; lindsay.bulman@scionresearch.com; rebecca.ganley@scionresearch.com

10.0 NEW ZEALAND

10.1 Plantations Health Surveillance (*Pinus radiata*):

10.1.1 Insect pests of *Pinus radiata*:

a). No insect problems of any note were recorded in *Pinus radiata* plantations.

10.1.2 Pathogens of *Pinus radiata*:

a). Dothistroma needle blight (*Dothistroma septosporum*)

Last year we predicted that the spray programme to control Dothistroma needle blight would be about 65,000 ha. A total of 66,018 ha were sprayed throughout the North Island during the 2011-2012 Summer (Figure 28). To put this in context, New Zealand has about 750,000ha of *Pinus radiata* in the susceptible age class of 1-15 years, so well less than 10% of the susceptible area was sprayed. Stands are generally sprayed when disease levels are assessed at above 15%, but this varies between owners. The spray programme for the 2012-2013 season will be larger due to a particularly wet summer in 2011-2012. The size of the spray programme does reflect the severity of disease but it is affected by other factors such as the size of the susceptible area (the rate of new planting has increased since 2009) and forest owners' threshold for spraying (improved log prices encourages reduced thresholds).

Forest health assessments are taken during the Forest Owners' Association pest detection surveillance programme. Dothistroma needle blight was most severe in the central North Island and the top of the South Island in Nelson and Marlborough. The disease was present but at low or trace levels on the eastern coastal areas of the North and South Islands and in Northland. Dothistroma needle blight was the most common disorder recorded, comprising 12% of the 6,800 records of disorders made.

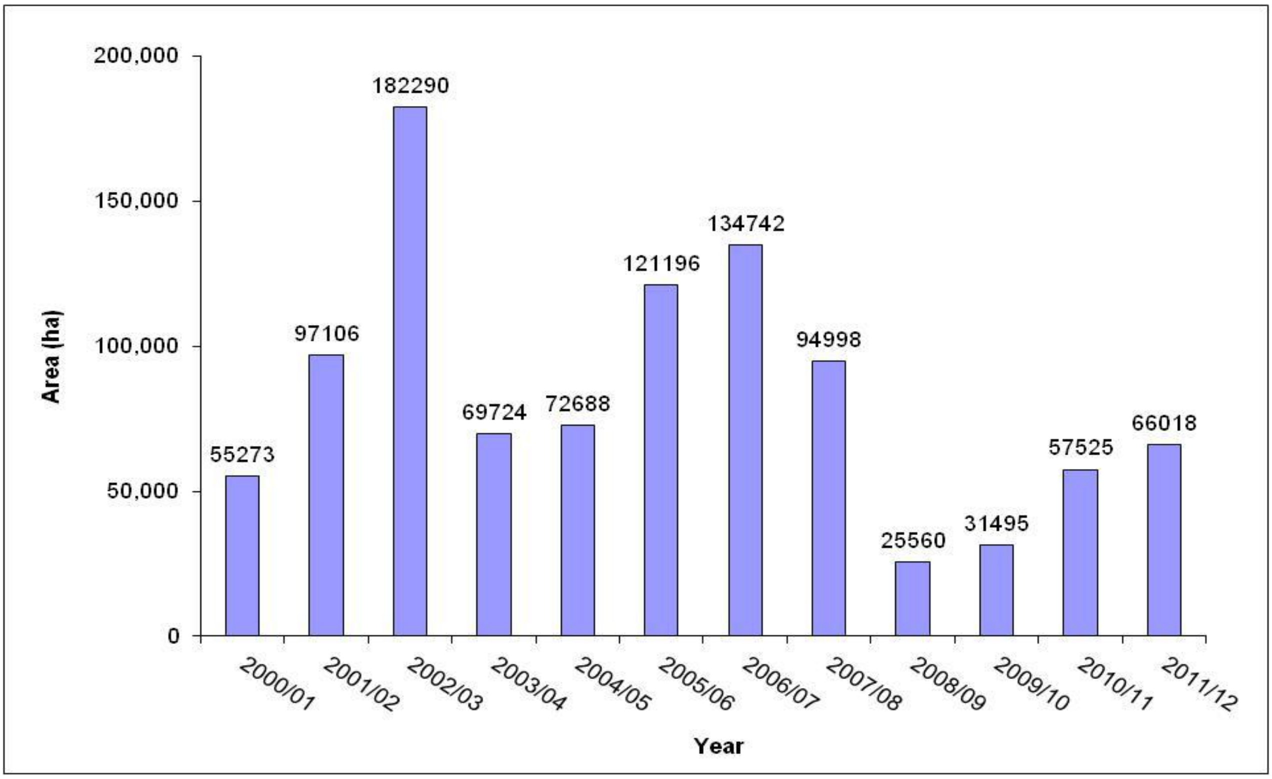


Figure 28: Area sprayed annually for Dothistroma control in the North Islandb).

Cyclaneusma needle cast (*Cyclaneusma minus*)

Based on observations made during the pest detection surveys, the severity of Cyclaneusma needle cast remained at low levels experienced over the past few years. There were 518 reports of Cyclaneusma needle cast in the forest health database (8% of the total number of disorder records) and 85% of those records recorded severity as low or trace. Cyclaneusma needle cast does not appear to be the significant problem it was 10 to 20 years ago, probably because the highly susceptible genotypes have been removed from the breeding population.

c). Nectria flute canker (*Neonectria fuckeliana*)

As previously reported, management regimes to control nectria flute canker have resulted in a significant reduction in the number of trees affected. There has been no further northward extension to the range of *Neonectria fuckeliana* which remains restricted to the lower half of the South Island (Figure 29).

d). Armillaria root rot

Armillaria root disease, caused primarily by *Armillaria novae-zelandiae* remains widespread but scattered in many *P. radiata* plantations throughout much of the country. There were 22 reports of mortality due to *Armillaria* from Southland at the bottom of the South Island. All sites were converted from native forest. Armillaria damage is not commonly reported from Southland.

e). *Phytophthora cactorum*

Small patches of mortality associated with *Phytophthora cactorum* infection still occurred in some plantations in the northern South Island. Symptoms include severe resinosus at the root collar and lower stem, similar to that caused by *Armillaria* infection. There was no sign of *Armillaria*, or of the other known causes of basal resinosus and *P. radiata* mortality. Overall incidence was very low and appeared isolated.

f). Physiological needle blight and red needle cast

Reports of physiological needle blight (PNB) were received in early to late spring. Almost 50% of the reports were from central North Island with a further 27% from Northland. Very few observations were recorded from the East Cape of the North Island. This area has a known history of PNB outbreaks. Only 1% of the records reported high severity, 40% recorded medium severity and the remainder were low or trace. As seen previously, PNB tends to be sporadic and localised to a few regions.

g). Red needle cast

This pathogen was reported as atypical *Cyclaneusma* in the 2006-2007 report. It was reported from the central North Island, East Cape, and the top of the South Island. Disease levels were overall low to medium (86% of the 407 records, those records had an average of 20% of foliage affected).

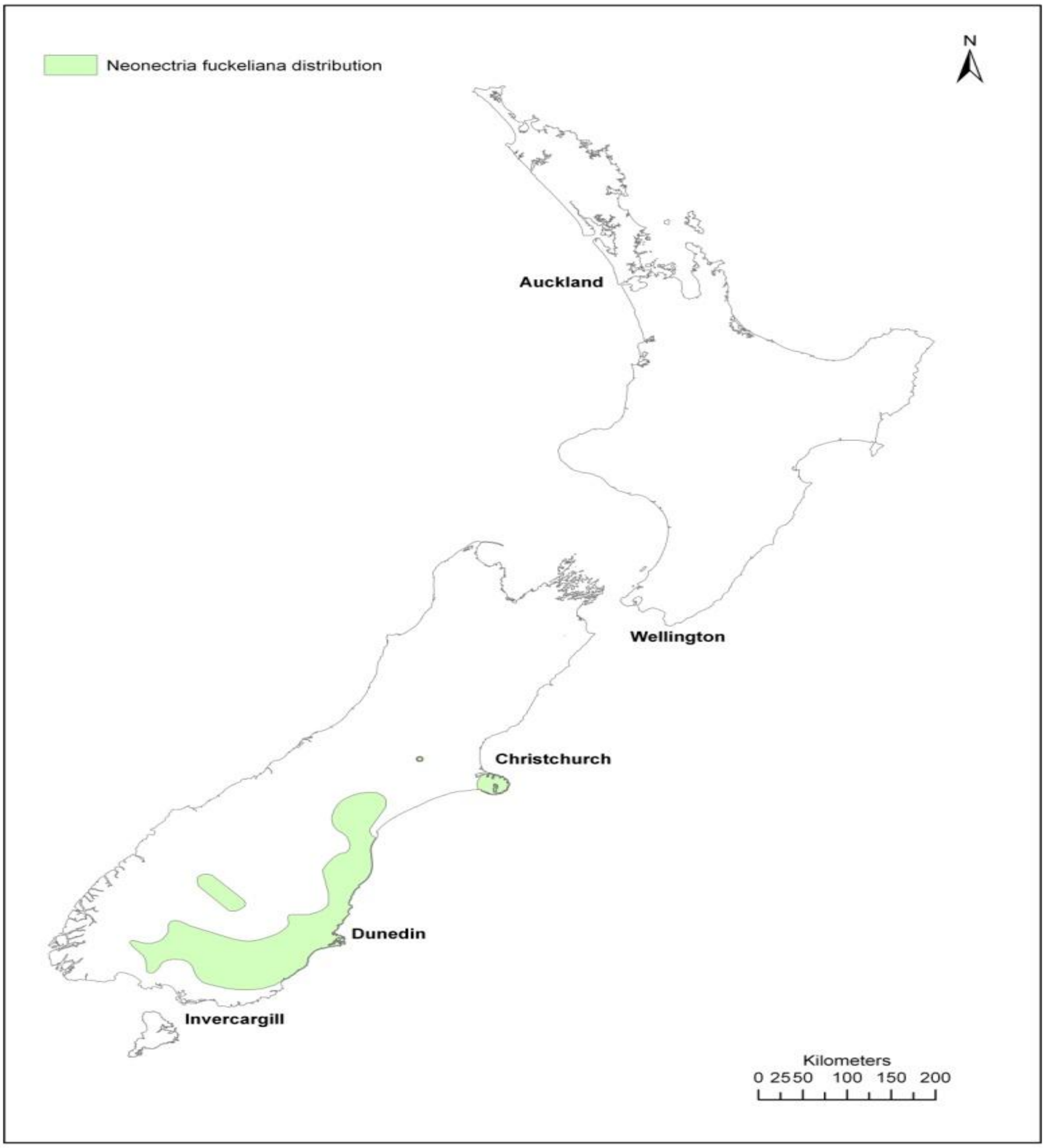


Figure 29: Known distribution of *N. fuckeliana* as at June 2012

10.2 Plantations Health Surveillance (Douglas-Fir – *Pseudotsuga menziesii*)

10.2.1 Insect pests of Douglas-Fir

No major insect pests are reported.

10.2.2 Pathogens of Douglas-Fir

a). Swiss needle cast disease (*Phaeocryptopus gaeumannii*)

Swiss needle cast disease (*Phaeocryptopus gaeumannii*) remains the most significant disease of Douglas-fir throughout New Zealand.

10.3 Plantations Health Surveillance (*Eucalyptus* spp.)

10.3.1 Insect pests of *Eucalyptus* spp.:

a). Gum leaf skeletoniser (*Uraba lugens*)

Uraba lugens (Nolidae), the gum leaf skeletoniser, is widespread in the greater Auckland region, as far north as Warkworth, and also in the Waikato region, at Mt Maunganui in the Bay of Plenty, and in the Coromandel. In the last year it has been found in Hawke's Bay and Nelson. The latter is the first record from the South Island. It has not yet been reported as a concern in commercial plantations, and is causing significant damage only on amenity trees in the Auckland region. A biological control agent (*Cotesia urabae* (Braconidae)) has been imported from Tasmania and was released in Auckland. It has established and its spread is being monitored. The eucalypt tortoise beetle *Paropsis charybdis* (Chrysomelidae) continues to be a major pest, particularly in *Eucalyptus nitens* plantations. Some forest managers continue to aerially spray their stands to control the pest. *Enoggera nassaui* (Pteromalidae) continues to play a significant role in the control of *P. charybdis* in some areas.

10.3.2 Pathogens of *Eucalyptus* spp.:

a). Septoria leaf blight (*Kirramyces eucalypti*)

Low level of foliage disease.

b). *Fairmaniella leprosa*

Low level of foliage disease.

c). Mycosphaerella leaf disease (*Mycosphaerella cryptica*)

Low level of foliage disease.

10.4 Plantations Health Surveillance (*Cypresses* species)

10.4.1 Insect pests of Cypress species:

No major insect pests are reported.

10.4.2 Pathogens of Cypress species:

a). Cypress canker (*Seiridium* spp.)

Cypress canker, caused by two species of *Seiridium* continues to cause damage in many cypress stands throughout the country, particularly *Cupressus macrocarpa*.

10.5 Indigenous Forests

10.5.1 Insect pests of indigenous forests:

No major insect pests are reported.

10.5.2 Pathogens of indigenous forests:

a). Kauri dieback disease and Phytophthora taxon Agathis (PTA)

Surveys to determine the distribution of PTA have continued. Although the known colonised area has expanded, PTA has not been detected in a number of the areas sampled. Work is also going into improving track construction and drainage in forest areas where PTA is known to be present in attempts to help reduce the spread of the disease. There have also been trial closures of walking and cycling tracks in some parks, or re-routing tracks away from Kauri. Trials of injected phosphite to treat the disease have shown promising laboratory results and field tests have been established in the Waitakere ranges and in Northland.

10.5.3 Other pests:

a). Australian brushtail possum (*Trichosurus vulpecular*)

Major damage to indigenous forests by the Australian brushtail possum (*Trichosurus vulpecula*) continues to occur throughout much of the country. Favoured food species are tall canopy species such as tawa (*Beilschmiedia tawa*), northern and southern rātā (*Metrosideros robusta* and *M. umbellata*), kohekohe (*Dysoxylum spectabile*), kāmahi (*Weinmannia racemosa*) and *Podocarpus cunninghamii* (Hall’s tōtara). Many other species are browsed to a lesser extent.

10.6 Biosecurity:

10.6.1 Post-border biosecurity (eradication):

a). Dutch elm disease (*Ophiostoma novo-ulmi*):

The pathogen, *Ophiostoma novo-ulmi*, remains confined to the greater Auckland region. One targeted continuous disease detection survey was carried out in the 2011/12 season. It started during December 2011 and finished during May 2012. A trapping programme for *Scolytus multistriatus*, the vector of the Dutch elm disease, in high risk areas to determine sources of infection or large amounts of breeding material was undertaken with 67 traps deployed. Diseased elms were found at 23 locations. The greatest majority of infected sites were in East and South Auckland (17), other sites were from North Shore (5) and central Auckland (1). The number of beetles trapped (2,200) was significantly lower than the 10,259 beetles trapped in the previous year. Only 12 beetles were positive for the presence of *O. novo-ulmi*, a significant reduction from the 149 positive beetles trapped in 2010/11.

Over the past four seasons, diseased elms have been found in three main areas, North Shore, South Auckland, and East Auckland (Figure 30). The pathogen and disease are also likely to exist in West Auckland. In the 2011-2012 season, a diseased tree was found in central Auckland for the first time in over four years (Figure 30). Infection (of trees and/or beetles) appears to be clustered in a small area on the North Shore but is widespread and intense in east Auckland and it appears that the disease is spreading southwards. An increase in locations where diseased trees or infective beetles have been found over the past two seasons is clear.

In April 2012, a large group of dead and dying elms was observed at a twenty-fourth location, 411 Clifton Rd in Whitford. Healthy specimens were also observed. Some of the standing dead elms (see Figure 31) were at least two seasons old. By the end of June 2011, because of access difficulties, the elms were still not sampled.

In February 2010, *S. multistriatus* were collected from an elm on Victoria Ave, Palmerston North during a High Risk Site Surveillance inspection for the Ministry for Primary Industries. The beetle is now known from Auckland, Waikato, Taupo, Gisborne, Hawke's Bay and Palmerston North. No further spread of the vector was recorded during this season.

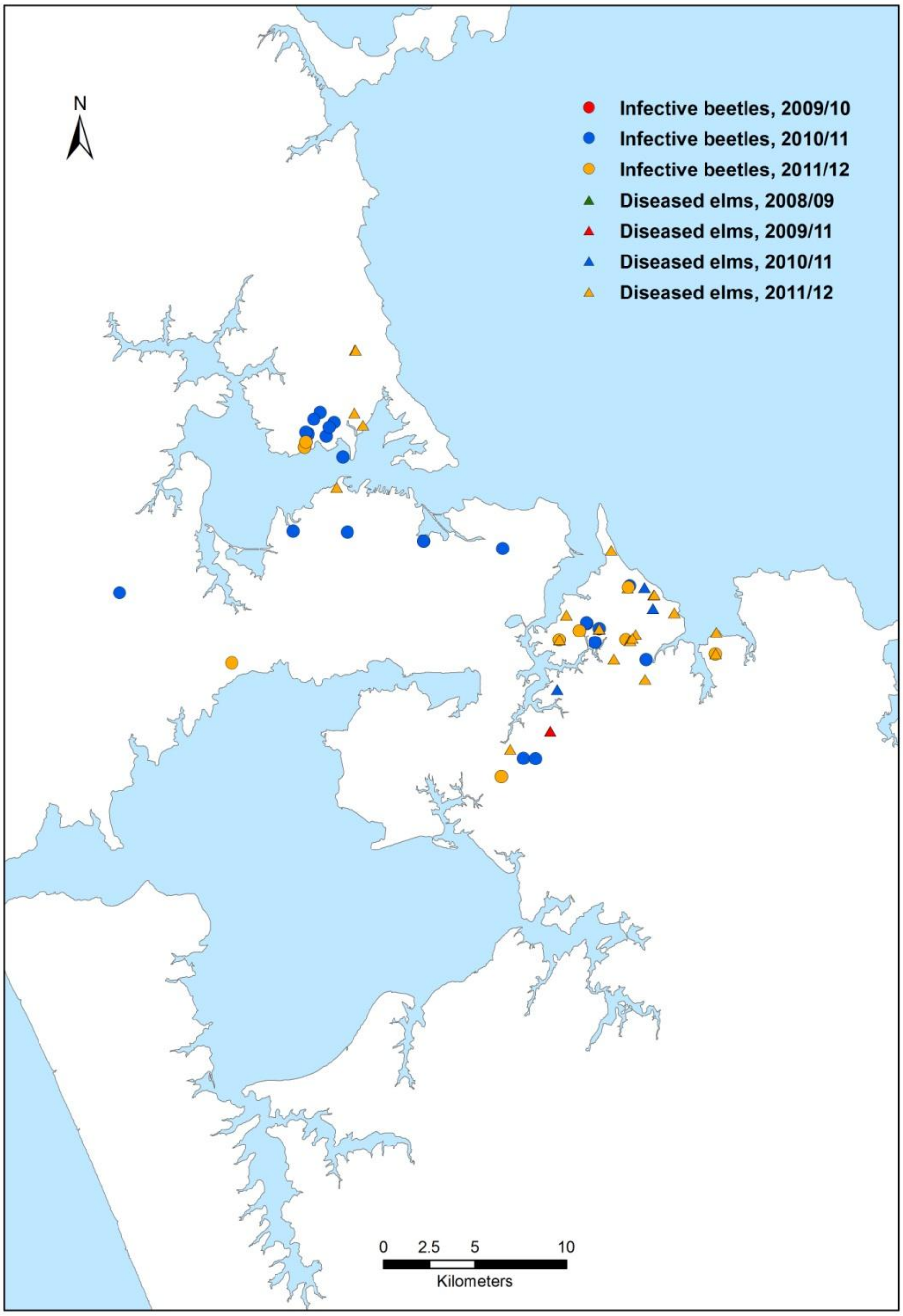


Figure 30: Geographic locations of diseased trees and infective beetles over the past four seasons.

Figure 31: Dead elms at 411 Clifton Rd, Whitford

Figure 32 shows the distribution of diseased trees and infective beetles trapped since Dutch elm disease was discovered in Auckland in 1989.

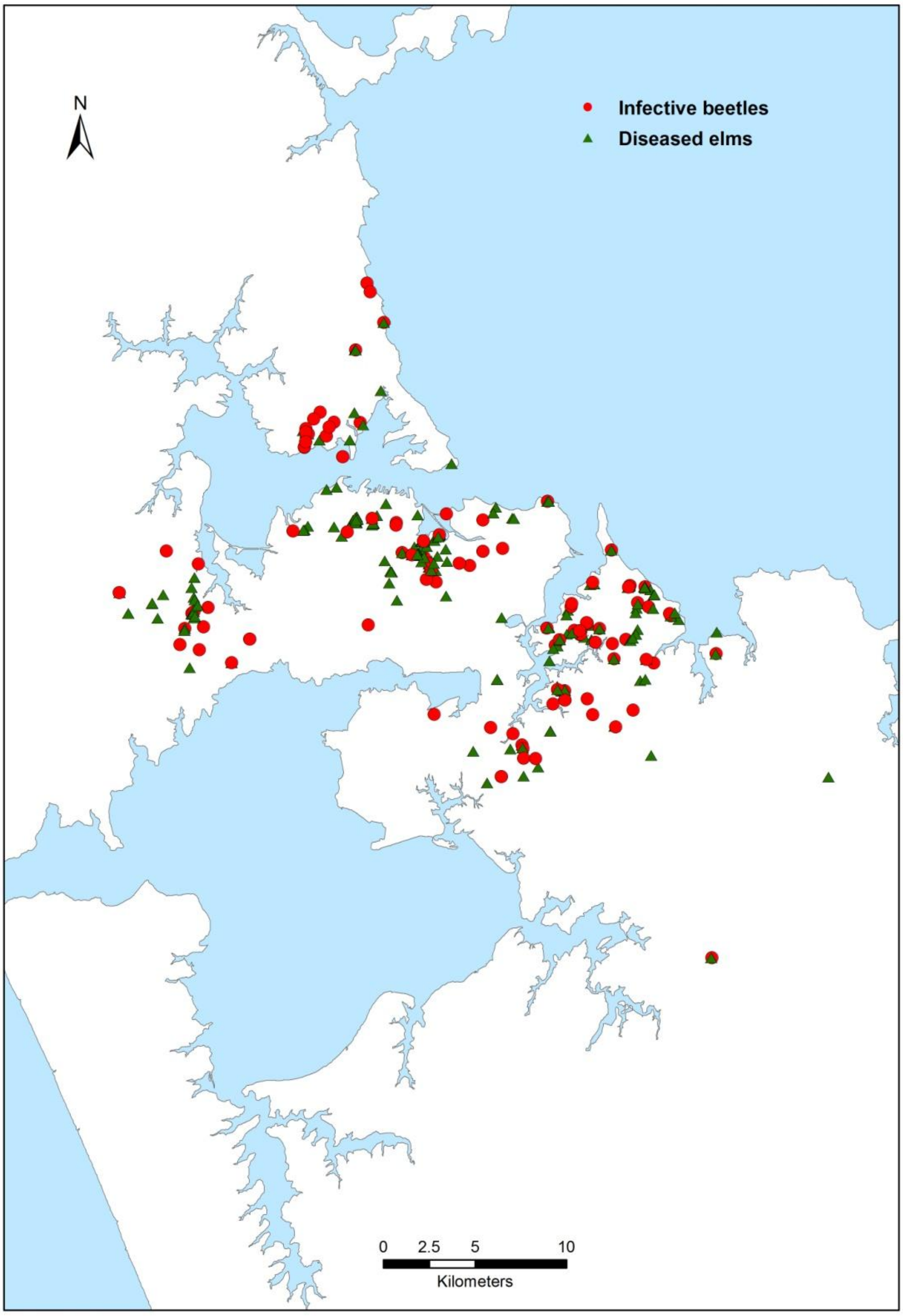


Figure 32: Distribution of diseased trees and infective beetles from 1989 to 2012

10.6.2 Post-border biosecurity (new records) insect pests:

The following new records were validated, investigated and reported in 2011-12.

a). Bronze bug (*Thaumastocoris peregrinus*) (Thaumastocoridae).

In March 2012 *T. peregrinus*, the bronze bug, was found on *Eucalyptus nicholii* during a routine survey conducted as part of the Ministry for Primary Industries' High Risk Site Surveillance programme. It is an Australian species that has become established in South America, South Africa and Italy. It has been recorded from a wide range of *Eucalyptus* spp.

b). Tenthredinid sawfly (*Amauronematus viduatus*):

The unidentified tenthredinid sawfly that was reported in 2009/2010 from *Salix babylonica* has been identified as *Amauronematus viduatus* (Tenthredinidae). *Amauronematus viduatus* is widely distributed from northwestern Europe to central Asia and Siberia. Specimens are also known from Alaska, central Canada, some northwestern United States and more recently, Australia. It was first found in New South Wales in 1992 on *Salix babylonica*, although an unidentified record of tenthredinid larvae on the same host in Tasmania in 1978 may well have been *A. viduatus*.

c). *Aculus ballei* and *Eriophyes exilis*:

These eriophyid mites where identified from a sample of lime tree *Tilia* sp. leaves taken from one tree in Logan Park, Dunedin. The literature suggests that both species are relatively benign and do not appear to pose any real risk to mature lime trees in New Zealand. *Eriophyes exilis* produces small characteristic galls in the axils of leaf veins. It is not generally considered a pest of mature trees. Other lime trees in Logan Park were free of galls, but galls were found at least 1 km away. Some trees in groups had many galls while others had none indicating that not every genotype of *Tilia* is an adequate host for the mite.

10.6.3 Post-border biosecurity (new records) pathogens:

a). *Stigmina platani*:

This fungus forms striking dark spore masses on the leaves of *Platanus* x *acerifolia* but associated leaf spots are small and seem to be of minor significance.

b). *Paraphaeosphaeria recuvifoliae*:

This fungus was identified on *Yucca filamentosa* var. *flaccida* from a garden in Masterton in the Wairarapa. *Paraphaeosphaeria recurvifoliae*, was published as a new species by Lee *et. al.* 2005[5], and noted as causing leaf spots and necrosis on *Yucca recurvifolia* in Korea where an outbreak occurred during a wet humid summer. The symptoms for the New Zealand collected samples in Masterton were described as spot necrosis on yucca leaves and the identification was determined by both morphological characteristics and molecular sequencing. The Masterton garden where this fungus was detected was a private garden and the yucca plant was not a new planting. It is very likely that this fungus has been present in New Zealand for quite a few years.

---

[5] Lee, H.B., Kim, K.M. and Jumg, H.S. 2005. *Paraphaeosphaeria recurvifoliae*, a new species causing leaf spots and necrosis on *Yucca recurvifolia*. *Fungal Diversity* 20: 71-81

10.6.4 Biological control agents:

a). Buddleia leaf weevil (*Cleopus japonicus*).

The buddleia leaf weevil, *Cleopus japonicus* (Curculionidae), a biological control agent for the weed buddleia (*Buddleja davidii*), continues to spread throughout New Zealand and each season the area defoliated by this weevil grows. The agent continues to be liberated in new areas by councils and forestry companies and is doing very well in most areas (Figure 33). A series of field trials which are coming to an end will help to further assess the impact of this agent on buddleia growth and how this may assist in production forestry in New Zealand.

b). Gum leaf skeletonizer (*Uraba lugens*)

See *Uraba lugens* under *Eucalyptus* spp. above.

Figure 33: Complete defoliation of *Buddleja davidii*.

10.7 Recent publications and website features:

The monthly Scion publication *Forest Health News* can be viewed on line. See: http://www.scionresearch.com/general/publications/forest-health-newsletter. To subscribe to this newsletter electronically, contact john.bain@scionresearch.com

1. Gresham BA., Avila G., Berndt LA and Withers TM (2012) Establishment and further releases of *Cotesia urabae*, a biological control agent for *Uraba lugens*, in New Zealand. *New Zealand Plant Protection* Vol. 65.
2. Hopkins AJM., Dick MA., Carlson CA and Crane PE (2012) Early investigations into the infection courts used by *Neonectria fuckeliana* to enter *Pinus radiata* stems. *European Journal of Plant Pathology* Vol. 132: 537-548.
3. Kimberley MO., Hood IA and Knowles RL (2011) Impact of Swiss needle-cast on Douglas-fir. *Phytopathology* Vol. 101: 583-593.
4. McCarthy JK., Hood IA., Kimberley MO., Didham RK., Bakys R., Fleet KR., Brownlie RK., Flint HJ and Brockerhoff EG (2012). Effects of season and region on sap stain and wood degrade following simulated storm damage in *Pinus radiata* plantations. *Forest Ecology and Management* Vol. 277: 81-89.
5. Sopow S., George S and Ward N (2012) Bronze Bug, *Thaumastocoris peregrinus:* A new Eucalyptus pest in New Zealand. *Surveillance* Vol. 39(2): 43-46.
6. Watson MC., Watt MS., Withers TM., Kimberley MO., Rolando CA (2011) Potential for *Cleopus japonicus* to control the weed *Buddleja davidii* in plantation forests in New Zealand. *Forest Ecology and Management* Vol. 261: 78-83.
7. Watt MS., Palmer DJ and Bulman LS (2011) Predicting the severity of Dothistroma on *Pinus radiata* under current climate in New Zealand. *Forest Ecology and Management* Vol. 261: 1792-1798.
8. Watt MS., Bulman LS and Palmer DJ (2011) The economic cost of Dothistroma needle blight to the New Zealand forest industry. *New Zealand Journal of Forestry* Vol. 56 (1): 20-22.
9. Withers TM and Watson M (2012) Buddleia takes a beating. What's New in Biological Control of Weeds Vol. 62: 7.
10. Withers TM., Allen GR., Patel VS., Satchell D and Manley G (2012) The potential of *Eadya paropsidis* from Tasmania as a biocontrol agent for *Paropsis charybdis* in NZ. *New Zealand Plant Protection* Vol. 65: 292.