

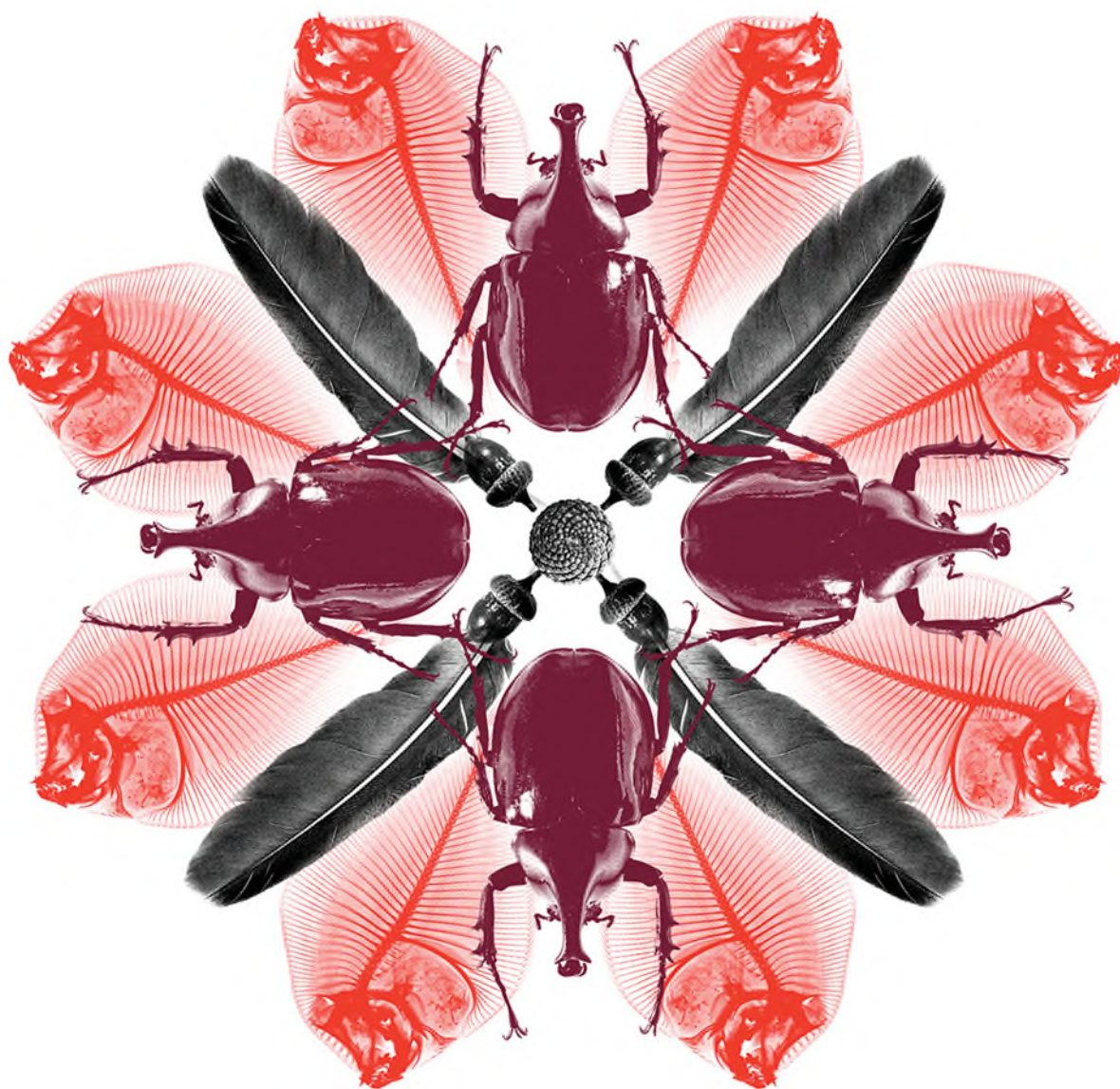


Australian Government

Department of Agriculture, Water and the Environment

Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 2

8 June 2021



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Map 1 Map of Australia

Acronyms and abbreviations

Term or abbreviation	Definition
ACT	Australian Capital Territory
ALOP	Appropriate level of protection
BCA	Biological control agent
BICON	Australia's Biosecurity Import Conditions System
DAWR	The former Department of Agriculture and Water Resources
FAO	Food and Agriculture Organization of the United Nations
ICS	Integrated Cargo System
IPPC	International Plant Protection Convention
ISO	International Organisation for Standardisation
ISPM	International Standard for Phytosanitary Measures
NSW	New South Wales
NPPO	National Plant Protection Organisation
NT	Northern Territory
PRA	Pest risk analysis
Qld	Queensland
SA	South Australia
SPS Agreement	WTO Agreement on the Application of Sanitary and Phytosanitary Measures
Tas.	Tasmania
The department	The Australian Government Department of Agriculture, Water and the Environment
URE	Unrestricted risk estimate
Vic.	Victoria
WA	Western Australia
WTO	World Trade Organization

Summary

Fresh cut flowers and foliage have been imported into Australia on a commercial basis for about 50 years. For simplicity, the term cut flower(s) and foliage will be used to refer to commercially produced fresh cut flower(s) and foliage throughout this report.

The global cut flower and foliage trade has changed, specifically in relation to increased volumes of trade, different flower and foliage species being traded, and the countries from which the flowers and foliage originate. These factors increase the risk of arthropod pests of biosecurity concern, associated with the cut flower and foliage pathway, arriving in Australia.

In 2017, the former Department of Agriculture and Water Resources (now the Department of Agriculture, Water and the Environment) conducted an Agricultural Competitiveness White Paper-funded review of the import conditions for cut flowers and foliage. This identified a high number of arthropod pests being found on consignments of imported cut flowers and foliage. Based on these findings, the department revised the import conditions for cut flowers and foliage to reduce the risk of arthropod pests arriving in Australia. The revised conditions were introduced on 1 March 2018.

The department initiated this pest risk analysis (PRA) to assess the pests of biosecurity concern to Australia that are associated with cut flower and foliage imports and to determine whether the revised import conditions are effectively managing the biosecurity risks to achieve the appropriate level of protection (ALOP) for Australia. The PRA was conducted in two parts, (Part 1) an assessment of the three major associated arthropod pest groups—mites, aphids and thrips, and (Part 2—this document) an assessment of other arthropod pests associated with cut flowers and foliage. Part 1 of the PRA was finalised in June 2019. The *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* is available from agriculture.gov.au/biosecurity/risk-analysis.

This final report represents Part 2 of the PRA for cut flower and foliage imports. Part 2 of the PRA assessed the remaining arthropod pests associated with imported cut flowers and foliage, namely, the beetles (Insecta: Coleoptera), flies (Insecta: Diptera), bugs (Insecta: Hemiptera (other than aphids, which were assessed in Part 1 of the PRA)), wasps, bees and ants (Insecta: Hymenoptera) and moths and butterflies (Insecta: Lepidoptera).

The department has taken a group approach in conducting this PRA, grouping all flower and foliage types and major pests. With numerous species of flowers imported from at least 19 countries or economies, a group pest risk analysis is an efficient, consistent and practical approach. The group approach is consistent with relevant international standards and requirements including ISPM No.2 Framework for pest risk analysis (FAO 2016a), ISPM 11: Pest risk analysis for quarantine pests (FAO 2016c), and the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) (WTO 1995b).

Interceptions of live arthropods at the border have been decreasing since the revised import conditions were implemented on 1 March 2018, and the introduction of the requirement for import permits for some imports from Colombia, Ecuador and Kenya on 1 September 2019. The department also completed work which determined that the *Tetranychus* mites arriving on cut flowers and foliage from Colombia, Ecuador and Kenya are not quarantine pests for Australia. The department's commitment to revise import conditions, through the introduction of import

permits in 2019 and appropriately targeted restrictions on specific pathways in 2020, has resulted in significant reductions in the number of consignments with pests of biosecurity concern arriving at the Australian border. The percentage of consignments intercepted with pests of biosecurity concern has reduced from 56% in September 2017 to 12% in March 2021. The analysis of interception data after September 2019 confirms that the revised import conditions are having the intended effect, that is, reducing the arrival rate of pests of biosecurity concern to Australia on the cut flower and foliage pathway.

Part 2 of this PRA assessed all 583 species of Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera known to be associated with the imported commercial cut flower and foliage pathway. From the 583 species, a total of 74 Coleoptera, 38 Diptera, 140 Hemiptera, and 110 Lepidoptera are identified as quarantine pests. A further six coleopteran and 10 hemipteran species are identified as potential regulated articles because they have the potential to transmit pathogens that are of biosecurity concern for Australia (the definition of ‘regulated article’ is given in the Glossary). A total of 378 pests (362 quarantine pests and 16 potential regulated articles) do not achieve Australia’s ALOP, and therefore require specific risk management measures to manage the biosecurity risks. As such, these pests, are regulated at the Australian border.

During the pest categorisation process, 13 hymenopteran species were classified as plant quarantine pests and are regulated at the Australian border. A risk assessment was not conducted for these phytophagous hymenopterans as very few had been intercepted on this pathway. The department will continue to monitor this situation and if an organism that has not been categorised, including a contaminant pest, is intercepted on cut flowers and foliage at the Australian border, it will require assessment by the department to determine whether additional phytosanitary measures are required.

In addition, the work conducted in Part 2 of this PRA has highlighted a number of contaminant pest species that are associated with the pathway for imported cut flowers and foliage, that are not present in Australia, but are not quarantine pests according to the International Plant Protection Convention (IPPC) definition (FAO 2019b). These additional eight Coleoptera, 17 Diptera, three Hemiptera and 19 Hymenoptera meet the definition of a ‘pest’ in the *Biosecurity Act 2015*, and a ‘contaminating pest’ as defined by the IPPC. If intercepted by the department, these contaminating pest species will be regulated because of their potential to be predators or parasitoids, transmit human and/or animal pathogens, or to be nuisance pests.

Phytosanitary measures are identified in this final report, and these align with the revised import conditions imposed on 1 March 2018 and updated with the introduction of import permits in certain circumstances on 1 September 2019. These import conditions require exporters and National Plant Protection Organisations (NPPOs) to manage biosecurity risks before they send cut flowers and foliage to Australia, so as to reduce the risk of pests arriving at Australia’s border.

The department recommends the following phytosanitary measures to manage the biosecurity risks posed by the Coleoptera, Diptera, Hemiptera, and Lepidoptera species to achieve Australia’s ALOP:

- Before cut flowers and foliage are exported to Australia, the exporting country must use one of three arthropod pest management options:
 - an NPPO-approved systems approach, or

- pre-export methyl bromide fumigation, or
- an NPPO-approved alternative pre-export disinfestation treatment.
- In addition, prior to export to Australia the exporting country must ensure consignment freedom from live pests, verified by NPPO pre-export visual inspection and remedial action if live pests are found.

When consignments arrive at the Australian border, they will be:

- subject to assessment of documentation to verify that the consignment is as described on the phytosanitary certificate, that required phytosanitary actions have been undertaken, and that product security has been maintained
- visually inspected to verify that the biosecurity status meets Australia's import conditions
- released if arthropod pests are unregulated, subject to consignment freedom from other contaminants and pathogens
- treated, destroyed or exported, as appropriate, if arthropods are identified as regulated (quarantine pest, regulated article or contaminating pest), or if the consignment does not meet Australia's import conditions.

Additional regulatory measures may also be needed in circumstances where an emerging risk is not managed by the current phytosanitary measures. Such additional regulatory measures may include:

- introduction of a permit requirement
- amendment/and or suspension of a particular measure
- suspension of a commodity and/or country pathway.

Written submissions on the draft report were received from 18 stakeholders. The department has made a number of changes to the report following consideration of technical comments from stakeholders and subsequent review of literature. These changes include:

- consideration of departmental pest interception data from January 2020 to December 2020 for the pest categorisation table and analysis of the data over this time period.
- amendment of text in the pest categorisation table (Appendix F) to recognise regional quarantine pests for Western Australia, and to update the distribution of certain species on the advice of several trading partner countries.
- the addition of Appendix H 'Issues raised in stakeholder comments', which summarises key stakeholder comments, and how they have been considered in this final report.
- minor corrections, rewording and editorial changes for consistency, clarity and web-accessibility.

1 Introduction

1.1 Australia's biosecurity policy framework

Australia's biosecurity policies aim to protect Australia against the risks that may arise from exotic pests entering, establishing and spreading in Australia, thereby threatening Australia's unique flora and fauna, as well as those agricultural industries that are relatively free from serious pests.

The risk analysis process is an important part of Australia's biosecurity policies. It enables the Australian Government to formally consider the level of biosecurity risk that may be associated with proposals to import goods into Australia. If the biosecurity risks do not achieve the appropriate level of protection (ALOP) for Australia, risk management measures are proposed to reduce the risks to an acceptable level. If the risks cannot be reduced to an acceptable level, the goods will not be imported into Australia until suitable measures are identified.

Successive Australian Governments have maintained a stringent, but not a zero risk, approach to the management of biosecurity risks. This approach is expressed in terms of the ALOP for Australia, which is defined in the *Biosecurity Act 2015* as providing a high level of protection aimed at reducing risk to a very low level, but not to zero.

Australia's risk analyses are undertaken by the Department of Agriculture, Water and the Environment (the department) using technical and scientific experts in relevant fields, and involve consultation with stakeholders at various stages during the process.

Risk analyses may take the form of a biosecurity import risk analysis (BIRA) or as a review of biosecurity import requirements (such as scientific review of existing policy and import conditions, pest-specific assessments, weed risk assessments, biological control agent assessments or scientific advice).

Further information about Australia's biosecurity framework is provided in the *Biosecurity Import Risk Analysis Guidelines 2016* located on the department's website (agriculture.gov.au/biosecurity/risk-analysis/conducting).

1.2 This Pest Risk Analysis

This Pest Risk Analysis (PRA) has been conducted for commercial fresh cut flower and foliage imports into Australia. The department initiated this PRA to assess the biosecurity risks posed by pests associated with cut flowers and foliage imports to Australia, and determine whether the revised import conditions are effectively managing the biosecurity risks to achieve the appropriate level of protection for Australia.

This PRA has been conducted in two parts. Part 1 of the PRA assessed the three major arthropod pest groups on this pathway, being the mites, thrips and aphids. The draft of Part 1 was released for public consultation on 14 November 2018, and the final report was completed and published on 21 June 2019. These documents are available on the department's website, at agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers. Some sections of text from Part 1 of the PRA are repeated in this document, for ease of reviewing.

Part 2 of the PRA (this report) determines the pest species within the Coleoptera (beetles), Diptera (flies), Hemiptera (bugs, other than the aphids which were included in Part 1 of this PRA),

Hymenoptera (wasps, bees and ants) and Lepidoptera (moths and butterflies) that are associated with cut flowers and foliage that are of biosecurity concern to Australia.

As in Part 1 of the PRA, Part 2 draws upon relevant risk analyses conducted by the department and other National Plant Protection Organisations (NPPOs), historic and recent interception data collected at Australia's borders prior to and after the implementation of current import conditions, information provided by NPPOs of countries that export cut flowers and foliage to Australia, an extensive literature review including floriculture and greenhouse pests, and discussions with internal and external stakeholders.

The ISPM No.2 Framework for pest risk analysis (FAO 2016a) states that 'Specific organisms may ... be analysed individually, or in groups where individual species share common biological characteristics.' The department is undertaking a group approach to this PRA which is consistent with relevant international standards and requirements—including ISPM 2, ISPM 11: Pest risk analysis for quarantine pests (FAO 2016c) and the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) (WTO 1995b).

1.2.1 Background

For around 50 years Australia has permitted the importation of cut flowers and foliage from many countries, provided Australian biosecurity requirements are met. With this trade comes the potential to introduce pests into Australia. Imports of various species of cut flowers and foliage have increased and are likely to continue to increase, due to significantly lower production costs in overseas countries, and continuing consumer demand for varied and new varieties throughout the year (Interim Inspector-General of Biosecurity 2015).

In 2017, the department conducted an internal review of Australia's import conditions for fresh cut flowers and foliage. This was part of a program of import condition reviews funded by the *Agricultural Competitiveness White Paper*, under the biosecurity surveillance and analysis initiative (more information is available from agriculture.gov.au/biosecurity/agwhitepaper-bio-surveillance-analysis). The import conditions review considered whether the import conditions in place at that time:

- were easy to understand and find in the department's Biosecurity Import Conditions system (BICON).
- were based on current information and risk management approaches.
- provided the department the ability to identify treatments available to manage biosecurity risks such as pests, diseases and contaminants.

The import conditions review found, at that time, that cut flower and foliage imports into Australia had increased considerably, citing Australian Bureau of Statistics data that showed growth in imports from around \$14.8 million in value in 2000–01 to \$64.1 million in value in 2015–16 (in 2015–16 dollar rate). Analysis of interception records showed that a high percentage of consignments of cut flowers and foliage had arthropod pests (primarily thrips, aphids and mites), with some countries having in excess of 50% of consignments with live arthropods. This high interception rate of arthropod pests was previously addressed by onshore methyl bromide fumigation, however this placed significant reliance on one pest control measure at the border.

In November 2017, the department finalised the *Group pest risk analysis for thrips and orthotospoviruses on fresh fruit, vegetable, cut-flower and foliage imports* (Thrips Group PRA) (DAWR 2017a). The Thrips Group PRA considered the biosecurity risk posed by all thrips across numerous import pathways, including cut flowers and foliage, and the biosecurity risk posed by the virus genus *Orthotospovirus*, which is transmitted by certain thrips species. The Thrips Group PRA identified phytosanitary measures for quarantine and regulated thrips (the definition of ‘regulated article’ is given in the Glossary and more detail is provided in Section 6.1.3 of Part 1 of this PRA) to reduce the risk of entry, establishment and spread of these organisms to Australia.

Based upon the outcomes of the import condition review and Thrips Group PRA, import conditions for cut flower and foliage were revised and implemented on 1 March 2018. These conditions require exporting countries to manage biosecurity risks before they send cut flowers and foliage to Australia, to reduce the risk of pests arriving at Australia’s border. Australia now also recognises multiple pest control options (relating to production, packaging and the export system) and pre-export treatments, which give greater confidence that any pests associated with imported cut flowers and foliage are dealt with appropriately before the goods reach Australia.

As required under the SPS Agreement, this PRA was initiated to assess the pests of biosecurity concern to Australia that are associated with global imports of fresh cut flowers and foliage, and whether the revised import conditions are effectively managing the biosecurity risks to achieve the ALOP for Australia.

1.2.2 Scope

The scope of the PRA (Part 1 and Part 2) is restricted to arthropod taxa associated with the pathway for commercially produced fresh cut flower and foliage imports for decorative purposes from all sources to Australia. In this PRA fresh cut flowers and foliage are defined as stems with flowers and foliage, without propagules (for example, bulbils, fruit and seeds). For simplicity, the term cut flower(s) and foliage will be used to refer to commercially produced fresh cut flower(s) and foliage throughout the PRA.

The PRA does not examine the risks posed by pathogens, weeds or non-arthropod pests on the cut flower and foliage pathway, except where certain pathogens are known to be transmitted by arthropods. It also does not examine Australia’s current requirements for herbicide devitalisation for propagatable species.

The PRA (Part 2) incorporates:

- findings from previous internal and publicly-available risk analyses and policy reviews of the cut flower and foliage pathway, including the department’s policy reviews on the importation of:
 - *Lilium* species cut flowers and *Phalaenopsis* nursery stock from Taiwan
 - *Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut flower and foliage imports*, and
 - *Draft group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports*, and

- *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (available from agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers).
- information from pest risk analyses conducted by the department for other commodities
- pest and biological control agent (BCA) information supplied by a number of the NPPOs of key exporting countries
- the results of visits undertaken by the department to cut flower growing facilities, packing houses and NPPO inspection points in Colombia, Ecuador, India and Kenya
- analyses of arthropod interception data recorded by the department for the periods 1 January 2000 to 28 February 2018, and 1 March 2018 to 30 December 2020, used to determine the interception rate of quarantine pests on this pathway, and
- an extensive literature review of floriculture pests.

The PRA (Part 1 and Part 2) focused on the:

- major cut flower and foliage exporting countries,
- currently permitted and most traded cut flower and foliage genera/species (a summary list is given in Appendix A), and
- key pest groups that are known to be associated with the cut flower and foliage pathway.

The PRA has been conducted in two parts—the first part (*Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1*), finalised in June 2019, assessed the three most frequently intercepted arthropod taxa on cut flower and foliage imports arriving at Australia's border. These were the mites (Arachnida: Acari), aphids (Insecta: Hemiptera: Aphididae) and thrips (Insecta: Thysanoptera).

This document is the second part of the PRA (Part 2) and assesses the remaining arthropod pests associated with imported cut flowers and foliage, the beetles (Insecta: Coleoptera), flies (Insecta: Diptera), bugs (Insecta: Hemiptera (other than aphids)), wasps, bees and ants (Insecta: Hymenoptera) and moths and butterflies (Insecta: Lepidoptera).

Part 1 and Part 2 of the PRA identified both regulated and potentially regulated articles during the assessment. A regulated article is defined by the IPPC (FAO 2019b) as—‘Any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harbouring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved’. These articles (pests) are regulated at the Australian border because they have the potential to transmit pathogens that are of biosecurity concern for Australia. The department will conduct risk assessments of the potential regulated articles identified in the PRA through Part 3 of the PRA and as required on a case-by-case basis. Following the risk assessments, phytosanitary measures will be updated as required.

Some of the Orders of insects reviewed in Part 2 of this PRA contain species that are not plant pests, but the department's interception data shows they are contaminating pests on this pathway. This document also assesses the regulatory status for Australia of these contaminating

pests, according to the *Biosecurity Act 2015* (further information is provided in Sections 1.2.3-4 of this chapter).

Of note for this PRA, several of the arthropod pests identified on the pathway in Part 2 are also listed as national priority plant pests for Australia (Department of Agriculture 2019f). The National Priority Plant Pest List is endorsed by Australia's Plant Health Committee (Australia's peak government plant biosecurity policy and decision-making forum) and identifies national priority plant pests that are of significant concern as they are capable of damaging Australia's natural environment, food production and agricultural industries.

The national priority plant pests for Australia, or insects capable of transmitting a national priority plant pest identified in Part 2 of this PRA include leafhoppers and sharpshooters (Insecta: Hemiptera: Cicadellidae) with the potential to transmit Australia's number one national priority plant pest, the bacterium *Xylella fastidiosa*. Also included are exotic invasive ants (Insecta: Hymenoptera: Formicidae), exotic bees (Insecta: Hymenoptera: Apidae) and the internal and external mites of bees (Acari), exotic leaf mining flies in the *Liriomyza* genus (Insecta: Diptera: Agromyzidae), armyworms in the *Spodoptera* genus (Insecta: Lepidoptera: Noctuidae), and vectors of exotic *Begomovirus* species (*Bemisia tabaci*—Insecta: Hemiptera: Aleyrodidae).

1.2.3 Contaminating pests

In addition to the pests of cut flowers and foliage that are assessed in this PRA, there are other organisms that may arrive with imported cut flowers and foliage that are not pests of the commodity. These organisms are contaminating pests ('contaminants') of cut flowers and foliage. A contaminating pest is defined by the IPPC (FAO 2019b) as 'A pest that is carried by a commodity, packaging, conveyance or container, or present in a storage place and that, in the case of plants and plant products, does not infest them'. In this PRA, contaminants include pests that may:

- cause environmental and amenity damage (such as invasive ants)
- transmit diseases of humans and/or animals (for example, mosquitoes, and bees that can transmit bee mites and pathogens)
- predate or parasitise native Australian arthropods (some beetles, bugs and wasps)
- be used as biological control agents (BCAs) in the exporting country's flower production systems (for example, parasitic wasps)
- be household or production nuisance pests (such as cockroaches, fungus gnats, millipedes, earwigs and spiders).

The risks posed by contaminants on the plant import pathway are routinely addressed by existing standard operating procedures (see Appendix B for more detail). In this PRA, the presence of contaminating pests has been highlighted—in part because of the nature of the commodity (flowers attract a wide variety of arthropods), but also because the department has historic interception data for the types of arthropods intercepted over time. For this reason, the department has clarified the regulatory status of individual contaminant species in the pest groups assessed in this PRA (belonging to the Coleoptera, Diptera, Hemiptera and Hymenoptera), and included this status in the pest categorisation assessment.

Contaminating BCAs and other beneficial organisms on the cut flower and foliage import pathway are subject to additional requirements in Australia, and these requirements are also outlined in Appendix B.

1.2.4 Regulatory framework

The *Biosecurity Act 2015* (Biosecurity Act) and its subordinate legislation provides the legal basis for preventing or controlling the entry of plants and plant products including cut flowers and foliage into Australia, and for managing the biosecurity risk arising from cut flower and foliage consignments, including the pests associated with those consignments, after they arrive at Australia's border.

Commercial cut flower and foliage imports are covered by Sections 26(1) and 26(2) of the *Biosecurity (Prohibited and Conditionally Non-prohibited Goods) Determination 2016* (Goods Determination), which includes a list of permitted cut flower and foliage species with their permitted countries of origin and listed pre-export measures (the *List of Species of Fresh Cut Flowers and Foliage with Alternative Conditions for Import – Mainland*), available from the department's website (agriculture.gov.au/biosecurity/legislation/fresh-cut-flowers-mainland).

Due to the complexity of pest groups found on the imported cut flower and foliage pathway, the department is clarifying its regulatory stance in relation to contaminating pests, and with regard to the Biosecurity Act:

- Section 9 of the Biosecurity Act defines a pest as 'a species, strain or biotype of plant or animal, or a disease agent, that has the potential to cause, either directly or indirectly, harm to: human, animal or plant health; or the environment.'
- this definition applies to cut flower and foliage imports in Section 26(1)(d) of the Goods Determination, which specifies the condition that 'the goods are free from pests'.

The Biosecurity Act definition of pest encompasses the IPPC (FAO 2019b) definitions of:

- pest—'Any species, strain or biotype of plant, animal, or pathogenic agent injurious to plants or plant products'
- quarantine pest—'A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled', and
- regulated article—'Any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harbouring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved'.
- contaminating pest—'A pest that is carried by a commodity, packaging, conveyance or container, or present in a storage place and that, in the case of plants and plant products, does not infest them'.

The department will regulate all pests of biosecurity concern found in imported cut flowers and foliage, with pests in this context meaning quarantine pests, regulated articles, potential regulated articles and contaminating pests.

Domestic arrangements

The Australian Government is responsible for regulating the movement of goods such as plants and plant products into and out of Australia. However, the state and territory governments are responsible for plant health controls within their individual jurisdictions. Legislation relating to resource management or plant health may be used by state and territory government agencies to control interstate movement of plants and plant products. Once plants and plant products have been cleared by Australian Government biosecurity officers, they may be subject to interstate movement conditions. It is the importer's responsibility to identify and ensure compliance with all requirements.

2 Commercial trade and production

Information about Australia's cut flower and foliage industry and the global cut flower and foliage trade in relation to exports to Australia is provided in Part 1 of this PRA. The chapter in Part 1 of this PRA also includes information on the pre-harvest, harvest and post-harvest practices considered to be standard globally for the commercial production of cut flowers and foliage for export. The export capabilities of the five major cut flower and foliage producing countries were also outlined.

This information on commercial trade and production was provided as context in understanding the potential biosecurity risks associated with imported cut flowers and foliage due to international production and trade practices.

There have been no changes to these practices since the publication of the *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (Department of Agriculture 2019b). Please refer to Chapter 2 of that document, available from agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers.

3 Cut flower and foliage pathway

A pathway is defined as any means that allows the entry or spread of a pest (FAO 2019b). As previously mentioned (Section 1.2.1), the import of fresh cut flowers and foliage into Australia is an historic pathway, and has not previously been subject to a full risk analysis. Part 1 of this PRA summarised the findings of a literature review about cut flowers and foliage as a pathway for the entry and spread of arthropod pests.

There have been no additions to this information since the publication of the *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (Department of Agriculture 2019b). Please refer to Chapter 3 of that document, available from agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers.

4 Previous import policies and principles

Australia has long-established conditions for the importation of commercial consignments of cut flowers and foliage from many countries. Part 1 of this PRA documented a chronology of key events in the development of these conditions, included significant decisions that influenced these policy settings, and outlined the principles set by whole-of-biosecurity reviews conducted in Australia.

Please refer to Chapter 4 of the *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (Department of Agriculture 2019b), available from agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers. Sections 4.2 and 4.3 (presented below) provide additional information in an update to that provided in Part 1 of this PRA.

4.1 Chronology of events

There have been no additions to this information since the publication of the *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (Department of Agriculture 2019b).

4.2 Summary of recent import conditions

The following is an addition to the information presented in the *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (Department of Agriculture 2019b), and should be read sequentially after Section 4.2.2 of the information presented in that document.

4.2.1 Change in status of *Tetranychus* mites for certain countries

After receipt of submissions from NPPOs, in 2019 the department completed work to determine the status of *Tetranychus* mites on cut flowers and foliage from the countries with the largest export volumes to Australia: Colombia, Ecuador and Kenya. Molecular testing confirmed that the *Tetranychus* mites found on flowers from Colombia, Ecuador and Kenya were predominately *Tetranychus urticae*, with a small number of interceptions of *T. lambi* and *T. ludeni*. The diagnostic work was only possible because the department had a sufficiently large sample size of previously intercepted specimens to provide confidence in their identifications. These three species of *Tetranychus* mites are not quarantine pests for Australia because they are present and not under official control.

The department did not find any other species of *Tetranychus* mites on cut flowers and foliage from these three countries and is therefore confident that any *Tetranychus* mites found on cut flowers and foliage from Colombia, Ecuador and Kenya are likely to be *T. urticae*, *T. lambi* or *T. ludeni*. Based on this outcome, from 1 September 2019, the department ceased applying phytosanitary measures to imported cut flowers and foliage from Colombia, Ecuador and Kenya infested with *Tetranychus* mites if they are the only pest found. The department will conduct periodic verifications of the *Tetranychus* mites arriving on cut flowers and foliage from these countries, to verify that no *Tetranychus* species that are quarantine pests for Australia are detected. Phytosanitary measures will be applied to imported cut flowers and foliage from these countries if other species of *Tetranychus* mites or other pests of biosecurity concern are detected.

4.2.2 Introduction of import permits for certain countries

On 1 September 2019, the department introduced additional requirements for an import permit for shipments of cut flowers and foliage produced in Colombia, Ecuador and Kenya under a

systems approach due to the continued high levels of pest interceptions and high export volumes from these trading partners under this export method.

Import permits took effect from 1 September 2019, and the department closely monitors compliance with the permit. To be granted an import permit, importers are required to develop a supply chain management system for each country from which they are planning to import. The supply chain management system must include details of:

- **the scope of activities**—details of the supply chain and all parties involved in biosecurity risk management prior to export, and the control measures to be performed across the pre-export supply chain. The proposed risk management controls must be additional to any regulatory control measures required by the exporting country's NPPO.
- **the implementation**—an explanation of how the control measures would be applied across the supply chain to manage the biosecurity risk.

Import permits are a regulatory tool that allow the department to more rapidly address the compliance of goods of individual importers. Where the department's monitoring identifies that compliance is not improving, such as in the case of unsatisfactory pest interception rates, the department may refuse to grant another permit, or require the importer to modify their supply chain management system.

Further information and guidance on the import permits and supply chain management systems is available on the department's website (from agriculture.gov.au/import/goods/plant-products/cut-flowers-foliage/invertebrate-pest-management#import--permits) and permit applications are available on the department's Biosecurity Import Conditions (BICON) system (from bicon.agriculture.gov.au/BiconWeb4.0/).

4.2.3 Suspension of pathway elements for certain countries

On 26 June 2020, the department implemented additional control measures through the suspension of chrysanthemums from Malaysia imported under a systems approach and NPPO-approved alternative disinfestation treatments. This was due to repeat interceptions of serpentine leaf miner (*Liriomyza huidobrensis*). Imports of chrysanthemums from Malaysia require methyl bromide fumigation at a rate of 32g/m³ at ≥21°C for 3 hours prior to export. These conditions will remain in effect until the department is able to undertake a review of the offshore pest management measures.

In situations of emerging risk, the department will review pathway elements to ensure import conditions are adequate.

4.3 Stakeholder consultation

The department has engaged in an extensive program of consultation with international and domestic stakeholders.

In 2016, the department established the Imported Cut Flowers and Foliage Regulation Working Group to enable the discussion of major policy and operational changes with cut flower importing, production and nursery garden industry sectors, as well as Plant Health Australia. This included discussion on the biosecurity risks associated with imported cut flowers and foliage, and the implementation of the revised import conditions.

Engagement has included corresponding with all countries through an SPS Notification (G/SPS/N/AUS/435 Importing fresh cut flowers and foliage into Australia safely) dated 14 September 2017, and addenda 1 to 6 to this SPS Notification in November 2017, November 2018, February 2019, April 2019, June 2019 and May 2020. The NPPOs of the 19 leading exporting countries were also advised of the changes to conditions and provided with updates on interception rates of pests of biosecurity concern, and visits were made to Colombia, Ecuador, India and Kenya to observe and evaluate commercial production practices. The department has corresponded with leading Australian importers and issued Industry Advice Notices to industry participants advising of the revision of import conditions.

Specific consultation on Part 1 of the PRA was conducted in 2019, with countries and their Australian representatives, importers, and domestic horticultural industries. In addition, in April 2019 the department held a stakeholder forum for all interested parties, with presentations from departmental staff on the import conditions, the PRA, inspection and scientific services, and from importers and domestic horticultural industries.

Consultation on the import conditions and subsequent regulatory changes has continued with international trading partners and domestic industries, particularly in the lead up to the introduction of import permits for Colombia, Kenya and Ecuador, and with importers in the decision period for renewing import permits. In September 2019, the department also expanded the membership of the Imported Cut Flowers and Foliage Regulation Working Group to include broader representation from domestic production industries.

Specific consultation was conducted on Part 2 of the PRA in 2020, with countries and their Australian representatives, importers, and domestic horticultural industries. A second stakeholder forum was planned for March 2020 but was replaced by a written update due to travel restrictions under the emerging COVID-19 situation.

The revised import conditions have been in place for almost three years, and the department has changed focus to monitoring and evaluation of the pathway. As such, the Imported Cut Flowers and Foliage Regulation Working Group's operation ceased on 28 October 2020. The department continues to engage with stakeholders, as required on this topic.

More detail about all international and domestic consultation is available in the *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (Department of Agriculture 2019b), and additions since April 2019 are presented in Appendix C of this document.

5 Changing patterns of activity and risk

Cut flowers and foliage are traded globally, and trade patterns have changed over time. In an historic trade pathway, like cut flowers and foliage to Australia, changes in trade patterns create changes to biosecurity risk, as different countries have different arthropod pest profiles. The changes to the biosecurity risk of this pathway formed the basis for Australia initiating this PRA.

The analysis of tariff code data on imports and arthropod pest interception data previously presented in Chapter 5 of the Draft of Part 2 of this PRA has not been updated. For reference:

- the interception data for the period 1 January 2000 to 31 December 2019 is provided in Appendix D (data summary). A detailed arthropod interception analysis at family, genus and species level is presented in an Excel spreadsheet, which is available from the department's website at agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers#pest-risk-analysis-for-cut-flower-and-foliage-imports---part-2.
- the content of the previous Chapter 5 has been reproduced in full and provided in Appendix I of this document).

The department's interception data for 2020 were assessed to determine whether any additional species of biosecurity concern were intercepted during this period, and this information is reported in Chapter 6 of this document.

This chapter now presents an update to the interception data of live pests of biosecurity concern on consignments arriving at Australia's border, as provided in Part 1 of this PRA and the draft of Part 2 of this PRA.

5.1 Revised import conditions and interceptions of pests of biosecurity concern

The department has continued to conduct verification and inspection activities on consignments of cut flowers and foliage that arrive at Australia's border, and has reported instances of live pest interceptions to exporting countries and Australian importers. In addition, the department introduced import permits on 1 September 2019 for countries with high volumes of cut flowers with high pest interception rates, and on 26 June 2020 suspended imports of chrysanthemums from Malaysia under a systems approach. The department also changed the biosecurity status of *Tetranychus* mites, from quarantine pest to non-quarantine pest, on cut flowers and foliage from Colombia, Ecuador and Kenya (see Section 4.2 for more detail).

The following section is an analysis of the department's records of interceptions of live pests of biosecurity concern on the cut flowers and foliage pathway. Imports of cut flowers and foliage are considered non-compliant with import conditions if they are found with live pests of biosecurity concern for Australia, if they are accompanied by documentation that is not complete and correct, if they are not accompanied with an import permit (if required) or if they do not meet other import requirements set out by the department. All non-compliant consignments require remedial action at the Australian border prior to release.

It is important to note that the following analysis reflects the updated biosecurity status of *Tetranychus* mites from Colombia, Ecuador and Kenya, retrospectively—that is, mites of this

genus in consignments from those three countries have been removed from registering as non-compliance.

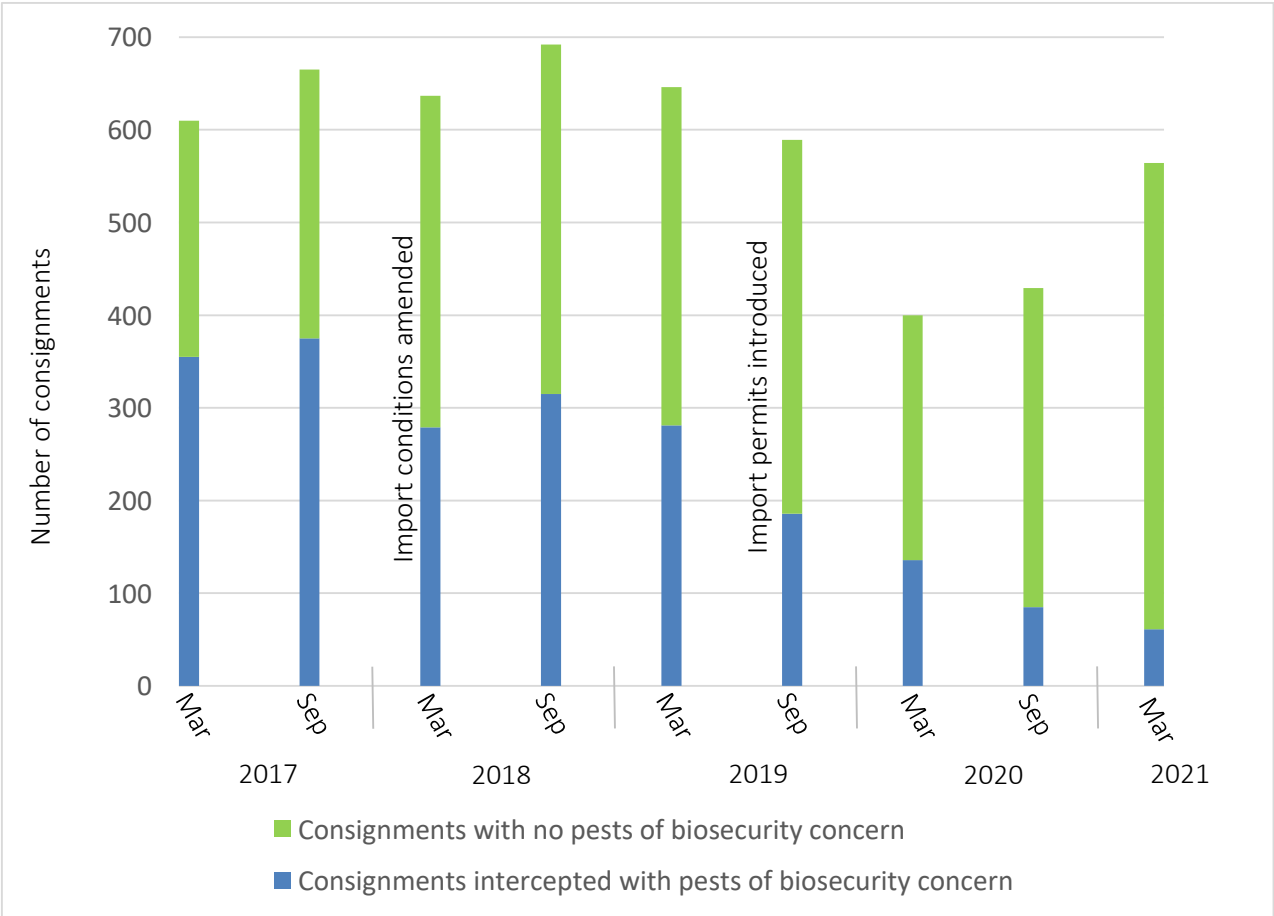
5.1.1 Snapshot analysis of interceptions of live pests of biosecurity concern from 2017 to 2021

Since 1 March 2018, revised import conditions have specified that countries must use one of three arthropod pest management options before exporting cut flowers and foliage to Australia: an NPPO-approved systems approach, pre-export methyl bromide fumigation, or an NPPO-approved alternative pre-export disinfestation treatment. In addition, a change in biosecurity risk has led to the introduction of permits for specific trading partners and suspension of chrysanthemums from Malaysia imported under a systems approach.

To evaluate the effectiveness of the changes in phytosanitary measures on the cut flower and foliage pathway, a snapshot analysis of interceptions of pests of biosecurity concern during 2017 (prior to the introduction of revised measures on 1 March 2018) to 2021 was performed.

Figure 1 presents the total number of consignments of cut flowers and foliage intercepted with and without live pests of biosecurity concern imported into Australia from all countries.

Figure 1 Number of imported consignments intercepted with/without live pests of biosecurity concern on cut flowers and foliage from all countries to Australia for 2017 to 2021.



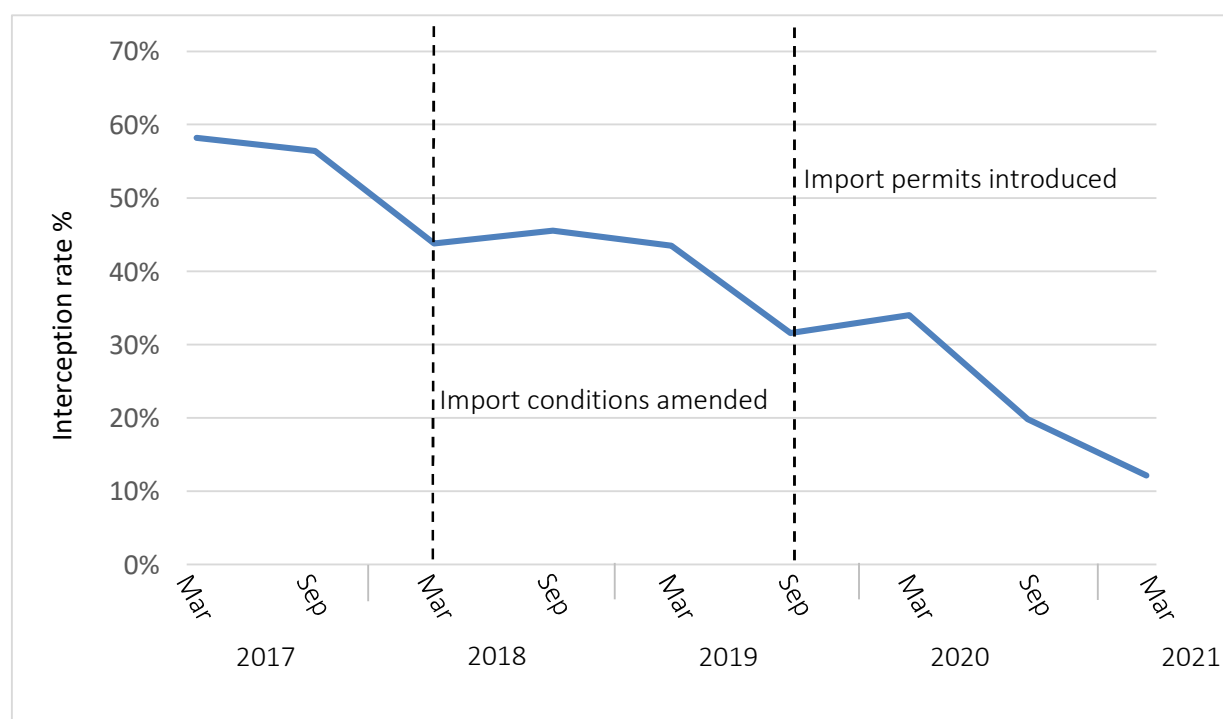
Source: Departmental consignment data.

Figure 1 shows a steady decline in the number of consignments arriving at Australia's border with live pests of biosecurity concern following the changes in import measures introduced on 1 March 2018. In September 2017, before changes to import measures were implemented, 375 consignments were intercepted with live pests of biosecurity concern at the Australian border. In contrast, in March 2021 only 61 consignments were intercepted with live pests of biosecurity concern. The department's commitment to revise import conditions as necessary, through the introduction of import permits in 2019 and appropriately targeted restrictions on specific pathways in 2020, has resulted in significant reductions in the number of consignments with pests of biosecurity concern being intercepted at the Australian border.

Figure 1 also shows a decrease in the total number of imported consignments during 2020 and 2021, due to the reduction in trade of cut flowers and foliage during the COVID-19 pandemic. In 2020 and 2021, while overall numbers of consignments decreased, a reduction in the percentage of consignments intercepted with pests of biosecurity concern is still observed.

To account for fluctuations in the numbers of consignments of imported cut flowers and foliage, Figure 2 presents a snapshot of interception rates of live pests of biosecurity concern found on cut flower and foliage consignments imported into Australia from all countries during March and September for 2017 to 2021.

Figure 2 Interception rates of pests of biosecurity concern on all consignments of cut flowers and foliage imported into Australia from all countries for 2017 to 2021.



Source: Departmental consignment data.

Despite the reduction in the number of consignments imported into Australia in 2020, the data presented in Figure 2 show that the percentage of consignments detected with live pests of biosecurity concern has reduced from 56% in September 2017 to 12% in March 2021.

The department continues to monitor imports of cut flowers and foliage from all countries and continues to review and strengthen Australia's import requirements. All consignments are subject to border procedures, and if live arthropods of biosecurity concern are intercepted, the consignment is either fumigated (where appropriate) prior to release or exported or destroyed. Where live pests of biosecurity concern continue to be intercepted at high levels, become more frequent, or new pests are intercepted, the department will revise regulatory measures. The actions being taken by the department in response to changes in biosecurity risk, including high levels of pest interceptions are discussed further in Section 7.

5.2 Chapter conclusion

The patterns of global cut flower and foliage trade as they relate to Australia have changed. In the recent past, changes have encompassed a combination of increased import volumes, different countries of origin, and a high arrival rate of live arthropods in Australia. All these factors contribute to a change in biosecurity risk associated with this importation pathway and have led to the department's decision to revise import conditions and conduct this PRA. Analysis of departmental interception data confirms the association of arthropods with the cut flower and foliage pathway and identifies the prevalence of different pest groups arriving with the commodity.

The analysis of interception data after September 2019 confirms that the revised import conditions are having the intended effect, that is, reducing the arrival rate of live pests of biosecurity concern to Australia on the cut flower and foliage pathway.

6 Pest risk assessment

This chapter identifies and assesses the pests of biosecurity concern to Australia that are associated with commercially produced imports of fresh cut flowers and foliage from all sources. As previously noted, this document (Part 2 of the PRA) focuses on the following arthropod orders—Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera. The methodology used for this assessment is presented in Appendix E of this document.

The species that are the subject of this chapter are those that were assessed in the pest categorisation table (Appendix F) as being quarantine pests or potential regulated articles for Australia (378 species). A summary table of these species is provided in Appendix G.

Information on the biology of these groups is presented, including for those groups that have been classified in this PRA as contaminating pests. The results of the department's analysis of interceptions on the cut flower and foliage pathway are discussed. An analysis of the risk ratings assigned to those quarantine pests assessed in previous departmental policies is also presented. A pest risk assessment has been conducted in accordance with ISPM 11: *Pest Risk Analysis for Quarantine pests* (FAO 2016c), to determine the quarantine pests associated with the pathway and estimate the level of unrestricted risk they pose.

The interception data discussed in this chapter are for the period 1 January 2000 to 31 December 2019. A summary of these data is provided in Appendix D, and detailed arthropod interception analysis at family, genus and species level is presented in an Excel spreadsheet, which is available from the department's website at agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers#pest-risk-analysis-for-cut-flower-and-foliage-imports---part-2.

Interception data for the 2020 year are not reflected in these results but were considered by the department to identify any additional pests of biosecurity concern that had not previously been identified. Only one additional species was identified, *Olene inclusa* Walker, 1856 (Lymantriidae), a lepidopteran that has been assessed as a quarantine pest for Australia and added to the Pest Categorisation Table (Appendix F) and the summary list of species provided in Appendix G.

6.1 Biology of Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera

6.1.1 Order Coleoptera (beetles)

The Coleoptera is the largest insect order in the world, with over 350,000 species described in 175 families (Britton 2019; CSIRO 2019d; Royal Entomological Society 2016). The order has more plant-feeding species than any other insect order (Kerruish & Unger 2010).

Coleoptera go through complete metamorphosis—their life cycle consists of four life stages, egg, larva, pupa and adult. The number of eggs laid depends on the beetle species and may range from one or two, up to hundreds. Eggs are usually laid into suitable substrate or close by an appropriate food source. The larvae often complete their development and pupate in the substrate where the eggs were laid, which may be soil, organic matter, water, plant or animal material (CSIRO 2019d). Beetle larvae live in a range of habitats including concealed habitats, such as underground or inside plants (Britton 2019), in decomposing or dead wood and/or plant material, mammalian herbivore dung, and exposed plant surfaces such as leaves and flowers (Resh & Carde 2009). Coleoptera are predominantly herbivores, scavengers or predators (Royal Entomological Society

2016). Both larvae and adults have biting and/or chewing mouthparts and are able to feed on other arthropods, fruit, fungi, dead animal and plant material, and wood (Britton 2019). The larvae are typically the main feeding stage but in many families the adults are long-lived and also feed. Some families of Coleoptera contain a combination of feeding types, depending on the genus or species, and the feeding habits of larvae and adults may be the same or vary. For example, some beetle species are predatory when in the larval stage and plant-feeders when adults (CSIRO 2019d). Most beetles are also capable of flight as adults although they are not considered agile or fast fliers (Resh & Carde 2009). Some species may swarm, and there is evidence that flights may be wind assisted (Fleming 1972), which is likely to increase their flight range (Biosecurity Australia 2011a; Pedgley 1982).

Interception analysis of data from 1 January 2000 to 31 December 2019 conducted for this PRA identified 54 species of Coleoptera on the cut flower and foliage pathway from 37 genera (see the dataset discussed in Appendix D). Of these, 18 species are biosecurity pests of concern for Australia (as categorised in Appendix F). It is likely that more species of Coleoptera are on this pathway, as only 466 of the 1074 individual interceptions were identified to genus or species level. The Coleoptera interceptions were attributed to 46 different families and 87 individual genera. The department's assessment of interception records that occurred in the year 2020 found no additional species of Coleoptera that were of biosecurity concern and were not already included in the pest categorisation table.

The most frequently intercepted families of Coleoptera on the imported cut flower and foliage pathway, in order of the frequency of interceptions, were the Latridiidae, Staphylinidae, Coccinellidae, Curculionidae, Chrysomelidae, Nitidulidae, Mycetophagidae, Scarabaeidae and Silvanidae (see the dataset discussed in Appendix D). Examples of these, and the impacts they can have, are discussed in more detail in the following section.

The most frequently intercepted families fall into several different life history/host types:

- those with the greatest numbers of plant feeders are the Chrysomelidae, Curculionidae and Scarabaeidae
- families that are predominantly predators of other arthropods that are plant feeders, such as aphids, mealybugs and scales (Coccinellidae and some Staphylinidae)
- families that feed on fungi or leaf litter (Latridiidae, Mycetophagidae, Nitidulidae and Silvanidae).

Chrysomelidae

The Chrysomelidae is a diverse family of phytophagous beetles, and both adults and larvae feed on nearly every type of plant and plant part, and the family contains many economically significant pests of agriculture and stored products (Azad et al. 2015; Bieńkowski & Orlova-Bienkowskaja 2018). There are a number of leaf-eating chrysomelids identified on this pathway, such as *Phyllotreta striolata*, which is a quarantine pest for Australia and feeds on cruciferous crops such as broccoli, cabbage, and cauliflower, and other important crops such as cucumber, squash, pumpkin, tomato, and potato (Hoffmann, Hoebeke & Dillard 2011). Under heavy infestations, affected leaves appear burnt and seedling loss can be significant (CABI 2020a). Adult feeding on foliage and roots delays plant development and results in lower yields, or death of young plants. Damage to broccoli and cabbage heads is known to significantly reduce crop quality and

marketability (Hoffmann, Hoebeke & Dillard 2011). Additionally, *P. striolata* is a vector of *Radish mosaic virus* (Butter 2018) which is not known to occur in Australia.

Curculionidae

The Curculionidae (weevils) is a highly diverse family of over 50,000 species, most of which feed on plants both as larvae and adults. Quarantine pest weevils intercepted on imported cut flowers and foliage include *Polydrusus formosus*, a pest of apple, pear, cherry, plum, *Corylus* and *Quercus* spp. (Alford 2016). The soil-inhabiting larvae often feed on plant roots, where adults can cause extensive damage to fruit buds, shoots, and blossoms (Alford 2016). Because of their plant feeding biology, all exotic weevils are considered to have the potential to cause economic (including environmental) consequences.

Scarabaeidae

In another plant feeding family, the Scarabaeidae, many are polyphagous pests that can feed on all plant parts, including roots, leaves, flowers and plant sap from wounds and fruit (Scholtz & Grebennikov 2016). For example, the quarantine pest *Adoretus versutus* (rose beetle) has a wide host range including *Acacia*, *Carica*, *Citrus*, *Coffea*, *Ficus*, *Hibiscus*, *Ipomoea*, *Litchi*, *Malus*, *Phaseolus*, *Prunus*, *Pyrus*, *Rosa*, *Solanum*, *Sorghum*, *Vitis* and *Zinnia* spp. (CABI 2020a). Larvae of the rose beetle attack the roots of host plants, while adults attack flowers and leaves, causing defoliation and young plant mortality (Waterhouse & Norris 1987).

The most frequently intercepted identified quarantine pest scarab on the cut flower and foliage pathway is *Oxythyrea funesta* (white spotted rose beetle). *Oxythyrea funesta* is polyphagous, attacking both wild and cultivated plants (Tamutis & Dalius 2013). The beetle is associated with pollen and flowers of apple, peach, rose, carnation and citrus, and some vegetable and field crops, including grains and vineyards (Gentry 1965; PaDIL 2020; Tamutis & Dalius 2013). The adult chews flower parts, rendering the flower infertile. Adults are considered harmful in southern Europe due to damage of floral organs and buds. Larvae have also been observed feeding on small plant roots (Tamutis & Dalius 2013), and the species has caused serious crop losses in Bulgaria (Gentry 1965).

Coccinellidae

Many coccinellids are predatory; for example, the three exotic species *Harmonia axyridis* (multi-coloured Asian ladybird), *Coccinella septempunctata* (seven spot ladybird) and *Propylea quatuordecimpunctata* (fourteen spotted lady beetle) are important natural enemies of aphids, scales, thrips, and other soft-bodied arthropods, and also feed on pollen and nectar from flowers when prey is scarce (Aristizábal & Arthurs 2018). Coccinellids lay eggs in masses (Britton 2019; Resh & Carde 2009), and their larvae are also generally predatory, moving freely about plant surfaces searching for prey. Predatory species are generally considered to be contaminating pests on this pathway and will be addressed by existing standard operational procedures if intercepted on arrival (see Appendix B for more detail about the department's standard operating procedures).

Harmonia axyridis is both predatory and phytophagous and is a quarantine pest for Australia. The species is highly invasive and has rapidly invaded most of North America and Europe, and it is now spreading in other regions such as South America and South Africa (CABI 2020b). The species can also be a household nuisance pest (Koch 2003). For example, in autumn in the USA, buildings can be invaded by large numbers of beetles (Potter et al. 2005). Exposure to these beetles can also

cause a range of allergenic responses in humans (Goetz 2009; Sharma et al. 2006). In autumn, *H. axyridis* adults are also reported to congregate in large numbers and feed on late season fruit, such as apples, pears, grapes and raspberries (Galvan, Burkness & Hutchison 2006; Koch & Galvan 2008; Kovach 2004). *Harmonia axyridis* is recognised as a pest of fruit, particularly wine grapes (Galvan, Burkness & Hutchison 2006; Kovach 2004). When present in harvested grapes, they release chemicals that can negatively impact wine flavour and aroma (Martin 2018c), which is known as ‘ladybug taint’ in wines (Brown et al. 2011). *Harmonia axyridis* is also known as an environmental pest, as it is highly polyphagous, has the capacity to out-compete other predators, and can pose a risk to native arthropod biodiversity (CABI 2020b).

Some coccinellid beetles are used as commercial biological control agents (BCAs) and most are regarded as contaminating pests of the commodity. For example, *Coccinella septempunctata*, which is not present in Australia, feeds predominantly on aphids and supplements its diet with pollen, nectar and fungal spores (Bertolaccini, Núñez-Pérez & Tizado 2008), and is often used as a BCA (Biosecurity Australia 2005a). *Propylea quatuordecimpunctata* is also not present in Australia, and is predatory on several types of arthropods, including aphids, and for that reason is used as a BCA in crops (van der Vlugt 2009). Both of these beetles have the potential to affect populations of native Australian insects because of their predatory habits, and as discussed in Section 1.2.3, BCAs are subject to additional import requirements before they can be released into the Australian environment. Although none of Australia’s major trading partners have reported using beetles as BCAs in cut flower and foliage production practices, these and other exotic coccinellid species may be present naturally in some cut flower and foliage growing regions.

Latridiidae, Mycetophagidae and Nitidulidae

The last groups of beetle families most frequently intercepted on the cut flower and foliage pathway are predominantly fungal feeders. Members of these families can be found in decaying vegetation and stored products. It is likely that these species become associated with cut flowers and foliage because of the moist growing conditions of the commodity and, as such, most are regarded as contaminants of the commodity. For example, Latridiidae adults and larvae are frequently found in decaying vegetation where they feed predominantly on the spores and conidia of ascomycete fungi (Lord et al. 2010; Majka, Langor & Rucker 2009). Similarly, most members of the Mycetophagidae are fungivorous, feeding primarily on spores or fungal fruiting bodies (Schigel 2012). Others are fairly commonly found in stored products, where they feed on moulds and decaying plant products (Gorham 1987; Lawrence, Pollock & Slipinski 2016). Nitidulids are frequently associated with decomposing plant material and other microhabitats, where they feed on fungi. Certain members of this family are known to feed on pollen and nectar, and several members of the genus *Meligethes* (unidentified *Meligethes* species have been intercepted on this pathway) feed on flowers from multiple species, notably canola (Cline 2005; Jelinek et al. 2016; Mason et al. 2003; Nentwig, Frank & Lethmayer 1998). The quarantine pest *Meligethes aeneus* is readily attracted to a wide range of flowers and may be exported accidentally; larvae damage flower buds, and severe damage can cause the buds to drop leaving podless stalks (CABI 2020b). Species such as *Carpophilus hemipterus*, which is not a quarantine pest for Australia, can also vector the fungal pathogen *Monilinia fructigena* (Agrios 2008), a fungus not present in Australia that causes brown rot in fruit (PaDIL 2020). *Carpophilus hemipterus* can also transmit the bacterial pathogen *Dickeya zeae* pineapple strain (= *Erwinia chrysanthemi*), a causal agent of rot disease on a wide range of hosts. *Dickeya zeae* is under official control in northern Australia (Northern

Territory Government of Australia 2017; QDAF 2018a). For this reason, *C. hemipterus* is considered a potential regulated article for Australia.

6.1.2 Order Diptera (flies)

Over 160,000 species of Diptera have been described in 150 families (CSIRO 2019b). Flies are ubiquitous and cosmopolitan, having successfully colonized nearly every habitat and all continents, including Antarctica. Depending on the group, adults can be non-feeding or feeding, with the latter including diets of blood, nectar, and other liquefied organic materials (Resh & Carde 2009). Several families of Diptera are of major economic importance to agriculture, and some are involved in the transmission of more disease pathogens to humans and other animals than any other group of arthropods (Resh & Carde 2009).

Diptera go through complete metamorphosis and their life cycle consists of four life stages: egg, larva, pupa and adult. Adults are usually winged and active fliers (Resh & Carde 2009). They have sucking/rasping and/or piercing mouthparts and are typically only able to feed on liquids. Larvae often complete their development and pupate in the substrate where the eggs were laid, which may be soil, organic matter, water, plant or animal material (CSIRO 2019b). Depending on their individual life histories, fly larvae mostly feed on moist, decomposing food items such as carrion, fungi, dung and rotting vegetable matter, although some are predators or parasites of other animals (CSIRO 2019b).

Interception analysis conducted for this PRA identified 21 species of Diptera on the cut flower and foliage pathway, from 17 genera (see the dataset discussed in Appendix D). Of these, three species are considered quarantine pests for Australia (refer to Appendix G). 11 additional species commonly found on the pathway are contaminating pests that vector pathogens of biosecurity concern to Australia based on their ability to transmit human and animal infectious agents. It is likely that more species of Diptera are on this pathway, as 201 interceptions of Diptera were not identified to family level. In addition, while 34 genera were identified from 42 families from 1144 interceptions, specimens of 17 genera were not identified to species level. The department's assessment of interception records that occurred in the year 2020 found no additional species of Diptera of biosecurity concern and that were not already included in the pest categorisation table.

The most frequently intercepted families of flies on the imported cut flower and foliage pathway, in order of the number of interceptions, were the Sciaridae, Cecidomyiidae, Chironomidae, Phoridae, Drosophilidae, Milichiidae and Psychodidae (see the dataset discussed in Appendix D). The most frequently intercepted genera were *Bradysia*, *Megaselia*, *Drosophila*, *Desmometopa* and *Liriomyza*. The most frequently identified species in these taxa, *Liriomyza huidobrensis* (serpentine leaf miner, family Agromyzidae), is a quarantine pest for Australia.

The fly families associated with imported cut flowers and foliage fall into several different life history/host types, and most of these groups are not considered to be plant pests, but rather are considered to be contaminating pests on this pathway. Some may also have environmental, human or animal health consequences. Examples of these are discussed in the following paragraphs.

Predators and parasitoids

A number of fly families are natural enemies of other arthropods, either as predators (Syrphidae larvae) or parasitoids (Tachinidae). Some natural enemies are also used as commercial BCAs. For example, adult hoverflies (Syrphidae) feed on pollen and nectar and are considered effective

pollinators, but their larvae are predators and feed on other arthropods, especially aphids, thrips, and other plant-sucking insects. Aphid-eating syrphids are recognized as important natural enemies of pests, and potential agents for use in biological control (ALA 2019; Bugg et al. 2008; UC IPM 2014). These species are not plant pests, but they have the potential to cause environmental consequences through predation on native arthropods. Their interception rate on the cut flower and foliage pathway is very low, with only 27 interceptions of syrphids recorded between 1 January 2000 and 31 December 2019, and they are considered to be contaminating pests on this pathway. Any interception of these species on arriving cut flowers and foliage will be addressed by existing standard operational procedures (Appendix B has more information).

Detritus feeders and contaminating pests

Detritus-feeding flies such as fungus gnats (Sciaridae), brine flies (Ephydriidae) and drain flies (Psychodidae) feed on decaying plant material and most species are considered to be contaminating pests on this pathway. Adult fungus gnats do not damage plants and their presence is primarily considered a nuisance (Betkhe & Dreistadt 2013). However, their larvae can feed on plant material (Manners 2013), and in large numbers can damage roots and stunt plant growth, particularly in seedlings and young plants (Betkhe & Dreistadt 2013). *Bradysia* spp. (Sciaridae) are known greenhouse pests and both adults and larvae can spread fungal diseases such as *Chalara*, *Botrytis*, *Pythium*, *Phytophthora*, *Fusarium*, *Rhizoctonia* and *Verticillium* (Manners 2013). Brine flies, such as *Scatella* spp., are nuisance pests in short-term greenhouse crops such as lettuce, herbs, cucumber and rose, and do not directly damage plant crops (Jacobson, Croft & Fenlon 1999; Vänninen & Koskula 2003). *Scatella* spp. can deposit faecal specks on vegetables and ornamental plants such as cut flowers, which can result in the rejection of produce due to lower aesthetic appeal and market value (Jacobson, Croft & Fenlon 1999). *Scatella* spp. are also vectors of fungal plant diseases such as *Pythium aphanidermatum* (Goldberg & Stanghellini 1991) (a pathogen that is not a quarantine pest for Australia), which causes major losses in greenhouse cucumber production (El Ghaouth et al. 1994). *Scatella tenuicosta* is a quarantine pest for Australia and has been intercepted on imported cut flowers and foliage.

Some flies that feed on pollen and/or nectar, but that are not considered plant pests, can be household nuisance pests, such as house flies (Muscidae), that are the best known and most widespread species. House fly adults can be attracted to various substances including sugar, sweat, tears and blood (ALA 2019). Species of Muscidae were intercepted at very low frequency, namely 20 times between 1 January 2000 and 31 December 2019. Other flies that fall into this group are the non-biting midges (Chironomidae), with the adults of some species feeding on pollen, and the larvae living in aquatic and semi-aquatic habitats (ALA 2019). Chironomids were intercepted 83 times between 1 January 2000 and 31 December 2019.

Biting flies

There also some flies that feed on living or decaying animal and/or human blood or flesh, such as biting midges (Ceratopogonidae), free-loader flies (Milichiidae), black flies (Simuliidae), blow flies (Calliphoridae), flesh flies (Sarcophagidae), horseflies (Tabanidae), mosquitoes (Culicidae) and scuttle flies (Phoridae). Members of these groups are not considered plant pests, although the adult flies will sometimes feed on nectar. Some of these species are capable of transmitting human and animal infectious agents, for example, members of the family Ceratopogonidae, the biting midges, are known to transmit pathogens and parasites of humans and animals. The most

important genus of biting midges of medical-veterinary interest is *Culicoides* (Mullen & Murphree 2019).

Four interceptions of *Culicoides* have been recorded on the cut flower and foliage pathway between 1 January 2000 and 31 December 2019, and another 20 interceptions of Ceratopogonidae that were not identified to species level have also been recorded. There have also been 21 interceptions of exotic mosquitoes (Culicidae), including the Asian tiger mosquito *Aedes albopictus*. *Aedes albopictus* is not present in Australia and can be a vector of a number of significant arboviruses, including yellow fever, dengue, chikungunya, Rift Valley fever and Zika viruses, which are responsible for public health problems around the world (Caglioti et al. 2013; Davies, Linthicum & James 1985; Linthicum, Davies & Kairo 1985; van den Hurk et al. 2016).

All of these fly species are considered to be contaminating pests on the cut flower and foliage pathway, and if intercepted on arrival in Australia will be addressed by existing standard operational procedures (see Appendix B).

Flies that are plant pests

Only a few families of flies are known to contain species that are plant pests. The families that are associated with imported cut flowers and foliage include the vinegar flies (Drosophilidae), gall midges (Cecidomyiidae), and leaf miners (Agromyzidae).

Many of the vinegar flies, family Drosophilidae, are generally considered to be nuisance flies rather than pests, since most species breed in rotting material. Flies in the family Drosophilidae were intercepted 62 times between 1 January 2000 and 31 December 2019, but the only identification to species level was of *D. melanogaster*, which is not a quarantine pest for Australia. The genus *Drosophila*, mostly known for the experimental studies of *D. melanogaster*, in the wild includes species that develop in rotting vegetation, rotting fruit, tree sap, fungi, living flowers, and plant stems and that prey on other invertebrates (Resh & Carde 2009). There are some economically important members of this family that feed in soft skinned fruit, but these are not associated with the imported cut flower and foliage pathway.

The gall midges, family Cecidomyiidae, such as the quarantine pest *Contarinia quinquenotata*, form galls causing the flower buds of *Hemerocallis* spp. to swell, distort and remain closed then desiccate, reducing the quality of the plants and flowers (AHS 2012; Ellis 2019). There have been 136 interceptions of Cecidomyiidae flies between 1 January 2000 and 31 December 2019 on the imported cut flower and foliage pathway.

Flies in the Agromyzidae family are commonly known as leaf miners for the feeding habits of their larvae, most of which tunnel in the leaves of various plants (ALA 2019). The family contains approximately 2,500 species that include some well-known insect pests of economic importance (Braun et al. 2008; Dempewolf 2004). Exotic leaf miners in the genus *Liriomyza* are also listed among Australia's national priority plant pests (as discussed in Section 1.2.2).

Most leaf miner species lay their eggs within the layers of the leaf (Braun et al. 2008), the stems (Pitkin et al. 2018), and/or the roots and flower heads (Braun et al. 2008) of the host plant. The female leaf miner adult inserts its ovipositor into the plant tissue to lay eggs, also using the puncture site to source sap for feeding (Ridland, Malipatil & PHA 2008).

Once hatched, agromyzid larvae ‘mine’ the leaf or stem as they feed on living plant tissue (Ridland, Malipatil & PHA 2008). Larvae cause blotches and mines on leaves, which are particularly destructive to young plants, resulting in reduced growth (Spencer 1973). Generation times are typically short, and the length of a leaf miner’s lifecycle is significantly determined by temperature. For example, in *Liriomyza*, generation times can be as short as 14 days in optimal circumstances (Jovicich 2009). The mature larvae of some species, such as the quarantine pest *Liriomyza bryoniae* (tomato leaf miner), exit the plant surface by cutting through the plant tissue and dropping to the ground before pupating amongst crop debris and soil (CABI 2020a). Mature larvae of other species, such as *Phytomyza gymnostoma* (Allium leaf miner, a quarantine pest for Australia), exit the plant surface to pupate in the bulb or leaf sheaths (Fleischer & Elkner 2016). Some species do not exit the plant, pupating at the end of the larval mine, such as *Chromatomyia horticola* (pea leaf miner, also a quarantine pest for Australia) (Ridland, Malipatil & PHA 2008).

Most leaf miners are host specific and are unable to fly long distances, therefore they remain close to their plant hosts. Some highly polyphagous species are important agricultural pests. Species that fit these criteria, and that are quarantine pests for Australia, include *Liriomyza bryoniae* (tomato leaf miner), *L. sativae* (vegetable leaf miner), *L. trifolii* (American serpentine leaf miner) and *C. horticola* (pea leaf miner) (Ridland, Malipatil & PHA 2008). For example, *Liriomyza huidobrensis*, the serpentine leaf miner, feeds on plants from at least 14 plant families, including beetroot, lettuce, peas, melons, capsicum, tomato and Chrysanthemum (EPPO 2020). In October 2020 this species was first detected in Australia, in Western Sydney in the state of New South Wales. *Liriomyza huidobrensis* remains a quarantine pest for Australia pending decisions on further action by Australian States and Territories regarding official control status (NSW DPI 2020a).

Leaf miner feeding causes economic damage by puncturing the plant’s surface; as larvae feed, they form visible, irregular mines within the plant tissue. Further economic damage occurs as photosynthesis is reduced, which stunts growth, making young plants particularly susceptible. Plants can wilt (EPPO 2020), yield may be reduced, and leaves may drop allowing for horticultural produce to be scalded by the sun (Jovicich 2009). Secondary damage can occur from opportunistic pathogenic infestation at puncture sites, which can create damp black and brown areas (Ridland, Malipatil & PHA 2008).

Although leaf miner flies are only modest flyers (Ridland, Malipatil & PHA 2008), they can be dispersed as larvae and pupae in fresh produce such as cut flowers and foliage, vegetable crops and nursery stock. Transportation of pupae may also occur through the movement of soil and growing media (Andersen & Hofsvang 2010), through the movement of machinery and aircraft, or even on clothes, shoes and personal effects (Department of Agriculture 2019e).

Leaf miners are also vectors for transmissible plant viruses such as *Sowbane mosaic virus*, *Tomato mosaic virus* (Harris 1981), *Watermelon mosaic virus* (Zitter & Tsai 1977), and *Tobacco mosaic virus* (Büchen-Osmond et al. 1988), all of which are present in Australia (CABI 2020a).

Key quarantine pest species intercepted or recorded on imported cut flowers and foliage such as *Liriomyza trifolii* (American serpentine leaf miner), *Liriomyza sativae* (vegetable leaf miner), *Liriomyza huidobrensis* (serpentine leaf miner), *Phytomyza rufipes* (cabbage leaf miner) and *Chromatomyia horticola* (pea leaf miner) pose a significant quarantine threat to Australian agriculture and horticulture (PHA 2014). From 1 January 2000 to 31 December 2019, there were

38 interceptions of agromyzid leaf miners on imported cut flowers and foliage. These included 17 interceptions of *Liriomyza huidobrensis* (serpentine leaf miner), and three interceptions of *Chromatomyia horticola* (pea leaf miner), both of which are quarantine pests for Australia.

6.1.3 Order Hemiptera

Worldwide there are around 100,000 described hemipteran species in 104 families (Royal Entomological Society 2016). Members of the Hemiptera can be plant pests in both agricultural and domestic environments (Royal Entomological Society 2016), and are also well known as vectors of plant pathogens (Mitchell 2004).

One group of Hemiptera, the family Aphididae (aphids) was assessed in Part 1 of this PRA (Department of Agriculture 2019b). The following information is provided for non-aphid members of this insect order.

Most hemipterans go through gradual incomplete metamorphosis (CSIRO 2019d). This development consists of laying an egg or producing live young known as nymphs. Hemipterans have elongated sap-sucking and piercing mouthparts that enable them to feed from vascular plant tissues or other arthropods or animals (Royal Entomological Society 2016). As plant pests they can feed on leaves, fruit, branches, main stems, trunks, roots, and seeds of plants, and their hosts include vegetables, ornamentals and even fungi (Kerruish & Unger 2010). Most hemipteran families contain species that feed on plants and plant products, and many are known as important plant pests. Some families of Hemiptera, such as the Anthocoridae (minute pirate bugs) (Mitchell 2004), Reduviidae (assassin bugs) (Australian Museum 2019) and bed bugs (Cimicidae) (Reinhardt & Siva-Jothy 2007) feed on arthropods or other animals.

Excluding the aphids, interception analysis conducted for this PRA identified 40 species of Hemiptera on the cut flower and foliage pathway from 33 genera (see the dataset discussed in Appendix D). Of these, 26 species are pests of biosecurity concern for Australia (refer to Appendix G). It is likely that more species of Hemiptera are on this pathway as 53 genera from 38 families were recorded from 2255 interceptions whereby 20 genera were represented by specimens not identified to species level. The department's assessment of interception records that occurred in the year 2020 found no additional species of Hemiptera of biosecurity concern and that were not already included in the pest categorisation table.

The most frequently intercepted families of Hemiptera (excluding the aphids) on the imported cut flower and foliage pathway, in order of the number of interceptions, are the Anthocoridae, Pseudococcidae, Miridae, Aleyrodidae, Lygaeidae and Cicadellidae (see the dataset discussed in Appendix D). The most frequently intercepted genera are *Orius* (Anthocoridae) and *Nysius* (Lygaeidae). The following paragraphs summarise the life histories of the Hemiptera on the imported cut flower and foliage pathway.

Anthocoridae (minute pirate bugs)

The family Anthocoridae contains many predatory species, and some are used as BCAs (for example, *Orius insidiosus*) and mass produced commercially to be released in stored food, pasture land (Wright 1994), granaries, greenhouses and orchards including food crops, forests and ornamental plant nurseries (Ballal & Yamada 2016; Capinera 2008). Anthocorids are small insects (1.4–4.5mm long) (Lattin 1999), and nymphs and adults are predators on all life stages of smaller soft-bodied arthropods; each individual is capable of feeding on over 30 spider mites per day

(Raupp, Traunfeld & Sargent 2019). Anthocorids can also directly damage plants, as eggs are laid into leaf stems and veins (Hiskes & Boucher 2012). The adults are attracted to various flowers and plants in search of prey (Sprague & Funderbunk 2016). Predatory anthocorid species have a wide prey range including midges, thrips, spider mites, aphids, mealybugs, weevils, beetles, booklice, caterpillars, butterflies, moths and their eggs (Ballal & Yamada 2016). With such a wide prey range, these species have the potential to affect populations of native Australian arthropods. As discussed in Section 1.2.3 (more information is provided in Appendix B), BCAs are subject to additional import requirements before they can be released into the Australian environment. The most frequently intercepted genus of anthocorid was *Orius*, a common predator of soft-bodied arthropods (Sprague & Funderbunk 2016). *Orius majusculus*, a thrips predator, has been intercepted on this pathway, is not present in Australia, and is considered a contaminating pest. If intercepted on arrival in Australia, this species will be addressed by existing standard operational procedures (see Appendix B for more detail).

Pseudococcidae (mealybugs)

In January 2019, the department published the *Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports* (Group Mealybugs PRA) (DAWR 2019c; DPIRD 2018). The methodology used for the Group Mealybugs PRA is consistent with the methodology used in the Thrips Group PRA (discussed in Part 1 of this PRA), and the methodology used in this PRA (presented in Appendix E of this document).

The Group Mealybugs PRA considered the biosecurity risk posed by all members of the Pseudococcidae, Putoidae and Rhizoecidae and assessed the viruses known to be transmitted by mealybugs that may be associated with commercial consignments of fresh fruit, vegetable, cut-flower and foliage imports.

All exotic pest mealybugs included in the pest categorisation process of the Mealybugs Group PRA were considered to be quarantine pests for Australia. They have the potential to cause economic (including environmental) consequences in Australia because they damage plants by sucking sap, secreting honeydew that encourages the growth of sooty mould, and/or transmitting viral diseases. The PRA determined that mealybugs were estimated to have an ‘indicative’ unrestricted risk estimate of ‘Low’, which does not achieve the appropriate level of protection (ALOP) for Australia.

Interception analysis conducted for this PRA identified six species of mealybugs from four genera on the cut flower and foliage pathway (see the dataset discussed in Appendix D). One additional genus was intercepted, but there were also 497 interceptions that were only identified to family level, indicating that more species of mealybugs could be on this pathway.

Miridae (plant bugs) and Lygaeidae (seed bugs)

Plant and seed bugs range from 1.5–20mm in length (CSIRO 2019e; Govender, McDonald & Kimber 2016) and are highly mobile, winged insects that can travel considerable distances to find a plant host or prey (Govender, McDonald & Kimber 2016; Henry & Lattin 1985). Members of these families exhibit a wide range of feeding habits, including being plant-feeders, predators, omnivores and fungus feeders (CSIRO 2019d). Plant and seed bugs are often found on grasses (Resh & Carde 2009) or seeds (CSIRO 2019d), and are often restricted to a single plant species or annuals that appear briefly (Resh & Carde 2009). There are some species that are found on the ground, either in association with leaf litter or leaf mould (CSIRO 2019d). Both families cause

direct damage to plants as the larvae feed on buds, pods, seeds and flowers of host plants (Govender, McDonald & Kimber 2016; GRDC 2014; QDAF 2018b).

A highly polyphagous pest, *Lygus pratensis* (Miridae) is a quarantine pest for Australia. This species is responsible for significant economic damage to many important agricultural crops throughout Europe and Asia including cotton, alfalfa, Chinese date, grape and pear (Liu et al. 2015). In China, this pest has been recorded to cause 10–30% yield loss in cotton and fruit trees (Liu et al. 2015).

Aleyrodidae (Whiteflies)

Whiteflies are very small (2 to 3mm long) sap-sucking pests and adults have a covering of white wax on the body and wings. They are usually found on the underside of foliage, where after mating, females lay eggs (Flint 2002; Government of Western Australia 2020; White 2013). Whiteflies excrete sticky honeydew while feeding, which causes drying, discolouration, and silvering of foliage, and can facilitate the growth of sooty mould (Flint 2002; White 2013). Whiteflies are also known to vector over 70 different plant viruses (Resh & Carde 2009). One identified *Bemisia* spp. and 157 unidentified whitefly species have been intercepted on imported cut flowers and foliage between 1 January 2000 and 31 December 2019.

Aleurodicus dispersus, the spiralling whitefly, is a quarantine pest for Australia. This whitefly is associated with over 25 different plant viruses (Banjo 2010), and is able to transmit *Cassava brown streak virus* (CBSV) (Mware et al. 2009), which is exotic to Australia and known to cause production losses as high as 60% in cassava (CABI 2020a). Within its native range, *A. dispersus* is not considered as a plant pest, however, once introduced to new host countries, it is considered a serious pest of many economically important crops including vegetables, ornamentals and fruit trees (CABI 2020b). The impact of *A. dispersus* is through the direct extraction of plant sap, which causes cosmetic damage, leaf drop, and reduces plant vigour and yield (CABI 2020b). Injury to flowers and foliage results in damage to aesthetics, leading to unmarketable crops and the reduction in market value of flowers and foliage.

Within the same genus, *Aleurodicus dugesii* is highly invasive (Muniappan et al. 2009), polyphagous, and a quarantine pest for Australia. The species is considered a serious pest of ornamentals and economically important crops including hibiscus, begonia, lilies, citrus, *Strelitzia* and bananas throughout the USA, with the host list including over 200 plants within 35 families (CISR 2019). As *A. dugesii* has the ability to create thick carpet-like wax coverings on foliage and produce honeydew which facilitates the growth black sooty mould, this species can cause a decline in plant growth (Muniappan et al. 2009). Since its discovery in Texas in 1991, *A. dugesii* is reported to have established throughout most of the USA (CISR 2019; Schoeller 2018).

Quarantine and non-quarantine pest whiteflies have the potential to introduce viruses of biosecurity concern to Australia. For example, the *Bemisia tabaci* (silverleaf whitefly) complex that is widespread throughout Australia is capable of vectoring over 100 plant viruses (Aristizábal et al. 2018; Gilbertson et al. 2015) including begomoviruses, ipomoviruses and torradoviruses which are damaging to several important plant species (Navas-Castillo, Fiallo-Olive & Sanchez-Campos 2011). *Bemisia cordylinidis* is a vector of viruses in the family Geminivirus (Brown 1994), a group of plant viruses that cause damage to many economically important crops (Briddon 2015). There are members of each of these groups of viruses that are not present in Australia and would be considered quarantine pests.

Begomoviruses have emerged as serious constraints to the cultivation of a variety of vegetable crops in various parts of the world (Navas-Castillo, Fiallo-Olive & Sanchez-Campos 2011), and their emergence as important pathogens over the past two decades is closely associated with the increased prevalence of *B. tabaci* (Wisler et al. 1998). The genus *Begomovirus* comprises 322 species of plant viruses (ICTV 2016) which are transmitted in a persistent non-propagative mode by the *B. tabaci* species group. Begomoviruses infect a very wide range of plants (King et al. 2012). There are members of the genus *Begomovirus* that are not present in Australia and would be considered quarantine pests. For example, three *Begomovirus* species are High Priority Pests in the industry biosecurity plans for cotton, grains and passionfruit—*Cotton leaf curl virus* (cotton), *Mungbean yellow mosaic virus* (grains) and *Passionfruit severe leaf distortion virus* (passionfruit). These three begomoviruses are not present in Australia.

Cicadellidae and Aphrophoridae

There are a number of plant pests in the Cicadellidae (leafhoppers) and Aphrophoridae (spittlebugs) families, which may impact plants directly by feeding, by fouling leaf surfaces with honeydew and causing sooty mould growth, and by transmitting diseases. For example, *Empoasca pteridis*, which has been intercepted on this pathway and is a quarantine pest for Australia, is a pest of several important crops, such as carrot, barley, and wheat (El-Wakeil et al. 2014; Szejda & Wrzodak 2007). The genus *Empoasca* is known to cause damage through sucking sap from the host plant (Calderon & Backus 1992). Pests in the Cicadellidae have been infrequently intercepted on this pathway, with four identified *Empoasca* spp. and 57 unidentified cicadellid species intercepted between 1 January 2000 and 31 December 2019. Only one Aphrophorid has been intercepted for the same time period, the meadow spittlebug *Philaenus spumarius*.

Some of these species have the potential to vector pathogens that are not yet present in Australia. For example, *Homalodisca vitripennis*, the glassy-winged sharpshooter, and *Philaenus spumarius*, the meadow spittlebug, are both quarantine pests for Australia and are known vectors of the bacterium *Xylella fastidiosa* and other xylem-transmitted diseases (Rathé et al. 2011; Santoiemma et al. 2019). Immature insects lose infective bacteria through the processes of maturation, moulting and expulsion of foregut contents (EFSA Panel on Plant Health 2015); however, adults that acquire *Xylella* bacteria remain infectious for the remainder of their life (Almeida et al. 2005). Due to the limited mobility of most Hemiptera nymphs, adult insects are considered the main method of natural spread of the bacteria (EFSA Panel on Plant Health 2015).

Xylella is absent from Australia and is Australia's number one national priority plant pest (Department of Agriculture 2019f). *Xylella* can affect over 500 important crops and environmentally important species (EFSA 2016) including grape, olive, stone fruits, eucalyptus, acacia and citrus (Department of Agriculture 2019f) (DAWR 2016f, 2017b; Santoiemma et al. 2019). The introduction of *Xylella* to Australia's diverse and unique environment could potentially have devastating consequences to many endemic species, such as *Eucalyptus* and *Acacia*, with flow-on consequences to surrounding ecosystems and Australia's economy.

As well as the risk of pathogen vectoring, *H. vitripennis* is a pest of a wide variety of plant hosts across 300 genera including *Chrysanthemum*, *Eucalyptus*, *Cordyline*, *Dracaena*, *Jacaranda*, *Vitis*, *Citrus*, *Prunus*, *Azalea*, *Olea*, *Persea*, *Pinus*, *Coffea*, *Pyrus*, pecan, *Ulmus*, *Acer* and *Quercus* spp. (DAF & NGIA 2017). The sharpshooter sucks sap from vascular tissue, deposits white excrement on host plants and causes egg scars on foliage (DAF & NGIA 2017). The spittlebug *Philaenus spumarius* is highly polyphagous, affecting a wide host range with over 1000 species of plants including

eucalypts, strawberry, stone fruit, tomato, potato, grape, raspberry, blackberry and beetroot (CABI 2020a). Feeding by *Philaenus spumaris* can cause stunting and reduce seed and fruit yield (CABI 2020a).

6.1.4 Order Hymenoptera (wasps, bees and ants)

The Hymenoptera is a large and diverse order of insects with over 150,000 described species in 132 families worldwide (Aguiar et al. 2013; CSIRO 2019c). The Hymenoptera includes ants, bees, wasps and sawflies, and the order has the largest number of beneficial insects (such as pollinators, predators and parasitoids) of any insect order (Kerruish & Unger 2010).

Hymenoptera undergo complete metamorphosis with four life stages: egg, larva, pupa and adult (CSIRO 2019c). This order has an extremely wide range of habits and biology. Some are parasitoids, whereas others are predators, herbivores, gall-formers, fungus feeders, leaf miners or nectar and/or pollen gatherers. Most species are solitary, while others are organised into social communities of varying size and complexity (Britton 2018).

Interception analysis conducted for this PRA of the total interceptions from 1 January 2000 to 31 December 2019 identified 34 species of ants, bees, and wasps from 23 genera (see the dataset discussed in Appendix D). Of these, two species are considered quarantine pests for Australia (refer to Appendix G). It is likely that more species of Hymenoptera are on this pathway, as 62 genera from 34 families were recorded from 1220 interceptions, implying that specimens from 39 genera were not identified to species level.

The department's assessment of interception records that occurred in the year 2020 found no additional species of Hymenoptera that were of biosecurity concern that were not already included in the pest categorisation table. In addition, the department reassessed interception data to determine whether plant pest Hymenoptera, specifically gall wasps and sawflies, were appearing on the imported cut flower and foliage pathway. The department reviewed sawflies and gall wasps within the Hymenopteran families of Tenthredinidae, Argidae, Cephidae and Cynipidae, and interception data does not indicate that these groups are present on this import pathway.

The hymenopteran families that are intercepted most frequently on imported cut flowers and foliage are, in order of the number of interceptions, the ants (Formicidae) and four families of largely parasitoid wasps, the Braconidae, Pteromalidae, Ichneumonidae, and Eulophidae. The Hymenopteran families associated with imported cut flowers and foliage fall into several different life history types, and the following paragraphs summarise those groups.

Ants

Ants (Formicidae) are social insects that utilise brood care, have a reproductive division of labour in which workers work on behalf of queen ants, and have overlapping generations in life stages (Collingwood et al. 2011). While individual worker ants arriving in Australia would be unable to establish without a queen, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019).

Ants exhibit highly variable feeding behaviours and most species of ants do not specifically injure or damage plant; if exotic ants were intercepted on this pathway most would be regarded as contaminating pests and regulated at the Australian border. Many ants are opportunistic

generalist feeders that prey or forage on any available food source including seeds, nectar, arthropod prey and carcasses (Austin et al. 2019; Collingwood et al. 2011; Goulet & Huber 1993). In agricultural contexts, most ants cause only limited direct damage as little living plant material other than seeds is taken as food (Kalshoven 1981). However, the indirect damage caused by ants can be more considerable. Ants are particularly attracted to 'honeydew' excreted by plant pests such as sap-sucking hemipterans (aphids, scales and mealybugs), and in exchange, ants protect the bugs from their natural enemies (Lach & Thomas 2008). This mutualistic relationship can assist the spread of plant pests such as scale insects (Kerruish & Unger 2010), and increase the impact and damage of insects such as mealybugs on plants (DAWR 2019c).

Ants also harvest seeds, assisting in the distribution of weed seeds, and can be a nuisance to people due to their stings and bites (Kalshoven 1981). Heavy infestations can cause displacement of native species and other invertebrates, as well as causing environmental damage (Sorger et al. 2017), and invasive ants have been implicated in the decline of many non-ant invertebrates (GISD 2010).

There were 518 interceptions of ants on the cut flower and foliage pathway between 1 January 2000 and 31 December 2019. The most frequently intercepted genera in this family in order of the number of interceptions were the *Tapinoma*, *Technomyrmex* and *Pheidole*. Exotic *Technomyrmex* species are regarded as high priority invasive ants in Australia. Some *Tapinoma* species are also regarded as high-risk exotic species. *Pheidole megacephala* is also considered highly invasive, however, it is already established in Australia (Department of the Environment and Energy & DAWR 2018). These ants are predominantly generalist opportunistic feeders that forage on any available food source in their natural environment (Austin et al. 2019).

Several of the intercepted ant genera contain species that are known to be invasive, including *Anoplolepis*, *Monomorium*, *Pheidole* and *Technomyrmex* (GISD 2009; Lowe et al. 2000). These ants have attributes that make them successful invaders, including adaptability to a wide range of habitats, high interspecific aggression and lack of intraspecific aggression which leads to unicoloniality (Le Breton et al. 2004; Ulloa-Chacon & Cherix 1990). Colonies containing numerous reproducing females (queens) (Holldobler & Wilson 1977) increase the likelihood of small numbers of ants that are split off from a colony being with a queen, and when transported by humans in trade, of those species being able to establish new colonies.

Three of the most frequently intercepted species of ants are present in Australia. These are *Technomyrmex albipes*, *Linepithema humile*, and *Tapinoma melanocephalum*. The fourth most frequently intercepted ant, *Technomyrmex vitiensis*, is not present in Australia. *Technomyrmex vitiensis* is known to occupy various environments and can inhabit niches from the ground to the tree crown (Delabie, Groc & Dejean 2011). *Technomyrmex vitiensis* can also disturb vertebrate pollination and seed dispersal of endangered flora, and outnumber native ant species (Delabie, Groc & Dejean 2011). Invasive ants can reduce species diversity and modify habitat structure and have the potential to severely impact human health and social amenity. Several species of invasive ants have painful stings which can cause anaphylactic shock in some people. They can also bite and sting pets, livestock and native animals, may chew through electrical insulation, and their nest building can damage machinery and buildings. Invasive ants can also have an impact on agriculture and forestry indirectly due to their association with hemipteran insects (Department of Agriculture 2019g). Eradication of invasive ant species, such as *Solenopsis invicta* (red imported fire ant) is also extremely costly. A 10-year plan to eradicate fire ants in South East Queensland

has received \$411.4 million in funding for the period (Department of Agriculture and Fisheries 2019).

The majority of exotic ants intercepted on the cut flower and foliage pathway are considered to be contaminating pests, and if detected on arrival in Australia, these species will be addressed by existing standard operational procedures (see Appendix B for more detail).

Wasps

Of the wasps intercepted on the imported cut flower and foliage pathway, the most common life history type is that of a parasitoid. Female parasitoid wasps use an ovipositor to lay eggs into or onto the juvenile or adult forms of other arthropods. The wasp larva feeds on the host to complete development, eventually killing the host (Goulet & Huber 1993). A number of Australia's trading partners have notified that they are using species of parasitoid wasps as part of their BCA programs, and it is likely that more species are acting as natural BCAs. As discussed in Section 1.2.3 (more detail provided in Appendix B), before BCAs can be released into the Australia environment a separate risk analysis must be undertaken by the department to demonstrate that the risk associated with releasing this species achieves the ALOP for Australia.

The most frequently intercepted parasitoid genera between 1 January 2000 and 31 December 2019, were *Aphidius* (Braconidae) with 48 interceptions, and *Diglyphus* (Eulophidae) with 8 interceptions.

Wasps of the family Braconidae are mainly parasitoids of juvenile forms of arthropods, such as caterpillars, aphids and weevil larvae (CSIRO 2019c; Kerruish & Unger 2010). Many braconids are egg-larval parasitoids and lay eggs in the host egg (Goulet & Huber 1993). The braconid subsequently hatches and feeds on the developing larva of the host. A few braconids also parasitise adult Coleoptera and Hymenoptera (Goulet & Huber 1993). Once larval feeding is complete, braconids pupate inside or form a cocoon outside of their host (ABRS 2020; CSIRO 1991). The most commonly intercepted genus *Aphidius*, is an aphid parasitoid and members of this genus are often used as BCAs (Stary 1993).

The biology and host-associations of the family Pteromalidae are extremely varied, but most species are idiobionts, meaning they prevent development of the host after parasitisation. Pteromalid wasps are ectoparasitoids, attacking larvae and pupae of Lepidoptera, Diptera, Coleoptera and Hymenoptera. Concealed hosts, such as leaf-miners and gall-inducers are commonly attacked. Other species are idiobiont endoparasitoids, commonly of lepidopterous pupae. A number of pteromalids are predatory rather than parasitic, and others are phytophagous. Several species have also been used successfully as BCAs (ABRS 2020).

Wasps in the family Ichneumonidae are most diverse in cool, wet habitats. They can be ecto- or endoparasitic, parasitising the larvae, pre-pupae or pupae of various arthropods such as Lepidoptera, Hymenoptera, Coleoptera and Diptera, and more rarely spiders and spider egg sacs. Lepidopteran larvae are the most common hosts in Australasia, and numerous species have been introduced as BCAs. Adult ichneumonids are commonly seen at flowers or searching for hosts around tree trunks, logs, vegetation, or in litter (ABRS 2020).

Eulophid wasps are generally parasitoids of leaf-mining and wood-boring Lepidoptera and Diptera, with some genera specialising on leaf miners, but most having a generalist behaviour and parasitising a wide range of hosts (Reina & La Salle 2019). Eulophids parasitise eggs, larvae, pupae

or adult forms of insects within an enclosed space, such as a gall or egg sac (Reina & La Salle 2019). Eulophids such as *Diglyphus isaea* parasitise agromyzid flies (Martin 2017b). *Diglyphus isaea* utilises the odours released by plants damaged by dipteran leaf miner larvae to locate host prey (Finidori-Logli, Bagnères & Clément 1996). *Diglyphus isaea* is not present in Australia, has been intercepted on this pathway, and is used by Ecuador and Kenya as a BCA (see the pest categorisation table in Appendix F for more detail). As discussed in Section 1.2.3 (more detail provided in Appendix B), before BCAs can be released into the Australia environment a separate risk analysis must be undertaken by the department to demonstrate that the risk associated with releasing this species achieves the ALOP for Australia.

Other parasitoid wasps intercepted on this pathway in lower numbers include important BCAs such as wasps in the family Encyrtidae, which are used to control economically important scale insects and mealybugs (Noyes 2019). Also intercepted in low numbers are wasps in the family Aphelinidae, which primarily parasitise hemipterans (Stringer, Jennings & Austin 2012), such as aphids, whiteflies, and scales (Hayat 1997). Australia has been notified that exotic aphelinids, such as *Eretmocerus eremicus*, are on the cut flower and foliage pathway as BCAs.

All exotic predatory and parasitoid wasps are considered to be contaminants on this pathway. If intercepted on arrival in Australia, these species will be addressed by existing standard operational procedures (see Appendix B for more detail).

Bees

Although infrequently intercepted on imported cut flowers and foliage, exotic bees and the pests and diseases they can transmit are national priority pests for Australia (Department of Agriculture 2019a). Four families of bees have been intercepted on this pathway at very low frequencies, the Apidae (honey bees), Colletidae (plasterer bees), Halictidae (sweat bees) and Megachilidae (leaf-cutter bees), with a total of 16 interceptions between 1 January 2000 to 31 December 2019. Eleven of the bee interceptions were from the family Apidae, and the following information focuses on this bee family.

The Apidae, honey bees, are highly social insects that live in perennial colonies that consist of a queen and her many daughter workers. Social bees are mostly floral generalists that actively collect nectar or pollen to feed their larvae (Michener 2007).

Most tropical and temperate tree species, fruits and vegetables, and forage crops, are bee-pollinated (Michener 2007). Honey bees are not considered to be plant pests, but they are contaminating pests on this pathway as they can be associated with pests and diseases that are harmful to other bee species. For example, *Apis mellifera* is present in Australia as an introduced pollinator (ABRS 2020; Kerruish & Unger 2010), but is also a natural host of a number of exotic bee pests and diseases. Of these, the Varroa mite (*Varroa destructor* and *V. jacobsoni*), is one of Australia's national priority plant pests (Department of Agriculture 2019f) and neither *Varroa* species is present in Australia (ABRS 2020). If these mites were to become established in Australia, it has been estimated that healthy populations of honey bees and the pollination services they provide could be substantially reduced (Department of Agriculture 2019a). As a result, higher costs could be faced by producers of crops such as almonds, apples and cherries that rely on pollination by bees (Department of Agriculture 2019a).

Honey bees may also be affected by a range of pests and diseases including Tropilaelaps mite (*Tropilaelaps clareae*), tracheal mite (*Acarapis woodi*), Braula fly (*Braula caeca*), American foulbrood (*Bacillus larvae*), European foulbrood (*Melissococcus pluton*), leafcutter bee chalkbrood (*Ascosphaera aggregata*), small hive beetle (*Aethina tumida*) and stonebrood (*Aspergillus falvum* and *A. fumigatus*) (Department of Agriculture 2019a; Department of Agriculture, Fisheries and Forestry 2012). All external and internal mites of bees are national priority plant pests for Australia (Department of Agriculture 2019f).

Other exotic *Apis* species, such as *Apis cerana* and *A. dorsata*, are present with a limited distribution in Australia and are not considered to be plant pests as they feed on pollen and nectar only (Egelie et al. 2015; Jack, Lucky & Ellis 2019). However, they have the potential to compete with native fauna for floral resources and nesting sites (Carr 2011). In addition, they are potential natural hosts of a number of exotic bee pests and diseases, including Varroa mite, which are not present in Australia (ABRS 2020; Egelie et al. 2015). Although *Apis cerana* is present in Queensland, it is currently under official control and is a declared pest in Western Australia (ABRS 2020; Department of Agriculture 2018; Government of Western Australia 2020).

All bees on this pathway are considered to be contaminants, and if detected on arrival in Australia, will be addressed by existing standard operational procedures (see Appendix B for more detail).

6.1.5 Order Lepidoptera (moths and butterflies)

The Lepidoptera is the second largest of the insect orders (Kerruish & Unger 2010), with over 150,000 described species in 125 families. Lepidoptera is one of the most damaging groups of agricultural pests (Regier et al. 2009).

Lepidoptera go through a complete metamorphosis consisting of four life stages: egg, larva, pupa, and adult (Capinera 2008; Miller & Hammond 2003). Adults lay eggs singly or in clusters, sticking directly onto leaves or stems of the food plant or close to them in the soil (Capinera 2008; Miller & Hammond 2003). The number of eggs laid depend on species; a typical batch has several hundred eggs, however, between tens to thousands of eggs can be laid per generation (Capinera 2008). Once hatched, larvae continuously feed and go through multiple (five to 12) instars over a period of a few weeks, moulting between each instar. After reaching the final instar, metamorphosis occurs in the pupa. The pupation stage can last from two or three weeks to one year, and allows overwintering in many species (Miller & Hammond 2003). Upon emerging, mating typically occurs straight after emergence, facilitated by species-specific pheromones emitted by females (Miller & Hammond 2003). Most Lepidoptera have plant-feeding larvae and pollen- or nectar-feeding adults. In summary, all lepidopteran species have a similar life cycle, as all families feed on plants, stored products or plant products.

Interception analysis from 1 January 2000 to 31 December 2019 conducted for this PRA identified 41 Lepidoptera species on the cut flower and foliage pathway from 32 genera (see the dataset discussed in Appendix D). Of these, 24 species are considered quarantine pests for Australia (refer to Appendix G). It is likely that more species of Lepidoptera are on this pathway, as only 158 of the 2157 individual interceptions were identified to genus or species level. The Lepidoptera interceptions were attributed to 20 different families and 39 individual genera. Lepidoptera interceptions were predominantly of larvae found on consignments; however, all life stages were present on the pathway. The department's assessment of interception records that occurred in the year 2020 found one additional species of Lepidoptera of biosecurity concern that was not

already included in the pest categorisation table. This species, *Olene inclusa* Walker, 1856 (Lymantriidae) is a quarantine pest for Australia and has been added to the Pest Categorisation Table (Appendix F) and the summary list of species provided in Appendix G.

The main lepidopteran families associated with imported cut flowers and foliage have similar feeding habits and tend to be plant pests with both environmental and economic consequences. Most lepidopteran species are known as plant pests due to damage inflicted by larval feeding. The most destructive families of Lepidoptera associated with cut flowers and foliage are the armyworms or cutworms (Noctuidae), shoot borers (Crambidae), webworms or frass moths (Pyrilidae), and leaf rollers (Tortricidae). These are also the most frequently intercepted lepidopteran families on the imported cut flower and foliage pathway (see the dataset discussed in Appendix D).

The following paragraphs summarise similar life histories and differences in ecology and biology of pest Lepidoptera on the cut flower and foliage pathway.

Noctuidae

Noctuids, commonly known as armyworms or cutworms, are an important plant pest family because of the damage caused to the foliage of the plants they feed upon (CSIRO 2010). Between 1 January 2000 and the 31 December 2019, a total of 1654 interceptions of Noctuidae were recorded on the cut flower and foliage pathway. Key quarantine pest noctuid species most frequently intercepted include *Spodoptera littoralis* (Cotton leafworm) and *Helicoverpa zea* (corn earworm).

Spodoptera littoralis, like other species within this genus, is highly polyphagous, destructive and mobile (CABI & EPPO 1997). *Spodoptera littoralis* has a short life cycle of approximately five weeks, and under the right conditions can have seven generations a year consisting of a few to thousands of eggs (Sullivan 2014). Eggs and larvae can be found on all above-ground plant parts, mostly on the underside of leaves. Larvae primarily feed on leaves, but also can burrow into fruiting structures such as cotton bolls, sweetcorn ears and inside tomato fruit (Alford 2012; CABI & EPPO 1997). *Spodoptera littoralis* has a host range belonging to over 40 families (CABI & EPPO 1997; PHA 2016a), including many species of economic importance such as *Allium*, *Amaranthus*, *Brassica*, *Camellia*, *Capsicum*, *Citrus*, *Chrysanthemum*, *Musa*, *Dianthus*, *Eucalyptus*, *Fragaria*, *Gerbera*, *Gossypium*, *Prunus*, *Zea*, *Helianthus*, *Hibiscus*, *Rosa*, *Vitis*, *Quercus* and *Solanum* spp. (CABI 2020a).

During the drafting of Part 2 of this PRA, *Spodoptera frugiperda* (fall armyworm), became established in Australia and is no longer considered a quarantine pest. In February 2020, this species was first detected in Australia, in the Torres Strait and in far northern Queensland. In March 2020, detections were confirmed in locations in the far north of the Northern Territory and Western Australia. In September 2020, *S. frugiperda* was confirmed in New South Wales (NSW DPI 2020b). The status of this species has been updated in the pest categorisation table and summary species list (Appendices F and G).

Another important noctuid quarantine pest for Australia, *Helicoverpa zea*, is also highly polyphagous. The species is reported to feed on over 100 plant species including *Allium*, *Amaranthus*, *Dianthus*, *Chrysanthemum* and *Gladiolus* spp., and important agricultural crops such as corn, sorghum and cotton (Capinera 2017a; Plant Health Australia 2009). *Helicoverpa zea* larvae feed on foliage and flowers, tunnelling within flower buds and excavating the interior (Mau

& Martin Kessing 1991b). Serious and costly damage is caused by this pest due to the larvae feeding on reproductive structures and growing points of high value crops such as corn cobs, sorghum heads and cotton bolls (Mau & Martin Kessing 1991b; Plant Health Australia 2009).

Crambidae

The family Crambidae, commonly known as grass moths, webworms or shoot borers (ALA 2019; Herbison-Evans & Crossley 2019), are sometimes used as BCAs for their host plants; however some species also damage valuable crops due to their feeding and boring behaviour (ALA 2019).

Between 1 January 2000 and the 31 December 2019, a total of 138 interceptions of Crambidae were recorded on the cut flower and foliage pathway. One such example is *Hendecasis duplifascialis* (jasmine budworm), the most commonly intercepted quarantine pest crambid species on the cut flower and foliage pathway. The budworm, *H. duplifascialis*, is polyphagous and a major pest of *Jasminum* spp. (Gilligan & Passoa 2014; Suganthi, Chandraeskan & Regupathy 2006). Budworm larvae chew and bore holes in flower buds, feeding on the inner flower structures (Veeraragavan, Duraisamy & Mani 2018), creating a web-like pattern in severe infestations (Plantwise 2019; Suganthi, Chandraeskan & Regupathy 2006).

Hendecasis duplifascialis is reported to also feed on *Dianthus*, *Gardenia*, and *Plumeria* spp. (Robinson et al. 2019), and *Senna alata* (Veeraragavan, Duraisamy & Mani 2018). The budworm is a serious threat to flower production, especially in areas with *Jasminum* species. In India, jasmine flower quality was recorded to decrease by 40-50%, and yield losses of 30-70% occurred as a result of damage by the larvae (Suganthi, Chandraeskan & Regupathy 2006).

Pyralidae and Tortricidae

Two other Lepidoptera families, Pyralidae and Tortricidae, are important pest families for cut flowers and foliage. The number of interceptions made between 1 January 2000 to 28 February 2018 was 72 pyralids and 38 tortricids. The predominant life stage intercepted was the larvae of both families.

The family Pyralidae has almost 6,000 species described from over 1,000 genera (van Nieukerken et al. 2011). Pyralid caterpillars are mostly concealed feeders, meaning they are often borers of seed, fruit or stems, or tunnel beneath the soil (Lotts & Naberhaus 2019). In addition to growing host plants, pyralids have a diverse food range which includes dry vegetable matter (including seeds). Many are granary and household pests that have been spread worldwide through human activities (Lotts & Naberhaus 2019). Other species are destructive agricultural pests, such as the European corn borer (ECB), *Ostrinia nubilalis*, which is a quarantine pest for Australia. The most commonly intercepted pyralid quarantine pest on the cut flower and foliage pathway is *Aphomia sabella* (= *Arenipses sabella*), the greater date moth. This species is a serious economic pest of date palms throughout its native range across North Africa, the Middle East, and northern India (Al-Antary, Al-Khawaldeh & Ateyyat 2014; Carpenter & Elmer 1978). In Iraq, 50% of the spathes and fruit bunches on 70% of the palms in some localities may be attacked (Hussain 1963), while in Iran damage amounts to 5–15% of the crop (Gharib 1969).

The family Tortricidae has over 10,300 species described from over 1,000 genera (van Nieukerken et al. 2011). Most species from this family are commonly known as leaf rollers due to the behaviour exhibited by caterpillars in forming a leaf shelter in which to live, feed and pupate (Herbison-Evans & Crossley 2019). Leaf roller larvae are usually polyphagous, however

some subfamilies have a narrower host range (Brown, Robinson & Powell 2008). Tortricids are known primarily as agricultural, forest and ornamental pests, and some species are also used as BCAs against invasive weeds (Brown, Robinson & Powell 2008). Larvae feed on new leaves, flowers and newly-set fruit, and then later on peel and mature fruit (Capinera 2008). Some species feed on needles and pollen (Editors of Encyclopaedia Britannica 2009), such as the most commonly intercepted tortricid species on the cut flower and foliage pathway—*Thaumatotibia leucotreta* (false codling moth). *T. leucotreta* is a serious pest of citrus in southern Africa, and of cotton in many parts of Africa, and has also become a significant pest of macadamia in Israel (Wysoki 1986). Additionally, *T. leucotreta* is a quarantine pest and a high priority pest of the cotton, grains, pineapple, stone fruit and summer fruit industries in Australia (Plant Health Australia 2005).

6.2 Risk ratings assigned in previous risk assessments

The department has previously undertaken PRAs on five of the Coleoptera species, one of the Diptera species, 20 of the Hemiptera species (including three mealybugs, 13 hard scales and one soft scale species), six of the Hymenoptera genera and 15 of the Lepidoptera species considered in this PRA. The outcomes of previous assessments provide indicative unrestricted risk estimates and therefore indicate whether the species are likely to require phytosanitary measures to manage the associated risks to achieve ALOP for Australia. These assessments are summarised i

Table 6.1.

Table 6.1 Summary of risk ratings assigned in previous pest risk assessments

Pest name	Commodity	Likelihood of						Consequences	URE
		Entry			Establishment	Spread	EES		
		Importation	Distribution	Overall					
Coleoptera									
<i>Adoretus versutus</i>	Island Cabbage (Pacific Islands) 2013	Very Low	Moderate	Very Low	Moderate	Moderate	Very Low	Moderate	Very Low
<i>Elytroteinus subtruncatus</i>	Ginger (Fiji) 2013	High	High	High	Low	Moderate	Low	Very Low	Negligible
<i>Harmonia axyridis</i>	Lilium spp. cut flowers (Taiwan) 2013	High	High	High	High	High	High	Moderate	Moderate
	Table grapes (California) 2013	Moderate	High	Moderate	High	High	Moderate	Moderate	Moderate
	Table grapes (China) 2011	High	High	High	High	High	High	Moderate	Moderate
	Table grapes (Japan) 2014	Low	High	Low	High	High	Low	Moderate	Low
	Table grapes (Korea) 2011	Moderate	High	Moderate	High	High	Moderate	Moderate	Moderate
<i>Popillia japonica</i>	Table grapes (China) 2011	Low	High	Low	High	High	Low	Moderate	Low
	Table grapes (Japan) 2014	Low	High	Low	High	High	Low	Moderate	Low
<i>Hippodamia convergens</i>	Tomato (Netherlands) 2003	Low	Moderate	Low	Low	Moderate	Very Low	Moderate	Very Low

Pest name	Commodity	Likelihood of						Consequences	URE
		Entry			Establishment	Spread	EES		
		Importation	Distribution	Overall					
Diptera									
<i>Liriomyza huidobrensis</i>	Tomato (Netherlands) 2003	Low	Low	Very low	Moderate	Low	Very low	Moderate	Very low
Hemiptera									
<i>Aonidomytilus albus</i>	Mangoes (Taiwan) 2006	High	Moderate	Moderate	High	Moderate	Low	Low	Very Low
<i>Chrysomphalus dictyospermi</i>	Orange (Italy) 2005	High	Low	Low	High	Moderate	Low	Low	Very Low
Coccidae	Draft Group PRA for soft and hard scales 2020	High *	Moderate *	Moderate	High	High	Moderate *	Low	Low *
Diaspididae	Draft Group PRA for soft and hard scales 2020	High *	Moderate *	Moderate	High	High	Moderate *	Low	Low *
<i>Dysmicoccus neobrevipes</i>	Pomegranate (India) 2020	High	Moderate	Moderate	High	High	Moderate	Low	Low
<i>Halyomorpha halys</i>	Brown marmorated stink bug PRA 2019	Extremely Low to High	Moderate to High	Very Low to High	High	High	Extremely Low to High	Moderate	Negligible to Moderate
<i>Hemiberlesia cyanophylli</i>	Mangoes (India) 2008	High	Low	Low	High	Moderate	Low	Low	Very Low
	Mangoes (Indonesia, Thailand, Vietnam) 2015	High	Moderate	Moderate	High	Moderate	Low	Low	Very Low
	Mangoes (Taiwan) 2006	High	Moderate	Moderate	High	Moderate	Low	Low	Very low
	Banana (Philippines) 2008	High	High	High	Moderate	High	Moderate	Low	Low
<i>Hemiberlesia palmae</i>	Banana (Philippines) 2008	High	High	High	Moderate	High	Moderate	Low	Low
<i>Howardia biclavis</i>	Mandarin (Japan) 2009	High	Low	Low	High	Moderate	Low	Low	Very Low
<i>Ischnaspis longirostris</i>	Mangosteen (Indonesia) 2012	High	Low	Low	High	Moderate	Low	Low	Very low
	Mandarin (Japan) 2009	High	Low	Low	High	Moderate	Low	Low	Very low

Pest name	Commodity	Likelihood of						Consequences	URE
		Entry			Establishment	Spread	EES		
		Importation	Distribution	Overall					
	Lychees (Taiwan, Vietnam) 2013	Very Low	Low	Very low	High	Moderate	Very low	Low	Negligible
<i>Lepidosaphes laterochitinsa</i>	Mangoes (Taiwan) 2006	High	Moderate	Moderate	High	Moderate	Low	Low	Very Low
<i>Lopholeucaspis cockerelli</i>	Limes (New Caledonia) 2006	High	Low	Low	High	Moderate	Low	Low	Very Low
<i>Lygus lineolaris</i>	Stone fruit (USA) 2010	Very Low	Moderate	Very Low	High	Moderate	Very Low	Moderate	Very Low
	Table grapes (California) 2013	Very low	Moderate	Very low	High	Moderate	Very low	Moderate	Very Low
	Apples (USA) 2020	Very Low	Moderate	Very Low	High	Moderate	Very Low	Moderate	Very Low
<i>Parlatoria pergandii</i>	Oranges (Italy) 2005	High	Low	Low	High	Moderate	Low	Low	Very Low
	Mandarin (Japan) 2009	High	Low	Low	High	Moderate	Low	Low	Very Low
	Apples (USA) 2020	Low	Low	Very Low	High	Moderate	Very Low	Low	Negligible
<i>Paracoccus marginatus</i>	Pomegranate (India) 2020	High	Moderate	Moderate	High	High	Moderate	Low	Low
<i>Pinnaspis aspidistrae</i>	Avocados (Chile) 2019	High	Low	Low	High	Moderate	Low	Low	Very Low
	Limes (New Caledonia) 2006	High	Low	Low	High	Moderate	Low	Low	Very low
Pseudococcidae	Group PRA for mealybugs 2019	High*	Moderate*	Moderate*	High	High	Moderate*	Low	Low
<i>Pseudococcus maritimus</i>	Apples (USA) 2020	High	Moderate	Moderate	High	High	Moderate	Low	Low
<i>Protopulvinaria pyrifomis</i>	Mangoes (Taiwan) 2006	High	Moderate	Moderate	High	Moderate	Low	Low	Very Low
<i>Pseudaonidia trilobitiformis</i>	Mandarin (Japan) 2009	High	Low	Low	High	Moderate	Low	Low	Very Low
	Mangosteen (Indonesia) 2012	High	Low	Low	High	Moderate	Low	Low	Very Low

Pest name	Commodity	Likelihood of						Consequences	URE
		Entry			Establishment	Spread	EES		
		Importation	Distribution	Overall					
	Mango (Indonesia, Thailand, Vietnam) 2015	High	Moderate	Moderate	High	Moderate	Low	Low	Very Low
	Limes (New Caledonia) 2006	High	Low	Low	High	Moderate	Low	Low	Very low
	<i>Pseudaulacaspis cockerelli</i>	Banana (Philippines) 2008	High	High	High	Moderate	High	Moderate	Low
<i>Pseudaulacaspis pentagona</i>	Capsicum (Korea) 2009	Moderate	Low	Low	High	Moderate	Low	Low	Very Low
	Island Cabbage (Pacific Islands) 2013	Moderate	Low	Low	Moderate	High	Low	Low	Very low
	Stone fruit (USA) 2010	Low	Low	Very Low	High	Moderate	Very low	Low	Negligible
<i>Selenaspidus articulatus</i>	Banana (Philippines) 2008	High	High	High	Moderate	High	Moderate	Low	Low
	Lychees (Taiwan, Vietnam) 2013	Very Low	Low	Very low	High	Moderate	Very Low	Low	Negligible
Hymenoptera									
<i>Cardiocondyla sp.</i>	Mangosteen (Indonesia) 2012	High	High	High	Moderate	High	Moderate	Moderate	Moderate
<i>Monomorium sp.</i>	Mangosteen (Indonesia) 2012	High	High	High	Moderate	High	Moderate	Moderate	Moderate
<i>Pheidole sp.</i>	Mangosteen (Indonesia) 2012	High	High	High	Moderate	High	Moderate	Moderate	Moderate
<i>Plagiolepis sp.</i>	Mangosteen (Indonesia) 2012	High	High	High	Moderate	High	Moderate	Moderate	Moderate
<i>Polyrhachis sp.</i>	Mangosteen (Indonesia) 2012	High	High	High	Moderate	High	Moderate	Moderate	Moderate
<i>Technomyrmex sp.</i>	Mangosteen (Indonesia) 2012	High	High	High	Moderate	High	Moderate	Moderate	Moderate
Lepidoptera									
<i>Adoxophyes orana</i>	Mandarin (Japan) 2009	Low	Moderate	Low	High	High	Low	Moderate	Low

Pest name	Commodity	Likelihood of						Consequences	URE
		Entry			Establishment	Spread	EES		
		Importation	Distribution	Overall					
	Longan and Lychee (China and Vietnam) 2004	Very Low	Low	Very Low	Moderate	Moderate	Very low	Low	Negligible
	Nectarine (China) 2016	Low	Moderate	Low	High	High	Low	Moderate	Low
	Apple (China) 2010	Low	Moderate	Low	High	High	Low	Moderate	Low
<i>Aphomia sabella</i>	Fresh dates (Middle East and African region) 2019	Low	Very Low	Very Low	Low	Moderate	Very Low	Low	Negligible
<i>Archips micaceana</i>	Table grapes (China) 2011	Low	Moderate	Low	High	High	Low	Moderate	Low
	Table grapes (India) 2016	Low	Moderate	Low	High	High	Low	Moderate	Low
<i>Archips rosana</i>	Stone fruit (USA) 2010	Moderate	Moderate	Low	High	High	Low	Moderate	Low
	Apples (USA) 2020	Moderate	Moderate	Low	High	High	Low	Moderate	Low
<i>Argyrotaenia franciscana</i> (= <i>Argyrotaenia citrana</i>)	Stone fruit (USA) 2010	Moderate	Moderate	Low	High	High	Low	Moderate	Low
	Apples (USA) 2020	Moderate	Moderate	Low	High	High	Low	Moderate	Low
<i>Choristoneura rosaceana</i>	Stone fruit (USA) 2010	Moderate	Moderate	Low	High	High	Low	Moderate	Low
	Apples (USA) 2020	Moderate	Moderate	Low	High	High	Low	Moderate	Low
<i>Cryptophlebia leucotreta</i>	Pineapple fruit (generic) 2002	High	Moderate	Moderate	High	Moderate	Low	Moderate	Low
<i>Chrysodeixis chalcites</i>	Tomatoes (Netherlands) 2003	Low	Low	Very low	Moderate	High	Very low	Moderate	Very low
<i>Deanolis sublimbalis</i>	Mango (India) 2008	Moderate	Moderate	Low	Moderate	Moderate	Low	Moderate	Low
	Mango (Indonesia, Thailand, Vietnam) 2015	Low	Moderate	Low	Moderate	Moderate	Low	Moderate	Low
<i>Homona magnanima</i>	Mandarin (Japan) 2009	Low	Moderate	Low	High	High	Low	Moderate	Low
<i>Lacanobia oleracea</i>	Tomatoes (Netherlands) 2003	High	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Low
<i>Mamestra brassicae</i>	Tomatoes (Netherlands) 2003	Low	Moderate	Low	Moderate	Moderate	Low	Moderate	Low

Pest name	Commodity	Likelihood of						Consequences	URE
		Entry			Establishment	Spread	EES		
		Importation	Distribution	Overall					
<i>Orgyia postica</i>	Mango (Taiwan) 2006	Low	Low	Very low	Moderate	Moderate	Very low	Low	Negligible
	<i>Phalaenopsis</i> nursery stock (Taiwan) 2010	Low	High	Low	Moderate	Moderate	Low	Low	Very low
	Mango (India) 2008	Low	Low	Very low	Moderate	Moderate	Very low	Low	Negligible
<i>Planotortrix excessana</i>	Apple (New Zealand) 2007	Moderate	Moderate	Low	High	High	Low	Moderate	Low
	Cherry (New Zealand) 2003	Low	Low	Very low	High	High	Very low	Moderate	Very low
	Stone fruit (New Zealand) 2006	High	Moderate	Moderate	High	High	Moderate	Moderate	Moderate
<i>Platynota stultana</i>	Stone fruit (USA) 2010	Moderate	Moderate	Low	High	High	Low	Moderate	Low
	Table grapes (Mexico) 2016	Moderate	Moderate	Low	High	High	Low	Moderate	Low

EES: Overall likelihood of entry, establishment and spread. **URE:** Unrestricted risk estimate. This is expressed in an ascending scale from negligible to extreme. * Indicative rating.

6.3 Pest risk assessment

This section assesses the likelihood of entry (importation and distribution), establishment and spread, and estimates the economic, including environmental, consequences that the quarantine pests identified in the pest categorisation process may cause if they were to enter, establish and spread in Australia. The methodology used for this assessment is consistent with the methodology used for the Thrips Group PRA, with some modification, and is presented in Appendix E of this document.

In conducting this pest risk assessment, some general considerations have been taken into account. Some of the Orders of insects reviewed in Part 2 of this PRA contain species that are not classified as plant pests, but which the department's interception data show are associated with the pathway as contaminating pests; these may, for example, feed on/parasitise insects that are plant pests, or they may be associated with aspects of the growing conditions of cut flowers and foliage. The determination of whether a species is a plant quarantine pest, a potential regulated article, or a contaminating pest is detailed in the pest categorisation table (Appendix F). The following pest risk assessments have therefore been conducted on the phytophagous (that is, the plant-feeding) species of the insect orders examined.

With the exception of the mealybugs and scales, the majority of the risk assessments summarised in

Table 6.1 were conducted for commodities on the fresh fruit pathway. It is reasonable to consider that many of the species identified in Appendix F have a higher likelihood of entry on the cut flower and foliage pathway than the fresh fruit pathway, for two reasons. Firstly, many cut flowers (such as roses) consist of complex arrays of petals that form good cryptic cover, which differs from the smooth surface of many fruits on which pests can be more readily detected during inspection. Secondly, a number of these pest species feed on foliage, which is imported as part of the commodity, and these species are already proven to be on the pathway, as shown in the departmental interception data presented in Appendix D. These factors related to pest entry increase the likelihood that these pests may be successfully distributed to suitable hosts in Australia.

The likelihood of establishment and of spread of an identified pest in the Pest Risk Analysis (PRA) area (defined as all of Australia) is largely unrelated to the commodity/country pathway through which the pest is imported into Australia, as these likelihoods relate specifically to events that occur in the PRA area. The consequences associated with the continuing presence of a pest are also independent of the importation pathway.

The same considerations for the higher than previously recorded likelihood of importation are relevant, as a proportion of interceptions are not able to be identified to species level (as discussed in Appendix I). In the context of the current analysis, it is reasonable to conclude that higher numbers of species of biosecurity concern to Australia have been arriving than are recorded as interceptions on the cut flower and foliage pathway.

6.3.1 Order Coleoptera

The phytophagous beetles of biosecurity concern associated with the imported cut flower and foliage pathway are considered to be herbivores with direct impacts on plant health. Therefore,

their ratings for entry, establishment, spread and consequences on this pathway are considered to be similar across species.

There is a wide range of beetle species of biosecurity concern found on the cut flower and foliage pathway, and these species are associated with the plant as a food source. Beetles form 2.45% of all arthropod interceptions between 1 January 2000 and 28 February 2018. Five species relevant to this PRA have been previously assessed, the coccinelids *Harmonia axyridis* and *Hippodamia convergens*, the scarabs *Adoretus versutus* and *Popillia japonica*, and the curculionid *Elytroteinus subtruncatus*. Previous pest risk assessments rated these beetles with a likelihood of entry ranging from 'Very low' on island cabbage (*Abelmoschus manihot*), 'Low' on fresh fruit, and 'High' on *Lilium* cut flowers and ginger.

The beetle species assessed in this document have a moderate degree of association with cut flowers and foliage. As a result of the beetle's size, stages of harvesting and processing of flowers and foliage are likely to remove some beetles from the commodity. The department's interception records of beetles is consistent with this assessment. Therefore, an importation likelihood rating for beetles of '**Moderate**' is supported on this pathway.

Imported cut flowers and foliage arrive in major Australian capital cities, are distributed to flower wholesalers and retailers (such as florists and supermarkets) throughout Australia, and are further distributed to customers. This increases the potential for beetles to move with the commodity. Decorative bunches of flowers and foliage are displayed inside buildings, but also outdoors (for example, funerals and weddings). In Australia, floral waste can be disposed of in household compost systems (as discussed in Part 1 of this PRA) or sent to landfill.

The polyphagous nature of the plant-feeding species increases the likelihood of them finding a susceptible host in Australia, and many coleopteran species can survive for several weeks without food. A distribution rating of '**Moderate**' to '**High**' for beetles is supported on this pathway, and aligns with ratings assigned in previous risk assessments for these species.

The overall likelihood of entry is determined by combining the likelihood of importation with the likelihood of distribution (Appendix E, Table IV). The likelihood that beetles will enter Australia as a result of trade in cut flowers and foliage, and be distributed in a viable state to a susceptible host is assessed as '**Low**' to '**Moderate**'.

Australia's climate is similar to the climate in many of the source countries of beetles on this pathway, and there have already been establishments of exotic species of beetles in Australia. Many pest species of beetles have a broad host range, and this increases the likelihood of them finding and establishing in a suitable habitat in Australia. Previous assessments have predominantly considered beetle establishment to be 'High'. This information supports an establishment likelihood of '**High**'.

Many adult beetles are capable of flight, and some are considered strong fliers, assisting their ability to spread from plant to plant. Beetles can also spread through human assistance, as larvae and adults in fresh produce such as cut flowers and foliage, vegetable crops and nursery stock. This increases the potential for long distance dispersal with the commodity. Previous pest risk assessments predominantly rated beetles with a 'Moderate' to 'High' likelihood of spread once they had entered Australia. This information supports a spread likelihood rating of '**Moderate**' to '**High**'.

The overall likelihood of entry, establishment and spread is determined by combining the likelihoods of entry, of establishment and spread using the matrix of rules shown in Appendix E, Table IV. The overall likelihood for the entry, establishment and spread of beetles on this pathway in Australia is estimated to be **‘Low’** to **‘Moderate’**.

Many plant-feeding beetle species are known to cause economic consequences. The range of horticultural, agricultural and ornamental crops that are potential hosts of polyphagous beetle species is expansive. Larval and adult feeding on host plants results in defoliation, skeletonisation, and mining or boring holes on different plant structures, including fruits and vegetables. This damage can reduce the cosmetic quality of high-value crops, making them unmarketable. Various beetle species also have the ability to transmit pathogens that have their own economic consequences, as well as those that can become stored product pests, household nuisance pests and taint commodities through their unpleasant taste. Previous pest risk assessments predominantly rated both predatory and phytophagous coleopteran species with **‘Moderate’** economic consequences. The information provided in this chapter supports a consequences rating of **‘Moderate’** on this pathway.

Unrestricted risk is the result of combining the likelihoods of entry, establishment and spread with the outcomes of the overall consequences. Likelihoods and consequences are combined using the risk estimation matrix (Appendix E, Table VII) and the outcomes are summarised in Table 6.2.

The unrestricted risk estimate for exotic phytophagous beetles on cut flowers and foliage arriving in Australia has been assessed as **‘Low’** to **‘Moderate’**. A **‘Low’** to **‘Moderate’** rating does not achieve the ALOP for Australia. Therefore, specific risk management measures are required for these pests on cut flowers and foliage arriving in Australia. Appendix F determines the biosecurity status of the 121 Coleoptera on the cut flowers and foliage pathway. In addition, Appendix G summarises the Coleoptera species that are quarantine pests and/or potential regulated articles for Australia on the pathway which are identified as not meeting ALOP and that require specific risk management measures.

6.3.2 Order Diptera

All phytophagous Diptera of biosecurity concern on the cut flower and foliage pathway are considered to be herbivores with direct impacts on plant health. Therefore, their ratings for entry, establishment, spread and consequences on this pathway are considered to be similar across species.

Only a few families of Diptera contain species that feed on plants and plant products, and the most frequently intercepted plant pest families of flies associated with imported cut flowers and foliage are the gall midges (Cecidomyiidae) and leaf miners (Agromyzidae). Leaf miner and gall midge species feed and live on stems, flowers and foliage during the larval stage of their life cycles and, therefore, have an injurious association with cut flowers and foliage. Harvesting and processing of flowers may remove some Diptera species from the commodity. Only one species of Diptera relevant to this PRA has been previously assessed. *Liriomyza huidobrensis* (the serpentine leaf miner), was previously assessed in the development of policy for Truss Tomato from the Netherlands as having a likelihood of importation of **‘Low’** (Biosecurity Australia 2003). Plant-feeding Diptera are more likely to be intercepted on flowers and foliage than on fruit as they are more likely to be concealed within the plant matter. They have also been intercepted on imported

cut flowers and foliage. Therefore, a likelihood of importation of **'High'** is supported on this pathway.

As discussed above for the Coleoptera, imported cut flowers and foliage arrive in major Australian capital cities, are distributed to flower wholesalers and retailers (such as florists and supermarkets) throughout Australia, and are further distributed to customers. This increases the potential for flies to move with the commodity. Decorative bunches of flowers and foliage are displayed inside buildings, but also outdoors (for example, funerals and weddings). Cut flowers and foliage are perishable commodities, and deterioration is likely to cause some fly mortality before the larvae are able to reach maturity on a host. In Australia, floral waste can be disposed of in household compost systems (as discussed in Part 1 of this PRA) or sent to landfill. The polyphagous nature of many plant-feeding fly species increases the likelihood of them finding a susceptible part of a host in Australia. Therefore, the likelihood of distribution rating of **'Moderate'** is supported on this pathway.

The overall likelihood of entry is determined by combining the likelihood of importation with the likelihood of distribution (Appendix E, Table IV). The likelihood that Diptera will enter Australia as a result of trade in cut flowers and foliage and be distributed in a viable state to a susceptible host is assessed as **'Moderate'**.

Australia's climate is similar to the climate in many of the source countries of flies on this pathway, and there have already been establishments of exotic species of flies in Australia. Many plant-feeding pest species of flies have a broad host range, including common and widespread plant species used in horticulture, and this increases the likelihood of establishment in Australia. The previous assessment considered the likelihood of establishment for *Liriomyza huidobrensis* to be **'Moderate'**. Other exotic leaf miner species have established in Australia, and this information combined with the information provided in this chapter supports an establishment likelihood rating of **'High'** for Diptera on this pathway.

Adult flies can fly, increasing their likelihood of spread. Although some adult flies are only weak to moderate fliers (Biosecurity Australia 2011a; Li 2004; Plant Health Australia 2009), they can also be wind dispersed. Humans may also assist dispersal of fly larvae and pupae in fresh produce such as cut flowers and foliage, vegetable crops and nursery stock (Plant Health Australia 2009; DAF Qld 2009). Decorative bunches of flowers and foliage are displayed inside buildings, but also outdoors (for example, funerals and weddings). Information provided in this PRA supports the likelihood of spread rating of **'High'** is supported.

The overall likelihood of entry, establishment and spread is determined by combining the likelihoods of entry, of establishment and of spread using the matrix of rules shown in Appendix E, Table IV. The overall likelihood for the entry, establishment and spread of Diptera on this pathway in Australia is estimated to be **'Moderate'**.

Plant feeding dipterans are known to cause economic consequences. Some species, such as polyphagous Agromyzidae feed on a broad range of agricultural and ornamental crops. Leaf miner damage, punctures and leaf mines, may reduce the cosmetic quality of high-value crops and make the produce unmarketable. Cecidomyiidae gall midges are also known to cause economic and environmental consequences, and some intercepted species are also polyphagous on economically important plant species. The introduction of exotic pest species of flies to Australia increases the likelihood of trade implications for Australia. The previous pest risk assessment for

Liriomyza huidobrensis rated this species with ‘Moderate’ economic consequences. Taking into consideration the different life strategies of the Diptera discussed, the information provided in this chapter supports a consequences rating of ‘Low’ to ‘Moderate’ on this pathway.

Unrestricted risk is the result of combining the likelihoods of entry, establishment and spread with the outcomes of the overall consequences. Likelihoods and consequences are combined using the risk estimation matrix (Appendix E, Table VII) and the outcomes are summarised in Table 6.2.

The unrestricted risk estimate for exotic Diptera on fresh cut flowers and foliage arriving in Australia has been assessed as ‘Low’ to ‘Moderate’, which does not achieve the ALOP for Australia. Therefore, specific risk management measures are required for these pests on cut flowers and foliage arriving in Australia. Appendix F outlines the determination of biosecurity status of the 66 Diptera on the cut flower and foliage pathway. In addition, Appendix G summarises Diptera that are quarantine pests and/or potential regulated articles for Australia on the pathway, that are identified as not meeting ALOP, and that require specific risk management measures.

6.3.3 Order Hemiptera

All phytophagous Hemiptera (excluding the Aphididae, which were assessed in Part 1 of this PRA) of biosecurity concern on the fresh cut flower and foliage pathway are considered to be herbivores with direct impacts on plant health, or vectors of plant diseases with direct impacts on plant health. Therefore, their ratings for entry, establishment, spread and consequences on this pathway are considered to be similar across species.

Plant pest hemipterans feed on vascular plant tissues and are often found on the cut flowers and foliage pathway. For example, Hemiptera (excluding aphids) formed 4.7% of all arthropod interceptions recorded on the imported cut flower and foliage pathway from 1 January 2000 to 28 February 2018. Seventeen species of Hemiptera (excluding the Aphididae) relevant to this PRA have been previously assessed. In addition, the biosecurity risk posed by family Pseudococcidae (the mealybugs), from all countries was previously assessed in the Group Mealybugs PRA. The Group Mealybugs PRA has been adopted in this PRA. Some species have been assessed in more than one PRA, bringing the total number of assessments to 32.

The Group Mealybugs PRA summarised the previous risk assessments for mealybugs (in Appendix C of that document) and determined the risk ratings for all exotic mealybugs on several plant import pathways, including for cut flowers and foliage (see Table 6.1

Table 6.1 of this document). This PRA verifies the indicative ratings given to mealybugs in the Group Mealybugs PRA for the likelihood of entry as ‘Moderate’ (importation and distribution being ‘High’ and ‘Moderate’ respectively). Thus, the Group Mealybugs PRA has been adopted in this PRA.

There are a wide range of other phytophagous Hemiptera of biosecurity concern found on cut flowers and foliage in all stages of their life cycle. A number of species have a high degree of association with cut flowers and foliage. The harvesting and processing of flowers does not remove all hemipterans from the commodity, and the nature of the commodity provides good cryptic coverage for hemipterans, particularly the smaller species and juveniles. Twenty four of

the 32 previous assessments for the Hemiptera species rated them with a ‘High’ importation likelihood. Therefore, an importation likelihood of **‘High’** is supported on this pathway.

As discussed above for the Diptera, imported cut flowers and foliage arrive in major Australian capital cities, are distributed to flower wholesalers and retailers (such as florists and supermarkets) throughout Australia, and are further distributed to customers. This increases the potential for Hemiptera to move with the commodity. Decorative bunches of flowers and foliage are displayed inside buildings, but also outdoors (for example, funerals and weddings). Cut flowers and foliage are perishable commodities, and deterioration is likely to cause some hemipteran mortality before the juveniles are able to reach maturity on a host. In Australia, floral waste can be disposed of in household compost systems (as discussed in Part 1 of this PRA) or sent to landfill. The polyphagous nature of many plant pest hemipteran species increases the likelihood of them finding a susceptible part of a host in Australia. Previous assessments have predominantly rated the likelihood of distribution for hemipteran species as ‘Low’ or ‘Moderate’. The information provided in this chapter supports a distribution rating of **‘Moderate’** on this pathway.

The overall likelihood of entry is determined by combining the likelihood of importation with the likelihood of distribution (Appendix E, Table IV). The likelihood that Hemiptera will enter Australia as a result of trade in cut flowers and foliage and be distributed in a viable state to a susceptible host is assessed as **‘Moderate’**.

Australia’s climate is similar to the climate in many of the source countries of Hemiptera on this pathway, and there have already been establishments of exotic Hemiptera species in Australia. Many plant pest Hemiptera species are polyphagous, and this increases the likelihood of them finding new hosts/prey and therefore establishing. Most previous assessments (27 of the 31 assessments) have considered the likelihood of establishment for Hemiptera to be **‘High’** which is supported by the information provided in this chapter.

Many adult hemipterans are strong fliers, and hemipteran eggs and juvenile stages can be dispersed through human-assisted movement in fresh produce such as cut flowers and foliage, vegetable crops and nursery stock. Decorative bunches of flowers and foliage are displayed inside buildings, but also outdoors (for example, funerals and weddings). Previous assessments have predominantly rated hemipterans with a moderate likelihood of spread (25 of the 31 assessments), and seven have rated the likelihood ‘High’. The information provided in this chapter supports a rating of **‘High’** being assigned on this pathway.

The overall likelihood of entry, establishment and spread is determined by combining the likelihoods of entry, of establishment and of spread using the matrix of rules shown in Appendix E, Table IV. The overall likelihood for the entry, establishment and spread of Hemiptera on this pathway in Australia is estimated to be **‘Moderate’**.

Most Hemipteran families contain species that feed on plants and plant products, and many are known as important plant pests. The introduction of exotic pest species of Hemiptera to Australia increases the likelihood of trade implications for Australia. A number of hemipterans are also capable of transmitting a large number of plant disease agents, some of which may be exotic to Australia, and some of which are likely to cause serious environmental and economic consequences (for example, *Xylella fastidiosa*). Twenty eight of the 31 previous assessments rated Hemiptera as having ‘Low’ economic consequences, with the remaining three being rated

‘Moderate’. Given the range of pest species of Hemiptera identified on cut flowers and foliage, and the ability of some of these species to transmit plant viruses of biosecurity concern to Australia, a consequences rating of ‘Low’ to ‘Moderate’ is supported.

Unrestricted risk is the result of combining the likelihoods of entry, establishment and spread with the outcomes of the overall consequences. Likelihoods and consequences are combined using the risk estimation matrix (Appendix E, Table VII) and the outcomes are summarised in Table 6.2.

The unrestricted risk estimate for exotic Hemiptera on cut flowers and foliage arriving in Australia has been assessed as ‘Low’ to ‘Moderate’, which does not achieve the ALOP for Australia. Therefore, specific risk management measures are required for these pests on cut flowers and foliage arriving in Australia. Appendix F outlines the determination of biosecurity status of the 200 Hemiptera on the cut flower and foliage pathway. In addition, Appendix G summarises Hemiptera that are quarantine pests and/or potential regulated articles for Australia on the pathway, that are identified as not meeting ALOP and that require specific risk management measures.

There is a level of uncertainty as to whether arriving whitefly species (Family Aleyrodidae) may be transmitting pathogens and, if so, which pathogens they potentially are transmitting. However, there is the potential that these species arriving in Australia on cut flowers and foliage could transmit exotic plant pathogens to other host plants. Available evidence is limited, therefore, all aleyrodid species regardless of whether they are present in Australia are considered as potential regulated articles. In addition, certain other species of Hemiptera known to be capable of vectoring *Xylella* (as marked in the pest categorisation table) are also considered to be potential regulated articles, as outlined in Appendix G.

6.3.4 Order Hymenoptera

Hymenoptera formed 2.74% of all arthropod interceptions on the imported cut flower and foliage pathway (see the dataset discussed in Appendix D) between 1 January 2000 and 28 February 2018. Of the 1054 interceptions of Hymenoptera for this period, the majority of interceptions were for non-plant feeding groups: 465 were ants in the family Formicidae and 347 were from the largely parasitoid families of the Braconidae, Pteromalidae, Ichneumonidae, Eulophidae and Aphelinidae. Species within these groups have also been identified as contaminating pests (see the pest categorisation table in Appendix F for individual determinations).

Only a few families of Hymenoptera contain species that feed on plants and plant products, and even fewer of these species are known as plant pests. There are, however, a number of Hymenoptera that are contaminating pests, and which will be regulated at the Australian border if intercepted because of the pests and diseases they can transmit (for example, bees transmitting *Varroa* mite), the consequences they have for human amenities and the environment (invasive ants), or the potential impacts they could have as predators on native Australian arthropods (parasitoid wasps).

At the request of stakeholders, the department reviewed the phytophagous plant pests including sawflies and gall wasps within the Hymenopteran families of Tenthredinidae, Argidae, Cephidae and Cynipidae. While several of Hymenoptera such as Wheat stem sawfly (*Cephus cinctus*) and European apple sawfly (*Hoplocampa testudinea*) are of biosecurity concern to other agricultural

industries, scientific research and departmental interception data does not indicate presence of these insects on the cut flower and foliage pathway. Due to this information a risk assessment of the phytophagous Hymenoptera has not been conducted.

The department will continue to monitor the interceptions of Hymenoptera, and if an organism that has not been categorised, including a contaminant pest, is intercepted on cut flowers and foliage on arrival in Australia, it will require assessment by the department to determine its quarantine status and whether phytosanitary action is required.

6.3.5 Order Lepidoptera

Lepidoptera of biosecurity concern associated with the imported cut flower and foliage pathway are considered to be herbivores with direct impacts on plant health. Therefore, their ratings for entry, establishment, spread and consequences on this pathway are considered to be similar across species.

There is a range of Lepidoptera species of biosecurity concern found on cut flowers and foliage. The harvesting and processing of cut flowers and foliage can be anticipated to remove a number of Lepidoptera, at multiple life stages, from the commodity if there were visual signs, as damaged flowers are not presented for sale. However, some Lepidoptera still enter through the pathway and have been intercepted at the Australian border. From 1 January 2000 to 28 February 2018, there were 2,111 interceptions of Lepidoptera at the border, making this 4.70% of all arthropod interceptions (see the dataset discussed in Appendix D).

Fifteen species of Lepidoptera included in the pest categorisation assessment of this PRA have been previously assessed, with some being assessed in more than one policy, bringing the total number of assessments to 25. Apart from four of these assessments, in truss tomatoes and *Phalaenopsis* nursery stock, all have been for fresh fruit commodities. The assessments for likelihood of importation range from 'Very Low' to 'High', with the upper ratings assigned based on factors such as the presence of stems and leaves with the commodity, for species that lay eggs on the underside of leaves, and those with internally feeding larvae or pupae within plant stems and fruit. For example, *Lacanobia oleracea* was assessed in Netherlands truss tomatoes (DAFF 2003), and the likelihood of importation of 'High' was assigned due the potential for presence of eggs on the underside of leaves, larvae on the fruit, and internally feeding larvae or pupae within plant canes (DAFF 2003). Lepidoptera eggs and larvae are more commonly found on leaves and in flowers, suggesting that the likelihood of importation would be higher if foliage were routinely imported along with the fruit on these pathways.

Butterfly and moth species typically feed and live on flowers and foliage during all stages of their life cycle and, therefore, have a high degree of association with the pathway. Lepidoptera eggs are laid onto the host plant, larvae (caterpillars) will feed, chew or bore into foliage, flowers and other plant structures, and adult moths and butterflies will land and feed on pollen or nectar before flying away. The harvesting and processing of cut flowers and foliage could be anticipated to remove most of these life stages to maintain cosmetic quality; however, eggs and some larvae may be overlooked if they are early instars and hidden within the flowers. Most cut flowers and foliage are also transported under cool storage which may also increase pest mortality or would delay development (Biosecurity Australia 2010b; DAWR 2019d). The department's interception records of lepidopteran pests are consistent with the information presented in this chapter,

therefore, a likelihood of importation rating of **'High'** is supported for Lepidoptera on this pathway.

Imported cut flowers and foliage arrive in major Australian capital cities, are distributed to flower wholesalers and retailers (such as florists and supermarkets) throughout Australia, and are further distributed to customers. This increases the potential for Lepidoptera to move with the commodity. Decorative bunches of flowers and foliage are displayed inside buildings, but also outdoors (for example, funerals and weddings). In Australia, floral waste can be disposed of in household compost systems (as discussed in Part 1 of this PRA) or sent to landfill.

Imported cut flowers and foliage arrive in major Australian capital cities, are distributed to flower wholesalers and retailers (such as florists and supermarkets) throughout Australia, and are further distributed to customers. This increases the potential for larvae and adults to move with the commodity. Cut flowers and foliage are perishable commodities, and deterioration is likely to cause some larval mortality before they are able to reach maturity on a host. The polyphagous nature of the pest Lepidoptera species increases the likelihood of them finding a susceptible host in Australia. Therefore, the likelihood of distribution rating of **'Moderate'** for Lepidoptera species is supported on this pathway, and aligns with the majority (18 of the 26 ratings) of ratings assigned in previous risk assessments.

The overall likelihood of entry is determined by combining the likelihood of importation with the likelihood of distribution (Appendix E, Table IV). The likelihood that Lepidopteran pests will enter Australia as a result of trade in the commodity and be distributed in a viable state to a susceptible host in Australia is assessed as **'Moderate'**.

Australia's climate is similar to the climate in many of the source countries of Lepidoptera on this pathway, and there have already been establishments of exotic species of Lepidoptera in Australia. Many lepidopteran pest species have a broad host range, including common and widespread plant species used in horticulture, and this increases the likelihood of them finding a suitable habitat in Australia. Previous PRAs have considered the likelihood of establishment for Lepidoptera species as between **'Moderate'** and **'High'**. This information supports an establishment likelihood rating of **'Moderate'** to **'High'**.

Many adult Lepidoptera are moderate to strong fliers, while some are also migratory or may have a high dispersal capacity. This would aid adults in transferring to a live susceptible plant host. Larvae are also able to crawl away or balloon to find food, and some species, such as *Spodoptera eridania*, are known to disperse in larval swarms to other host plants, rapidly and over long distances. Previous pest risk assessments predominantly rated Lepidoptera species with a **'High'** or **'Moderate'** likelihood of spread once they enter Australia. Information in this and previous PRAs are similar, and nature of invasive exotic species intercepted on the cut flower and foliage pathway are taken into consideration, therefore, a likelihood of spread rating of **'Moderate'** to **'High'** is supported.

The overall likelihood of entry, establishment and spread is determined by combining the likelihoods of entry, of establishment and of spread using the matrix of rules shown in Appendix E, Table IV. The overall likelihood for the entry, establishment and spread of Lepidoptera species on this pathway in Australia is estimated to be **'Low'** to **'Moderate'**.

Many Lepidoptera species are known to cause economic consequences. The range of horticultural, agricultural and ornamental crops that are potential hosts of polyphagous caterpillar species is broad. Caterpillar feeding damage can reduce the cosmetic quality of high-value ornamental crops, reduce fruit set on fruiting crops, may also contribute to plant mortality of susceptible or young plants. Caterpillar populations may be controlled with chemical control or BCAs, however there are concerns over insecticide resistance, which would cause additional economic consequences.

Previous pest risk assessments rated the economic consequences of 18 of the 26 assessments of Lepidoptera species as 'Moderate', and the other four species as 'Low'. Given the range of quarantine pest Lepidoptera species identified on imported cut flowers and foliage and their ability to cause economic consequences, the consequences rating of '**Moderate**' is supported.

Unrestricted risk is the result of combining the likelihoods of entry, establishment and spread with the outcomes of the overall consequences. Likelihoods and consequences are combined using the risk estimation matrix (Appendix E, Table VII) and the outcomes are summarised in Table 6.2.

The unrestricted risk estimate for Lepidoptera species on cut flowers and foliage arriving in Australia has been assessed as '**Low**' to '**Moderate**', and does not achieve the ALOP for Australia. Therefore, specific risk management measures are required for these pests on fresh cut flowers and foliage arriving in Australia. Appendix F outlines the determination of biosecurity status of the 136 Lepidoptera on the cut flower and foliage pathway. In addition, Appendix G summarises Lepidoptera that are quarantine pests and/or potential regulated articles for Australia on the pathway, that are identified as not meeting ALOP, and that require specific risk management measures.

Table 6.2 Summary of unrestricted risk estimates for Coleoptera, Diptera, Hemiptera, and Lepidoptera on the cut flower and foliage pathway

Pest name	Likelihood of			Establishment	Spread	EES	Consequences	URE
	Entry							
	Importation	Distribution	Overall					
Coleoptera (beetles)	Moderate	Moderate to High	Low to Moderate	High	Moderate to High	Low to Moderate	Moderate	Low to Moderate
Diptera (flies)	High	Moderate	Moderate	High	High	Moderate	Low to Moderate	Low to Moderate
Hemiptera (bugs)	High	Moderate	Moderate	High	High	Moderate	Low to Moderate	Low to Moderate
Lepidoptera (moths and butterflies)	High	Moderate	Moderate	Moderate to High	High	Low to Moderate	Moderate	Low to Moderate

EES: Overall likelihood of entry, establishment and spread. **URE:** Unrestricted risk estimate. This is expressed in an ascending scale from negligible to extreme.

6.4 Conclusion

The pest categorisation for all species of Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera known to occur on the imported commercial cut flower and foliage pathway is presented in Appendix F. The 583 species were identified from sources including departmental interception data, information provided by a number of exporting country NPPOs, and risk analyses conducted by the department and other NPPOs.

A total of 74 Coleoptera, 38 Diptera, 140 Hemiptera and 110 Lepidoptera are identified as quarantine pests for Australia. A further six Coleoptera and ten Hemiptera are identified as potential regulated articles. The risk assessments conducted for these species determined that the unrestricted risk estimate for the Coleoptera, Diptera, Hemiptera and Lepidoptera species is '**Low**' to '**Moderate**' which does not achieve the ALOP for Australia. Therefore, specific risk management measures are required for these arthropods on cut flowers and foliage to mitigate the risks. A short-form list of all quarantine and potential regulated species identified in this PRA is provided in Appendix G, along with their identified regulatory status.

During the pest categorisation process, an additional 13 Hymenoptera were classified as plant quarantine pests and are regulated at the Australian border. A risk assessment for the phytophagous Hymenoptera was not conducted, as interception numbers were extremely low. The department will continue to monitor this situation, and will assess uncategorised phytophagous Hymenoptera, or any other organisms, if they arrive on this pathway.

In addition, although not classified as plant quarantine pests, eight Coleoptera, 17 Diptera, three Hemiptera and 19 Hymenoptera were identified as contaminating pests on this pathway, and if detected on arrival in Australia, these species will be addressed by existing standard operational procedures (see Appendix B for more detail).

7 Pest risk management

This chapter provides information and recommendations on the management of quarantine pest and regulated article species of Coleoptera, Diptera, Hemiptera, and Lepidoptera assessed as being associated with commercially produced fresh cut flowers and foliage and having an unrestricted risk estimate that does not achieve the ALOP for Australia. Risk management measures are required to reduce the risks posed by these pests to an acceptable level for Australia. This chapter also provides information on the management of contaminating pests on the pathway that were determined to be of biosecurity concern to Australia and are therefore regulated under the *Biosecurity Act 2015*. Those risk management measures are described in this chapter, and information is provided on potential alternative measures for consideration on a case-by-case basis.

The use of the term ‘pest’ in this chapter means quarantine pests, regulated articles and contaminating pests, and as discussed in Section 1.2, all pests of biosecurity concern to Australia are regulated on this pathway.

7.1 Pest risk management measures and phytosanitary procedures

Pest risk management evaluates and selects options for measures to reduce the risk of entry, establishment or spread and associated consequences of quarantine pests and regulated articles where they have been assessed as having an unrestricted risk level that does not achieve the ALOP for Australia. In calculating the unrestricted risk, existing commercial production practices have been considered, as have post-harvest and packing procedures.

In addition to existing commercial production systems and packing house operations for cut flowers and foliage, and specified border procedures in Australia, specific pest risk management measures, including operational systems, are recommended to achieve the ALOP for Australia.

7.1.1 Pest risk management for regulated pests

The pest risk analysis identified the pests of biosecurity concern (quarantine pests and regulated articles) to Australia with an unrestricted risk estimate that does not achieve the ALOP for Australia. Risk management measures are required to manage the risks posed by these pests. The pest categorisation (Appendix F) also identified the species that are contaminating pests on the cut flower and foliage pathway, and that are regulated under the *Biosecurity Act 2015* if detected on arrival in Australia. The risk management measures recommended for the quarantine pests and regulated articles are also considered to be effective against the contaminating pests on this pathway.

Since the release of Part 1 of the PRA in June 2019, some additions have been made to the pest risk management measures in response to identified biosecurity risks. These measures are recommended for the pests examined in Part 2 of this PRA and are listed in Table 7.1.

Table 7.1 Pest risk management measures for the identified quarantine and regulated Coleoptera, Diptera, Hemiptera, and Lepidoptera pest species on cut flowers and foliage from all countries

Pest	Common name	Measures
Coleoptera Diptera Hemiptera Lepidoptera (pests as specified in Appendix F & G)	Beetles	<u>To be applied pre-export</u> One of three arthropod pest management options:
	Flies	1. NPPO-approved systems approach; or
	Bugs	2. Pre-export methyl bromide fumigation; or
	Moths and butterflies	3. NPPO-approved alternative pre-export disinfestation treatment.
		AND Consignment freedom from live pests verified by NPPO pre-export visual inspection and remedial action if live pests are found. (a)
		AND <u>On arrival in Australia</u> On-arrival visual inspection to verify that the biosecurity status of consignments of cut flowers and foliage meets Australia's import conditions. Consignments released if arthropods are unregulated subject to freedom from other contaminants and pathogens. Consignments subject to remedial treatment if arthropods are identified as regulated or if the consignment does not meet Australia's import conditions. (b)
		AND <u>In circumstances of changing risk (c)</u> The department may require additional regulatory mechanisms to import requirements such as: <ul style="list-style-type: none"> • Import via an import permit; or • Amendment/and or suspension of a particular measure; or • Suspension of a commodity and/or country pathway.

Note: **a.** Pre-export remedial action (depending on the location of the inspection) may include treatment of the consignment to ensure that the pest is no longer viable or withdrawing the consignment from export to Australia. **b.** On-arrival remedial action will constitute treatment of the consignment to ensure that the pest is no longer viable, or disposal or export from Australia. **c.** Change in biosecurity risk is discussed in further detail in Section 7.1.5.

The risk management measures provided here are based on the existing risk management measures recommended by the department for mites, aphids and thrips in Part 1 of this PRA. The efficacy of these measures is supported through the department's verification and monitoring processes which show a significant reduction in interceptions of the pest groups assessed in Part 1 (mites, aphids and thrips) and Part 2 of this PRA (Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera), as discussed in Section 5.1.

This PRA (Part 2) recommends measures as listed in Table 7.1. When applied pre-export and at the Australia border, these measures should reduce the risks associated with quarantine and regulated Coleoptera, Diptera, Hemiptera and Lepidoptera on cut flowers and foliage, so as to achieve the ALOP for Australia.

Prior to export to Australia one of three arthropod pest management options is required; an exporting country's NPPO-approved systems approach, or pre-export methyl bromide fumigation, or an NPPO-approved alternative pre-export disinfestation treatment. In addition, all

consignments require visual inspection and treatment certification by the exporting NPPO to verify freedom from live pests.

On arrival in Australia, all cut flower and foliage consignments are inspected to verify their biosecurity status and that the imported goods meet Australia's import conditions. In situations where pests are identified and/or consignments do not meet Australia's import conditions, consignments will be subject to remedial treatment, or destroyed or exported, as appropriate. Imported consignments which are verified free from pests and meet Australia's import conditions are released.

Where the department detects and identifies pests that indicate either a changing risk or ongoing consignment non-compliance the department reserves the right to remove access to pest risk management options that are not managing pest risks and/or employ additional regulatory measures.

The department also reserves the right to suspend imports (either all imports, or imports from specific pathways) and conduct a review of the risk management systems. Imports will recommence only when the department is satisfied that appropriate correctional action has been undertaken. Countries could apply to re-instate measures, for example the systems approach, by preparing a detailed submission outlining corrective actions, which would be assessed by the department. The department may also conduct an audit of the particular phytosanitary system prior to decision about reinstatement.

7.1.2 NPPO-approved systems approach

Where a systems approach option is chosen, consistent with ISPM 14: *The use of integrated measures in a systems approach for pest risk management* (FAO 2016d), the exporting country's NPPO must:

- register growers (as well as treatment facilities and packing houses) that are producing cut flowers and foliage for export to Australia under a systems approach.
- provide details of the system approach, if requested by the department.
- investigate and instigate corrective actions in a systems approach where there is evidence of detections of pest of biosecurity concern to Australia at either export certification inspection or on arrival inspection in Australia.
- approve and certify the systems approach on a phytosanitary certificate.
- inspect each consignment to verify freedom from live pests.

The NPPO must present the following information on a Phytosanitary Certificate:

- the full scientific name of the cut flowers and foliage (to at least genus level, and where possible to species level).
- the declaration '*This consignment was produced and prepared for export by [insert name of approved growers and/or packing houses] under an NPPO approved systems approach and was inspected and found free from live quarantine pests*'.

- the declaration '*The consignment is packaged in pest-proof cartons or containers that eliminate the possibility of entry or egress of insect pests*'.

If live pests are detected by the pre-export inspection, the exporting country must not issue a phytosanitary certificate, and pre-export remedial action must be taken. Remedial action must include management of the consignment to ensure that the pests are no longer viable, or withdrawal of the consignment from export to Australia. In the situation where pre-export inspection and identification processes are unable to determine the pest species, remedial action must be based upon the biosecurity risk of the level of taxa identified. For example, if the pest is identified at family level and PRA Part 1 or Part 2 has identified quarantine and, or regulated articles in the same insect family, the exporting country must not issue a phytosanitary certificate, and pre-export remedial action must be taken on the consignment.

The concept of systems approaches is defined in ISPM 14: *The use of integrated measures in a systems approach for pest risk management* as 'A pest risk management option that integrates different measures, at least two of which act independently, with cumulative effect' (FAO 2016d). Systems approaches used for the export of cut flowers and foliage to Australia must be consistent with the intent and guidance in ISPM 14. An effective systems approach for the cut flower pathway needs to ensure that the imported product is free from all live pests, as listed in Appendix F and G of this document and Part 1 of this PRA (available on the departments website from agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers). To achieve this the department recommends employing a systems approach that uses multiple measures and activities from all key areas of a cut flower supply chain management system; namely:

- 1 Defined production activities—site management, sanitation and hygiene, pest free production sites, production inputs, pest free propagation material, clean growing media, registration of farms, and pest monitoring, for example, visual examination and trapping.
- 2 Defined pest control activities—chemical and organic pesticides (for example, oils, soaps, plant extracts), physical measures (for example, enclosed production systems such as glasshouses and screen houses), cultural practices (for example, field hygiene and sanitation, planting densities), mechanical measures (for example, the use of sticky traps), and BCAs (for example, the release of predators to suppress pest populations).
- 3 Defined post-harvest procedures—sorting and grading, post-harvest treatments (for example, chemical, physical, or controlled atmosphere treatments), hygiene and sanitation of packing facilities, temperature control during the packing process, packing in pest-proof containers to prevent re-infestation, and inspection to verify freedom from live pests.
- 4 Defined inspection activities at the farm and packing house stages to provide product quality control and inform the effectiveness of management and pest control activities.
- 5 Procedures for notifying farms and packing houses of detections of pest of biosecurity concern to Australia at either export certification inspection or on arrival inspection.
- 6 Procedures for investigating the cause of pest detections and undertaking corrective actions including, if required, deregistration of registered farms and packing houses.

Where there is a permit requirement for the importation of cut flowers and foliage under a systems approach, the importer must submit a Supply Chain Management System (SCMS) as part of their permit application that documents the activities on their supply chain that manage risk. Further details on the department's recommendations for developing a SCMS to manage biosecurity risk on imported cut flowers and foliage' is available from agriculture.gov.au/import/goods/plant-products/cut-flowers-foliage/supply-chain-management-system.

If the species of cut flowers and foliage being exported to Australia are propagatable (as listed on BICON on the *Propagatable species list*), the flowers and/or foliage must be devitalised using glyphosate according to the *Imported cut flowers treatment guide* (DAWR 2018c) (also available on BICON).

To demonstrate compliance with this requirement, the exporting country's NPPO must present the following additional declaration on the Phytosanitary Certificate:

- '*Devitalisation treatment has been carried out under our supervision at [insert name of accredited treatment facility]. The flower stem has been immersed for 20 minutes in glyphosate solution [insert active ingredient concentration and dosage] to a depth of at least 35 cm/ to within 5 cm of the flower head/ within 15 cm of apex [select the dipping method used]*'.

7.1.3 Pre-export methyl bromide fumigation

Where the pre-export methyl bromide fumigation option is chosen, the exporting country's NPPO must:

- inspect each treated consignment to verify freedom from live pests.
- approve and certify the treatment on a phytosanitary certificate.

The NPPO must present the following information on a Phytosanitary Certificate:

- the full scientific name of the cut flowers and foliage (to at least genus level, and where possible, to species level).
- the additional declaration '*The consignment was fumigated with methyl bromide as per the attached fumigation certificate and was inspected and found free from live quarantine pests*'.
- the additional declaration '*The consignment is packaged in pest-proof cartons or containers that eliminate the possibility of entry or egress of insect pests*'.

AND

A methyl bromide fumigation certificate that includes a declaration that the goods have been fumigated at one of the rates specified in 7.2.

Table 7.2 Pre-export methyl bromide fumigation rates for cut flowers and foliage

Product core temperature	Minimum initial dose rate	Exposure period
21 °C and above	32 g/m ³	2 hours
16 °C - 20.9 °C	40 g/m ³	2 hours
11 °C - 15.9 °C	48 g/m ³	2 hours
10 °C - 10.9 °C	56 g/m ³	2 hours

Note: Fumigation is not permitted if the minimum temperature of the goods and fumigation structure falls below 10 °C. To ensure an effective fumigation, it is recommended that 80% of the initial dose rate is retained at the end of the exposure period.

Prior to fumigation, the cut flowers and foliage must not be wrapped or coated in impervious materials that may prevent the fumigant from penetrating the target of the fumigation. Impervious materials including plastic must be opened, cut or removed prior to fumigation to allow the methyl bromide to reach the target of the fumigation.

If the species of cut flowers and foliage being exported to Australia are propagatable (as listed on BICON on the *Propagatable species list*), the flowers and/or foliage must be devitalised using glyphosate according to the *Imported cut flowers treatment guide* (DAWR 2018c) (also available on BICON).

To demonstrate compliance with this requirement, the exporting country's NPPO must present the following additional declaration on the Phytosanitary Certificate:

- '*Devitalisation treatment has been carried out under our supervision at [insert name of accredited treatment facility]. The flower stem has been immersed for 20 minutes in glyphosate solution [insert active ingredient concentration and dosage] to a depth of at least 35 cm/ to within 5 cm of the flower head/ within 15 cm of apex [select the dipping method used]*'.

7.1.4 NPPO-approved alternative pre-export disinfestation treatment

The department will accept any treatments approved by the NPPO of the exporting country that are applied to manage pests on cut flowers and foliage for export to Australia. The approval of alternative measures is the responsibility of the exporting NPPO, except for treatments designed to achieve pest sterility, such as irradiation.

The NPPO of the exporting country must:

- inspect each treated consignment to verify freedom from live pests.
- approve and certify the treatment on a phytosanitary certificate.

The NPPO must present the following information on a Phytosanitary Certificate:

- the full scientific name of the cut flowers and foliage (to at least genus level, and where possible, to species level).
- details of the disinfestation treatment (for example, identify the active constituent, its effective concentration and the duration for which applied).

- the name of the treatment provider.
- the additional declaration '*The consignment was inspected and found free from live quarantine pests*'.
- the additional declaration '*The consignment is packaged in pest-proof cartons or containers that eliminate the possibility of entry or egress of insect pests*'.

On-arrival at the Australian border a visual inspection is performed on all consignments of cut flowers and foliage to verify that the biosecurity status meets Australia's import conditions. Monitoring compliance of alternative treated consignments allows the department to evaluate the efficacy of the alternative treatment. In the situation where repeated high levels of non-compliance are observed for a specific NPPO-approved alternative treatment the department will take action. This action will include notification to the exporting NPPO and request for improvements to the treatment. Where improvements are not evident, the department has the options of requesting the exporting NPPO not to certify for a specific treatment, or if necessary, suspension of the alternative treatment option.

Various countries are undertaking research on development of alternative treatments to methyl bromide to treat cut flowers and foliage. One example is low temperature phosphine fumigation, and the department's website (agriculture.gov.au/cut-flowers and follow the link to 'managing pests') provides some examples of research papers describing the effect of phosphine on arthropod pests and flower quality.

7.1.5 Devitalisation of propagatable cut flowers and foliage

If the species of cut flowers and foliage being exported to Australia are propagatable (as listed on BICON on the *Propagatable species list*), the flowers and/or foliage must be devitalised using glyphosate according to the *Imported cut flowers treatment guide* (DAWR 2018c) (also available on BICON).

To demonstrate compliance with this requirement, the exporting country's NPPO must present the following additional declaration on the Phytosanitary Certificate:

- '*Devitalisation treatment has been carried out under our supervision at [insert name of accredited treatment facility]. The flower stem has been immersed for 20 minutes in glyphosate solution [insert active ingredient concentration and dosage] to a depth of at least 35 cm/ to within 5 cm of the flower head/ within 15 cm of apex [select the dipping method used]*'.

7.1.6 Additional regulatory measures

The department inspects all consignments of cut flowers and foliage arriving at the Australian border regardless of pre-export treatment type to verify that import conditions have been met. The department will take action where a circumstance of changing or emerging risk is identified. Circumstances of changing risk include situations where the department intercepts an unacceptable number of pests and ongoing high levels of consignment non-compliance, an increase in interceptions of pests of significant biosecurity concern to Australia, or interceptions of a new emerging pest. Under these circumstances the department may require additional regulatory mechanisms to facilitate stronger control to mitigate the biosecurity risks which may

not be appropriately managed by standard pre-export and at-the-border phytosanitary conditions. Additional regulatory measures may include the:

- introduction of a permit requirement
- removal of approved pre-export phytosanitary measure or measures
- removal of a specific plant species from one of the recommended export phytosanitary options
- requirement for a specific treatment measure to target a specific pest or group of pests.

Where additional regulatory measures are required, the department will:

- inform exporting countries and importers if additional phytosanitary measures are required on specific pathways to allow import
- provide details on reasons for additional phytosanitary measures
- provide specifications and timeframes for implementation of the additional measures.

The exporting country's NPPO must:

- meet the additional requirements outlined by the department prior to re-commencement of trade.

Countries can apply to reinstate measures, for example a systems approach, by preparing a detailed submission outlining corrective actions, which would be assessed by the department. The department may also conduct an audit of the particular phytosanitary system prior to decisions about reinstatement.

Examples in which the department has required additional measures in circumstances of changing risk include the introduction of permits for cut flowers and foliage exported under the systems approach measure from Colombia, Ecuador and Kenya, and the suspension of chrysanthemums produced under a systems approach from Malaysia. Import permits were introduced to manage high levels of pest interceptions on 1 September 2019 for imports from the three highest export volume countries with the highest levels of pest interceptions, Colombia, Ecuador and Kenya. In circumstances of high levels of pest interceptions, import permits continue to provide the department with greater oversight and assurance that the product arriving in Australia has appropriate risk mitigation measures in place. In July 2020 the department detected an increase in interception rate of a pest of significant concern, serpentine leaf miner (*Liriomyza huidobrensis*) on Malaysian chrysanthemums imported under a systems approach. In response, the department required an amendment in import conditions that restricted import of chrysanthemums from Malaysia to be only permitted import under pre-export methyl bromide fumigation.

7.2 Operational system for the maintenance and verification of phytosanitary status

A system of operational procedures is necessary to maintain and verify the phytosanitary status of imported cut flowers and foliage. This is to ensure that risk management measures are met and maintained.

7.2.1 A system of traceability to source farms

This procedure is necessary where the exporting country has chosen the NPPO-approved systems approach as its arthropod pest management option, and where that systems approach includes on-farm controls. The objectives of this procedure are to ensure that:

- cut flowers and foliage are sourced only from farms producing commercial export-quality flowers.
- farms from which cut flowers and foliage are sourced can be identified so that any investigation and corrective action can be targeted rather than applied to all contributing export farms, in the event that live pests are intercepted.

Sites producing cut flowers and foliage under the systems approach must be registered with the exporting NPPO before commencement of harvest each season. The list of registered production sites must be kept by the exporting NPPO. The exporting NPPO must ensure that cut flowers and foliage for export to Australia can be traced back to the production site. The exporting NPPO is required to ensure the registered production sites are suitably equipped and have a system in place to carry out the specified phytosanitary activities. Records of the exporting NPPO's audits must be made available to the Department of Agriculture, Water and the Environment upon request. Records of production site monitoring/management must be made available upon request.

The exporting country's NPPO must ensure that cut flowers and foliage for export to Australia can be traced back to farm level if the NPPO-approved systems approach includes on-farm controls as part of its pest control measures. The exporting country's NPPO is also responsible for ensuring that exporting cut flower and foliage growers are aware of the pests of biosecurity concern to Australia, and of the agreed risk management measures.

7.2.2 Registration of packing houses and treatment providers and auditing of procedures

The objectives of this procedure are to ensure that:

- export-quality cut flowers and foliage are sourced only from packing houses that are approved by the NPPO, if the exporting country has chosen the NPPO-approved systems approach as its arthropod pest management option.
- treatment providers are approved by the NPPO and are capable of applying a treatment that suitably manages the target pests.

Export packing houses must be registered with the exporting country's NPPO. A list of registered packing houses must be kept by the exporting country's NPPO. The NPPO of the exporting country is required to ensure that registered packing houses are suitably equipped, and have a system in

place to carry out the specified phytosanitary activities. Audit records of the exporting country's NPPO must be made available to the department upon request.

In circumstances where cut flowers and foliage undergo treatment prior to export, such processes must be undertaken by treatment providers that have been registered with and audited by the exporting country's NPPO for that purpose. Records of the exporting country's NPPO registration requirements and audits are to be made available to the department upon request.

Approval for treatment providers must include verified operability of suitable systems to ensure compliance with treatment requirements. These systems should include:

- documented procedures to ensure cut flowers and foliage are appropriately treated and safeguarded post-treatment.
- staff training to ensure compliance with procedures.
- record keeping procedures.
- suitability and operability of facilities and equipment.
- compliance with the exporting country's NPPO system of oversight of treatment application.

7.2.3 Packaging and labelling

The objectives of this procedure are to ensure that cut flowers and foliage proposed for export to Australia, and associated packaging, are not contaminated by quarantine pests, regulated articles or contaminating pests (as defined in ISPM 5: Glossary of phytosanitary terms (FAO 2019b)). Secure, pest-proof packaging must be used during storage and transport to Australia to prevent re-infestation during storage and transport, and escape of pests during clearance procedures on arrival in Australia.

Export packing houses and treatment providers must ensure that packaging and labelling are suitable to maintain the phytosanitary status of export consignments. The packaged cut flowers and foliage also must be labelled with sufficient identification information for purposes of traceability.

Each consignment must be secured (that is, made arthropod-proof) by one of the following methods:

- packaging in fully-enclosed cartons that have no ventilation holes, with lids that are tightly fixed to the base.
- packaging in cartons with ventilation holes that are covered with mesh or screens to prevent entry of pests. This requirement is currently being reviewed and may be amended if there are continued interceptions of small-sized pests such as thrips and mites. Alternatively, ventilation holes may be completely taped over.
- packaging in vented cartons with sealed plastic liners or plastic bags. Overlapping folded edges of a liner are considered to be sealed.

Meshed or plastic (shrink) wrapped pallets or Unit Load Devices (ULDs) with open ventilation holes/gaps, or palletised cartons with ventilation holes/gaps must be fully covered or wrapped

with polythene/plastic/foil sheet or mesh/screen or placed in a fully enclosed container to prevent entry of pests.

Full container loads that arrive by sea freight and delivered directly to a 2.4 Approved Arrangement facility for inspection are considered to be insect-proof fully enclosed containers under the current import conditions.

7.2.4 Specific conditions for storage and movement

The objective of this procedure is to ensure that the quarantine integrity of the commodity is maintained during storage and movement.

Cut flowers and foliage for export to Australia that have been treated and/or inspected must be kept secure and segregated at all times from any products for domestic or other markets, or untreated/non pre-inspected products, to prevent mixing or cross-contamination.

7.2.5 Freedom from trash

The objective of this procedure is to ensure that cut flowers and foliage for export are free from trash (for example, fruits, seeds, soil, and animal matter/parts) and foreign matter.

Freedom from trash must be confirmed by pre-export inspection procedures. Export lots or consignments found to contain trash or foreign matter must be withdrawn from export unless approved remedial action such as reconditioning is available, and is applied to the export consignment and verified by re-inspection.

7.2.6 Pre-export phytosanitary inspection and certification by the NPPO of the exporting country

The objective of this procedure is to ensure that Australia's import conditions have been met.

All consignments must be inspected in accordance with official procedures of the exporting country NPPO for all visually detectable live pests and other risk material (including contaminants, soil, and animal and plant debris). Consignments are to be representatively sampled at a standard 600-unit sampling rate or equivalent.

If there are several lots (for example, several growers and/or flower types) in the consignment the samples are to be drawn proportionately from each lot. Examination under magnification should be used to detect arthropod pests (for example, mites) that would be difficult to detect with the naked eye. A visual examination with the naked eye can be used to detect biosecurity risk material such as soil, larger insect pests, seeds and symptoms of plant disease.

If live pests or other risk material is found, remedial action must be taken on the entire consignment. Pre-export remedial action (depending on the location of inspection) may include treatment of the entire consignment to ensure that the pest is no longer viable, or withdrawal of the entire consignment from export to Australia.

A Phytosanitary Certificate is issued for each consignment upon successful completion of pre-export inspection to verify that the required risk management measures have been undertaken pre-export, and that the consignment meets Australia's import requirements.

Each Phytosanitary Certificate must include:

- a description of the consignment (including traceability information as required)
- details of the pest management measure applied (for example, methyl bromide fumigation, alternative disinfestation treatments or NPPO-approved systems approach), including, as appropriate, date, concentration, temperature, duration, and an attached fumigation or alternative disinfestation treatment certificate, or details of approved growers and/or packing houses (as appropriate)
- details of the devitalisation treatment applied and appropriate additional declaration (if relevant)
- an additional declaration attesting to the consignment meeting Australia's insect-proof packaging requirements.

7.2.7 Phytosanitary inspection by the Department of Agriculture, Water and the Environment

The objectives of this procedure are to ensure that:

- consignments comply with Australian import requirements
- consignments are as described on the Phytosanitary Certificate and quarantine integrity has been maintained.

On arrival in Australia, the department will:

- assess documentation to verify that the consignment is as described on the Phytosanitary Certificate, that required phytosanitary actions have been undertaken, and that product security has been maintained
- complete an inspection of each consignment to verify that the biosecurity status meets Australia's import conditions, using a representative sample of 600 units per consignment.

Consistent with the principles of ISPM 31: *Methodologies for sampling of consignments* (FAO 2016f), Australia's standard biosecurity sampling protocol requires inspection of 600 units for the presence of live pests and other biosecurity risk material using systematically selected random samples from each homogeneous consignment or lot. If live arthropods are found, the department will identify these pests to species where possible, prior to making the decision to subject the consignment to remedial treatment, destruction or export.

If no pests are detected by the inspection, this sample size achieves a confidence level of 95% that not more than 0.5% of the units in the consignment are infested or infected. The level of confidence depends on each unit in the consignment having similar likelihood of being affected by a regulated pest, and the inspection technique being able to reliably detect all these pests in the sample. If no live pests are detected in the sample, the consignment is considered to be free from regulated pests.

Consignments that do not comply with Australia's import conditions will be subject to remedial treatment, or destroyed or exported, as appropriate.

The department reserves the right to suspend imports (either all imports or imports from specific pathways) and to conduct an audit of the risk management system if consignments are repeatedly non-compliant. Imports will recommence only when the department is satisfied that appropriate corrective action has been undertaken.

7.2.8 Remedial action(s) for non-compliance

The objectives of remedial action(s) for non-compliance are to ensure that:

- Any live pest is addressed by remedial action, as appropriate
- non-compliance with import requirements is addressed, as appropriate.

Any consignment that fails to meet Australia's import conditions will be subject to a suitable remedial treatment (if one is available), or disposed of/destroyed or exported to manage the biosecurity risk.

Other actions may be taken depending on the specific pest intercepted and the risk management strategy put in place against that pest.

If cut flower and foliage consignments are repeatedly non-compliant, the department reserves the right to suspend imports (either all imports or imports from specific pathways or imports of a specific flower or foliage species) and to conduct an audit of the risk management systems. Imports will recommence only when the department is satisfied that appropriate corrective action has been undertaken.

7.2.9 Uncategorized pests

If an organism that has not been categorised, including contaminating pests and biocontrol agents (BCAs), is detected on cut flowers and foliage either in the exporting country or on arrival in Australia, it will require assessment by the department to determine its biosecurity status, and whether phytosanitary action is required.

Assessment will also be made if the detected species was categorised as not likely to be on the import pathway (for example, the phytophagous Hymenoptera as discussed in Section 6.3.4). If the detected species was categorised as being on the pathway, but assessed as having an unrestricted risk that achieves the ALOP for Australia, then it may require reassessment. The interception of any pests of biosecurity concern not already identified in the analysis may result in remedial action and/or temporary suspension of trade while a review is conducted to ensure that management measures continue to provide the appropriate level of protection for Australia.

7.3 Consideration of alternative options

Consistent with the principle of equivalence detailed in ISPM 11: *Pest risk analysis for quarantine pests* (FAO 2019c), the department will consider any alternative measure proposed by an NPPO, providing that it demonstrably manages the target pests to achieve the ALOP for Australia. Evaluation of such measures will require a technical submission from the NPPO that details the proposed measures, including suitable information to support claims of efficacy, for consideration by the department.

7.3.1 Area freedom or low pest prevalence

A number of ISPMs provide guidance on elements that may offer pest risk management options for an NPPO-approved systems approach, or for an alternative measure such as area freedom or low pest prevalence for specified pests of concern. These may be used, as appropriate, to achieve the objective of freedom from quarantine and regulated pests:

- ISPM 4: *Requirements for the establishment of pest free areas* (FAO 2017)
- ISPM 10: *Requirements for the establishment of pest free places of production and pest free production sites* (FAO 2016b)
- ISPM 22: *Requirements for the establishment of areas of low pest prevalence* (FAO 2016e).

For example, countries that grow cut flowers and/or foliage for export in secure greenhouses may base a systems approach on ISPM 10. Other measures might be put in place at both production and post-harvest stages.

7.4 Review of processes

The department reserves the right to review the import policy after a suitable volume of trade has been achieved. In addition, the department reserves the right to review the import policy as deemed necessary, including if there is reason to believe that the pests or phytosanitary status of the countries of origin has changed.

The exporting country's NPPO must inform the department immediately if any new pests of cut flowers and foliage that are of potential biosecurity concern to Australia are detected in the exporting country.

8 Conclusion

The findings of Part 2 of this Final PRA for cut flowers and foliage from all countries are based on scientific analysis of relevant literature and analysis of historic interception data.

The Department of Agriculture, Water and the Environment considers that the risk management measures recommended in this Final PRA will achieve Australia's ALOP against the pests identified as associated with the trade of cut flowers and foliage from all countries.

Appendix A: Permitted flowers and foliage

The following list summarises the approximately 96 taxa of commercially produced cut flowers and foliage permitted for import into Australia for decorative purposes, current on 1 September 2019. The definitive list of permitted species, and any specific associated import conditions, can be found in the *List of Species of Fresh Cut Flowers and Foliage with Alternative Conditions for Import – Mainland*, available from the department's website (agriculture.gov.au/biosecurity/legislation/fresh-cut-flowers-mainland).

<i>Agapanthus</i> spp.	<i>Convallaria</i> spp.	<i>Hypericum</i> spp.	<i>Pandanus odoratissimus</i>
<i>Alcea</i> spp.	<i>Cordyline</i> spp.	<i>Iris</i> spp.	<i>Papaver</i> spp.
<i>Allium</i> spp.	<i>Craspedia</i> spp.	<i>Ixia</i> spp.	<i>Philodendron</i> spp.
<i>Alstroemeria</i> spp.	<i>Curcuma alismatifolia</i>	<i>Jasminum sambac</i>	<i>Phormium</i> spp.
<i>Althaea</i> spp.	<i>Cycas</i> spp.	<i>Lathyrus odoratus</i>	<i>Polianthes</i> spp.
<i>Alyxia stellata</i>	<i>Cyclamen</i> spp.	<i>Leucojum</i> spp.	Polypodiopsida (ferns)
<i>Amaranthus</i> spp.	<i>Delphinium</i> spp.	<i>Liatris</i> spp.	<i>Primula</i> spp.
<i>Amaryllis</i> spp.	<i>Dianthus</i> spp.	<i>Lilium</i> spp.	<i>Ranunculus asiaticus</i>
<i>Ammi majus</i>	<i>Digitalis</i> spp.	<i>Limonium</i> spp.	<i>Rosa</i> spp.
<i>Ammi visnaga</i>	<i>Dracaena</i> spp.	<i>Liriope muscari</i>	<i>Ruscus</i> spp.
<i>Anemone</i> spp.	<i>Epipremnum aureum</i>	<i>Lysimachia clethroides</i>	<i>Sandersonia</i> spp.
<i>Anigozanthos</i> spp.	<i>Epipremnum pinnatum</i>	<i>Molucella</i> spp.	<i>Scabiosa</i> spp.
<i>Anthurium</i> spp.	<i>Eryngium</i> spp.	<i>Monstera</i> spp.	<i>Strelitzia</i> spp.
Arecaceae (palm)	<i>Eustoma grandiflorum</i>	<i>Muscari</i> spp.	<i>Symphyotrichum ericoides</i>
<i>Astilbe</i> spp.	<i>Eustoma russellianum</i>	<i>Myrtus</i> spp.	<i>Tagetes</i> spp.
<i>Brunia</i> spp.	<i>Freesia</i> spp.	<i>Narcissus</i> spp.	<i>Thalictrum</i> spp.
<i>Calathea insignis</i>	<i>Galax urceolata</i>	<i>Nelumbo nucifera</i>	<i>Triteleia</i> spp.
<i>Calathea lancifolia</i>	<i>Gentiana triflora</i>	<i>Nerine</i> spp.	<i>Trollius</i> spp.
<i>Callistephus chinensis</i>	<i>Gerbera</i> spp.	<i>Nymphaea</i> spp.	<i>Tropaeolum</i> spp.
<i>Campanula</i> spp.	<i>Gladiolus</i> spp.	<i>Ocimum tenuiflorum</i>	<i>Tulipa</i> spp.
<i>Chelone</i> spp.	<i>Gloriosa</i> spp.	Orchidaceae (orchids)	<i>Viburnum</i> spp.
<i>Chrysanthemum</i> spp.	<i>Gypsophila</i> spp.	<i>Ornithogalum</i> spp.	<i>Viola</i> spp.
<i>Codiaeum variegatum</i>	<i>Hippeastrum</i> spp.	<i>Oxypetalum</i> spp.	<i>Zantedeschia</i> spp.
<i>Consolida</i> spp.	<i>Hyacinthus</i> spp.	<i>Paeonia</i> spp.	<i>Zinnia</i> spp.

Note: No changes have been made to the permitted list of species since 25 April 2019 (referred to in the *Final Pest Risk Analysis for Cut Flowers and Foliage—Part 1*) but the 1 September 2019 list incorporates information about import permits.

Appendix B: Contaminating pests

The risks posed by contaminating pests ('contaminants') on the plant import pathway are addressed by existing standard operational procedures and do not require further consideration in this PRA. All cut flower and foliage consignments undergo inspection on arrival in Australia. The department will investigate whether any pest identified through import verification processes is of biosecurity concern to Australia, and may therefore require remedial action.

Contamination is the 'Presence of a contaminating pest or unintended presence of a regulated article in or on a commodity, packaging, conveyance, container or storage place', and a contaminating pest is 'A pest that is carried by a commodity, packaging, conveyance or container, or present in a storage place and that, in the case of plants and plant products, does not infest them' (FAO 2019b).

The department's pest categorisation process (Appendix F) has identified those species in the Coleoptera, Diptera, Hemiptera and Hymenoptera that are contaminating pests on the imported cut flower and foliage pathway. In addition to those species, departmental interception analysis of arthropods on this pathway has found a range of other contaminant species, and the following table identifies those arthropod orders that are also determined to be contaminating pests, along with their proportion of interceptions, on this pathway.

Appendix Table I Interceptions of contaminant pests on cut flowers and foliage

Arthropod order	Common name	Percentage of all interception events (a), 2000–2018 (Actual number of interceptions)	Percentage of all interception events (b), 2018–2019 (Actual number of interceptions)
Araneae	Spiders	4.02% (1544)	2.29% (365)
Psocoptera	Booklice	0.86% (331)	0.63% (100)
Neuroptera	Lacewings	0.21% (81)	0.17% (23)
Blattodea	Cockroaches	0.11% (42)	0.02% (3)
Collembola	Springtails	0.09% (34)	0.00% (0)
Dermaptera	Earwigs	0.09% (34)	0.01% (1)
Orthoptera	Crickets, Grasshoppers and Locusts	0.05% (18)	0.01% (1)
Embiopoda	Web spinners	0.00% (1)	0.00% (0)
Isopoda	Termites	0.02% (8)	0.00% (0)
Mantodea	Praying Mantis	0.02% (6)	0.00% (0)
Odonata	Dragonflies	0.00% (1)	0.00% (0)
Thysanura	Silverfish	0.02% (6)	0.02% (3)
Trichoptera	Caddisflies	0.00% (1)	0.01% (1)
Gastropoda [Phylum: Mollusca]	Snails and slugs	- (235) (c)	- (45) (c)

Source: Integrated Cargo System (ICS) data for tariff codes 0603.1 and 0604.2 and departmental interception data.

Note: **a.** Calculated on the basis of interception events recorded by Australia over an 18 year period (1 January 2000 to 28 February 2018). **b.** Calculated on the basis of interception events recorded by Australia since the revised import conditions were introduced, from 1 March 2018 to 31 December 2019. **c.** Percentage of all interception events for gastropods were not able to be calculated as information was derived from a different data source.

All plant import pathway commodities must be free from contaminating material and organisms, including plant trash, seeds, soil, animal matter/parts and other extraneous material and pests of

biosecurity concern to Australia. This is confirmed by inspection procedures (more detail is available in Part 1 of this PRA in Section 2.3.1). Export lots or consignments found to contain contaminating material or organisms should be withdrawn from export unless approved remedial action is available and applied to the export consignment, which must then be re-inspected for compliance.

Contaminating biological control agents (BCAs) and other beneficial organisms on the plant import pathway are subject to additional requirements in Australia. A BCA is an organism, such as an insect or pathogen that is used to manage the impact of a pest species, including insects or weeds, on or in cultivated crops and/or the environment. ISPM 3 *Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms* (FAO 2005) states that pest risk analysis should be conducted prior to import or release, and possible impacts on the environment, such as impacts on non-target invertebrates, should also be considered.

Before BCAs or beneficial organisms can be released into the Australian environment a separate risk analysis must be undertaken by the Department of Agriculture, Water and the Environment, and a parallel process must be undertaken to make a ruling under the *Environment Protection and Biodiversity Conservation Act 1999*.

The risk analysis for BCAs must demonstrate that the risk associated with release of a BCA achieves the ALOP for Australia. The risk analysis takes account of any negative impact on non-target species and the potential magnitude of consequences. Rigorous host specificity testing is required to ensure that a proposed BCA is appropriately specific to its target pest. This minimises the risk of any significant negative consequences as a result of the organism's release.

Appendix C: Consultation by the department

The following information provides an update to Appendix C of the *Final Pest Risk Analysis for Cut Flower and Foliage Imports—Part 1* (Department of Agriculture 2019b). Please refer to Appendix C of that document, available from agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers, for the preceding sections.

International

15-19 April 2019—Departmental officers met staff from the Instituto Colombiano Agropecuaria (ICA), Asocolflores, Ministry of Agriculture, Ministry of Foreign Affairs and ProColombia in Colombia to discuss issues related to cut flower and foliage import conditions.

15-19 April 2019—Kenya's Plant Health Inspectorate Service (KEPHIS) and exporters visited Australia to observe Australia's cut flower and foliage inspection and fumigation processes.

18 April 2019—The department notified trading partners of the commencement of Part 2 of the PRA for imports cut flowers and foliage, via SPS Notification G/SPS/N/AUS/435/Add.4.

April to June 2019—Officers from the department met individually with representatives from a number of Embassies and High Commissions to discuss the compliance performance of imports and the department's future actions.

14 May 2019—The department corresponded with the NPPOs of the leading exporting countries to provide an update on compliance with the new import conditions (in the month of April 2019), and requested that countries with high rates of pest interceptions investigate and address the instances of non-compliance. Certain countries with high pest interceptions were notified of the potential removal of the systems approach option and advised that trade could still continue through the application of post-harvest treatments approved and certified by NPPOs or import permits. Letters also invited certain countries to visit Australia to view inspection and diagnostics processes first-hand.

21-28 May 2019—Agricultural and Minister Counsellors and the department met with NPPOs to share information and clarify requirements under the new cut flowers and foliage import policy. An NPPO requested more time to meet Australia's import conditions and the pest interception data for May 2019. They also requested that Australia included bar codes in non-compliance data to enable them to trace back non-compliant exporters.

5-11 June 2019—Two highly non-compliant NPPOs sought an extension to the decision date (1 July 2019) and sought clarification on differences in non-compliance rates between department and NPPOs data.

18-19 June 2019—The department met with all Embassy representatives as a follow up on the first meeting in April 2019. The purpose of this meeting was to share with the trading partner countries the outcomes of monitoring, the regulatory changes from 1 Sept 2019, and share findings of the final PRA Part 1 report.

20 June 2019—The department provided individual responses to the NPPOs of five countries that commented on the draft PRA (Part 1) and answered the questions that were raised.

21 June 2019—The department released the Final PRA (Part 1), notifying trading partners through SPS Notification Addendum G/SPS/N/AUS/435/Add.5.

1 July 2019—The department corresponded with NPPOs of the leading exporting countries to provide an update on the performance of their imports from April to June 2019, and advised highly non-compliance countries of the introduction of new regulatory conditions (import permits) from 1 September 2019.

5–14 July 2019—Departmental biosecurity officers visited Kenya to provide training on pest identification and fumigation.

July and August 2019—Officers from the department met with Embassy and High Commission representatives from three countries with high non-compliance and high volumes of trade to discuss the regulatory changes (import permits) to be introduced from 1 September 2019.

23 December 2019—The department wrote to the Colombian, Ecuadorian and Kenyan NPPOs to provide an update on pest interceptions for November 2019 and the status of the next round of import permits.

16 January 2020—The department wrote to the Colombian, Ecuadorian and Kenyan NPPOs to provide an update on pest interceptions for December 2019, and to all other NPPOs to provide an update on non-compliance for October to December 2019.

18 February 2020—The department wrote to Malaysia to inform them of a plant Pest interception and request investigation and action to prevent recurrence.

26 February 2020—The department met with the Ecuador Ambassador to discuss compliance on the cut flowers and foliage pathway.

2 June 2020—The department wrote to Malaysia to inform them of a plant pest interception and request investigation and action to prevent recurrence.

25 June 2020—The department wrote to Malaysia to inform them of the amended import conditions with immediate effect for *Chrysanthemum* spp. imported from Malaysia.

7 August 2020—The department wrote to Malaysia to inform them of a plant pest interception and request investigation and action to prevent recurrence.

1 September 2020—The department wrote to Malaysia to inform them of revised import conditions for imported cut flowers and foliage into Australia.

8 September 2020—The department wrote to Colombia to inform them of a plant pest interception and request investigation and action to prevent recurrence.

23 September 2020—The department wrote to Ecuador to inform them of a High Priority Plant Pest interception and request investigation and action to prevent recurrence.

28 September 2020 – The department wrote to Kenya and Malaysia provide an update on non-compliance for August 2020.

15 December 2020 – The department wrote to Ecuador to provide an update on non-compliance for January to October 2020.

2 November 2020 – The department wrote to Colombia to propose the establishment of an agreed work plan between ICA and the Department of Agriculture, Water and the Environment to manage the importation of fresh cut flowers from Colombia.

6 November 2020 – The department wrote to Kenya, Malaysia and Ecuador provide an update on non-compliance for September 2020.

13 November 2020 - The department wrote to Colombia to inform them of a Plant pest interception and request investigation and action to prevent recurrence.

16 December 2020 - The department wrote to Kenya and Ecuador provide an update on non-compliance for October 2020.

17 December 2020 - The department wrote to all NPPOs other than Kenya, Colombia, and Ecuador to provide an update on non-compliance for July to October 2020.

23 February 2021 – the department met with Ecuadorian NPPO representatives to provide an update on Australia's approach to managing cut flower imports and to propose an agreed work plan between Agrocaldad and the Department of Agriculture, Water and the Environment to manage the importation of fresh cut flowers from Colombia.

10 March 2021 - The department wrote to Ecuador and Malaysia provide an update on non-compliance for January 2021.

29 March 2021 – The department wrote to Kenya to provide an update on non-compliance for January 2021 and request investigation of the high levels of non-compliance for consignments with methyl bromide or an alternate treatment applied.

16 April 2021 - The department wrote to Colombia to inform them of a plant pest interception and request investigation and action to prevent recurrence.

22 April 2021 - The department wrote to Ecuador to inform them of a plant pest interception and request investigation and action to prevent recurrence.

23 April 2021 - The department wrote to Malaysia to inform them of a plant pest interception and request investigation and suspension of the fumigation facility to prevent recurrence.

Domestic

20 June 2019—The department provided individual responses to domestic stakeholders that commented on the draft PRA (Part 1) and answered the questions that were raised.

21 June 2019—The department publicly announced the release of the Final PRA (Part 1) on its website, and notified all registered domestic stakeholders via email.

24 June 2019—The department met with three stakeholder peak bodies, providing detail about the likely change to import conditions and the upcoming introduction of import permits.

1 July 2019—The department corresponded with importers on the performance of their imports from April to June 2019, and issued an Industry Advice Notice to importers, approved arrangements, freight forwarders and brokers about the new requirement for import permits for cut flowers and foliage imports countries with high non-compliance and high volumes of trade.

5 August 2019—The department issued an Industry Advice Notice to importers, approved arrangements, freight forwarders and brokers, as a reminder about the new requirement for import permits for cut flowers and foliage imports countries with high non-compliance and high volumes of trade.

29 August 2019—The department issued an Industry Advice Notice to importers, approved arrangements, freight forwarders and brokers. This notice advised that from 1 September 2019, Australia would no longer accept consignments of cut flowers and foliage that arrive with incomplete phytosanitary certificates. This includes certificates with missing or incomplete additional declarations.

30 August 2019—The department issued an Industry Advice Notice to importers, approved arrangements, freight forwarders and brokers advising that commencing 1 September 2019, the department's entomologists will be trialling provision of preliminary identification of certain types of live pests detected during weekend inspections of consignments of cut flowers and foliage.

19 September 2019—Departmental officers held a teleconference with representatives of state and territory governments to discuss the pest categorisation assessment for Part 2 of the PRA.

20 September 2019—A representative of leading cut flower and foliage importers met with the department to discuss issues relating to import conditions, the PRA and the introduction of import permits.

27 September 2019—The Imported Flower and Foliage Regulation Working Group met to discuss issues related to import permits and application process, *Tetranychus* mite diagnostics and the PRA Part 2. The membership of the working group was expanded to include broader production industry representation. The working group consists of members from the department, state governments (Plant Health Committee), the cut flower and foliage importing industry (Australian Flower Traders Association, Lynch Group, WAFEX, Tony's Wholesale Flowers), the cut flowers and foliage production industry (NSW Flower Council), florists (Roses Only), Flowers Victoria, National Farmers Federation, Queensland Farmers Federation, AUSVEG, Grain Producers Australia, Greenlife Industry Australia, Australian Horticultural Exporters and Importers Association, and Plant Health Australia.

9 October 2019—Departmental officers met with a representative of leading cut flower and foliage importers to discuss weekend clearance arrangements for upcoming public holidays.

6 November 2019—The department corresponded with Australian importers about the upcoming expiry of import permits, and provided information on the re-application process.

18 December 2019—The Imported Flower and Foliage Regulation Working Group met to discuss issues related to compliance with import requirements, current import permits and the re-application and assessment process for import permits.

31 January 2020—Departmental officers met with representatives of leading cut flower and foliage importers to discuss operational issues including import clearance processes, devitalisation, and weed seed detections.

11 February 2020—The department issued an invitation to approximately 70 domestic cut flower industry stakeholders to attend a forum at the department on 17 March 2020 to discuss the regulatory arrangements now in place for cut flower and foliage imports to Australia; and to share findings from the draft of Part 2 of the PRA.

3 April 2020—To replace a face-to-face forum that was planned for 15 March 2020 but cancelled due to COVID-19 considerations, the department sent stakeholders a written update on the biosecurity work being undertaken on cut flowers and foliage.

17 April 2020—The department held a teleconference with domestic industries to provide information regarding the cut flowers and foliage PRA Part 2.

12 June 2020—The department held a teleconference with the Australian Flowers Traders Association to discuss the trial of weekend diagnostic services.

2 July 2020—The department held a teleconference with the Australian Flower Traders Association to discuss the suspension of *Chrysanthemum spp.* from Malaysia under a NPPO approved systems approach.

8 July 2020—The department held a teleconference with state and territory governments to discuss the draft of Part 2 of the PRA.

10 July 2020—The department held a teleconference with domestic industries to discuss the draft of Part 2 of the PRA.

31 July 2020—The department held a teleconference with the National Farmers' Federation to discuss general cut flower and foliage issues including management of pest non-compliance, devitalisation and the draft of Part 2 of the PRA.

4 September 2020 – The department wrote to all importers holding permits to provide an update on their compliance between 1 May 2020 and 31 July 2020.

23 September 2020—The department corresponded with Australian importers about the upcoming expiry of import permits, and provided information on the re-application process.

6 October 2020—The department held a teleconference with Australian Flower Traders Association to discuss plans for potential future border optimisation meetings.

28 October 2020—The department emailed members of the Imported Flower and Foliage Regulation Working Group to advise of its decision to discontinue the group. The department ceased operation of the Imported Cut Flower and Foliage Regulation Working Group as the continuation of the group was no longer deemed valuable to the department or stakeholders. Early in 2020 several IFFRWG members expressed their concern that the working group was no longer a constructive forum that allowed representation of their views as intended by the Terms of Reference and requested to withdraw their membership. In addition, at this point in time, the department had a good understanding of the supply chain for imported cut flowers and therefore the working group was ceased.

16 November 2020 – The department responded to correspondence from Queensland Farmers' Federation regarding concerns around the cessation of the Imported Cut Flower and Foliage Regulation Working Group.

7 December 2020—The department corresponded with Australian importers about the outcomes of the recent permit round and expectations for the current permit period.

17 December 2020 – The department wrote to all importers holding permits to provide an update on their compliance between 21 September 2020 and 30 November 2020.

18 December 2020 – The department responded to correspondence from National Farmers' Federation regarding concerns around the cessation of the Imported Cut Flower and Foliage Regulation Working Group, the import conditions, pre-export certification of cut flower consignments, onshore fumigation, pests that vector pathogens and devitalisation.

5 February 2021 - The department met with members of AFTA to discuss the regulation of weeds seeds in imported fresh cut flowers.

12 February 2021—The department had a meeting with National Farmers' Federation to discuss updates on cut flower and foliage pathway, including non-compliance rates and ongoing monitoring activities.

20 February 2021—The department provided a factsheet to the National Farmers' Federation on the management of the cut flowers and foliage pathway.

17 March 2021—The department corresponded with Australian importers about the upcoming expiry of import permits and provided information on the re-application process.

Appendix D: Arthropod interception analysis

Over the 20 year period from 1 January 2000 to 31 December 2019 there have been 54,332 live arthropod interceptions on imports of cut flowers and foliage. Of these live arthropod interceptions 38,404 occurred prior to the implementation of the revised import conditions (1 March 2018) and 15,928 occurred after. Appendix Table II provides the order level arthropod interception analysis from 1 January 2000 to 31 December 2019. This table includes a comparison between interceptions pre- and post-implementation of revised import conditions, as well as yearly and monthly average interception rates. For detailed arthropod interception analysis at family, genus and species level, please refer to the Appendix D Excel spreadsheet, which is available from the department's website at agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers#pest-risk-analysis-for-cut-flower-and-foliage-imports---part-2.

Appendix Table II Order level arthropod interception analysis

	1 January 2000 to 28 February 2018		1 March 2018 to 31 December 2019		Total: 1 January 2000 to 31 December 2019		Pre import condition changes	Post import condition changes	Pre import condition changes	Post import condition changes
	Count of interceptions	Percentage of all interceptions	Count of interceptions	Percentage of all interceptions	Count of interceptions	Percentage of all interceptions	Average count of interceptions per month	Average count of interceptions per month	Average count of interceptions per year	Average count of interceptions per year
Arachnida	11504	29.96%	7307	45.88%	18811	34.62%	48.75	332.14	584.85	3985.64
Trombidiformes	6450	16.80%	5375	33.75%	11825	21.76%	27.33	244.32	327.91	2931.82
Mesostigmata	2562	6.67%	1243	7.80%	3805	7.00%	10.86	56.50	130.25	678.00
Araneae	1544	4.02%	365	2.29%	1909	3.51%	6.54	16.59	78.50	199.09
Prostigmata	317	0.83%	0	0.00%	317	0.58%	1.34	0.00	16.12	0.00
Sarcoptiformes	286	0.74%	129	0.81%	415	0.76%	1.21	5.86	14.54	70.36
(Not identified further)	139	0.36%	194	1.22%	333	0.61%	0.59	8.82	7.07	105.82
Araneida	73	0.19%	0	0.00%	73	0.13%	0.31	0.00	3.71	0.00
Acariforms	52	0.14%	0	0.00%	52	0.10%	0.22	0.00	2.64	0.00
Parasitiformes	30	0.08%	0	0.00%	30	0.06%	0.13	0.00	1.53	0.00

Oribatida	27	0.07%	0	0.00%	27	0.05%	0.11	0.00	1.37	0.00
Astigmata	12	0.03%	0	0.00%	12	0.02%	0.05	0.00	0.61	0.00
Pseudoscorpiones	8	0.02%	1	0.01%	9	0.02%	0.03	0.05	0.41	0.55
Ixodida	2	0.01%	0	0.00%	2	0.00%	0.01	0.00	0.10	0.00
Opiliones	2	0.01%	0	0.00%	2	0.00%	0.01	0.00	0.10	0.00
Chilopoda	5	0.01%	1	0.01%	6	0.01%	0.02	0.05	0.25	0.55
Scolopendrida	3	0.01%	0	0.00%	3	0.01%	0.01	0.00	0.15	0.00
(Not identified further)	1	0.00%	1	0.01%	2	0.00%	0.00	0.05	0.05	0.55
Lithobiida	1	0.00%	0	0.00%	1	0.00%	0.00	0.00	0.05	0.00
Collembola	523	1.36%	107	0.67%	630	1.16%	2.22	4.86	26.59	58.36
Entomobryomorpha	384	1.00%	53	0.33%	437	0.80%	1.63	2.41	19.52	28.91
(Not identified further)	116	0.30%	48	0.30%	164	0.30%	0.49	2.18	5.90	26.18
Poduromorpha	14	0.04%	5	0.03%	19	0.03%	0.06	0.23	0.71	2.73
Symphyleona	7	0.02%	1	0.01%	8	0.01%	0.03	0.05	0.36	0.55
Metaxypleona	2	0.01%	0	0.00%	2	0.00%	0.01	0.00	0.10	0.00
Diplopoda	4	0.01%	1	0.01%	5	0.01%	0.02	0.05	0.20	0.55
(Not identified further)	2	0.01%	0	0.00%	2	0.00%	0.01	0.00	0.10	0.00
Polyxenida	2	0.01%	0	0.00%	2	0.00%	0.01	0.00	0.10	0.00
Julida	0	0.00%	1	0.01%	1	0.00%	0.00	0.05	0.00	0.55
Insecta	26368	68.66%	8512	53.44%	34880	64.20%	111.73	386.91	1340.52	4642.91
Thysanoptera	16464	42.87%	6327	39.72%	22791	41.95%	69.76	287.59	837.01	3451.09
Hemiptera	4497	11.71%	1188	7.46%	5685	10.46%	19.06	54.00	228.62	648.00
Lepidoptera	1806	4.70%	351	2.20%	2157	3.97%	7.65	15.95	91.81	191.45
Hymenoptera	1054	2.74%	166	1.04%	1220	2.25%	4.47	7.55	53.58	90.55
Diptera	974	2.54%	170	1.07%	1144	2.11%	4.13	7.73	49.52	92.73

Coleoptera	941	2.45%	133	0.84%	1074	1.98%	3.99	6.05	47.84	72.55
Psocoptera	331	0.86%	100	0.63%	431	0.79%	1.40	4.55	16.83	54.55
Neuroptera	81	0.21%	23	0.14%	104	0.19%	0.34	1.05	4.12	12.55
(Not identified further)	69	0.18%	45	0.28%	114	0.21%	0.29	2.05	3.51	24.55
Blattodea	42	0.11%	3	0.02%	45	0.08%	0.18	0.14	2.14	1.64
Dermaptera	34	0.09%	1	0.01%	35	0.06%	0.14	0.05	1.73	0.55
Collembola	34	0.09%	0	0.00%	34	0.06%	0.14	0.00	1.73	0.00
Orthoptera	18	0.05%	1	0.01%	19	0.03%	0.08	0.05	0.92	0.55
Isoptera	8	0.02%	0	0.00%	8	0.01%	0.03	0.00	0.41	0.00
Thysanura	6	0.02%	3	0.02%	9	0.02%	0.03	0.14	0.31	1.64
Mantodea	6	0.02%	0	0.00%	6	0.01%	0.03	0.00	0.31	0.00
Trichoptera	1	0.00%	1	0.01%	2	0.00%	0.00	0.05	0.05	0.55
Embioptera	1	0.00%	0	0.00%	1	0.00%	0.00	0.00	0.05	0.00
Odonata	1	0.00%	0	0.00%	1	0.00%	0.00	0.00	0.05	0.00
Grand total	38404	100.00%	15928	100.00%	54332	100.00%	162.73	724.00	1952.41	8688.00

Appendix E: Group pest risk analysis method

This Appendix sets out the method used for the group pest risk analysis (Group PRA) in this report, as also used in the Thrips Group PRA and the Group Mealybugs PRA, with some modification. This method is consistent with the principles of the International Standards for Phytosanitary Measures (ISPMs), including ISPM 2: Framework for Pest Risk Analysis (FAO 2016a) and ISPM 11: *Pest Risk Analysis for Quarantine Pests* (FAO 2016c), and the requirements of the SPS Agreement (WTO 1995b).

The International Plant Protection Convention (IPPC) defines PRA as ‘the process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it’ (FAO 2019b). A pest is ‘any species, strain or biotype of plant, animal, or pathogenic agent injurious to plants or plant products’ (FAO 2019b).

International Standard for Phytosanitary Measures Number 2: Framework for pest risk analysis (FAO 2016a) states that ‘Specific organisms may ... be analysed individually, or in groups where individual species share common biological characteristics.’ This is the basis for the Group PRA, in which organisms are grouped if they share common biological characteristics, and as a result also have similar likelihoods of entry, establishment and spread and comparable consequences—thus posing a similar level of biosecurity risk.

The department recognises there may be exceptional circumstances where risk(s) posed by specific pests differ significantly from those of the other members of the group. If technically justified, a specific risk assessment would be undertaken where such exceptions exist.

A glossary of the key terms used in this Group PRA is provided at the back of this report.

This Group PRA was undertaken in three consecutive stages: initiation, pest risk assessment and pest risk management.

Stage 1: Initiation

Initiation identifies the pest(s) and pathway(s) that are of potential quarantine concern and should be considered for risk analysis in relation to the identified PRA area. For this PRA, the ‘PRA area’ is defined as all of Australia.

This group pest risk analysis was initiated by the department to review the biosecurity risks associated with the cut flowers and foliage pathway. The department has previously conducted pest categorisation (multiple risk analyses) for some of the arthropods on this pathway, including the *Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports* (Group Mealybugs PRA) (DAWR 2019c). These risk analyses determined that some arthropods on this pathway are quarantine pests for Australia.

Stage 2: Pest risk assessment

A pest risk assessment (for quarantine pests) is the ‘evaluation of the probability of the introduction and spread of a pest and of the magnitude of associated potential economic consequences’ (FAO 2019b).

In this PRA, the pest risk assessment was undertaken in several interrelated phases, using the Group PRA approach. Where the department has conducted a previous risk assessment for a

quarantine pest determined to be associated with the cut flower and foliage pathway, these assessments were incorporated into the pest risk assessment.

Pest categorisation

Pest categorisation in this Group PRA was undertaken on the Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera on the cut flowers and foliage pathway which have the potential to be quarantine pests for Australia. A quarantine pest is ‘a pest of potential economic importance to the area endangered thereby and not yet present there, or present and not widely distributed and officially controlled’ (FAO 2019b).

The process of pest categorisation is summarised by the IPPC in the five elements outlined below:

- identity of the pest
- presence or absence of the pest in the PRA area
- regulatory status of the pest in the PRA area
- potential for pest establishment and spread in the PRA area
- potential for the pest to cause economic consequences (including environmental consequences) in the PRA area.

The results of pest categorisation are given in Appendix F. The quarantine pests identified during pest categorisation were carried forward for pest risk assessment.

Assessment of the likelihood of entry, establishment and spread

Details of how to assess the ‘probability of entry’, ‘probability of establishment’ and ‘probability of spread’ of a pest are given in ISPM (FAO 2016c). The SPS Agreement (WTO 1995b) uses the term ‘likelihood’ rather than ‘probability’ for these estimates. In qualitative PRAs, the department uses the term ‘likelihood’ for the descriptors it uses for its estimates of the likelihood of entry, establishment and spread. The use of the term ‘probability’ is limited to the direct quotation of ISPM definitions.

A summary of this process is given in this Appendix, followed by a description of the qualitative methodology used in this pest risk analysis.

Likelihood of entry

The likelihood of entry describes the likelihood that a quarantine pest will enter Australia as a result of trade associated with the plant import pathway, be distributed in a viable state in the PRA area and be transferred to a susceptible host.

Entry is defined as the movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO 2019b).

For the purpose of considering the likelihood of entry, the department divides this step into two components:

- likelihood of importation—the likelihood that a pest will arrive in Australia when a given plant import pathway commodity is imported.

- likelihood of distribution—the likelihood that the pest will be distributed, as a result of the processing, sale or disposal of a plant import pathway commodity, in the PRA area and subsequently transfer to a susceptible part of a host.

The overall likelihood of entry is determined by combining the likelihood of importation with that of likelihood of distribution.

Factors considered in the likelihood of importation include:

- distribution and incidence of the pest in the source area
- occurrence of the pest in a life-stage that could be associated with the commodity
- mode of trade (for example, as bulk or packed commodity)
- volume and frequency of movement of the commodity along each pathway
- seasonal timing of imports
- pest management, cultural and commercial procedures applied at the place of origin
- speed of transport and conditions of storage compared with the duration of the life cycle of the pest
- vulnerability of the life-stages of the pest during transport or storage
- incidence of the pest likely to be associated with a consignment
- commercial procedures applied to consignments during transport and storage in the country of origin, and during transport to Australia.

Factors considered in the likelihood of distribution include:

- commercial procedures applied to consignments during distribution in Australia
- dispersal mechanisms of the pest, including vectors, to allow movement from the pathway to a host
- whether the imported commodity is to be sent to a few or many destination points in the PRA area
- proximity of entry, transit and destination points to hosts
- time of year at which import takes place
- intended use of the commodity
- risks from by-products and waste.

Likelihood of establishment

Establishment is defined as the ‘perpetuation for the foreseeable future, of a pest within an area after entry’ (FAO 2019b). In order to estimate the likelihood of establishment of a pest, reliable biological information (for example, life cycle, host range, epidemiology and survival) is obtained from the areas where the pest currently occurs. The situation in the PRA area can then be compared with that in the areas where it occurs and expert judgement used to assess the likelihood of establishment.

Factors considered in the likelihood of establishment include:

- availability of hosts, alternative hosts and vectors

- suitability of the natural and/or managed environment
- reproductive strategy and potential for adaptation
- minimum population needed for establishment
- cultural practices and control measures.

Likelihood of spread

Spread is defined as ‘the expansion of the geographical distribution of a pest within an area’ (FAO 2019b). The likelihood of spread considers the factors relevant to the movement of the pest, after establishment on a host plant or plants, to other susceptible host plants of the same or different species in other areas. In order to estimate the likelihood of spread of the pest, reliable biological information is obtained from areas where the pest currently occurs. The situation in the PRA area is then compared with that in the areas where the pest currently occurs and expert judgement used to assess the likelihood of spread in the PRA area.

Factors considered in the likelihood of spread include:

- suitability of the natural and/or managed environment
- presence of natural barriers
- potential for movement with commodities, conveyances or by vectors
- intended end-use of the commodity
- potential vectors of the pest in the PRA area
- potential natural enemies of the pest in the PRA area.

Assigning likelihoods for entry, establishment and spread

Likelihoods are assigned to each step of entry, establishment and spread. Six descriptors are used: High, Moderate, Low, Very low, Extremely low and Negligible (Table III). Descriptive definitions for these descriptors and their indicative ranges are given in Table III. The indicative ranges are only provided to illustrate the boundaries of the descriptors and are not used beyond this purpose in qualitative PRAs. These indicative ranges provide guidance to the risk analyst and promote consistency between different pest risk assessments.

Appendix Table III Nomenclature for likelihoods

Likelihood	Descriptive definition	Indicative range
High	The event would be very likely to occur	$0.7 < \text{to} \leq 1$
Moderate	The event would occur with an even likelihood	$0.3 < \text{to} \leq 0.7$
Low	The event would be unlikely to occur	$0.05 < \text{to} \leq 0.3$
Very low	The event would be very unlikely to occur	$0.001 < \text{to} \leq 0.05$
Extremely low	The event would be extremely unlikely to occur	$0.000001 < \text{to} \leq 0.001$
Negligible	The event would almost certainly not occur	$0 < \text{to} \leq 0.000001$

Combining likelihoods

The likelihood of entry is determined by combining the likelihood that the pest will be imported into the PRA area and the likelihood that the pest will be distributed within the PRA area, using a matrix of rules (Table IV). This matrix is then used to combine the likelihood of entry and the

likelihood of establishment, and the likelihood of entry and establishment is then combined with the likelihood of spread to determine the overall likelihood of entry, establishment and spread.

For example, if the likelihood of importation is assigned a descriptor of 'Low' and the likelihood of distribution is assigned a descriptor of 'Moderate', then they are combined to give a likelihood of 'low' for entry. The likelihood for entry is then combined with the likelihood assigned for establishment of 'High' to give likelihood for entry and establishment of 'Low'. The likelihood for entry and establishment is then combined with the likelihood assigned for spread of 'Very low' to give the overall likelihood for entry, establishment and spread of 'Very low'. This can be summarised as:

Importation x distribution = entry [E] Low x Moderate = Low

[E] x establishment = [EE] Low x High = Low

[EE] x spread = [EES] Low x Very low = Very low

Appendix Table IV Matrix of rules for combining likelihoods

	High	Moderate	Low	Very low	Extremely low	Negligible
High	High	Moderate	Low	Very low	Extremely low	Negligible
Moderate		Low	Low	Very low	Extremely low	Negligible
Low			Very low	Very low	Extremely low	Negligible
Very low				Extremely low	Extremely low	Negligible
Extremely low					Negligible	Negligible
Negligible						Negligible

Time and volume of trade

A factor affecting the likelihood of entry is the volume and duration of trade. If all other conditions remain the same, the overall likelihood of entry will increase as time passes and the overall volume of trade increases.

The department normally considers the likelihood of entry on the basis of the estimated volume of one year's trade. This is a convenient value for the analysis that is relatively easy to estimate and allows for expert consideration of seasonal variations in pest presence, incidence and behaviour to be taken into account. The consideration of the likelihood of entry, establishment and spread and subsequent consequences takes into account events that might happen over a number of years even though only one year's volume of trade is being considered. This difference reflects biological and ecological facts, for example where a pest or disease may establish in the year of import but spread may take many years.

The use of a one year volume of trade has been taken into account when setting up the matrix that is used to estimate the risk and therefore any policy based on this analysis does not simply apply to one year of trade. Policy decisions that are based on the department's method that uses the estimated volume of one year's trade are consistent with Australia's policy on appropriate level of protection and meet the Australian Government's requirement for ongoing quarantine protection. Of course if there are substantial changes in the volume and nature of the trade in

specific commodities then the department has an obligation to review the risk analysis and, if necessary, provide updated policy advice.

In assessing the volume of trade in this risk analysis the department assumed that a substantial volume of trade is occurring. Trade volumes are discussed in Chapter 5.

Assessment of potential consequences

The objective of the consequences assessment is to provide a structured and transparent analysis of the potential consequences if the pests were to enter, establish and spread in Australia. The assessment considers direct and indirect pest effects and their economic and environmental consequences. The requirements for assessing potential consequences are given in Article 5.3 of the SPS Agreement (WTO 1995b), ISPM 5 (FAO 2019b) and ISPM 11 (FAO 2016c).

Direct pest effects are considered in the context of the effects on:

- plant life or health
- other aspects of the environment.

Indirect pest effects are considered in the context of the effects on:

- eradication, control
- international trade
- domestic trade
- environment.

For the previous PRAs conducted by the department (and discussed in Section 6.2), the consequences were estimated over four geographic levels for each of these six criteria, defined as:

- *Local*: an aggregate of households or enterprises (a rural community, a town or a local government area).
- *District*: a geographically or geopolitically associated collection of aggregates (generally a recognised chapter of a state or territory, such as 'Far North Queensland').
- *Regional*: a geographically or geopolitically associated collection of districts in a geographic area (generally a state or territory, although there may be exceptions with larger states such as Western Australia).
- *National*: Australia wide (Australian mainland states and territories and Tasmania).

For each criterion, the magnitude of the potential consequences at each of these levels was described using four categories, defined as:

- *Indiscernible*: pest impact unlikely to be noticeable.
- *Minor significance*: expected to lead to a minor increase in mortality/morbidity of hosts or a minor decrease in production but not expected to threaten the economic viability of production. Expected to decrease the value of non-commercial criteria but not threaten the criterion's intrinsic value. Effects would generally be reversible.

- *Significant*: expected to threaten the economic viability of production through a moderate increase in mortality/morbidity of hosts, or a moderate decrease in production. Expected to significantly diminish or threaten the intrinsic value of non-commercial criteria. Effects may not be reversible.
- *Major significance*: expected to threaten the economic viability through a large increase in mortality/morbidity of hosts, or a large decrease in production. Expected to severely or irreversibly damage the intrinsic 'value' of non-commercial criteria.

The estimates of the magnitude of the potential consequences over the four geographic levels were translated into a qualitative impact score (A–G) using Table V.

Appendix Table V Decision rules for determining consequences impact score

Magnitude	Geographic scale			
	Local	District	Region	Nation
Indiscernible	A	A	A	A
Minor significance	B	C	D	E
Significant	C	D	E	F
Major significance	D	E	F	G

Note: In earlier qualitative PRAs, the scale for the impact scores went from A to F and did not explicitly allow for the rating 'indiscernible' at all four levels. This combination might be applicable for some criteria. In this report, the impact scale of A to F has been changed to become B G and a new lowest category A ('indiscernible' at all four levels) was added. The rules for combining impacts in Table VI were adjusted accordingly.

Appendix Table VI Decision rules for determining the overall consequences rating for each pest

Rule	The impact scores for consequences of direct and indirect criteria	Overall rating	consequences
1	Any criterion has an impact of 'G'; or more than one criterion has an impact of 'F'; or a single criterion has an impact of 'F' and each remaining criterion an 'E'.	Extreme	
2	A single criterion has an impact of 'F'; or all criteria have an impact of 'E'.	High	
3	One or more criteria have an impact of 'E'; or all criteria have an impact of 'D'.	Moderate	
4	One or more criteria have an impact of 'D'; or all criteria have an impact of 'C'.	Low	
5	One or more criteria have an impact of 'C'; or all criteria have an impact of 'B'.	Very low	
6	One or more but not all criteria have an impact of 'B', and all remaining criteria have an impact of 'A'.	Negligible	

The overall consequences for each pest is achieved by combining the qualitative impact scores (A–G) for each direct and indirect consequences using a series of decision rules (Table V). These rules are mutually exclusive, and are assessed in numerical order until one applies.

Estimation of the unrestricted risk

Once the assessments of the likelihood of entry, establishment and spread and potential consequences are completed, the unrestricted risk can be determined for each group of pests. This is determined by using a risk estimation matrix (Table VII) to combine the estimates of the likelihood of entry, establishment and spread and the overall consequences of pest establishment and spread. Therefore, risk is the product of likelihood and consequences.

When interpreting the risk estimation matrix, note the descriptors for each axis are similar (for example, Low, Moderate, High) but the vertical axis refers to likelihood and the horizontal axis refers to consequences. Accordingly, a 'low' likelihood combined with 'High' consequences, is not the same as a 'High' likelihood combined with 'Low' consequences—the matrix is not symmetrical. For example, the former combination would give an unrestricted risk rating of 'Moderate', whereas, the latter would be rated as a 'Low' unrestricted risk.

Appendix Table VII Risk estimation matrix

Likelihood of pest entry, establishment and spread	Consequences of pest entry, establishment and spread						
	Negligible	Very low	Low	Moderate	High	Extreme	
High	Negligible risk	Very risk	low	Low risk	Moderate risk	High risk	Extreme risk
Moderate	Negligible risk	Very risk	low	Low risk	Moderate risk	High risk	Extreme risk
Low	Negligible risk	Negligible risk	Very risk	low	Low risk	Moderate risk	High risk
Very low	Negligible risk	Negligible risk	Negligible risk	Very risk	low	Low risk	Moderate risk
Extremely low	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very risk	low	Low risk
Negligible	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very risk	low

Appropriate level of protection (ALOP) for Australia

The SPS Agreement defines the concept of an 'appropriate level of sanitary or phytosanitary protection (ALOP)' as the level of protection deemed appropriate by the WTO Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory.

Like many other countries, Australia expresses its ALOP in qualitative terms. The ALOP for Australia reflects community expectations through government policy, and is currently expressed as providing a high level of sanitary or phytosanitary protection aimed at reducing risk to a very low level, but not to zero. The band of cells in Table VII marked 'Very low risk' represents the ALOP for Australia.

Stage 3: Pest risk management

Pest risk management describes the process of identifying and implementing phytosanitary measures to manage risks to achieve the ALOP for Australia, while ensuring that any negative effects on trade are minimised.

The conclusions from pest risk assessments are used to decide whether risk management is required and if so, the appropriate measures to be used. Where the unrestricted risk estimate does not achieve the ALOP for Australia, risk management measures are required to reduce this risk to a very low level. The guiding principle for risk management is to manage risk to achieve Australia's ALOP. The effectiveness of any proposed phytosanitary measure (or combination of measures) is evaluated, using the same approach as used to evaluate the unrestricted risk, to ensure the restricted risk achieves the ALOP for Australia.

ISPM 11 (FAO 2016c) provides details on the identification and selection of appropriate risk management options and notes that the choice of measures should be based on their effectiveness in reducing the likelihood of entry of the pest.

Examples given of measures commonly applied to traded commodities include:

- options for consignments, include inspection or testing for freedom from pests, prohibition of parts of the host, a pre-entry or post-entry quarantine system, specified conditions on preparation of the consignment, specified treatment of the consignment, restrictions on end-use, distribution and periods of entry of the commodity
- options preventing or reducing infestation in the crop, including treatment of the crop, restriction on the composition of a consignment so it is composed of plants belonging to resistant or less susceptible species, harvesting of plants at a certain age or specified time of the year, production in a certification scheme
- options ensuring that the area, place or site of production or crop is free from the pest, including pest-free area, pest-free place of production or pest-free production site
- options for other types of pathways, including consider natural spread, measures for human travellers and their baggage, cleaning or disinfestation of contaminated machinery
- options within the importing country, including surveillance and eradication programs
- prohibition of commodities, if no satisfactory measure can be found.

Risk management measures are identified for each quarantine pest where the unrestricted risk estimate does not achieve the ALOP for Australia. These are presented in the 'Pest Risk Management' chapter of this report.

Appendix F: Pest categorisation

This pest categorisation is for the pathway of commercially produced fresh cut flower and foliage imports from all sources to Australia. The table does not represent a comprehensive list of all the pests associated with this pathway, and also only represents the Coleoptera, Diptera, Hemiptera (excluding the aphids, that were covered in Part 1 of this PRA), Hymenoptera and Lepidoptera. Key information sources were used to generate the list of species and these sources are identified in the potential to be on the pathway column (and these sources are provided in the references section of this document). Information presented in the geographical distribution column concentrates on known trading partner countries for this commodity, and does not necessarily present the entire known distribution of that species.

The steps in the initiation and categorisation processes are considered sequentially, with the assessment terminating at 'Present' for column 3 (except for pests that are present, but under official control and/or pests that are regulated articles) or the first 'No' for columns 4, 5 or 6.

Some pests identified in this table have been recorded in some regions of Australia, but due to interstate quarantine regulations and enforcement procedures, are considered under official control. The acronym for the state or territory for which the regional pest status is considered, such as 'WA' (Western Australia), is supplied for each of these organisms. Some pests have also been recorded in Australia, but due to their ability to transmit plant pathogens that have not been recorded in Australia, are regarded as potentially regulated articles.

Throughout the table acronyms are used for the Australian state or territory for which regional pest status is considered, such as 'ACT' (Australian Capital Territory), 'Qld' (Queensland), 'NSW' (New South Wales), 'NT' (Northern Territory), 'SA' (South Australia), 'Tas.' (Tasmania), 'WA' (Western Australia) or 'Vic.' (Victoria). These acronyms identify organisms that have been recorded in some regions of Australia, and if used in the quarantine pest column, due to interstate quarantine regulations are considered to be under official control.

Column 6 (Quarantine pest/Regulated article) includes the determination of the species regulatory status, but also whether that species is classified as a contaminating pest and the reason for this classification. The response in this column will answer 'Yes' or 'No' to quarantine pest, and will only record regulated articles or contaminant pests if relevant. Contaminant pest determinations include species that are not plant pests, but that are known to be:

- predatory or parasitic,
- nuisance pests, or
- vectors of human and/or animal disease.

Definitions of key terms used in the pest categorisation are provided in Section 1.2.4 and the Glossary of the PRA.

Appendix Table VIII Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera pest categorisation

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Coleoptera (beetles)						
<i>Acanthoscelides obtectus</i> (Say, 1831) [Chrysomelidae] Bean weevil, bean bruchid	Cosmopolitan distribution. Egypt, Kenya, Malawi, Mexico, Mauritius, Morocco, Tanzania, Zimbabwe, Argentina, Chile, India, Iran, Israel, Japan, Malaysia, Thailand, Vietnam, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain Switzerland, New Zealand, Papua New Guinea, Colombia, Peru, USA, and South Africa (EPPO 2020).	Present, widespread (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Adoretus sinicus</i> Burmeister, 1855 [Scarabaeidae] Chinese rose beetle, Chinese rose chafer	American Samoa, China, India, Indonesia, Malaysia, Republic of Korea, Singapore, Taiwan, Thailand, Vietnam (CABI 2020a; McQuate & Jameson 2011; Spafford et al. 2016), Hawaii and Japan (Mau & Martin Kessing 1991a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Adoretus sinicus</i> is associated with foliage of <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Adoretus sinicus</i> is polyphagous, feeding on over 250 different plants including <i>Rosa</i> , <i>Brassica</i> , <i>Zea</i> , <i>Gossypium</i> , <i>Solanum</i> , <i>Vitis</i> , <i>Fragaria</i> , <i>Phaseolus</i> , <i>Ipomoea</i> and <i>Zingibe</i> spp. (Mau & Martin Kessing 1991a; PHA 2016a) which are present in Australia (APNI 2020). <i>A. sinicus</i> has a history of establishment in numerous countries and	Yes. <i>Adoretus sinicus</i> is known to feed on agricultural plants including broccoli, cabbage, corn, cotton, cucumber, eggplant, grape, beans, strawberry, raspberry and roses (PHA 2016a), which are economically important plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). Adults	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				regions (McQuate & Jameson 2011), including Japan, South East Asia and Hawaii (Mau & Martin Kessing 1991a), where climatic conditions are similar to parts of Australia. Therefore, <i>A. sinicus</i> has the potential to establish and spread in Australia.	feed on foliage, between leaf veins, creating a lacelike or shothole appearance and in severe cases, most leaves are skeletonized (Mau & Martin Kessing 1991a), reducing photosynthetic capacity of the plant and causing heavy damage to crops (Furutani et al. 1995; McQuate & Jameson 2011). Therefore, <i>A. sinicus</i> has the potential to cause negative economic consequences in Australia.	
<i>Adoretus versutus</i> Harold, 1869 [Scarabaeidae] Rose beetle, yam rose beetle	India (Waterhouse & Norris 1987), American Samoa, Fiji, Indonesia, Madagascar, Malaysia, Mauritius, Pakistan, Sri Lanka, Tonga and Vanuatu (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Adoretus versutus</i> is associated with foliage of <i>Rosa</i> spp. (PHA 2016a). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (Biosecurity Australia 2002c). <i>Adoretus versutus</i> is polyphagous, with a wide host range including <i>Acacia</i> , <i>Carica</i> , <i>Citrus</i> , <i>Coffea</i> , <i>Ficus</i> , <i>Hibiscus</i> , <i>Ipomoea</i> , <i>Litchi</i> , <i>Malus</i> , <i>Phaseolus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Rosa</i> , <i>Solanum</i> , <i>Sorghum</i> , <i>Vitis</i> and <i>Zinnia</i> spp. (CABI 2020a), all present throughout Australia (APNI 2020). The species is distributed in the	Yes. Previously assessed by the department (Biosecurity Australia 2002c). <i>Adoretus versutus</i> attacks agricultural crops including lychee, bean, papaya, cashew, wattle, pear, plum, ginger, sugar cane, grape, and rose, which are economically important in Australia (Horticulture Innovation Australia 2019c; PHA 2016a; Waterhouse & Norris 1987). Larvae attack roots of host	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Pacific Islands, and some African and Asia regions (Waterhouse & Norris 1987) areas with similar climatic conditions to Australia. Therefore, <i>A. versutus</i> has the potential to establish and spread in Australia.	plants, while adults attack flowers and leaves, causing defoliation and young plant mortality (Waterhouse & Norris 1987), reducing plant quality. Therefore, <i>A. versutus</i> has the potential to cause negative economic consequences in Australia.	
<i>Agrilus cuprescens</i> (Ménétriés, 1832) [Buprestidae] Raspberry buprestid, rose stem girdler, bronze cane borer	USA (Alston 2015), Belgium, France, Greece, Italy, Spain, Sweden and Portugal (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Agrilus cuprescens</i> is associated with stems and foliage of <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Agrilus cuprescens</i> is known to feed on <i>Rubus</i> and <i>Rosa</i> spp. (PHA 2016a), which are present throughout Australia (APNI 2020). It is distributed in Europe and has invaded USA (Alston 2015), suggesting similar climatic conditions in parts of Australia are suitable for the pest. Therefore, <i>A. cuprescens</i> has the potential to establish and spread in Australia.	Yes. <i>Agrilus cuprescens</i> is a cane boring beetle which attacks raspberry, blackberry and <i>Rosa</i> spp. (Alston 2015; PHA 2016a), economically important plants in Australia (Horticulture Innovation Australia 2019c). Larvae tunnel in canes or stems, causing gall like swellings and stem breakage. This reduces fruit production, and causes plant wilt and mortality (Alston 2015). Foliage damage reduces appearance (Alston 2015), with negative impact for ornamental industries. Therefore, <i>A. cuprescens</i> has the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					potential to cause negative economic consequences in Australia.	
<i>Agriotes lineatus</i> (Linnaeus, 1767) [Elateridae] Lined click beetle	France, Greece, the Netherlands, USA, Belgium, Iran, Israel, Italy, Portugal, Spain, Switzerland (de Jong et al. 2019; EPPO 2020), New Zealand (Frolov 2008) and UK (GBIF Secretariat 2017).	No record found (ABRS 2020; OGTR 2006; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Agriotes lineatus</i> is associated with <i>Dianthus</i> spp. foliage (OGTR 2006).	Yes. <i>Agriotes lineatus</i> is a polyphagous soil inhabiting pest with a wide host range including <i>Dianthus</i> , <i>Zea</i> , <i>Helianthus</i> , <i>Solanum</i> , <i>Triticum</i> , <i>Beta</i> and <i>Hordeum</i> spp. (Frolov 2008; OGTR 2006; Plant Health Australia 2005) which are present throughout Australia (APNI 2020). It prefers soils with high water holding capacity (Stolpe Nordin 2017). The pest is distributed throughout Europe and has been introduced to New Zealand (Frolov 2008), regions where climatic conditions are similar to Australia. Therefore, <i>A. lineatus</i> has the potential to establish and spread in Australia.	Yes. <i>Agriotes lineatus</i> is an agricultural pest, known to attack wheat, rye, oats, barley, maize, potato, beet, carrot, onion, tomato, and fruit saplings (Frolov 2008), economically important plants in Australia (Horticulture Innovation Australia 2019c). Economic consequences are caused due to feeding on sown seeds and seedlings, eating new shoots, leaves, stems and nodes of tillers in cereals, and penetrating into roots (ALA 2018; Frolov 2008) which reduces yield and plant quality (Stolpe Nordin 2017). Once established, early intervention with multiple control measures become necessary (Frolov 2008), and increase costs for affected industries. Therefore, <i>A. lineatus</i> has	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					the potential to cause negative economic and environmental consequences in Australia.	
<i>Ahasverus advena</i> (Waltl, 1834) [Silvanidae] Foreign grain beetle	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland (de Jong et al. 2019), Ethiopia, Indonesia, Malawi, Malaysia, Philippines, Singapore, Tonga, Sri Lanka, UK, USA (CABI 2020a), Japan, New Zealand, South Africa (Discover Life 2018) and the Netherlands, (GBIF Secretariat 2017).	Present (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Anchastus swezeyi</i> Van Zwaluwenburg 1931 [Elateridae]	Endemic to Hawaii, USA (Haines & Foote 2005; van Zwaluwenburg 1940).	No record found (ABRS 2020; Plant Health Australia 2020)	<i>Anchastus swezeyi</i> is associated with foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Anchastus swezeyi</i> is an elaterid beetle, feeding on insects, organic and vegetable matter (Calder 1996a). <i>Anchastus</i> spp. are distributed throughout the world, with three species, including <i>Anchastus australis</i> , already present in Australia (Calder 1996b). This suggests suitable climatic conditions and host plants occur in Australia. Therefore, <i>A. swezeyi</i> has	Yes. Elaterid larvae, often called wireworms, are omnivorous, feeding on insect larvae and other invertebrates as well as organic and other vegetable matter (Calder 1996a). <i>Anchastus</i> spp. have been recorded predated insects associated with on Bromeliad species (Campos & Fernández 2011). Therefore, <i>A. swezeyi</i> has the potential to cause	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				the potential to establish and spread in Australia.	negative economic and environmental consequences in Australia.	
<i>Anthelephila pedestris</i> (Rossi, 1790) Synonyms: <i>Carabus pedestris</i> Rossi, 1790, <i>Anthicus nobilis</i> Faldermann, 1837, <i>Formicomus sareptana</i> Desbroches des Loges, 1875, <i>Formicomus tincta</i> Reitter, 1889 [Anthicidae]	Albania, Austria, Bosnia, Herzegovina, Bulgaria, Corsica, Croatia, Cyprus, Czech Republic, France, Germany, Gibraltar, Greece, Hungary, Italy, Crete, Madeira Island, Latvia, North Africa, Poland, Portugal, Romania, Yugoslavia, Sardinia, Sicily, Slovakia, Spain, Russia, Switzerland, Turkey and Ukraine (de Jong et al. 2019; Kirejtshuk et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020)	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Anthelephila pedestris</i> is a scavenger and opportunistic predator, feeding on organic matter and small invertebrates (Kejval 2003). The pest is distributed throughout Europe (de Jong et al. 2019), with five species, including <i>A. bataviensis</i> , <i>A. biroii</i> , <i>A. consul</i> , <i>A. denisonii</i> and <i>A. theresae</i> , already present in Australia (Kejval 2005). This suggests suitable climatic conditions and host plants occur in Australia. Therefore, <i>A. pedestris</i> has the potential to establish and spread in Australia.	Yes. <i>Anthelephila pedestris</i> is a scavenger and opportunistic predator, feeding on organic matter and small invertebrates (Kejval 2003). Therefore, <i>A. pedestris</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Anthrenus verbasci</i> (Linnaeus, 1767) Synonym: <i>Anthrenus (Nathrenus) verbasci</i> (Linnaeus, 1767) [Dermestidae]	Cosmopolitan distribution including Italy, Papua New Guinea (Plant Health Australia 2020), Belgium, France, Spain, Greece, Portugal, Switzerland (de Jong et al. 2019), Japan, South	Present, Vic., NSW, ACT, SA, Tas., Qld and WA (Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Varied carpet beetle	Africa, Morocco, USA, UK and New Zealand (Discover Life 2019).					
<i>Araecerus fasciculatus</i> (De Geer, 1775) [Anthribidae] Coffee bean weevil	Kenya (Letter from KEPHIS on 29/01/2018) Belgium, France, the Netherlands, Panama, South Africa, UK, USA (GBIF Secretariat 2017), American Samoa, Argentina, Cambodia, Chile, China, Colombia, Egypt, Fiji, India, Indonesia, Iran, Israel, Italy, Japan, Malaysia, Madagascar, Mauritius, New Caledonia, Mexico, Republic of Korea, Philippines, Singapore, Sri Lanka, Taiwan, United Republic of Tanzania, Tonga, Thailand, Uganda and Vietnam (CABI 2020a).	Present, NSW, WA and Vic. (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Attagenus fasciatus</i> (Thunberg, 1795) Synonym: <i>Attagenus (Attagenus) fasciatus</i> (Thunberg, 1795) [Dermestidae] Banded black carpet beetle	Egypt, France, South Africa, UK, USA (GBIF Secretariat 2017), Singapore (CABI 2020a), Mexico (Discover Life 2018) and India (Veer, Prasad & Rao 1991).	Present, Qld, NSW, WA and NT (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Aulacophora nigripennis</i> Motschulsky, 1857 [Chrysomelidae] Pumpkin beetle	Japan, Republic of Korea, Vietnam, China and Taiwan (Aston 2009; Lee & Beenen 2015).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Aulacophora nigripennis</i> is associated with <i>Dianthus</i> spp. foliage (PHA 2016a).	Yes. <i>Aulacophora nigripennis</i> is a pest of <i>Glycine</i> , <i>Lagenaria</i> , <i>Callerya</i> and <i>Dianthus</i> spp. (Aston 2009; Lee & Beenen 2015; PHA 2016a), which are present throughout Australia (APNI 2020). The species is distributed in Asia where climatic conditions are similar to parts of Australia. Therefore, <i>A. nigripennis</i> has the potential to establish and spread in Australia.	Yes. <i>Aulacophora nigripennis</i> adults attack and damage the stems, leaves, petals and flower buds of carnations (Uda et al. 2001). Feeding damage in the field is severe and frequent (Saito 1985; Uda et al. 2001), consequently reducing the appearance and marketability of carnation flowers. Therefore, <i>A. nigripennis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Carpophilus dimidiatus</i> (Fabricius, 1792) [Nitidulidae] Corn sap beetle	France, Greece, Italy, Portugal, Spain (de Jong et al. 2019), USA, the Netherlands, (Discover Life 2019), Japan and South Africa (GBIF Secretariat 2017).	Present, Qld, NT, NSW, WA, Tas. and SA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Carpophilus hemipterus</i> (Linnaeus, 1758) [Nitidulidae] Dried fruit beetle	France, Japan, New Zealand, South Africa, USA (GBIF Secretariat 2017), Egypt, Greece, Indonesia, Malaysia, Singapore, Thailand, Vietnam (CABI 2020a), British Virgin Islands, Mexico, Portugal, Spain	Present (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Carpophilus hemipterus</i> has already established and spread in Australia (ABRS 2020; Plant Health Australia 2020).	Yes. <i>Carpophilus hemipterus</i> transmits yeast fungi which causes souring of figs, and is a vector of the fungal pathogen <i>Monilinia fructigena</i> (Agrios 2008), which is not present in Australia (CABI 2020b).	No/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	and UK (Discover Life 2018).				This species also vectors the bacterial pathogen <i>Dickeya zeae</i> pineapple strain (= <i>Erwinia chrysanthemi</i>), a causal agent of rot disease on a wide range of hosts which is under official control in northern Australia (Northern Territory Government of Australia 2017; QDAF 2018a). Therefore, introduction of infected <i>C. hemipterus</i> has the potential to cause negative economic consequences in Australia.	
<i>Carpophilus obsoletus</i> Erichson, 1843 [Nitidulidae] Sap beetle	Kenya, South Africa, UK, USA, Zimbabwe (GBIF Secretariat 2017), Indonesia, Malaysia (CABI 2020a), China, Egypt, Greece, India, Iran, Israel, Italy, Morocco, Portugal, Saudi Arabia, Spain, Taiwan, United Arab Emirates (Lason & Ghahari 2013) and Japan (Discover Life 2018).	Present Qld, Tas., NSW and NT (Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020)	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Carpophilus obsoletus</i> has already established and spread in other parts of Australia (ABRS 2020; Plant Health Australia 2020). Therefore, <i>C. obsoletus</i> has the potential to establish and spread in Western Australia.	Yes. <i>Carpophilus obsoletus</i> is considered a significant agricultural pest of stored timber products, and a pest of rice, wheat, maize, figs, garlic and onions (Stanaway et al. 2001) (Brown 2009), all economically important plants and crops in Australia (Horticulture Innovation Australia 2019c). <i>Carpophilus</i> spp. are generally	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					considered minor pests but the presence of large numbers of feeding adults and larvae on host plants can damage crops and reduce marketability (Myers 2019). Therefore, <i>C. obsoletus</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Cartodere bifasciata</i> (Reitter, 1877) Synonym: <i>Aridius bifasciatus</i> (Reitter, 1877), <i>Cartodere (Aridius) bifasciata</i> (Reitter, 1877) [Latridiidae]	UK, Portugal, France, Belgium, Switzerland, the Netherlands, Spain (de Jong et al. 2019), Italy (Salvato & Uliana 2016) and USA (GBIF Secretariat 2017).	Present (ABRS 2020; Majka, Langor & Rucker 2009; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Cartodere constricta</i> (Gyllenhal, 1827) Synonym: <i>Coninomus constrictus</i> (Gyllenhal), <i>Lathridius constricta</i> Gyllenhal, <i>Latridius constricta</i> Gyllenhal [Latridiidae] Plaster beetle	Central and South America (PaDIL 2020)	Present (CSIRO 2019a).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Cartodere nodifer</i> (Westwood, 1839)	Belgium, France, Greece, Italy, Iceland, Portugal,	Present (de Jong et al. 2019; Hagstrum &	Species intercepted at Australian points of entry	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Synonym: <i>Aridius nodifer</i> (Westwood, 1839), <i>Lathridius nodifer</i> Westwood, 1839, <i>Lathridius antipodum</i> (White, 1846) [Latridiidae]	Spain, Switzerland, the Netherlands (de Jong et al. 2019), UK, USA (GBIF Secretariat 2017) and New Zealand (Discover Life 2018).	Subramanyam 2016; Vorst & Cuppen 2000).	on cut flower and foliage consignments (unpublished).			
<i>Chrysomela vigintipunctata</i> (Scopoli, 1763) Synonym: <i>Chrysomela (Strickerus) vigintipunctata</i> Scopoli, 1763, <i>Melasoma vigintipunctata</i> [Chrysomelidae] Spotted willow leaf beetle	Republic of Korea (Byun et al. 2009), France, Greece, Italy, the Netherlands and Belgium (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020)	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Chrysomela vigintipunctata</i> attacks foliage of <i>Salix</i> spp. (Charles et al. 2014; Kutcherov 2015) which are distributed throughout Australia (APNI 2020). The species is distributed across temperate forest zones of northern Europe and Asia (Palearctic region) (Kutcherov 2015), areas with similar climatic conditions to parts of Australia. Therefore, <i>C. vigintipunctata</i> has the potential to establish and spread in Australia.	Yes. <i>Chrysomela vigintipunctata</i> is oligophagous, feeding and completing its lifecycle on willows trees (Charles et al. 2014). Outbreaks cause severe defoliation of willows (Charles et al. 2014; Kutcherov 2015). Therefore, <i>C. vigintipunctata</i> has the potential to cause negative economic, including environmental consequences in Australia.	Yes
<i>Coccinella septempunctata</i> Linnaeus, 1758 [Coccinellidae]	New Zealand (Guthrie 2008), Belgium, France, UK, USA, Chile, China, Egypt, Greece, India, Iran, Israel, Italy, Japan,	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Coccinella septempunctata</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008). Species intercepted at	Yes. <i>Coccinella septempunctata</i> is omnivorous, feeding mainly on aphids (Bertolaccini, Núñez-	Yes. <i>Coccinella septempunctata</i> is omnivorous, feeding predominantly on aphids and supplementing its	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Seven spot ladybird	Morocco, Lebanon, the Netherlands, Pakistan, Portugal, Republic of Korea, Spain, Switzerland, Taiwan (CABI 2020a), Afghanistan, Mexico and Nepal (Discover Life 2018).		Australian points of entry on cut flower and foliage consignments (unpublished).	Pérez & Tizado 2008), and is associated with <i>Cordyline</i> spp. (Guthrie 2008), cereals, herbaceous plants and deciduous trees (Honek et al. 2014). The species has established throughout North America (CABI 2020a). Therefore, as a result of invasive capabilities, suitable host plants to develop on and similar climatic conditions, <i>C. septempunctata</i> has the potential to establish and spread in Australia.	diet with pollen, nectar and fungal spores (Bertolaccini, Núñez-Pérez & Tizado 2008). This species is often used as a biological control agent for aphids (BCA) (Biosecurity Australia 2005a). With omnivorous feeding habits and association with plants of economic importance <i>C. septempunctata</i> has the potential to cause negative environmental consequences in Australia.	
<i>Coccinella transversalis</i> Fabricius, 1781 [Coccinellidae] Transverse ladybird, transverse lady beetle	India, China, Indonesia, Japan, Malaysia, Philippines, USA, Tonga, Vietnam (CABI 2020a), New Caledonia, Taiwan, Thailand and Vanuatu (GBIF Secretariat 2017),	Present, widespread (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Coccinella undecimpunctata</i> Linnaeus, 1758 [Coccinellidae] Eleven spotted ladybird	India, Pakistan, Egypt, USA, Greece, UK, New Zealand (CABI 2020a), the Netherlands, Iceland, Italy, Portugal, Spain, Belgium and France (de Jong et al. 2019).	Present, widespread (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Coccotrypes dactyliperda</i> (Fabricius, 1801) [Curculionidae] Button beetle, date stone beetle, Date stone borer	France, Greece, Italy, Portugal, Spain, Switzerland, Iceland (de Jong et al. 2019), USA, Virgin Islands, Malaysia, Thailand, (Discover Life 2019), Panama, Colombia, Argentina (Blackwelder 1944), South America, Africa, Mexico, (ITIS 2018b) and Peru (GBIF Secretariat 2017).	Present, NSW, Qld, WA and NT (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Conoderus eveillardii</i> (LeGuillou, 1844) Misspelling: <i>Conoderus eveillsrdi</i> (LeGuillou, 1844) [Elateridae] Click beetle	Hawaii, USA (Johnson et al. 2017)	Present, NSW, Qld and Vic. (ABRS 2020; Plant Health Australia 2020).	<i>Conoderus eveillardii</i> is associated with foliage and branches of <i>Cordyline</i> spp. (MAF 2002; MPI 2016).	Assessment not required	Assessment not required	No
<i>Cryptamorphia desjardinsi</i> (Guérin Méneville, 1844) [Silvanidae] Desjardin's beetle, Desjardin's flat beetle	New Zealand (MacFarlane et al. 2010), Portugal, Japan (Yoshida & Hirowatari 2014) and New Caledonia (Dumbleton 1954).	Present, NSW, Qld, Tas. and Vic. (Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Cryptolaemus montrouzieri</i> Mulsant, 1853	Belgium, France, Taiwan, New Zealand, South Africa, Spain, USA (GBIF Secretariat 2017), Fiji, Greece, India, Iran, Kenya, Malaysia, Mauritius, New	Present, WA, SA, NT, Qld, Vic. and NSW (ALA 2018; Government of Western Australia 2020).	Australia has been notified that species is on this pathway as a BCA (Letter from MANR on 06/03/2018).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Synonym: <i>Cryptolaemus montrouzieri</i> (Mulsant, 1853) [Coccinellidae] Mealybug ladybird, mealybug destroyer	Caledonia, the Netherlands, Peru, Papua New Guinea, Portugal, Saudi Arabia, United Republic of Tanzania (CABI 2020a), Israel, Italy, Japan and Mexico (Discover Life 2018). <i>Cryptolaemus montrouzieri</i> is used as a BCA in Ethiopia (Letter from MANR on 06/03/2018).					
<i>Cryptolestes ferrugineus</i> (Stephens, 1831) [Laemophloeidae] Rusty grain beetle	India, Japan, Republic of Korea, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Vietnam, Egypt, Ethiopia, Kenya, Zimbabwe, USA, Belgium, Greece, Italy, Spain, UK (CABI 2020a), France and Portugal (de Jong et al. 2019).	Present, NT, Qld, Tas., NSW, SA and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020). Although present in Western Australia, this species is still a declared pest due to an insecticide resistant form (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Cryptolestes pusillus</i> (Schöenherr, 1817) Synonym: <i>Cucujus minutus</i> (Olivier, 1791),	Kenya (letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Belgium, France, Greece, Italy, Portugal, Spain (de	Present, Qld, Tas., NSW and NT (Plant Health Australia 2020). Declared pest, prohibited entry into WA	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished). Australia has been notified that	Yes. Previously assessed by WA government (DAFWA 2015; DPIRD 2017). <i>Cryptolestes pusillus</i> is cosmopolitan and will feed on dried	Yes. Previously assessed by WA government (DAFWA 2015; DPIRD 2017). <i>Cryptolestes pusillus</i> is a pest of stored cereal grains and	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Laemophloeus minutus</i> (Olivier) [Laemophloeidae] Flat grain beetle	Jong et al. 2019), Argentina, China, Fiji, India, Indonesia, Israel, Malawi, Malaysia, Mexico, Morocco, New Caledonia, New Zealand, Papua New Guinea, Philippines, Singapore, Sri Lanka, Taiwan, United Republic of Tanzania, Thailand, Uganda, Vietnam, Zimbabwe (CABI 2020a), Egypt, Iran, Pakistan (Gentry 1965), Japan, UK, Peru and Virgin Islands (Discover Life 2018).	(Government of Western Australia 2020; PHA 2018).	<i>Cryptolestes pusillus</i> is on this pathway as a common pest (letter from KEPHIS on 29/01/2018; letter from KEPHIS on 29/01/2018).	plant material, either in storage or occurring naturally (DAFWA 2015; DPIRD 2017). <i>C. pusillus</i> has already established and spread in parts of Australia (PaDIL 2020).	processed commodities (DAFWA 2015). Potentially a pest of dried grapes (DPIRD 2017). Therefore <i>C. pusillus</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Cryptophilus integer</i> (Heer, 1841) Synonym: <i>Cryptophagus integer</i> (Heer, 1841) [Erotylidae]	Belgium, France, Greece, Italy, Spain (de Jong et al. 2019), New Zealand (MacFarlane et al. 2010; PaDIL 2020), USA (CABI 2020a), Afghanistan, Indonesia, Portugal and South Africa (Discover Life 2018).	Present (ABRS 2020; ALA 2018; ITIS 2018a).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Diabrotica speciosa</i> (Germar, 1824) [Chrysomelidae]	Argentina, Colombia, Ecuador, Peru and Panama (CABI 2020a; Collins et al. 2014; OEPP/EPP0 2005)	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Diabrotica speciosa</i> is associated with flowers and leaves of <i>Chrysanthemum</i> and <i>Dahlia</i> spp. (PHA 2016a).	Yes. <i>Diabrotica speciosa</i> is polyphagous, feeding on over 70 species of host plants, including <i>Phaseolus</i> , <i>Solanum</i> , <i>Zea</i> , <i>Triticum</i> , <i>Chrysanthemum</i> , <i>Dhalia</i> , <i>Arachis</i> , <i>Brassica</i> , <i>Cucurbita</i> , <i>Malus</i> , <i>Prunus</i> (Collins et al. 2014),	Yes. <i>Diabrotica speciosa</i> feeds on agricultural plants such as cotton, potato, tomato, maize, wheat, citrus, grapes, apple, peach, beans and <i>Brassica</i> spp. (Collins et al. 2014) all economically important in Australia	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<p><i>Citrus</i>, <i>Helianthus</i> <i>Gossypium</i> and <i>Vitis</i> spp. (CABI 2020a), which are present throughout Australia (APNI 2020). The species is present in Central and South American countries (Collins et al. 2014) where climatic conditions are similar to parts of Australia. Therefore, <i>D. speciosa</i> has the potential to establish and spread in Australia.</p>	<p>(Horticulture Innovation Australia 2019c). Adults defoliate and damage leaves, flowers, and fruit, while larvae feed primarily on roots. In South American corn fields, <i>D. speciosa</i> larvae caused 73% reduction in yield, while adults damaged the tassels of cobs (Collins et al. 2014) which reduce marketability. Damage by adults will also reduce the appearance and value of ornamental plants. This pest also vectors several Comoviruses, Tymoviruses and Carmoviruses, and bacterial pathogens such as <i>Erwinia tracheiphila</i> and <i>Passionfruit yellow mosaic virus</i> (Tymovirus) (Collins et al. 2014) which are high priority pests for the melon and passionfruit industries in Australia (PHA 2019b). Therefore <i>D. speciosa</i> has the potential to cause negative economic</p>	

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Diaprepes abbreviatus</i> (Linnaeus, 1758) [Curculionidae]	British Virgin Islands and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Diaprepes abbreviatus</i> is associated with foliage and branches of <i>Dracaena</i> spp. (MAF 2002; MPI 2016).	Yes. <i>Diaprepes abbreviatus</i> is highly polyphagous, known to feed on about 270 plant species, including ornamental and wild plants, <i>Citrus</i> , <i>Saccharum</i> , <i>Solanum</i> , <i>Zea</i> , <i>Carica</i> , <i>Dracaena</i> , <i>Gossypium</i> , <i>Ipomoea</i> , <i>Mangifera</i> and <i>Musa</i> spp. (CABI 2020a; Weissling et al. 2009). The species is native to the Caribbean and was introduced to USA in 1964, presumably via ornamental plant shipments from Puerto Rico, where it has spread readily (Weissling et al. 2009). Therefore, due to its invasive behaviour, suitable climatic conditions and host plant availability, <i>D. abbreviatus</i> has the potential to establish and spread in Australia.	consequences in Australia. Yes. <i>Diaprepes abbreviatus</i> attacks agricultural crops of economic importance to Australia, including cotton, mango, maize, banana, citrus, sugarcane, potatoes, papaya, and ornamentals (CABI 2020a; Horticulture Innovation Australia 2019c; Weissling et al. 2009). Adults feed on leaves, while larvae feed on roots, causing reduced production or mortality (Weissling et al. 2009). This species is known to cause significant economic losses in citrus, ornamentals and other crops in USA, amassing US\$70 million in damage annually just in Florida (Weissling et al. 2009). Therefore <i>D. abbreviatus</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Diaxenes phalaenopsidis</i> Fisher, 1937 [Cerambycidae] Orchid Capricorn beetle	Indonesia (Dyah 2014; PHA 2016a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Diaxenes phalaenopsidis</i> is associated with <i>Dendrobium</i> , <i>Phalaenopsis</i> (PHA 2016a) and <i>Oncidium</i> spp. (CABI 2020a).	Yes. <i>Diaxenes phalaenopsidis</i> is associated with <i>Dendrobium</i> , <i>Phalaenopsis</i> and <i>Oncidium</i> spp. (CABI 2020a), which are present in Australia (APNI 2020). This species is distributed in Indonesia where climatic conditions are similar to parts of Australia. Therefore, <i>D. phalaenopsidis</i> has the potential to establish and spread in Australia.	Yes. <i>Diaxenes phalaenopsidis</i> attacks multiple orchid species which are grown in Australia as ornamental plants (Flowers Australia 2019). Larvae bore into roots, and feed on leaves and flowers (Iswanto 2005). Damage to roots cause plants to dry out and result in death (Dyah 2014). Foliage and flower damage would also affect the overall plant appearance. Therefore, <i>D. phalaenopsidis</i> has the potential to cause economic consequences in Australia.	Yes
<i>Elytroteinus subtruncatus</i> (Fairmaire, 1881) [Curculionidae] Fijian ginger weevil	Tonga and Fiji (EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020)	<i>Elytroteinus subtruncatus</i> is associated with foliage of <i>Cordyline</i> and <i>Dracaena</i> (MPI 2016).	Yes. Previously assessed by the department (DAFF 2013a). Distribution is restricted to the tropics, so potentially it could establish in northern Australia. <i>Elytroteinus subtruncatus</i> feeds on a range of live and dead plant material in the field and in storage and trade, including avocado, lemon and sugarcane (DAFF 2013a). These plants are	Yes. Previously assessed by the department (DAFF 2013a). Larvae feeding on roots result in wilting and loss of vigour in host plants. If feeding is extensive, the host may die. Particularly a storage pest of root crops such as taro and ginger. (DAFF 2013a). Therefore, <i>E. subtruncatus</i> has the potential to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				present in Australia (APNI 2020), therefore, <i>E. subtruncatus</i> has the potential to establish and spread in Australia.	economic consequences in Australia.	
<i>Epuraea luteola</i> (Erichson, 1843) Synonym: <i>Epuraea (Haptoncus) luteolus</i> Erichson, 1843, <i>Haptoncus luteolus</i> (Fairmarie) Gillogly, 1962 [Nitidulidae] Pineapple sap beetle	France, Greece, Italy, Portugal, Spain (de Jong et al. 2019), China, Israel (CABI 2020a), Afghanistan, United Arab Emirates, India, Republic of Korea, Japan, Morocco, Nepal, Pakistan, Saudi Arabia, Taiwan (Lason & Ghahari 2013) and USA (Discover Life 2019).	Present, NSW (ABRS 2020; Lawrence & Slipinski 2013; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Epuraea luteolus</i> is already present in parts of Australia and Christmas Island (Plant Health Australia 2020). Therefore, it is likely that similar climatic conditions and host plants exist in Western Australia to facilitate the establishment and spread of <i>E. luteolus</i> .	Yes. <i>Epuraea luteolus</i> is a generalist pest of several types of fresh, decomposing and dried fruit (Myers 2019), including date palm (Wakil, Faleiro & Miller 2015), pineapple, figs, cotton, apple, peach (PHA 2016b) and grapes (PaDIL 2020). Sap beetles can cause severe damage to ripened dates in the field and storage (Wakil, Faleiro & Miller 2015). <i>E. luteola</i> has also been found in bee colonies, living on pollen, and has the potential to cause damage to the colonies they invade (Krishnan et al. 2014). Therefore, <i>E. luteola</i> has the potential to cause negative economic and environmental consequences in Western Australia.	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p><i>Euchionellus zanzibaricus</i> (Belon, 1887)</p> <p>Synonym: <i>Metophthalmus albofasciatus</i> Reitter, 1891</p> <p>[Latridiidae]</p> <p>Minute brown scavenger beetle</p>	Afrotropical, Nearctic, Neotropical and Asian regions (de Jong et al. 2019), including Japan and Indonesia (Hagstrum & Subramanyam 2016).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Euchionellus zanzibaricus</i> is associated with stored plant products (Hagstrum & Subramanyam 2016) and occurs in damp areas with decomposing plant materials, herbaceous vegetation and animal nests (Majka, Langor & Rucker 2009). This beetle is distributed in Asian and Afrotropical regions (de Jong et al. 2019) where climatic conditions are similar to parts of Australia. Therefore <i>E. zanzibaricus</i> has the potential to establish and spread in Australia.	Yes. Latridiid beetles are associated with leaf litter and dead, wilting vegetation, fungi and animal nests (Majka, Langor & Rucker 2009). <i>Euchionellus zanzibaricus</i> is also a stored product pest (Hagstrum & Subramanyam 2016), which can become an issue for stored products for export from Australia. Therefore, <i>E. zanzibaricus</i> has the potential to cause negative economic or environmental consequences in Australia.	Yes
<p><i>Eucossonus comptus</i> Broun, 1886</p> <p>[Curculionidae]</p>	New Zealand (Guthrie 2008; MacFarlane et al. 2010).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Eucossonus comptus</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Eucossonus comptus</i> is polyphagous, known to feed on <i>Cordyline</i> spp. (Guthrie 2008) which are present in Australia (APNI 2020). This weevil is distributed in New Zealand (Guthrie 2008) where climatic conditions are similar to parts of Australia. Therefore, <i>E. comptus</i> has the potential to establish and spread in Australia.	Yes. <i>Eucossonus comptus</i> is polyphagous and known to feed on <i>Cordyline</i> spp. which are economically important ornamental (Thomas & Gollnow 2013) and naturalised plants present throughout Australia (APNI 2020). Therefore, <i>E. comptus</i> has the potential to cause economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Eucossonus setiger</i> (Sharp, 1878) [Curculionidae]	New Zealand (Marra 2003a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Eucossonus setiger</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Eucossonus setiger</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008; Kuschel 1990; Marra 2003a), which are present throughout Australia (APNI 2020). The weevil is endemic to New Zealand (Marra 2003a) where climatic conditions are similar to parts of Australia. Therefore, <i>E. setiger</i> has the potential to establish and spread in Australia.	Yes. <i>Eucossonus setiger</i> is known to feed on <i>Cordyline</i> spp. (Marra 2003a), which are ornamental (Thomas & Gollnow 2013) and naturalised plants present throughout Australia (APNI 2020). Therefore, <i>E. setiger</i> has the potential to cause economic consequences in Australia.	Yes
<i>Euphoria sepulcralis</i> (Fabricius, 1801) [Scarabaeidae] Dark flower scarab, flower beetle	USA (Woodruff 2006) and Mexico (Orozco 2012).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Euphoria sepulcralis</i> is associated with <i>Rosa</i> and <i>Helianthus</i> spp. (Ali et al. 2016; Thomas 2007; Woodruff 2006).	Yes. <i>Euphoria sepulcralis</i> is polyphagous, known to attack <i>Rosa</i> , <i>Malus</i> , <i>Brassica</i> , <i>Capsicum</i> , <i>Cattleya</i> , <i>Citrus</i> , <i>Dahlia</i> , <i>Ginkgo</i> , <i>Dendrobium</i> , <i>Ficus</i> , <i>Helianthus</i> , <i>Hibiscus</i> , <i>Hypericum</i> , <i>Lantana</i> , <i>Mangifera</i> , <i>Phaseolus</i> , <i>Prunus</i> , <i>Philodendron</i> , <i>Pinus</i> , <i>Pyrus</i> , <i>Quercus</i> , <i>Solanum</i> and <i>Zea</i> spp. (Thomas 2007), which are all present throughout Australia (APNI 2020). The beetle is distributed in USA, Mexico and the Bahamas (Thomas 2007),	Yes. <i>Euphoria sepulcralis</i> is associated with <i>Rosa</i> spp., sunflowers, apple, capsicum, dahlia, orchids, mango, pines, oaks, corn cobs, ripening fruit, fruit trees in bloom, and <i>Prunus</i> , <i>Solanum</i> , <i>Citrus</i> and <i>Brassica</i> spp. (Thomas 2007), which are all economically important and naturalised plants in Australia (Horticulture Innovation Australia 2019c). Heavy feeding on flowers leads to reduced fruit production and grain damage. In addition other	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				regions where climatic conditions are similar to parts of Australia. Therefore, <i>E. sepulcralis</i> has the potential to establish and spread in Australia.	<i>Euphoria</i> species are recorded feeding on honey and boring into bee hives (Thomas 2007; Woodruff 2006). Therefore, <i>E. sepulcralis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Eutassa comata</i> (Broun, 1909) Synonym: <i>Tanysona comatum</i> (Broun, 1886) [Curculionidae]	New Zealand (Kuschel 1990; May 1987).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Eutassa comata</i> is associated with foliage of <i>Cordyline</i> spp. (Guthrie 2008; Kuschel 1990).	Yes. <i>Eutassa comata</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008; Kuschel 1990), which are present throughout Australia (APNI 2020). The species is distributed in New Zealand (May 1987), where climatic conditions are similar to parts of Australia. Therefore, <i>E. comata</i> has the potential to establish and spread in Australia.	Yes. <i>Eutassa comata</i> is associated with <i>Cordyline</i> flower stems (Kuschel 1990; May 1987). This weevil is an important wood boring pest (Kuschel 1990). <i>Cordyline</i> spp. are naturalised and economically important ornamental plants in Australia (Thomas & Gollnow 2013). Therefore, <i>E. comata</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Euwallacea similis</i> (Ferrari, 1867) Synonym: <i>Wallacellus similis</i> (Ferrari, 1867),	Cambodia, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Nepal, Kenya, Pakistan, Singapore, Taiwan, Sri Lanka,	Present, Qld and NSW (ABRS 2020; Plant Health Australia 2020; Pullen, Jennings & Oberprieler 2014).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Xyleborus similis</i> Ferrari, 1867 [Curculionidae]	Thailand, Vietnam, Egypt, Mauritius, South Africa, Republic of Tanzania, Kiribati, USA, Marshall Islands, New Caledonia, Fiji, Papua New Guinea and Samoa (CABI 2020b).					
<i>Exophthalmus jekelianus</i> (White, 1858) [Curculionidae] Costa Rican weevil	Central America, Caribbean (Franz 2012), Colombia and Panama (EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Exophthalmus jekelianus</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Exophthalmus jekelianus</i> is polyphagous, associated with <i>Coffea</i> (Henderson & Roitberg 2006), <i>Cedrela</i> (Wright et al. 2003), <i>Ficus</i> (EPPO 2020) and <i>Dracaena</i> spp. (USDA 2011), which are present throughout Australia (APNI 2020). The weevil is distributed in Central America, the Caribbean and Colombia (EPPO 2020), areas with similar climatic conditions to parts of Australia. Therefore, <i>E. jekelianus</i> has the potential to establish and spread in Australia.	Yes. <i>Exophthalmus jekelianus</i> causes economic damage to coffee plants through defoliation (EPPO 2020; Henderson & Roitberg 2006). The weevil is likely to be polyphagous on other crops plants (EPPO 2020). In Costa Rica, <i>E. jekelianus</i> has been observed feeding on leaves of the economically important Spanish cedar tree (<i>Cedrela odorata</i>) (Wright et al. 2003), a species present in Australia (CABI 2020b). Therefore, <i>E. jekelianus</i> has the potential to cause negative economic or environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p><i>Glycyphana malayensis</i> (Guérin Méneville, 1840)</p> <p>Synonym: <i>Glycyphana (Macroglycyphana) malayensis</i> (Guérin Méneville, 1840), <i>Cetonia malayana</i> Schaum, 1844</p> <p>[Scarabaeidae]</p> <p>Rose chafer</p>	Indonesia, Malaysia and Thailand (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	<p>Yes. <i>Glycyphana</i> spp. are associated with flowers of 16 host plants from 6 families including Myrtaceae, Asteraceae, Caprifoliaceae, Combretaceae, Pittosporaceae and Euphorbiaceae (Ramage 2015) which produce high levels of nectar and pollen (Biosecurity Australia 2009c; Hawkeswood 2002). Other <i>Glycyphana</i> spp. are present in parts of Australia (ABRS 2020; Bacchus 1974), suggesting suitable habitats are present for <i>G. malayensis</i>. Therefore, <i>G. malayensis</i> has the potential to establish and spread in Australia.</p>	<p>Yes. Scarab beetles feed on all angiosperm parts, including roots, leaves, flowers and plant sap from wounds and fruit (Scholtz & Grebennikov 2016). <i>Glycyphana</i> spp. have been observed feeding on flowers from multiple plant families (Ramage 2015). <i>Glycyphana horsfieldii</i> has been found on the foliage of cultivated guava in Thailand (Hawkeswood, Sommung & Sommung 2018). Therefore, <i>G. malayensis</i> has the potential to cause negative economic and environmental consequences in Australia.</p>	Yes
<p><i>Gonocephalum simplex</i> (Fabricius, 1801)</p> <p>Synonym: <i>Dasus simplex</i> (Fabricius)</p> <p>[Tenebrionidae]</p> <p>Dusty brown beetle</p>	Kenya (Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), South Africa (GBIF Secretariat 2017), Tanzania, Uganda and Zimbabwe (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	<p>Yes. <i>Gonocephalum simplex</i> is associated with <i>Helianthus</i> (Khaemba & Mutinga 1982), <i>Zea</i>, <i>Gossypium</i>, Tobacco, <i>Phaseolus</i> spp., <i>Coffea</i> spp., legumes, solanaceous and other food crops (Gentry 1965), which are present</p>	<p>Yes. <i>Gonocephalum simplex</i> is a pest of sunflowers, corn, cotton, beans, coffee, legumes and solanaceous crops (Gentry 1965; Khaemba & Mutinga 1982), which are economically important plants to Australia (Horticulture</p>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				throughout Australia (APNI 2020). The beetle is distributed in African regions where climatic conditions are similar to Australia. Therefore, <i>G. simplex</i> has the potential to establish and spread in Australia.	Innovation Australia 2019c). Adults feed on roots and stems, causing damage to seedlings by girdling or cutting through them, making <i>G. simplex</i> a serious seedling pest of sunflowers in Kenya (Khaemba & Mutinga 1982). They are considered a seedling pest of many crops (Gentry 1965), and a major pest of coffee and <i>Oryza sativa</i> (EPPO 2020). Therefore, <i>G. simplex</i> have the potential to cause negative economic and environmental consequences in Australia.	
<i>Harmonia axyridis</i> (Pallas, 1773) [Coccinellidae] Multi coloured Asian lady beetle, harlequin ladybird	Kenya (Letter from KEPHIS on 29/01/2018), China, Japan, Republic of Korea, Taiwan, Egypt, Kenya, South Africa, Spain, Tanzania, Mexico, Argentina, Chile, Colombia, Peru, Greece, the Netherlands, Portugal, Switzerland, Belgium, France, Italy,	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Harmonia axyridis</i> is associated with <i>Lilium</i> spp. (PHA 2016a). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (AQIS 2002; Biosecurity Australia 2011a, b; DAFF 2013d; Department of Agriculture 2014b). <i>Harmonia axyridis</i> has demonstrated its ability to spread rapidly in Europe, Africa and the Americas (Brown et al.	Yes. Previously assessed by the department (AQIS 2002; Biosecurity Australia 2011a, b; DAFF 2013d; Department of Agriculture 2014b). If <i>Harmonia axyridis</i> are present in harvested grapes they release chemicals that alter the taste of the juice and wine	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	USA, UK (Brown et al. 2011; CABI 2020a; de Jong et al. 2019) and New Zealand (Martin 2018c).			2011; DAFF 2013d). The species is known as a predator of aphids and other soft bodied insects and also feeds on pollen, nectar, apple and pear fruit (Koch 2003). The ladybird can be imported and moved over long distances on cut flowers as well as other traded commodities including fruit (Koch 2003). Adults are known to fly long distances (Martin 2018c). Therefore, <i>H. axyridis</i> has the potential to establish and spread in Australia.	(Martin 2018c), known as 'ladybug taint' in wines (Brown et al. 2011). This may limit or restrict access of such goods into overseas markets and require additional measures to be undertaken. The beetles can also aggregate and infest buildings (Aristizábal & Arthurs 2018; DAFF 2013d; Huelsman et al. 2010). Additionally, <i>H. axyridis</i> is primarily a predator of aphids, scales and other insects and is often used as a BCA, however prey scarcity leads to feeding on fruit crops such as apple, pear and grapes which affects taste and quality of fruits (Martin 2018c). Therefore, <i>H. axyridis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Harmonia conformis</i> (Boisduval, 1835)	Egypt, USA and New Zealand (CABI 2020a).	Present, NSW, Tas., Qld, Vic., WA, ACT and SA (ABRS 2020; Government	Species intercepted at Australian points of entry on cut flower and foliage	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Synonym: <i>Harmonia conformis</i> (Boisduval, 1835), <i>Leis conformis occidentalis</i> (Lea, A.M. 1902)</p> <p>[Coccinellidae]</p> <p>Common spotted ladybird</p>		of Western Australia 2020; Plant Health Australia 2020).	consignments (unpublished).			
<p><i>Hippodamia convergens</i> Guérin Méneville, 1842</p> <p>[Coccinellidae]</p>	Kenya (Letter from KEPHIS on 29/01/2018), China, Pakistan, Philippines, South Africa, USA, Mexico, Argentina, Chile, Colombia, Ecuador, Peru, France, Italy and New Zealand (CABI 2020a).	<p>No record found (ABRS 2020; PaDIL 2020; Plant Health Australia 2020).</p> <p>Note: CABI (2020b) record of pest presence in Australia is incorrect according to Australian records and literature.</p>	<i>Hippodamia convergens</i> has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (DAFF 2003). <i>Hippodamia convergens</i> is an important natural enemy of aphids, scales, thrips, and other soft-bodied insects and it will also feed on pollen and nectar from flowers when prey is scarce (Aristizábal & Arthurs 2018). Suitable prey species are abundant throughout Australia. Adults of <i>Hippodamia convergens</i> can overwinter. Adults are active fliers and larvae may be dispersed on infested fruit or trusses (DAFF 2003). Therefore, <i>H. convergens</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (DAFF 2003). The ladybug beetle may have an effect on arthropod fauna at the national level (DAFF 2003). Additionally, they are used for the biological control of aphid pests (PaDIL 2020). Therefore, <i>H. convergens</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Hippodamia septemmaculata</i> (De Geer, 1775) Synonym: <i>Hippodamia (Hemisphaerica) septemmaculata</i> DeGeer, 1775 [Coccinellidae]	Belgium, France and Italy (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Hippodamia septemmaculata</i> feeds on aphids and is associated with herbaceous plants (Honek et al. 2014). The lady beetle is distributed in Central Europe (de Jong et al. 2019). Australia has similar climatic conditions and numerous herbaceous plants. Therefore, <i>H. septemmaculata</i> has the potential to establish and spread in Australia.	Yes. <i>Hippodamia septemmaculata</i> is a predatory arthropod of aphids and is often found on herbaceous host plants (Honek et al. 2014). <i>Hippodamia</i> spp. use pollen or nectar to supplement nutrition when prey is scarce (Bertolaccini, Núñez-Pérez & Tizado 2008). Therefore <i>H. septemmaculata</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Hippodamia variegata</i> (Goeze, 1777) [Coccinellidae]	UK, Belgium, France, USA, South Africa, Italy (GBIF Secretariat 2017), China, India, Iran, Republic of Korea, Lebanon, Pakistan, Saudi Arabia, Ethiopia, South Africa, Zimbabwe, Chile and Portugal (CABI 2020a).	Present, WA, SA, Vic., NSW, ACT, Qld, NT and Tas. (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Homalorynchites hungaricus</i> Fussly [Attelabidae] Rose curculio	Bulgaria (Margina et al. 1999).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Homalorynchites hungaricus</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Homalorynchites hungaricus</i> is associated with <i>Rosa</i> spp. (Chalova, Manolov & Manolova 2017; Margina et al. 1999) which are present throughout Australia	Yes. <i>Homalorynchites hungaricus</i> is a destructive pest of roses (Margina et al. 1999) which are economically important ornamental and naturalised plants in	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				(APNI 2020). The beetle is distributed in Bulgaria (Margina et al. 1999) where climatic conditions are similar to parts of Australia. Therefore, <i>H. hungaricus</i> has the potential to establish and spread in Australia.	Australia (Flowers Australia 2019). The beetles feed on foliage and flower buds. In Bulgaria, buds were most severely damaged during bud formation, and the damage causes browning (Margina et al. 1999), consequently affecting the appearance of the flowers. Therefore <i>H. hungaricus</i> has the potential to cause negative economic consequences in Australia.	
<i>Lasioderma serricorne</i> (Fabricius, 1792) [Anobiidae] Cigarette beetle, cigar beetle, tobacco beetle	Cosmopolitan (PaDIL 2020), including Portugal, Peru, UK, France, Mexico, Belgium, Italy, China, India, Indonesia, Israel, Japan, Republic of Korea, USA, Malaysia, Pakistan, Egypt, Saudi Arabia, Philippines, Singapore, Taiwan, Thailand, Ethiopia, Spain, Greece, Papua New Guinea, Zimbabwe, Tanzania and Argentina (CABI 2020a).	Present, widespread (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Lema bilineata</i> Germar, 1824	South Africa (Stevens et al. 2010), Spain, Argentina, Zimbabwe	Present (ABRS 2020; Lawrence & Slipinski 2013; PaDIL 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Synonym: <i>Lema</i> (<i>Quasilema</i>) <i>bilineata</i> Germar, 1824 [Chrysomelidae] Tobacco slug beetle	(CABI 2020a) and Italy (EPPO 2020).		consignments (unpublished).			
<i>Lema pectoralis</i> Baly, 1865 [Chrysomelidae] Orchid lema, yellow orchid beetle	Southeast Asia (Reid 2016), including Singapore, Philippines, Thailand and Malaysia (Beenen & Roques 2010; CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lema pectoralis</i> is associated with foliage and flowers of <i>Phalaenopsis</i> , <i>Vanda</i> , <i>Oncidium</i> and <i>Dendrobium</i> spp. (MPI 2017; PHA 2016a).	Yes. <i>Lema pectoralis</i> is a pest of <i>Phalaenopsis</i> , <i>Vanda</i> , <i>Oncidium</i> and <i>Dendrobium</i> spp. orchids (MPI 2017; PHA 2016a) which are present throughout Australia (APNI 2020). The beetle is present in Southeast Asia (Beenen & Roques 2010; Reid 2016) where climates are similar to parts of Australia. Therefore, <i>L. pectoralis</i> has the potential to establish and spread in Australia.	Yes. <i>Lema pectoralis</i> larvae and adults feed on flowers and foliage of multiple orchid species (Beenen & Roques 2010; Bieńkowski 2010) which are economically important ornamentals in Australia (Flowers Australia 2019; Thomas & Gollnow 2013). The beetle is a major pest of orchids in the Philippines (Beenen & Roques 2010), Malaysia and Thailand (Kumari & Lyla 2001). Therefore, <i>L. pectoralis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Lilioceris formosana</i> Heinze, 1943 Synonym: <i>Lilioceris neptis</i> subsp. <i>formosana</i> (Heinze), <i>Lilioceris</i>	Taiwan (GBIF Secretariat 2017; Warchalowski 2011)	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA	<i>Lilioceris formosana</i> is associated with foliage of <i>Lilium</i> , <i>Alstroemeria</i> and <i>Tulipa</i> spp. (DAFF 2013d; PHA 2016a).	Yes. Previously assessed by the department (DAFF 2013d). Some <i>Lilioceris</i> spp. have established in many countries after accidental introduction,	Yes. Previously assessed by the department (DAFF 2013d). Adults and larvae of <i>Lilioceris</i> spp. cause economic damage by attacking foliage and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>impressa</i> subsp. <i>loochooana</i> (Nakane) [Chrysomelidae]		(Government of Western Australia 2020).		indicating they are a potentially invasive species. The Australian climate is likely to be conducive for the spread of this pest (DAFF 2013d). Therefore, <i>L. formosana</i> has the potential to establish and spread in Australia.	flowers of many cultivated and native <i>Lilium</i> plant species and other hosts (Casagrande & Kenis 2004; Salisbury 2008). <i>Lilioceris formosana</i> are leaf feeders but their host plant association is not fully understood (DAFF 2013d). Therefore, <i>L. formosana</i> has the potential to cause negative economic consequences in Australia.	
<i>Lilioceris lili</i> (Scopoli, 1763) [Chrysomelidae] Scarlet lily beetle	China, Canada, Morocco, Spain, USA, Belgium, France, Greece, Italy, the Netherlands, Portugal, Switzerland, UK and Morocco (CABI 2020a, b; de Jong et al. 2019; Kenis et al. 2002; Salisbury 2008).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lilioceris lili</i> is associated with foliage of <i>Lilium</i> , <i>Iris</i> , <i>Alstroemeria</i> , and <i>Tulipa</i> spp. (PHA 2016a; Salisbury 2008).	Yes. <i>Lilioceris lili</i> is polyphagous on 23 genera, including <i>Lilium</i> , <i>Nomocharis</i> , <i>Iris</i> , <i>Alstroemeria</i> , <i>Cardiocrinum</i> , <i>Tulipa</i> , <i>Narcissus</i> , <i>Polygonatum</i> , <i>Smilax</i> , <i>Trillium</i> and <i>Solanum</i> (Casagrande & Kenis 2004; PHA 2016a; Salisbury 2008) all present in Australia (APNI 2020). The species is found in Asia, Europe, North America and North Africa (Salisbury 2008) where climatic conditions are similar to parts pf	Yes. <i>Lilioceris lili</i> adults and larvae feed on irises, tulips, lilies and <i>Solanum</i> spp. (Salisbury 2008), which are economically important ornamental and agricultural plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). Damage is caused by feeding on foliage and flowers of lilies and other hosts in North America, UK and Netherlands (Casagrande & Kenis 2004; Salisbury 2008). Severe damage	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Australia. The species has established in countries after being accidentally introduced (CABI 2020b; Kenis et al. 2002; Salisbury 2008), indicating its invasive capabilities. Therefore, <i>L. lili</i> has the potential to establish and spread in Australia.	has been recorded in parks and gardens in North America (Kenis et al. 2002). In lily fields and areas where it is invasive with no natural predators, <i>L. lili</i> is considered a major threat (Salisbury 2008). Therefore, <i>L. lili</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Lilioceris merdigera</i> (Linnaeus, 1758) Synonym: <i>Chrysomela merdigera</i> (Linnaeus, 1758) [Chrysomelidae] Shining leaf beetle, onion beetle, lily beetle	Belgium, France, Greece, Italy, Spain, Switzerland, the Netherlands (de Jong et al. 2019) and UK (Haye & Kenis 2004).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lilioceris merdigera</i> is associated with flowers and foliage of <i>Lilium</i> spp. (Haye & Kenis 2004; PHA 2016a).	Yes. <i>Lilioceris merdigera</i> is polyphagous on several genera in the family Liliaceae, including <i>Polygonatum</i> , <i>Allium</i> , <i>Convallaria</i> , and <i>Lilium</i> spp. (Haye & Kenis 2004), all present in Australia (APNI 2020). The species is found in Europe (Haye & Kenis 2004) where climatic conditions are similar to parts of Australia. Therefore, <i>L. merdigera</i> has the potential to establish and spread in Australia.	Yes. <i>Lilioceris merdigera</i> is known to feed on <i>Allium</i> and <i>Lilium</i> spp. (Haye & Kenis 2004), which are economically important plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). The beetle can cause up to 70% damage to leaves, and a 20%- 50% decrease in yield of infested onion crops (Luczak 1992). Therefore, <i>L. merdigera</i> has the potential to cause negative economic and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					environmental consequences in Australia	
<i>Lioadalia sexareata</i> Weise [Coccinellidae] Ladybird beetle	Kenya and Uganda (Merkl 1993).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Lioadalia sexareata</i> is known from parts of Africa (Merkl 1993) that have similar climates to parts of Australia. <i>Lioadalia</i> spp. are predators of other arthropods (Brown 1972). Ladybird beetles may supplement their normal prey in times of scarcity with other types of food, including flower nectar, water and honeydew excrete by insects such as aphids and whiteflies (Frank & Mizell 2014). With the availability of suitable climatic conditions and prey species, <i>L. sexareata</i> has the potential to establish and spread in Australia.	Yes. Members from the genus <i>Lioadalia</i> , such as <i>L. flavomaculata</i> , are predatory beetles (Brown 1972). Many species of ladybirds are predators of Hemiptera and or mites (Frank & Mizell 2014). With omnivorous feeding habits and association with plants of economic importance <i>L. sexareata</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Litargus balteatus</i> LeConte, 1856 Synonym: <i>Litargus (Alitargus) balteatus</i> LeConte, 1856 [Mycetophagidae]	France, Italy, Spain, Switzerland, the Netherlands (de Jong et al. 2019), New Zealand (Kuschel 1990), USA (Williams, Ellis & Fickle 1995), Portugal and UK (Gorham 1987).	Present, NSW, NT, ACT and Qld (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Litargus balteatus</i> is already present in parts of Australia (Plant Health Australia 2020). The beetle feeds on fungus (Lawrence, Pollock & Slipinski 2016; Winks, Fowler & Smith 2004)	Yes. <i>Litargus balteatus</i> is commonly found in stored products, such as corn and stored grain, where they feed on mould and decaying plant products (Gorham 1987; Lawrence, Pollock &	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
		(Government of Western Australia 2020).		and infests corn and stored grain products (Gorham 1987). Introduction into WA would lead to establishment and spread since it is likely to find suitable hosts on which to develop and reproduce.	Slipinski 2016). As a stored product pest, <i>L. balteatus</i> presents potential negative economic consequences for WA including for the export market.	
<i>Loberus depressus</i> (Sharp, 1876) [Erotylidae] Pleasing fungus beetle	New Zealand (Guthrie 2008; Kuschel 1990).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Loberus depressus</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008)	Yes. <i>Loberus depressus</i> is endemic to New Zealand (Leschen 2003), and is associated with <i>Cordyline</i> , <i>Phormium</i> and <i>Leptospermum</i> spp. (Guthrie 2008). Similar climatic zones and suitable hosts exist in Australia, therefore, <i>L. depressus</i> has the potential to establish and spread in Australia.	Yes. <i>Loberus depressus</i> is found on foliage of <i>Cordyline</i> plants (Guthrie 2008; Leschen 2003), which are economically important ornamental and naturalised plants in Australia (APNI 2020; Thomas & Gollnow 2013). The beetle is abundant on crowns with flowers (Guthrie 2008; Leschen 2003). Therefore <i>L. depressus</i> has the potential to cause negative economic or environmental consequences in Australia.	Yes
<i>Luperomorpha xanthodera</i> (Fairmaire, 1888) [Chrysomelidae]	China, Belgium, France, Italy, the Netherlands, Spain, Switzerland, UK (de Jong et al. 2019; EPPO 2020) and Republic of	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Luperomorpha xanthodera</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Luperomorpha xanthodera</i> is polyphagous and feeds on plants from 23 genera and 12 families (Kozłowski & Legutowska	Yes. <i>Luperomorpha xanthodera</i> is polyphagous, with hosts including citrus, hibiscus, oregano, hydrangea, silver sheen and rose	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Korea (Kozłowski & Legutowska 2014).			2014), including <i>Viburnum</i> , <i>Hypericum</i> , <i>Hibiscus</i> , <i>Eugenia</i> , <i>Ligustrum</i> , <i>Rosa</i> , <i>Pittosporum</i> , <i>Gardenia</i> , <i>Citrus</i> and <i>Hydrangea</i> spp. (EPPO 2012), which are all present in Australia (APNI 2020). The beetle is native to China and Korea (Bieńkowski & Orlova-Bienkowskaja 2018) and invasive in Europe having been primarily dispersed through the nursery stock trade (Kozłowski & Legutowska 2014). Therefore, with suitable climates and hosts, <i>L. xanthodera</i> has the potential to establish and spread in Australia.	(CABI 2020a; Kozłowski & Legutowska 2014), which are naturalised or economically important plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). Destruction to ornamental plants and flowers through chewing, producing holes in petals and destruction of reproduction organs reduces the value of economically important plants (Kozłowski & Legutowska 2014). Therefore, <i>L. xanthodera</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Lyctus brunneus</i> (Stephens, 1830) Synonym: <i>Xylotrogus brunneus</i> (Stephens, 1830), <i>Lyctus costatus</i> (Blackburn, 1887) [Bostrichidae] Brown powderpost beetle	Africa, Oceania, Europe, Asia and the US (PaDIL 2020), including Belgium, France, Greece, Italy, Portugal, Spain, Switzerland and the Netherlands (de Jong et al. 2019).	Present, widespread (PaDIL 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p><i>Macrodactylus subspinosus</i> (Fabricius, 1775)</p> <p>Synonym: <i>Melolontha elongata</i> (Herbst, 1790), <i>Macrodactylus angustatus</i> (LeConte, 1856), <i>Macrodactylus polyphagus</i> (Burmeister, 1855), <i>Macrodactylus barbatus</i> (Fitch, 1863)</p> <p>[Scarabaeidae]</p> <p>Rose chafer</p>	USA (McLeod & Williams 1990) and Mexico (GBIF Secretariat 2017).	<p>No record found (ABRS 2020; Plant Health Australia 2020).</p> <p>Declared pest, prohibited entry into WA (Government of Western Australia 2020).</p>	<i>Macrodactylus subspinosus</i> is associated with flowers and foliage of <i>Rosa</i> spp. and other ornamentals (Ali et al. 2016; PHA 2016a; Williams et al. 2000).	<p>Yes. <i>Macrodactylus subspinosus</i> is polyphagous and known to feed on <i>Vitis</i>, <i>Fragaria</i>, <i>Prunus</i>, <i>Malus</i>, <i>Rubus</i>, <i>Zea</i>, <i>Phaseolus</i>, <i>Capsicum</i>, <i>Brassica</i> and <i>Peony</i> spp. and many more plants, trees and shrubs (McLeod & Williams 1990), which are present throughout Australia (APNI 2020). The species is distributed in the USA and Mexico. Therefore, with suitable climates and hosts, <i>M. subspinosus</i> has the potential to establish and spread in Australia.</p>	<p>Yes. <i>Macrodactylus subspinosus</i> attacks flowers, buds, fruit and foliage of apple, rose, grapevine, strawberry, cherry, peach, raspberry, corn, pepper, and cabbage (McLeod & Williams 1990; PHA 2016a), which are all economically important or naturalised plants in Australia (Horticulture Innovation Australia 2019c). The beetle is a serious pest of flowers, ornamentals and fruit crops in north eastern USA (Williams et al. 2000). Feeding damage causes considerable damage to all plant parts and, in severe cases, can lead to defoliation and ultimately tree mortality (McLeod & Williams 1990). Therefore, <i>M. subspinosus</i> has the potential to cause negative economic and environmental consequences in Australia</p>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Macroscytalus parvicornis</i> (Sharp, 1878) Synonym: <i>Rhinanusus parvicornis</i> (Sharp, 1878) [Curculionidae] Cossonine weevil	New Zealand (Watts et al. 2014).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Macroscytalus parvicornis</i> is associated with <i>Cordyline</i> spp. (May 1987).	Yes. <i>Macroscytalus parvicornis</i> is endemic to New Zealand (Watts et al. 2014), where similar climatic conditions to parts of Australia exist. The weevil is associated with <i>Cordyline</i> , <i>Eutassa</i> and <i>Eucossonus</i> spp. (May 1987), which are present in Australia (APNI 2020). Therefore, <i>M. parvicornis</i> has the potential to establish and spread in Australia.	Yes. <i>Macroscytalus parvicornis</i> is phytophagous and is known to occur on <i>Cordyline</i> spp. and tree ferns (Kuschel 1990; May 1987) which are ornamental and naturalised plants in Australia. The weevil becomes abundant in favoured habitats, especially on tree ferns (Marra 2003b). Therefore, <i>M. parvicornis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Meligethes aeneus</i> Fabricius, 1775 [Nitidulidae] Common pollen Beetle	China, Italy, France, Germany, Netherlands, Spain, UK, Greece, Canada and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Meligethes aeneus</i> is associated with predominantly yellow cut flower types (CABI 2020a).	Yes. <i>Meligethes aeneus</i> is a pest of <i>Brassica</i> and <i>Sinapis</i> spp., however when unavailable will feed on a wide range of plant hosts with predominantly yellow flowers (CABI 2020a), plants which are present in Australia (APNI 2020). The beetle is distributed throughout Europe, Asia and North America (CABI 2020a), where climatic	Yes. <i>Meligethes aeneus</i> is highly polyphagous. The beetle feeds primarily on <i>Brassica</i> and <i>Sinapis</i> spp., however when unavailable will feed on a wide range of plant hosts with predominantly yellow flowers (CABI 2020a). Many plant hosts are economically important, endemic or naturalised plants in Australia (APNI 2020;	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				conditions are similar to parts of Australia. Therefore, <i>M. aeneus</i> has the potential to establish and spread in Australia.	Horticulture Innovation Australia 2019c). <i>Meligethes aeneus</i> adults feed on the pollen of host plants and oviposit eggs within developing flowers, damaging flower and seed development (CABI 2020a). Therefore, <i>M. aeneus</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Melolontha melolontha</i> (Linnaeus, 1758) [Scarabaeidae] June beetle	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland (de Jong et al. 2019), the Netherlands, UK (EPPO 2020), China and India (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Melolontha melolontha</i> is associated with cut flowers and foliage (Ali et al. 2016).	Yes. <i>Melolontha melolontha</i> is highly polyphagous and is known to feed on forest trees such as <i>Quercus</i> , <i>Fagus</i> , <i>Acer</i> , <i>Aesculus</i> , <i>Juglans</i> , <i>Zea</i> , <i>Prunus</i> and <i>Solanum</i> spp., other cereals, grasses and fruits (Dai 1965; INRA 2021), all of which are present throughout Australia (APNI 2020). The beetle is distributed throughout Europe and present in Asia (Dai 1965; Enkerli et al. 2008) where climatic conditions are similar to parts of Australia.	Yes. <i>Melolontha melolontha</i> is a pest of cherry, plum, potato, corn, walnut, hazelnut, fir, maple, beech, pine, oak, willow and pasture crops (INRA 2021; Plant Health Australia Ltd 2016), all economically important or naturalised plants in Australia (Horticulture Innovation Australia 2019c). The beetle is an important pest in forestry, agriculture, horticulture and viticulture (Dai 1965; PaDIL 2020). Larvae and adults feed on roots,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Therefore, <i>M. melolontha</i> has the potential to establish and spread in Australia.	stems, leaves, and fruit and vegetables, and can completely destroy young <i>Vitis</i> vines and tubers (Enkerli et al. 2008; INRA 2021). Therefore, <i>M. melolontha</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Merhynchites bicolor</i> (Fabricius, 1775) Synonym: <i>Rhynchites bicolor</i> [Attelabidae] Rose curculio	USA (Dickerson 1910; Pierce 1909).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Merhynchites bicolor</i> is associated with <i>Rosa</i> spp. (Stroom, Fetzter & Krischik 1997).	Yes. <i>Merhynchites bicolor</i> is associated with <i>Rosa</i> (Hamilton & Kuritsky 1981), <i>Rubus</i> spp. (MAF 2011), and <i>Camellia</i> spp. (Hoerner 1927) which are present throughout Australia (APNI 2020). The species is present in USA (Pierce 1909) where climatic conditions are similar to parts of Australia. Therefore, <i>M. bicolor</i> has potential to establish and spread in Australia.	Yes. <i>Merhynchites bicolor</i> is destructive to both wild and cultivated roses and raspberry in the USA (Hoerner 1927), which are also economically important and naturalised plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). Adults feed on developing rose buds and foliage (Stroom, Fetzter & Krischik 1997), and oviposit into the hypanthium (Hamilton & Kuritsky 1981). Internal bud feeding by hatched larvae creates a perforated look on petals when they bloom	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					(Hoerner 1927). Ten to almost 100% damage has been observed in large clumps of rose bushes (Hoerner 1927). Therefore, <i>M. bicolor</i> has the potential to cause economic consequences in Australia.	
<i>Micropodabrus cochleata</i> (Wittmer, 1978) Synonym: <i>Kandyosilis cochleata</i> (Wittmer, 1978), <i>Mimopodabrus cochleata</i> (Wittmer, 1978) [Cantharidae]	Vietnam (Wittmer 1978).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Micropodabrus cochleata</i> is associated with foliage and flowers of <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Micropodabrus cochleata</i> is associated with <i>Dracaena</i> spp. (MPI 2016) which are present throughout Australia (APNI 2020). Cantharid beetles are predacious but also feed on pollen, nectar and fresh foliage (Lawrence & Britton 1994). The beetle is found in Vietnam where climatic conditions are similar to parts of Australia. Therefore, <i>M. cochleata</i> has the potential to establish and spread in Australia.	Yes. <i>Micropodabrus cochleata</i> are associated with <i>Dracaena</i> blossoms (Wittmer 1978) which are ornamentals in Australia (Horticulture Innovation Australia 2019c). Larvae dwell in the soil and leaf litter where they are general predators on small arthropods (ABRS 2020). Therefore, <i>M. cochleata</i> has the potential to cause negative environmental consequences in Australia.	Yes
<i>Monanus concinnulus</i> (Walker, 1858) [Silvanidae] Silvanid flat bark beetle	Sri Lanka and Thailand (Discover Life 2019).	Not present, <i>Monanus concinnulus</i> is listed as present in ABRS (2020), however is considered absent due to the unreliability of records.	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Silvanid flat bark beetles live under the bark of dead trees, where they fed on fungi (Yoshida & Hirowatari 2014). <i>Monanus concinnulus</i> is present in	Yes. There is limited information regarding <i>Monanus concinnulus</i> . However, silvanid beetles are often fungivorous and can also be stored products pests (Yoshida	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Sri Lanka, Thailand (Discover Life 2019), Mexico, Nicaragua and Puerto Rico (Thomas 1993) where climatic conditions are similar to parts of Australia. Therefore, <i>M. concinnulus</i> has potential to establish and spread in Australia.	& Hirowatari 2014). <i>Oryzaephilus surinamensis</i> which is already established in parts of Australia is a well-known storage pest from the same family (ABRS 2019; Plant Health Australia 2019). Therefore, <i>M. concinnulus</i> has the potential to cause negative economic consequences in Australia.	
<i>Mycetophagus quadriguttas</i> (Müller, 1821) [Mycetophagidae]	Belgium, France, Greece, Italy, Spain, Switzerland, the Netherlands (de Jong et al. 2019), UK (GBIF Secretariat 2017) and USA (King, Bain & Dussault 2013).	Present (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Naupactus cervinus</i> Boheman, 1840 Synonym: <i>Asynonychus cervinus</i> (Boheman, 1840), <i>Naupactus godmanni</i> (Crotch, 1867), <i>Pantomorus cervinus</i> (Boheman, 1840) [Curculionidae] Fuller's rose beetle	A cosmopolitan species (Logan et al. 2008) present in France, Italy, Portugal, Spain (de Jong et al. 2019), USA (Gyeltshen & Hodges 2016), Mexico, Argentina (Elgueta & Marvaldi 2006), New Zealand (Kuschel 1990), Chile, Egypt, Japan, Morocco, Peru and South Africa (CABI 2020b).	Present, Vic., WA, SA, Qld, NSW, ACT, Tas. and WA (ABRS 2020; Plant Health Australia 2020; Poole 2010).	<i>Naupactus cervinus</i> is associated with foliage of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Necrobia rufipes</i> (DeGeer, 1775) [Cleridae] Red legged ham beetle	China, Indonesia, India, Saudi Arabia, Singapore, Thailand, Egypt, USA (CABI 2020a), Portugal, France and UK (GBIF Secretariat 2017).	Present, Vic., WA, SA, Qld, NSW, ACT, Tas. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Nematocerus castaneipennis</i> (Hustache, 1921) [Curculionidae]	Tanzania and East Africa (Schabel 2006).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Nematocerus castaneipennis</i> is polyphagous, associated with <i>Acacia</i> and <i>Eucalyptus</i> spp. (Schabel 2006) which are widespread in Australia (APNI 2020). The weevil is found in East Africa (Schabel 2006) where climatic conditions are similar in parts of Australia. Therefore, <i>N. castaneipennis</i> has the potential to establish and spread in Australia.	Yes. <i>Nematocerus castaneipennis</i> is known as a minor pest of several agricultural crops and trees, including acacias, <i>Cassia</i> , citrus, eucalyptus and rubber trees (Schabel 2006). The weevil is known to reduce yields by damaging leaves, flowers, stems and pods in host plants (Kankwatsa & Muzira 2018). Therefore, <i>N. castaneipennis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Novitas dispar</i> Broun, 1893 [Curculionidae]	New Zealand (Broun 1893; Kuschel 1990).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Novitas dispar</i> is associated with <i>Cordyline</i> spp. (May 1987).	Yes. <i>Novitas dispar</i> is associated with <i>Phormium</i> and <i>Cordyline</i> spp. (May 1987) which are present throughout Australia (APNI 2020). The weevil is distributed in New Zealand where	Yes. <i>Novitas dispar</i> is associated with <i>Phormium tenax</i> and <i>P. cookianum</i> (Kuschel 1990; May 1987) and is commonly found in bushes and gardens (Kuschel 1990).	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				climatic conditions are similar to part of Australia. Therefore, <i>N. dispar</i> has the potential to establish and spread in Australia.	Therefore, <i>N. dispar</i> has the potential to cause negative environmental consequences in Australia.	
<i>Omonadus floralis</i> (Linnaeus, 1758) Synonym: <i>Anthicus floralis</i> (Linnaeus, 1758) [Anthicidae] Narrow neck grain beetle	Cosmopolitan distribution across Central and South America, Europe, North Asia and USA (PaDIL 2020), including Ecuador (Peck et al. 1998), Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (de Jong et al. 2019) and New Zealand (MacFarlane et al. 2010).	Present, Tas. (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Omonadus floralis</i> is already present in parts of Australia (Plant Health Australia 2020). This species infests stored products (Hemp & Dettner 2003; Peck et al. 1998). Introduction into Western Australia could lead to establishment and spread since the beetle is likely to find suitable hosts on which to develop and reproduce.	Yes. <i>Omonadus floralis</i> is a stored products pest (Peck et al. 1998), often found in saw dust and fish food (Hemp & Dettner 2003). Therefore, <i>O. floralis</i> infestation of stored products has the potential to cause negative economic consequences in Western Australia.	Yes (WA)
<i>Omophoita cyanipennis</i> (Fabricius, 1798) Synonym: <i>Homophoeta cyanipennis</i> var. <i>octomaculata</i> (Crotch, 1873), <i>Omophoita cyanipennis octomaculata</i> (Crotch, 1873) [Chrysomelidae] Eight spotted flea beetle	Mexico and USA (Quinn 2011).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Omophoita cyanipennis</i> is associated with <i>Lavandula</i> and <i>Helianthus</i> spp. (Clark et al. 2004).	Yes. <i>Omophoita cyanipennis</i> is polyphagous and is known to feed on <i>Brassica</i> , <i>Beta</i> , <i>Citrullus</i> , <i>Medicago</i> , <i>Pisum</i> , <i>Vigna</i> , <i>Lavandula</i> , <i>Zea</i> , <i>Solanum</i> and <i>Helianthus</i> spp. (Clark et al. 2004), which are present throughout Australia. The beetle is distributed in USA to Central America (Quinn 2011) where climatic	Yes. <i>Omophoita cyanipennis</i> is associated with several plant species of economic value in Australia, including cabbage, beet, watermelon, alfalfa, pea, lavender, corn, potato, mango, pineapple, fig, rice and lemon (Clark et al. 2004). Adult leaf beetles consume foliage, pollen, or other floral parts, while larval feeding is	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				conditions are similar to Australia. Therefore, <i>O. cyanipennis</i> has the potential to establish and spread in Australia.	greatly varied (Clark et al. 2004). Therefore, <i>O. cyanipennis</i> has the potential to cause negative economic consequences in Australia.	
<i>Orchidophilus aterrimus</i> (Waterhouse, 1874) Synonym: <i>Baridius aterrimus</i> (Waterhouse, C.O. 1874), <i>Acythopeus aterrimus</i> (Waterhouse, 1874) [Curculionidae] Orchid weevil	South Asia including Singapore, Philippines, Thailand, Malaysia, Indonesia and Japan (CABI 2020a; PaDIL 2020; Swezey 1945).	Present, NT, Qld, NSW and SA (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020) and notifiable pest for NT (Department of Primary Industries and Resources 2018).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Orchidophilus aterrimus</i> is already present in parts of Australia (Plant Health Australia 2020) and is associated with orchid plants (Prena 2008). Introduction into Western Australia could lead to establishment and spread since the weevil is likely to find suitable hosts on which to develop and reproduce.	Yes. <i>Orchidophilus aterrimus</i> are associated with orchids which are important ornamental plants in Western Australia. Adults deposit eggs singly in holes made in stems, leaves, pseudobulbs and flowers, and both larvae and adults feed on all above ground plant parts of the host, with a preference for young growth (Prena 2008; Swezey 1945), consequently reducing the value of the plant. Therefore, <i>O. aterrimus</i> has the potential to cause negative economic consequences in Western Australia.	Yes (WA and NT)
<i>Orchidophilus peregrinator</i> Buchanan, 1935	Indonesia and Philippines (Prena 2008; Swezey 1945).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Orchidophilus peregrinator</i> is associated with flowers, stems, and foliage of <i>Oncidium</i> , <i>Dendrobium</i> , <i>Phalaenopsis</i>	Yes. <i>Orchidophilus peregrinator</i> is a polyphagous pest of several genera from the Orchidaceae and	Yes. <i>Orchidophilus peregrinator</i> is associated with several orchid species (Swezey 1945), including <i>Dendrobium</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Misspelling: <i>Orchidophilus perigrinator</i> (Buchanan, 1935)</p> <p>[Curculionidae]</p> <p>Lesser orchid weevil</p>			and <i>Vanda</i> spp. (Leonhardt & Sewake 1999; MPI 2017; Prena 2008; Tenbrink & Hara 1994).	Epidendroideae plant families, including <i>Vanda</i> , <i>Dendrobium</i> , <i>Phalaenopsis</i> , <i>Grammatophyllum</i> and <i>Oncidium</i> spp. (Leonhardt & Sewake 1999; MPI 2017; Prena 2008; Tenbrink & Hara 1994). The weevil is distributed in Southeast Asia (Prena 2008) where similar climates to parts of Australia exist. Therefore, <i>O. peregrinator</i> has the potential to establish and spread in Australia.	and <i>Phalaenopsis</i> (Prena 2008), which are important ornamental plants in Australia (Flowers Australia 2019). Damage is caused by feeding (Tenbrink & Hara 1994) which reduces the value of the plant. Therefore, <i>O. peregrinator</i> has the potential to cause negative economic consequences in Australia.	
<p><i>Orchidophilus ran</i> Morimoto, 1994</p> <p>[Curculionidae]</p> <p>Orchid weevil</p>	Philippines and Taiwan (Prena 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Orchidophilus ran</i> is associated with flowers, stems and foliage of <i>Dendrobium</i> and <i>Oncidium</i> spp. (Leonhardt & Sewake 1999; MPI 2017).	Yes. <i>Orchidophilus ran</i> is associated with several species from the Orchidaceae and Epidendroideae plant families, including <i>Oncidium</i> , <i>Cymbidium</i> , <i>Dendrobium</i> and <i>Phalaenopsis</i> spp. (Leonhardt & Sewake 1999; MPI 2017; Prena 2008), which are present throughout Australia (APNI 2020). It is known from the Philippines and Taiwan (Prena 2008), where climatic conditions	Yes. <i>Orchidophilus ran</i> , along with other members of its genus are known primarily as pests of orchids (Leonhardt & Sewake 1999) which are important ornamental plants in Australia (Flowers Australia 2019). <i>Orchidophilus ran</i> is a pest of concern in Japan and Korea (Prena 2008). <i>Orchidophilus</i> spp. damage host plants with their chewing mouthparts (Tenbrink & Hara 1994), consequently reducing	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				are similar to parts of Australia. The availability of host plants and suitable climatic conditions suggests <i>O. ran</i> pest has the potential to establish and spread in Australia.	the value of the plant. Therefore, <i>O. ran</i> has the potential to cause negative economic consequences in Australia.	
<i>Oryctes monoceros</i> (Olivier, 1789) Synonym: <i>Oryctes bluchaei</i> (Fairmaire, 1898), <i>Oryctes insularis</i> (Coquerel, 1852), <i>Scarabaeus monoceros</i> (Olivier, 1789) [Scarabaeidae] Coconut beetle	Kenya, Madagascar, Malawi, South Africa, United Republic of Tanzania, Uganda and Saudi Arabia (EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Oryctes monoceros</i> is associated with foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Oryctes monoceros</i> has a wide host range (CABI 2020a), including <i>Cocos</i> , <i>Phoenix</i> , <i>Cordyline</i> , <i>Saccharum</i> , <i>Musa</i> and <i>Dracaena</i> spp. (CABI 2020a; EPPO 2020; MPI 2016) which are present throughout Australia (APNI 2020). The beetle is distributed throughout Africa (EPPO 2020) where climatic conditions are similar to parts of Australia. Therefore, <i>O. monoceros</i> has the potential to establish and spread in Australia.	Yes. <i>Oryctes monoceros</i> is polyphagous, associated with plants, such as hemp, coconut, <i>Dracaena</i> , oil palm (<i>Elaeis guineensis</i>), banana, date palm and sugarcane (CABI 2020a), which are important ornamental or naturalised plants in Australia. The beetle is an important pest of coconut in East Africa and of palms in general (CABI 2020a). Adults bore through leaves and petioles, and may reach the growing point of seedlings and younger palms, resulting in plant death (CABI 2020a). Therefore, <i>O. monoceros</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Oryzaephilus surinamensis</i> (Linnaeus, 1758) Synonym: <i>Dermestes surinamensis</i> (Linnaeus, 1758) [Silvanidae] Sawtoothed grain beetle	Ethiopia (letter from MANR on 06/03/2018) France, UK, Portugal, (de Jong et al. 2019), Argentina, Belgium, Colombia, Cambodia, Chile, China, Egypt, Greece, Iran, India, Indonesia, Israel, Italy, Japan, Malawi, Madagascar, Malaysia, Mexico, Morocco, the Netherlands, Nepal, New Caledonia, Pakistan, Peru, Philippines, Republic of Korea, Saudi Arabia, South Africa, Singapore, Spain, Sri Lanka, Switzerland, Taiwan, Thailand, Vietnam, USA and Zimbabwe (CABI 2020a; Discover Life 2018).	Present, NT, NSW, Tas., Qld, Vic., ACT, SA and WA (ABRS 2020; Plant Health Australia 2020). Present in WA, but insecticide resistant forms are regulated as prohibited organisms under s.12 of the BAM Act 2007; and its entry into WA restricted under s.15(1) (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Oryzaephilus surinamensis</i> has already established in parts of Australia (ABRS 2020; Plant Health Australia 2020), suggesting suitable climatic conditions and host plants are available in Western Australia. Therefore, <i>P. cockerelli</i> has the potential to establish and spread in Western Australia.	Yes. Populations of the stored grain pest, <i>Oryzaephilus surinamensis</i> have developed strong resistance to phosphine (Collins 2009). As phosphine accounts for 80% of disinfection treatments in Australia, insecticide resistance stored grain pests such as <i>O. surinamensis</i> have the potential to cause negative economic consequences in Australia.	Yes (WA)
<i>Oxythyrea cinctella</i> (Schaum, 1841) [Scarabaeidae] Middle Eastern flower scarab	Eastern Mediterranean to south of the Caucasus and the Middle East (Vuts et al. 2012), including Greece, Afghanistan, Lebanon, Israel, Egypt, Iran and Pakistan (Gentry 1965; Kizub 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Oxythyrea cinctella</i> is polyphagous, feeding on rosaceous hosts and deciduous fruit trees, including <i>Rosa</i> , <i>Prunus</i> , <i>Cydonia</i> , <i>Papaver</i> , <i>Vitis</i> , <i>Malus</i> , <i>Triticum</i> and other cereal spp. (Gentry 1965; Vuts et al. 2012) all present throughout Australia (APNI 2020).	Yes. <i>Oxythyrea cinctella</i> is a pest of citrus, wheat, grape, quince, cucurbits, rose, apricot, almond and apple (Gentry 1965; Vuts et al. 2012) which are important ornamental and agricultural crops in Australia (Flowers Australia 2019; Horticulture Innovation	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				The species is distributed throughout the Palearctic region (Kizub 2013) where climatic conditions are similar to parts of Australia. Therefore, <i>O. cinctella</i> has the potential to establish and spread in Australia.	Australia 2019c). In Iran, <i>O. cinctella</i> has caused medium to severe damage, and in Pakistan the beetle is considered a minor pest (Gentry 1965). The beetle feeds on the reproductive parts of host plants, such as buds and flowers, which renders them infertile (Vuts et al. 2012). Damage to fruit plants would affect yield and affect the appearance of ornamental plants. Therefore, <i>O. cinctella</i> has the potential to cause negative economic consequences in Australia.	
<i>Oxythyrea funesta</i> (Poda, 1761) [Scarabaeidae] Mediterranean spotted chafer, white spotted rose beetle	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (de Jong et al. 2019), Iran and Morocco (ITIS 2018a).	No record found (ABRS 2020; Plant Health Australia 2020)	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Oxythyrea funesta</i> is polyphagous, and known to feed on host plants from the families Asteraceae, Rosaceae, Apiaceae, Brassicaceae and Fabaceae, including <i>Malus</i> , <i>Prunus</i> , <i>Vitis</i> , <i>Rosa</i> , <i>Dianthus</i> , <i>Caldula</i> and <i>Citrus</i> spp. (Gentry 1965; Tamutis & Dalius 2013). The beetle is distributed in the western Palearctic	Yes. <i>Oxythyrea funesta</i> is polyphagous, attacking both wild and cultivated plants (Tamutis & Dalius 2013). <i>O. funesta</i> associated with grains (PaDIL 2020), pollen and flowers of apple, peach, <i>Vitis</i> spp., rose, carnation, citrus and some vegetable and field crops (Gentry 1965; Tamutis & Dalius 2013). Adults are	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				region (Tamutis & Dalius 2013) where climatic conditions are similar to parts of Australia. Therefore, <i>O. funesta</i> has the potential to establish and spread in Australia.	considered harmful in southern Europe due to damage to floral organs and buds. Larvae have also been observed feeding on small plant roots (Tamutis & Dalius 2013), and the species has caused serious crop losses in Bulgaria (Gentry 1965). <i>Oxythyrea funesta</i> does not represent as great a threat to orchards, however, significant damage can be caused to flowering grapevines and late flowering wheat (PaDIL 2020). Therefore, <i>O. funesta</i> has the potential to cause negative economic consequences in Australia.	
<i>Pachnaeus litus</i> (Germar, 1824) [Curculionidae] Southern blue green citrus weevil, citrus root weevil	Mexico and USA (Guerrero et al. 2012; Weathersbee et al. 2003).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Pachnaeus litus</i> is associated with foliage and flowers of ornamental plants, including <i>Gerbera</i> spp. (Cruz Borrueal et al. 2009; Weathersbee et al. 2003).	Yes. <i>Pachnaeus litus</i> is highly polyphagous with over 70 host plants (Futch & McCoy 1993; Guerrero et al. 2012), including <i>Gerbera</i> (Cruz Borrueal et al. 2009), <i>Dimocarpus</i> (Crane et al. 2013), <i>Casuarina</i> (Futch & McCoy 1993), <i>Citrus</i> , <i>Mangifera</i> , <i>Persea</i> ,	Yes. <i>Pachnaeus litus</i> is known to feed on up to 70 host plants (Guerrero et al. 2012), including <i>Citrus</i> spp., mango, avocado longan and gerbera (Cruz Borrueal et al. 2009; Futch & McCoy 1993; Plantwise 2019; Wolfenbarger 1971), which are economically	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<i>Ipomoea</i> and <i>Ocimum</i> spp. (Plantwise 2019; Wolfenbarger 1971) which are present throughout Australia (APNI 2020). The weevil is distributed in Mexico (Guerrero et al. 2012) and parts of USA (Weathersbee et al. 2003) where climatic conditions are similar to parts of Australia. Therefore, <i>P. litus</i> has the potential to establish and spread in Australia.	important in Australia (Horticulture Innovation Australia 2019c). The weevil is considered a pest in its native range due to foliage feeding resulting in marginal notching on the leaves of young shoots, and larval feeding on roots which results in weak and stressed trees (Guerrero et al. 2012; Weathersbee et al. 2003). In Cuba, <i>P. litus</i> damages gerbera flowers, resulting in complete petal loss and rendering the flowers unsuitable for ornamental use (Cruz Borrueal et al. 2009). In Florida, adults are also frequently found on Australian pine trees (Futch & McCoy 1993), suggesting the weevil could also be an environmental pest on endemic or naturalised plants in Australia.	
<i>Paederus australis</i> Guérin-Méneville, 1830 [Staphylinidae]	Australia (Discover Life 2019).	Present, NT and Tas. (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Whiplash rove beetle			consignments (unpublished).			
<i>Paederus littoralis</i> Gravenhorst, 1802 Synonym: <i>Paederus (Poederomorphus) littoralis</i> Gravenhorst, 1802 [Staphylinidae] Rove beetle	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (de Jong et al. 2019), UK, Afghanistan (Discover Life 2018), India (Bhatti & Khajuria 2018), Iran (Bazrafkan et al. 2015) and Pakistan (Rana et al. 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Paederus littoralis</i> is a predatory rove beetle found frequently in crops such as cotton, rice, wheat, cereal, vegetables and fruits (Rana et al. 2013) where they feed on flies, aphids and other arthropods (Bhatti & Khajuria 2018; Frank & Kanamitsu 1987). <i>Paederus</i> spp. dwell in moist habitats, in tropical to temperate regions (Frank & Kanamitsu 1987). Australia has diverse arthropod fauna and suitable climates, similar to the current geographical distribution of <i>P. littoralis</i> . Therefore, <i>P. littoralis</i> has the potential to establish and spread in Australia.	Yes. <i>Paederus littoralis</i> is an arthropod predator (Frank & Kanamitsu 1987). The beetle also produces a toxic substance which causes contact dermatitis and conjunctivitis in humans (Bazrafkan et al. 2015). Therefore, <i>P. littoralis</i> is a human health pest and has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator/vector of human and/or animal disease)
<i>Phoracantha semipunctata</i> (Fabricius, 1775) [Cerambycidae] Australian eucalyptus longhorn	Argentina, Chile, Egypt, Israel, Italy, Malawi, Mauritius, Morocco, Papua New Guinea, Peru, Zimbabwe (CABI 2020b), France, Kenya, Mexico, New Zealand, Portugal, South Africa, Spain and	Present (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	USA (GBIF Secretariat 2017).					
<i>Phyllotreta striolata</i> (Fabricius, 1803) Synonym: <i>Phyllotreta vittata</i> (Fabricius) [Chrysomelidae] Striped flea beetle, turnip flea beetle, cabbage flea beetle	Afrotropical, Asian and Nearctic regions, including Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (de Jong et al. 2019), Vietnam (PPD 2010), USA, Taiwan (USDA-APHIS 2007), Thailand, Singapore, Indonesia (Waterhouse 1993b), Republic of Korea (Lim et al. 2012) Northern Asia and South Africa (PaDIL 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Phyllotreta striolata</i> is polyphagous and is known to feed on cruciferous crops and weeds, including <i>Brassica</i> , <i>Cucumis</i> , <i>Cucurbita</i> , and <i>Solanum</i> spp. (Hoffmann, Hoebeke & Dillard 2011), which are present throughout Australia (APNI 2020). <i>P. striolata</i> has a widespread distribution and has been introduced into North America and South Africa (CABI 2020a), suggesting similar climatic conditions in Australia would aid pest establishment and spread. Therefore, <i>P. striolata</i> has the potential to establish and spread in Australia.	Yes. <i>Phyllotreta striolata</i> is a pest of crops such as broccoli, cabbage, cauliflower, brussel sprouts, turnip, kale, and radish, cucumber, squash, pumpkin, tomato, potato and cruciferous weeds (Hoffmann, Hoebeke & Dillard 2011), all economically important or naturalised plants in Australia (Horticulture Innovation Australia 2019c). Larvae feed on subterranean roots and stems. Under heavy infestations, leaves appear burnt and seedling loss can be significant (CABI 2020a). Adult feeding on foliage and roots delays plant development and results in lower yields or death of young plants. Damage to broccoli and cabbage heads is known to significantly reduce crop quality and marketability (Hoffmann, Hoebeke & Dillard 2011).	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					Additionally, <i>P. striolata</i> is a vector of <i>Radish mosaic virus</i> (Butter 2018) which is not known to occur in Australia (CABI 2020a). Therefore, <i>P. striolata</i> has the potential to cause negative economic consequences in Australia.	
<i>Phytoecia rufiventris</i> Gautier, 1870 [Cerambycidae] Chrysanthemum longicorn beetle, chrysanthemum beetle	Eastern Asia, including Japan (Shintani 2011) and Republic of Korea (Byun et al. 2009).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytoecia rufiventris</i> is associated with stems of <i>Chrysanthemum</i> spp. (PHA 2016a).	Yes. <i>Phytoecia rufiventris</i> is associated with herbaceous host plants in the Asteraceae family, including <i>Aster</i> , <i>Artemisia</i> and <i>Chrysanthemum</i> spp. (Shintani 2011) which are present throughout Australia (APNI 2020). The beetle is present in Eastern Asia (Shintani 2011), where climatic conditions are similar to parts of Australia. Therefore, <i>P. rufiventris</i> has the potential to establish and spread in Australia.	Yes. <i>Phytoecia rufiventris</i> is a pest of chrysanthemums (Shintani 2011) which are important ornamental plants in Australia (Flowers Australia 2019). Adults chew leaf veins or stems and oviposit inside the stems. After hatching, larvae burrow inside stems and move to roots in summer (Shintani 2011), which induces stem drooping (Yamazaki 2012) and significantly reduces plant quality and appearance. Infestation in commercial chrysanthemum crops has the potential to cause serious damage (Shintani 2011). Therefore,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					<i>P. rufiventris</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Plesispa reichei</i> Chapuis, 1875 [Chrysomelidae] Two coloured coconut leaf beetle	Indonesia, Malaysia, Philippines, Singapore, Thailand (CABI 2020b), Oceania (Rethinam & Singh 2007) and Sri Lanka (Kumari, Suwadarathna & Fernandopulle 2009).	Present, Qld (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Plesispa reichei</i> is a phytophagous pest of coconut palm species (Sivapragasam & Hong 2007) which are present in Australia (APNI 2020). The species is present in Asia (CABI 2020b) where climatic conditions are similar to parts of northern Australia. Therefore, <i>P. reichei</i> has the potential to establish and spread in Australia	Yes. <i>Plesispa reichei</i> has been recorded as a pest of coconut palm species including <i>Roystonea regia</i> , <i>R. oleracea</i> , <i>Cocus nucifera</i> and <i>Veitchia merrilli</i> . These species support a small niche agricultural market and are important landscape plants in northern Australia (APNI 2020). Both adult and larval stages feed on immature and young palm leaf fronds, often causing extensive damage in palm nurseries and landscapes (Sivapragasam & Hong 2007). Therefore, <i>P. reichei</i> has the potential to cause negative economic consequences in Australia.	Yes (WA)
<i>Polydrusus formosus</i> (Mayer, 1779) [Curculionidae]	Belgium, France, Italy, Spain, Switzerland, the Netherlands (de Jong et al. 2019), England (NBN	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Yes. <i>Polydrusus formosus</i> is a pest of apple, pear, cherry, plum, <i>Corylus</i> and <i>Quercus</i> spp. (Alford	Yes. <i>Polydrusus formosus</i> is a pest of fruit crops such as apple, pear, cherry, plum and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Green leaf weevil	2018), India (Thakkar & Parikh 2016) and USA (Alford 2016).		consignments (unpublished).	2016) which are present in Australia (APNI 2020). <i>P. formosus</i> is present in Europe, USA (Alford 2016) and India (Thakkar & Parikh 2016) where climatic conditions are similar to parts of Australia. Therefore, <i>P. formosus</i> has the potential to establish and spread in Australia (Korotyaev, Kataev & Kovalev 2018).	hazelnut (Alford 2016) which are economically important in Australia (Horticulture Innovation Australia 2019a). The soil-inhabiting larvae often feed on plant roots, while adult weevils can cause extensive damage to fruit buds, shoots, and blossoms (Alford 2016). On apple, fruitlets may be damaged, resulting in cosmetic damage such as corky scars on the skins of mature fruit (Alford 2016). Therefore, <i>P. formosus</i> has the potential to cause negative economic consequences in Australia.	
<i>Popillia japonica</i> Newman, 1841 [Scarabaeidae] Japanese beetle	India, China, Japan (Ali et al. 2016), Hong Kong, USA, Portugal (PaDIL 2020), Italy and Switzerland (EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020), Vic. (DEDJTR 2017) and NT (DPIR 2018a).	<i>Popillia japonica</i> is associated with cut flowers and foliage, including <i>Rosa</i> spp. (Ali et al. 2016; PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2011a; Department of Agriculture 2014a). <i>Popillia japonica</i> has been accidentally introduced into the USA where it is now widespread (Fleming 1972). The ability of <i>P. japonica</i> larvae to feed on grass	Yes. Previously assessed by the department (Biosecurity Australia 2011a; Department of Agriculture 2014a). <i>Popillia japonica</i> inflicts millions of dollars damage to the USA each year through lost production and control costs (CABI 2009; Reding & Krause 2005).	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<p>roots while the adults feed on foliage and fruit (Pfeiffer & Schultz 1986) makes the beetle ideally suited to establish, spread and exploit Australian urban and agricultural areas, especially home gardens with lawns (Biosecurity Australia 2011a).</p>	<p>Agricultural crops damaged by <i>P. japonica</i> include apples (<i>Malus</i> spp.), stone fruits (<i>Prunus</i> spp.), berries (<i>Rubus</i> spp.) and grapes (<i>Vitis</i> spp.). Home gardens and lawns are also badly affected by adults and larvae, respectively (Biosecurity Australia 2011a; CABI 2009). Additionally, <i>P. japonica</i> is a high priority pest for Australian <i>Rubus</i> and stone fruit industries (PHA 2018) and a vector of plant viruses such as <i>Southern bean mosaic virus</i> and <i>Bean pod mottle virus</i> (Wickizer & Gergerich 2007) which are not known to occur in Australia (CABI 2020a). Therefore, <i>P. japonica</i> has the potential to cause negative economic consequences in Australia</p>	
<p><i>Propylea quatuordecimpunctata</i> (Linnaeus, 1758) [Coccinellidae]</p>	<p>UK, Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (de Jong et al. 2019), USA (Discover</p>	<p>No record found (ABRS 2020; Plant Health Australia 2020).</p>	<p>Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).</p>	<p>Yes. <i>Propylea quatuordecimpunctata</i> feeds on aphids and is abundantly present in cereal crops and herbaceous plants</p>	<p>Yes. <i>Propylea quatuordecimpunctata</i> is not a plant pest, however a predator of invertebrates, including aphids, and for that</p>	<p>No. Not a plant pest. Contaminating pest (predator)</p>

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Fourteen spotted lady beetle	Life 2019) and China (CABI 2020b).			(Honek et al. 2014). The lady beetle has a wide prey range (CABI 2020a) that is likely to be present in Australia. <i>Propylea quatuordecimpunctata</i> is distributed in Europe and Asia (CABI 2020a; de Jong et al. 2019) where climatic conditions are similar climates to parts of Australia. Therefore, <i>P. quatuordecimpunctata</i> has the potential to establish and spread in Australia.	reason is often used as biological control agents in crops (van der Vlugt 2009). Therefore, <i>P. quatuordecimpunctata</i> has the potential to cause negative environmental consequences in Australia.	
<i>Proterhinus vestitus</i> Sharp, 1878 [Belidae] Primitive weevil	Hawaii (Perkins 1928).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Proterhinus vestitus</i> is associated with foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Proterhinus vestitus</i> is known to feed on <i>Aleurites</i> , <i>Dracaena</i> , <i>Pipturus</i> , <i>Pisonia</i> , <i>Ipomoea bona-nox</i> (syn. <i>I. alba</i>), <i>Cordyline</i> and <i>Hibiscus</i> spp. (Swezey 1938) which are present throughout Australia (APNI 2020). The species is present in Hawaii (Perkins 1928), where climatic conditions are similar to tropical parts of Australia. Therefore, <i>P. vestitus</i> has the potential to establish and spread in Australia.	Yes. <i>Proterhinus vestitus</i> is polyphagous and is known to feed on <i>Cordyline</i> , <i>Dracaena</i> , white morning glory and hibiscus (Perkins 1928; Swezey 1938) which are naturalised or important ornamental plants in Australia. <i>Proterhinus</i> spp. live in bark, can be leaf or stem miners and feed on foliage (Perkins 1928; Swezey 1938). Therefore <i>P. vestitus</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Psammoecus simoni</i> Grouvelle, 1892 Misspelling: <i>Psammoecus simonis</i> (Grouvelle, 1892) [Silvanidae] Silvan flat bark beetle	Taiwan, Japan, India, Sri Lanka, Malaysia, Indonesia and Madagascar, Philippines and France (Yoshida, Karner & Hirowatari 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Psammoecus simoni</i> is distributed throughout Asia (Yoshida & Hirowatari 2014) where climatic conditions are similar to parts of Australia. <i>Psammoecus</i> spp. are found in plant detritus and silvanid beetles are often fungus feeders in their habitats (Yoshida & Hirowatari 2014). Therefore, <i>P. simoni</i> has the potential to establish and spread in Australia.	consequences in Australia. Yes. <i>Psammoecus</i> spp. are not considered plant pests, however silvanid beetles are often fungivorous and can also be stored products pests (Yoshida & Hirowatari 2014). <i>P. simoni</i> has been intercepted in a wooden pallet transported from Taiwan (Yoshida, Karner & Hirowatari 2018) and found in dead leaf litter to which fungi are attached (Yoshida & Hirowatari 2014). Therefore, <i>P. simoni</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Psammoecus trimaculatus</i> Motschulsky, 1858 Synonym: <i>Psammoecus excellens</i> (Grouvelle, 1908a), <i>Psammoecus alluaudi</i> (Grouvelle, 1912) [Silvanidae]	Taiwan, Japan, Madagascar, Mauritius, France, South Africa, Tanzania, Uganda, Nepal, India, USA (Yoshida, Karner & Hirowatari 2018), Malaysia (Thomas & Yamamoto 2007).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Psammoecus trimaculatus</i> is associated with decaying plant matter and has been found in haystacks, under dry cut grass and leaf garbage (Kovalev 2016). The species is present in countries in Asia and Africa (Thomas &	Yes. <i>Psammoecus</i> spp. are not considered plant pests, however silvanid beetles are often fungivorous and can also be stored products pests (Yoshida & Hirowatari 2014). <i>Psammoecus</i> spp. have been intercepted in a wooden pallet	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Silvan flat bark beetle				Yamamoto 2007; Yoshida, Karner & Hirowatari 2018), where climatic conditions are similar to parts of Australia. Therefore, <i>P. trimaculatus</i> has the potential to establish and spread in Australia.	transported from Taiwan (Yoshida, Karner & Hirowatari 2018) and transferred with leather goods and packaging from China (Yoshida & Hirowatari 2014). Therefore, <i>P. trimaculatus</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Psilocnaeia asteliae</i> Kuschel, 1987 [Cerambycidae] Longhorn beetle	New Zealand (Guthrie 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Psilocnaeia asteliae</i> is associated with foliage of <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Psilocnaeia asteliae</i> is associated with <i>Cordyline</i> , <i>Astelia</i> , <i>Collospermum</i> and <i>Phormium</i> spp. (Guthrie 2008; Kuschel 1990), which are present in Australia (APNI 2020). The beetle is present in New Zealand (Guthrie 2008), where climatic conditions are similar to Australia. Therefore, <i>P. asteliae</i> has the potential to establish and spread in Australia.	Yes. <i>Psilocnaeia asteliae</i> is known to feed on <i>Cordyline</i> spp. (Guthrie 2008) which are naturalised and ornamental plants in Australia (APNI 2020). They feed on leaves of host plants (Guthrie 2008). <i>Psilocnaeia</i> larvae bore into flowers, woody stems, or dried fruit of the host plant (Guthrie 2008; Kuschel 1990), which can affect the appearance and value of ornamental plants. Therefore <i>P. asteliae</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Psilocnaeia nana</i> (Bates, 1874) [Cerambycidae] Longhorn beetle	New Zealand (Guthrie 2008; Winks, Fowler & Smith 2004).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Psilocnaeia nana</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Psilocnaeia nana</i> is associated with <i>Cordyline</i> , <i>Pittosporum</i> , <i>Eucalyptus</i> , <i>Hoheria</i> , <i>Lagunaria</i> and <i>Chrysanthemoides</i> spp. (Guthrie 2008; Kuschel 1990), which are present in Australia (APNI 2020). The beetle is present in New Zealand (Guthrie 2008), where climatic conditions are similar to Australia. Therefore, <i>P. nana</i> has the potential to establish and spread in Australia.	consequences in Australia. Yes. <i>Psilocnaeia nana</i> is polyphagous, known to feed on <i>Cordyline</i> spp., eucalyptus, boneseed and lagunaria (Guthrie 2008) which are endemic or ornamental plants in Australia (APNI 2020; Thomas & Gollnow 2013). Larvae bore into flowers, woody stems, or dried fruit of the host plant (Guthrie 2008; Kuschel 1990), which can affect the appearance and value of ornamental plants. Therefore <i>P. nana</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Ptilodactyla exotica</i> Chapin, 1927 [Ptilodactylidae] Toed winged beetle	Africa, France Italy, Switzerland (Denux & Zagatti 2010) and USA (Discover Life 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Ptilodactyla exotica</i> is associated with foliage and branches of <i>Dracaena</i> spp. (MAF 2002; MPI 2016).	Yes. <i>Ptilodactyla exotica</i> is associated with <i>Dracaena</i> spp. which are present throughout Australia and household plants (APNI 2020; Denux & Zagatti 2010). The beetle is native to Africa and invasive in Europe, often imported into	Yes. <i>Ptilodactyla exotica</i> is known to feed on <i>Dracaena</i> spp. (Denux & Zagatti 2010) which are naturalised or ornamental plants in Australia (APNI 2020). Beetles are feed on fungus and plant material (Hajek 2009). They are	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				European countries on tropical plants (Denux & Zagatti 2010; Hajek 2009). Climatic conditions in the current geographical distribution are similar to parts of Australia. Therefore, <i>P. exotica</i> has the potential to establish and spread in Australia.	often found on tropical household and greenhouse plants (Hajek 2009). Therefore, <i>P. exotica</i> has the potential to cause negative environmental consequences in Australia.	
<i>Rhyzopertha dominica</i> (Fabricius, 1792) [Bostrichidae] Lesser grain borer	Ethiopia (Letter from MANR on 06/03/2018), France, Mexico, South Africa, UK, USA, Argentina, Chile, China, Egypt, Fiji, Greece, India, Indonesia, Iran, Israel, Italy, Japan, Malaysia, Morocco, Nepal, Pakistan, Peru, Philippines, Saudi Arabia, Singapore, Spain, Sri Lanka, Switzerland, Taiwan, Thailand, United Republic of Tanzania, Zimbabwe (CABI 2020b; GBIF Secretariat 2017), Vietnam (Duong, Bui & Collins 2016), Portugal, Belgium, the Netherlands (de Jong et al. 2019) and Afghanistan (Gentry 1965).	Present, NT, Qld, NSW, SA, Vic., Tas., WA and ACT (ABRS 2020; Plant Health Australia 2020). Present in WA, but insecticide resistant forms are regulated as prohibited organisms under s.12 of the BAM Act 2007; and its entry into WA restricted under s.15(1)(Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Rhyzopertha dominica</i> has already established in parts of Australia (ABRS 2020; Plant Health Australia 2020), suggesting suitable climatic conditions and host plants are available in Western Australia. Therefore, <i>R. dominica</i> has the potential to establish and spread in Western Australia.	Yes. Populations of the stored grain pest, <i>Rhyzopertha dominica</i> have developed strong resistance to phosphine (Collins 2009). As phosphine accounts for 80% of grain disinfection treatments in Australia, insecticide resistant stored grain pests such as <i>R. dominica</i> have the potential to cause negative economic consequences in Australia.	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Sangariola punctatostrata</i> (Motschulsky, 1861) [Chrysomelidae] Lily leaf flea beetle	Japan, Republic of Korea, and Taiwan (Chujo & Kimoto 1961; DAFF 2013d; Wang & Lin 1997).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Sangariola punctatostrata</i> is associated with foliage of <i>Lilium</i> spp. (DAFF 2013d; PHA 2016a).	Yes. Previously assessed by the department (DAFF 2013d). <i>Sangariola punctatostrata</i> has a limited distribution internationally though it has established in areas with a wide range of climatic conditions that are similar to parts of Australia. Plant hosts including <i>Smilax</i> spp. are widespread in Australia (APNI 2012). Therefore, <i>S. punctatostrata</i> has the potential to establish and spread in Australia	Yes. Previously assessed by the department (DAFF 2013d). <i>Sangariola punctatostrata</i> could cause economic damage by attacking foliage and flowers of many cultivated and native plant species, including <i>Smilax</i> spp. and <i>Lilium</i> spp. (APNI 2012).	Yes
<i>Scyphophorus acupunctatus</i> Gyllenhal 1838 Synonym: <i>Scyphophorus interstitialis</i> (Gyllenhal) [Curculionidae] Sisal weevil, agave weevil	Kenya (letter from KEPHIS on 29/01/2018), France, Mexico, South Africa, Spain, USA, Argentina, Colombia, Fiji, Indonesia, Israel, Italy, New Zealand, Portugal, Saudi Arabia, UK, United Republic of Tanzania and Greece (CABI 2020b; EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Scyphophorus acupunctatus</i> is associated with foliage and branches of <i>Dracaena</i> spp. (MAF 2002).	Yes. <i>Scyphophorus acupunctatus</i> is polyphagous and is known to feed on <i>Agave</i> , <i>Furcraea</i> , <i>Dracaena</i> and <i>Yucca</i> spp. (EPPO 2020) which are present throughout Australia (APNI 2020). The species has a wide geographic distribution and it is likely that suitable climates exist in parts of Australia. <i>S. acupunctatus</i> has previously invaded multiple regions in Africa, and Central and South	Yes. <i>Scyphophorus acupunctatus</i> is a polyphagous pest of fresh stems and ornamentals, including <i>Furcraea</i> , <i>Dracaena</i> and <i>Yucca</i> spp. (EPPO 2020; PaDIL 2020) which are naturalised or ornamental plants in Australia (APNI 2020; Thomas & Gollnow 2013). Adults bore into leaves, creating holes or mottled areas (CABI 2020a), and burrow into fleshy parts above taproots to lay eggs (Pott 1976). Hatched	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				America (Pott 1976). Therefore, <i>S. acupunctatus</i> has the potential to establish and spread in Australia.	larvae feed on plant tissue in the trunk, then move to roots (Pott 1976). The weevil is a serious pest for yucca and agave plants in parts of USA, Mexico and Central America, causing foliage discolouration and collapse of the basal trunk (Pott 1976). Therefore, <i>S. acupunctatus</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Silvanoprus scuticollis</i> (Walker, 1859) Synonym: <i>Silvanus triangulus</i> (Reitter) [Silvanidae] Flat bark beetle	Neotropical (Thomas & Yamamoto 2007), including Ethiopia, Uganda, Tanzania, Madagascar, Japan, Portugal and Thailand (Discover Life 2018).	Present (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Sinoxylon conigerum</i> Gerstäcker, 1855 Synonym: <i>Sinoxylon unidentatum</i> (Fabricius, 1801) [Bostrichidae]	Kenya (Letter from KEPHIS on 29/01/2018), American Samoa, China, India, Indonesia, Italy, Japan, Madagascar, Malawi, Malaysia, Mauritius, Pakistan, Philippines, Singapore,	No record found (ITIS 2018a; PaDIL 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Sinoxylon conigerum</i> is polyphagous with known host plant species from the families Ulmaceae, Euphorbiaceae, Lauraceae, Dipetrocarpaceae,	Yes. <i>Sinoxylon conigerum</i> is polyphagous, feeding upon many woody plants or timber products in suitable conditions (Savoldelli & Regalin 2009; Sittichaya et al. 2009). <i>S. conigerum</i> has	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Conifer auger beetle	Spain, Sri Lanka, Thailand, USA, United Republic of Tanzania, Vietnam (Benker 2008; EPPO 2020), Papua New Guinea and South Africa (GBIF Secretariat 2017).			Mimosaceae, Leguminosae, Anacardiaceae and Rubiaceae (Savoldelli & Regalin 2009), including <i>Acacia</i> , <i>Bambusa</i> , <i>Gossypium</i> , <i>Manihot</i> , <i>Mangifera</i> and <i>Hevea</i> spp. (EPPO 2020; Filho et al. 2006) which are present in Australia (APNI 2020). <i>S. conigerum</i> is widespread in tropical Asian and African countries, and has spread to several new regions via infested timber (Sittichaya et al. 2009). These regions have climatic conditions similar to parts of Australia. Therefore <i>S. conigerum</i> has the potential to establish and spread in Australia.	been recorded on teak, mango, rubber tree, bamboo, pigeon pea, cassava, cotton, guava, acacia (Filho et al. 2006), avocado and <i>Shorea</i> (CABI 2020a). Due to its polyphagous nature and biology, <i>S. conigerum</i> is an important agricultural, timber pest, and contaminating pest for wood packaging and dunnage (Filho et al. 2006). Therefore, <i>S. conigerum</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Sitophilus linearis</i> (Herbst, 1795) [Curculionidae] Tamarind weevil, tamarind pod borer	Afrotropical, Neotropical, Nearctic and Asian regions, including Italy (de Jong et al. 2019), USA (Cotton 1920), and Madagascar (Discover Life 2019).	Present, Qld (Brooks 1969; Plant Health Australia 2020; Pullen, Jennings & Oberprieler 2014).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Sitophilus oryzae</i> (Linnaeus, 1763) [Curculionidae] Rice weevil	Kenya (Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Panama, Peru, USA (GBIF Secretariat 2017), Argentina, Belgium, China, Egypt, Greece, India, Iran, Indonesia, Israel, Italy, Japan, Malaysia, Morocco, Nepal, New Zealand, Pakistan, Republic of Korea, South Africa, Spain, Sri Lanka, UK, Switzerland, Taiwan, United Republic of Tanzania (CABI 2020a), the Netherlands and Portugal (Discover Life 2018).	Present, NSW, NT, Tas., Vic, Qld, WA, SA and ACT (ABRS 2020; Plant Health Australia 2020). Present in WA, but insecticide resistant forms are regulated as prohibited organisms under s.12 of the BAM Act 2007; and its entry into WA restricted under s.15(1) (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Sitophilus oryzae</i> has already established in parts of Australia (ABRS 2020; Plant Health Australia 2020), suggesting suitable climatic conditions and host plants are available in Western Australia. Therefore, <i>S. oryzae</i> has the potential to establish and spread in Western Australia.	Yes. Populations of the stored grain pest, <i>Sitophilus oryzae</i> have developed strong resistance to phosphine (Holloway et al. 2016). As phosphine accounts for 80% of grain disinfection treatments in Australia, insecticide resistance stored grain pests such as <i>S. oryzae</i> has the potential to cause negative economic consequences in Australia.	Yes (WA)
<i>Sitophilus zeamais</i> Motschulsky, 1855 [Curculionidae] Corn weevil, maize weevil	Kenya (letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Afghanistan, Argentina, China, Belgium, Chile, Colombia, Egypt, Ethiopia, Fiji, Greece, India, Indonesia, Iran, Israel, Italy, Japan, Malawi, Malaysia, Mexico, Morocco, Nepal, New Caledonia, Papua New Guinea, Pakistan, Peru,	Present, Qld, NSW, ACT, Vic., Tas. and WA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Philippines, Portugal, Saudi Arabia, Spain, Republic of Korea, Singapore, Sri Lanka, South Africa, Tonga, Taiwan, Switzerland, Uganda, Thailand, UK, United Republic of Tanzania, USA, Vietnam, Zimbabwe (CABI 2020b) and France (GBIF Secretariat 2017).					
<i>Systates pollinosus</i> Gerstäcker, 1871 [Curculionidae] Systates weevil	Kenya, Ethiopia, Malawi, Uganda, Zimbabwe and the United Republic of Tanzania (Alonso-Zarazaga & Lyal 1999).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Systates pollinosus</i> is distributed in East Africa where they are known to feed on <i>Helianthus</i> (Khaemba & Mutinga 1982), <i>Gossypium</i> (Harris 1936), <i>Acacia</i> , <i>Cassia</i> , <i>Citrus</i> , <i>Eucalyptus</i> , <i>Pinus</i> , <i>Cinnamomum</i> , and <i>Hevea</i> spp. (Schabel 2006). These host plants are present in Australia (APNI 2020) and similar climatic conditions exist in Australia. Therefore, <i>S. pollinosus</i> has the potential to establish and spread in Australia.	Yes. <i>Systates pollinosus</i> attacks foliage of cotton (Harris 1936), sunflower (Khaemba & Mutinga 1982), eucalyptus (Duke 1983), citrus, pines and acacias (Schabel 2006) which are economically important or naturalised plants in Australia (Horticulture Innovation Australia 2019c). They are considered minor pests of agriculturally important crops in some areas where adults damage plant foliage (Harris 1936; Schabel 2006). Therefore, <i>S. pollinosus</i> has the potential to cause negative economic and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					environmental consequences in Australia.	
<i>Tenebroides mauritanicus</i> (Linnaeus, 1758) [Trogossitidae] Cadelle beetle	Belgium, France, Greece, Italy, Spain, Switzerland, the Netherlands (de Jong et al. 2019), China, Colombia, Ecuador, Egypt, Fiji, India, Sri Lanka, Indonesia, Japan, Kenya, Kiribati, Malawi, Malaysia, Mauritius, Mexico, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, South Africa, Taiwan, Thailand, United Republic of Tanzania (CABI 2020a), UK and USA (Discover Life 2019).	Present, NSW, WA, Tas., Qld, Vic., NT and SA (ABRS 2020; Plant Health Australia 2020).	<i>Tenebroides mauritanicus</i> is associated with <i>Lilium</i> spp. (DAFF 2013d).	Assessment not required	Assessment not required	No
<i>Tribolium castaneum</i> (Herbst, 1797) [Tenebrionidae] Red flour beetle, rust red flour beetle	Kenya (letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Belgium, France, Greece, Italy (de Jong et al. 2019), China, Afghanistan, Argentina, Egypt, Cambodia, Colombia, Ecuador, Fiji, India, Indonesia, Iran, Israel, Japan, Madagascar, Malawi, Malaysia, Mexico, Morocco, Nepal, Pakistan,	Present, Qld, NT, NSW, Vic., WA, Tas., SA and ACT (ABRS 2020; Plant Health Australia 2020). Present, but also declared pest, prohibited entry into WA (Government of Western Australia 2020) and notifiable pest in Qld (Office of the Queensland Parliamentary Counsel 2016).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	New Caledonia, Panama, Papua New Guinea, Peru, Philippines, Portugal, Sri Lanka, Republic of Korea, Saudi Arabia, Singapore, South Africa, Spain, Taiwan, Thailand, Tonga, United Arab Emirates, United republic of Tanzania, Uganda, Vanuatu, Vietnam, Zimbabwe (CABI 2020a), UK, the Netherlands and USA (GBIF Secretariat 2017).					
<i>Tropinota hirta</i> (Poda, 1761) Synonym: <i>Epicometis hirta</i> Poda, 1761, <i>Tropinota (Epicometis) hirta</i> (Poda, 1761) [Scarabaeidae] Apple blossom beetle	Belgium, France, Greece, Italy, Spain, Switzerland and the Netherlands (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Tropinota hirta</i> is associated with <i>Rosa</i> spp. (PHA 2016a; Yaşar & Sağdaş 2014).	Yes. <i>Tropinota hirta</i> is polyphagous, known to feed on fruit trees and grains including <i>Fragaria</i> , <i>Rosa</i> , <i>Prunus</i> , <i>Malus</i> , <i>Triticum</i> , <i>Hordeum</i> , <i>Ribes</i> and <i>Pyrus</i> spp. (PaDIL 2020; Stastna & Psota 2013; Ulusoy, Vatansever & Uygun 1999) which are present throughout Australia. The beetle is distributed in Central Europe (Yaşar & Sağdaş 2014), where climatic conditions are similar to parts of Australia. Therefore, <i>T. hirta</i> has the	Yes. <i>Tropinota hirta</i> is a serious orchard pest (PaDIL 2020). Adults feed on strawberry, cherry, apple, pear, quince, plum, canola, rye, wheat, barley, blackcurrant and tulip (PaDIL 2020; Stastna & Psota 2013; Ulusoy, Vatansever & Uygun 1999; Yaşar & Sağdaş 2014), all economically important plants in Australia (Horticulture Innovation Australia 2019c). Adults primarily feed on reproductive parts of flowers, affecting fruit production, and can	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.	feed on shoots, leaves and fruits (Yaşar & Sağdaş 2014). The beetle is also an economically important pest of cherry in Turkey (Ulusoy, Vatansever & Uygun 1999). Therefore, <i>T. hirta</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Typhaea stercorea</i> (Linnaeus, 1758) Synonym: <i>Dermestes stercorea</i> (Linnaeus, 1758), <i>Dermestes fumata</i> (Linnaeus, 1767) [Mycetophagidae]	Belgium, France, Greece, Iceland, Italy, Portugal, Spain, Switzerland, the Netherlands (de Jong et al. 2019), China, Indonesia, Singapore (CABI 2020a), Iran, Pakistan (Gentry 1965), New Zealand (Gorham 1987), USA (Dowell et al. 2016), Republic of Korea (Hong et al. 2012), Japan, UK and Virgin Islands (Discover Life 2018).	Present, NSW, NT, WA, Qld, Tas., ACT, Vic. and SA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Urophorus humeralis</i> (Fabricius, 1798) Synonym: <i>Carpophilus humeralis</i> (Fabricius, 1798), <i>Carpophilus foveicollis</i> Murr	North, Central and South America, Europe, Northern Asia, Mediterranean Basin, Africa, South and South East Asia, including USA (PaDIL 2020), France,	Present, NSW, NT, WA, Qld, Tas., ACT, Vic. and SA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Urophorus humeralis</i> is already established and spread in Australia (ABRS 2020; Plant Health Australia 2020).	Yes. <i>Urophorus humeralis</i> is known to vector the bacterial pathogen <i>Dickeya zeae</i> pineapple strain (= <i>Erwinia chrysanthemi</i>), a serious causal agent on a wide	No/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Nitidulidae]	Greece, Italy, Portugal, Spain (de Jong et al. 2019), New Zealand (MacFarlane et al. 2010), Chile, China, India, Indonesia, Iran, Israel, Italy, Kenya, Madagascar, Malaysia, Mauritius, United Arab Emirates (CABI 2020a), Japan, Thailand and Taiwan (Discover Life 2018).				range of plant hosts which is under official control in Australia (Northern Territory Government of Australia 2017; QDAF 2018a). Therefore, introduction of infected <i>U. humeralis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Xyleborinus saxesenii</i> (Ratzeburg, 1837) Synonym: <i>Xyleborinus saxeseni</i> (Ratzeburg, 1837) [Curculionidae] Fruit tree pinhole borer	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (de Jong et al. 2019), UK, USA, Argentina, Chile, China, Ecuador, Egypt, India, Iran, Israel, Japan, Mexico, Morocco, New Zealand, Papua New Guinea, Philippines, Republic of Korea, South Africa, Taiwan and Vietnam (CABI 2020b; Smith, Beaver & Cognato 2020).	Present, NSW, Vic., SA, Qld and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020; Pullen, Jennings & Oberprieler 2014).	<i>Xyleborinus saxesenii</i> is associated with foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Xyleborus affinis</i> Eichhoff, 1867 [Curculionidae]	Africa, Asia, North, Central and South America, Europe and Oceania, including Panama, Mexico, USA, Argentina, Chile,	Present, Qld, NSW, Vic. and SA (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA	<i>Xyleborus affinis</i> is associated with foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Xyleborus affinis</i> is polyphagous and is associated with trunks or woody stems of most woody plants in its climatic range (MAF	Yes. <i>Xyleborus affinis</i> can cause economic damage in moist, low land areas of the Neotropical regions (Gomez et al. 2018). Due to the beetle's	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Sugarcane shot hole borer	Colombia, Ecuador and Peru (Gomez et al. 2018).	(Government of Western Australia 2020).		2002), including <i>Acacia</i> , <i>Aleurites</i> , <i>Cordyline</i> , <i>Mangifera</i> , <i>Melastoma</i> and <i>Saccharum</i> spp. (Samuelson 1981). The beetle is a native of tropical America and has already been introduced into parts of Australia (Pullen, Jennings & Oberprieler 2014). Therefore, <i>X. affinis</i> has the potential to establish and spread in Western Australia.	polyphagous nature, it is likely that it could have an impact on both the native flora, such as eucalyptus, and economically important plant or tree species such as mango, <i>Cordyline</i> and sugarcane (Samuelson 1981). Adult stages of this pest are associated with the stalks of fresh clean foliage (MAF 2002). Therefore, <i>X. affinis</i> has the potential to cause negative economic and environmental consequences in Western Australia.	
<i>Xyleborus ferrugineus</i> (Fabricius, 1801) [Curculionidae] Black twig borer	Africa, Asia, North, Central and South America, including Panama, Mexico, Argentina, Chile, Colombia, Ecuador, Peru, USA (Gomez et al. 2018), American Samoa, British Virgin Islands, Ethiopia, Fiji, Kenya, Kiribati, Madagascar, Malaysia, Papua New Guinea, Republic of Korea, South Africa, United Republic of	Present, Qld and NSW (ABRS 2020; Plant Health Australia 2020).	<i>Xyleborus ferrugineus</i> is associated with foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Xyleborus ferrugineus</i> has already established and spread in Australia (ABRS 2020; Plant Health Australia 2020).	Yes. <i>Xyleborus ferrugineus</i> vectors the fungal pathogen <i>Raffaelea lauricola</i> (Carrillo et al. 2014), which is not present in Australia (PaDIL 2020) and a serious threat to the Australian avocado industry (Geering 2013). Therefore, introduction of infected <i>X. ferrugineus</i> has the potential to cause negative economic	No/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Tanzania, Uganda and Zimbabwe (EPPO 2020).				consequences in Australia.	
<i>Xyleborus malgasicus</i> Schedl, 1965 Synonym: <i>Xyleborus similis</i> Schedl, 1961 [Curculionidae] Ambrosia beetle	Asia, India and Madagascar (Cognato 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Xyleborus malgasicus</i> is distributed in Asia, Madagascar and India (Cognato 2008), areas where climatic conditions are similar to Australia. <i>Xyleborus</i> spp. are polyphagous, and are associated with trunks or stems of most woody plants in their climatic range (MAF 2002). Therefore, <i>X. malgasicus</i> has the potential to establish and spread in Australia.	Yes. <i>Xyleborus</i> spp. are regarded as stem borers (Biosecurity Australia 2006d) and may be pests of timber (PaDIL 2020) affecting the forestry industry. Ambrosia beetles bore into wood, especially in damaged or unhealthy trees (limiting their economic impact), feeding on fungi, which the beetles may transfer between hosts (Biosecurity Australia 2010b). Therefore <i>X. malgasicus</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Xyleborus perforans</i> (Wollaston, 1857) [Curculionidae] Island pinhole borer	France, India, Japan, United Republic of Tanzania, American Samoa, Cambodia, China, Fiji, Indonesia, Kenya, Kiribati, Madagascar, Malawi, Malaysia, Marshall Islands, Mauritius, Nepal, New Caledonia, Pakistan,	Present, Qld and NSW (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Xyleborus perforans</i> is associated with cut foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Xyleborus perforans</i> is native to tropical America and was introduced into Queensland, and now has a cosmopolitan distribution (Pullen, Jennings & Oberprieler 2014). The borer is polyphagous and is	Yes. Due to its polyphagous nature, <i>Xyleborus perforans</i> could have an impact on both the native flora, such as eucalyptus, and economically important plant or tree species, such as <i>Cordyline</i> , <i>Dracaena</i> , mango and sugarcane	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Papua New Guinea, Philippines, Portugal, Singapore, Spain, Sri Lanka, Taiwan, Thailand, Tonga, Uganda, Vanuatu, Vietnam (CABI 2020b; Smith, Beaver & Cognato 2020) and USA (EPPO 2020).			associated with trunks or stems of most woody plants in its climatic range (MAF 2002) including <i>Persea</i> (EPPO 2020), <i>Acacia</i> , <i>Aleurites</i> , <i>Cordyline</i> , <i>Eucalyptus</i> , <i>Eugenia</i> , <i>Mangifera</i> , <i>Persea</i> , <i>Pisonia</i> and <i>Saccharum</i> spp. (Samuelson 1981). Therefore, <i>X. perforans</i> has the potential to establish and spread in Western Australia.	(Samuelson 1981). Adult stages of this pest are associated with the stalks of fresh clean foliage (MAF 2002). Therefore, <i>X. perforans</i> has the potential to cause negative economic and environmental consequences in Western Australia.	
<i>Xyleborus rugatus</i> Blackburn, 1885 [Curculionidae]	USA and Hawaii (PaDIL 2020; Samuelson 1981).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Xyleborus rugatus</i> is associated with foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Xyleborus rugatus</i> is endemic to Hawaii (Samuelson 1981), where climatic conditions are similar to parts of Australia. The beetle is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (Samuelson 1981), which are present throughout Australia. Therefore, <i>X. rugatus</i> has the potential to establish and spread in Australia.	Yes. <i>Xyleborus rugatus</i> is endemic to the Hawaiian Islands and known host plants include <i>Cordyline</i> , <i>Dracaena</i> and <i>Aleurites</i> spp. (Samuelson 1981), plants that have ornamental value in Australia. The beetle is also associated with timber (PaDIL 2020). Adults are associated with the stalks of fresh clean foliage (MAF 2002). Therefore, <i>X. rugatus</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Xylopsocus capucinus</i> (Fabricius, 1781) Synonym: <i>Apate capucinus</i> Fabricius [Bostrichidae] False powder post beetle, horned powder post beetle	Kenya (letter from KEPHIS on 29/01/2018), Malawi, Malaysia (Discover Life 2018), India, Thailand (Sittichaya et al. 2009), Indonesia, New Caledonia and USA (GBIF Secretariat 2017).	Not present, <i>Xylopsocus capucinus</i> is listed as present in ABRS (2019), however is considered absent due to the unreliability of records.	<i>Xylopsocus capucinus</i> is associated with foliage and branches of <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Xylopsocus capucinus</i> is polyphagous, and known to feed on living wood in a wide range of fruit and ornamental plants including <i>Morus alba</i> , <i>Litchi chinensis</i> , <i>Vitis</i> spp., <i>Nephelium lappaceum</i> , <i>Cinnamomum zeylanicum</i> , <i>Gardenia jasminoides</i> , <i>Persea</i> spp. and <i>Mangifera indica</i> (Wooruff 1978). <i>Xylopsocus capucinus</i> is known to inhabit a wide geographic area (GBIF Secretariat 2017) where climatic conditions are similar to Australia. Therefore <i>X. capucinus</i> has the potential to establish and spread in Australia.	Yes. <i>Xylopsocus capucinus</i> is polyphagous, with a wider host range of fruit and ornamental plants including <i>Morus alba</i> , <i>Litchi chinensis</i> , <i>Vitis</i> spp., <i>Nephelium lappaceum</i> , <i>Cinnamomum zeylanicum</i> , <i>Gardenia jasminoides</i> , <i>Persea</i> spp. and <i>Mangifera indica</i> (Wooruff 1978). Many of these species are economically important crop, landscape or ornamental plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>X. capucinus</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Xylosandrus compactus</i> (Eichhoff, 1875) Synonym: <i>Xylosandrus morstatti</i> (Hagedorn, 1912), <i>Xylosandrus compactus</i> (Chapuis, 1875) [Scolytidae]	American Samoa, British Virgin Islands, Cambodia, China, Fiji, France, India, Indonesia, Italy, Japan, Kenya, Madagascar, Malaysia, Mauritius, Papua New Guinea, Peru, Philippines, Singapore, South Africa, Sri Lanka, Taiwan, United Republic	No record found (ABRS 2020; Plant Health Australia 2020). Note: Record in ABRS (2020) relates to Christmas Island; species does not occur in mainland Australia	<i>Xylosandrus compactus</i> is associated with the canes of <i>Dendrobium</i> and <i>Cattleya</i> spp. (Leonhardt & Sewake 1999).	Yes. <i>Xylosandrus compactus</i> has a pantropical distribution (Ngoan et al. 1976), and is known to inhabit a wide geographic area (Cognato 2008; EPPO 2020) where climatic conditions are similar to Australia. The beetle is	Yes. <i>Xylosandrus compactus</i> is considered a serious pest of shrubs and trees (Hara & Beardsley 1979) and classified as an exotic High Priority Pest of tea tree in Australia due to its potential to cause extensive damage if	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	of Tanzania, Thailand, Uganda, USA, Vietnam Zimbabwe (CABI 2020a; Cognato 2008; EPPO 2020) and Vietnam (Greco & Wright 2015; Hara & Beardsley 1979; Smith, Beaver & Cognato 2020).	(Pullen, Jennings & Oberprieler 2014). Declared pest, prohibited entry into WA (Government of Western Australia 2020).		polyphagous and known to attack over 200 plant species of woody plants and shrubs, including <i>Coffea</i> , <i>Persea</i> , <i>Melaleuca</i> , <i>Eucalyptus</i> , <i>Dendrobium</i> , <i>Cattleya</i> , <i>Citrus</i> , <i>Mangifera</i> , <i>Macadamia</i> and <i>Cocoa</i> spp. (PHA 2019a), which are present throughout Australia. Therefore <i>X. compactus</i> has the potential to establish and spread in Australia.	established (PHA 2019a). This beetle breeds in the shoots, twigs and small branches of several woody plants, which is the major cause of damage to hosts (DAWR 2016d; Ngoan et al. 1976; PHA 2019a). The beetle is a known pest of coffee, avocado, pear, cocoa and several forest plantation species, including <i>Melaleuca</i> and <i>Eucalyptus</i> (Ngoan et al. 1976), and facilitates the spread of the ambrosia fungus <i>Fusarium solani</i> (PHA 2019a) which is present in Australia (Summerell et al. 2011). Therefore, <i>X. compactus</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Xylosandrus crassiusculus</i> (Motschulsky 1866) [Scolytidae] Asian ambrosia beetle	Argentina, China, France, India, Indonesia, Italy, Japan, Kenya, Madagascar, Malaysia, Mauritius, Nepal, New Caledonia, Pakistan, Panama, Papua New	Present, Qld and NSW (ABRS 2020; EPPO 2020; PaDIL 2020; Plant Health Australia 2020) Declared pest, prohibited entry into WA	<i>Xylosandrus crassiusculus</i> is associated with foliage of <i>Cordyline</i> spp. (MAF 2002).	Yes. <i>Xylosandrus crassiusculus</i> has already been found to occur on host plants in parts of Australia (ABRS 2020), and is widely introduced around the globe where	Yes. <i>Xylosandrus crassiusculus</i> is polyphagous, feeding on plants in over 46 host families, including coffee, cacao, mango, papaya, Australian pine, rubber,	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Guinea, Philippines, Republic Of Korea, Spain, Sri Lanka, Taiwan, United Republic of Tanzania, Thailand, USA (CABI 2020b; EPPO 2020) and Vietnam (Dell & Thu 2008; Dell, Xu & Thu 2012; Thu et al. 2010).	(Government of Western Australia 2020).		similar climatic conditions and environs occur (Gomez et al. 2018). Therefore, <i>X. crassiusculus</i> has the potential to establish and spread in Western Australia.	tea, camphor, mahogany, teak, crepe myrtle, peach, pear, pecan, oak, plum, cherry, persimmon, sweet potato, and magnolia (Cognato 2008; PaDIL 2020; Samuelson 1981), which are present in Australia as commercial or naturalised plants (APNI 2020; Horticulture Innovation Australia 2019c). The beetle is an aggressive, high risk quarantine pest in North America, known to invade undisturbed forests (Meissner et al. 2009) and a serious pest of hardwood tree, young trees in nurseries and orchards and hardwood plantations (Gomez et al. 2018; PaDIL 2020). Therefore, <i>X. crassiusculus</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Xylosandrus morigerus</i> (Blandford, 1894) [Scolytidae]	American Samoa, Colombia, Ecuador, Fiji, France, India, Indonesia, Italy, Madagascar,	Present, Qld (ABRS 2020; Plant Health Australia 2020; Pullen, Jennings & Oberprieler 2014).	<i>Xylosandrus morigerus</i> is associated with stems of <i>Dendrobium</i> spp. (Swezey 1945).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Brown coffee twig beetle	Malaysia, Mauritius, Mexico, Panama, Papua New Guinea, Philippines, Sri Lanka, Taiwan, Tonga, UK, USA (CABI 2020b; Cognato 2008; EPPO 2020) and Vietnam (Dole & Cognato 2010; Smith, Beaver & Cognato 2020).					
Diptera (flies, midges, mosquitoes)						
<i>Acidia cognata</i> (Weidman, 1817) [Tephritidae]	Italy (ITIS 2018a), Finland (Kahanpää & Winqvist 2014) France, the Netherlands and UK (GBIF Secretariat 2017), Lithuania (Lutovinovas 2014) and Latvia (Stalažs 2014).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Acidia cognata</i> is associated with foliage of <i>Alstroemeria</i> spp. (PHA 2016a).	Yes. <i>Acidia cognata</i> is polyphagous feeding on Asteraceae, <i>Alstroemeria</i> , <i>Cucumis</i> and <i>Lycopersicon</i> spp. (Ellis 2019; PHA 2016a), including <i>Senecio vulgaris</i> , <i>Tussilago farfara</i> and <i>Petasites hybridus</i> (DBIF 2014) which are present throughout Australia (APNI 2020; PlantNet 2019). The species has similar dispersal potential to other leaf miners and can be spread on plants (PHA 2016a). <i>A. cognata</i> is distributed throughout Europe where climatic conditions are similar to regions in Australia. Therefore, <i>A. cognata</i> has	Yes. <i>Acidia cognata</i> feeds on Asteraceae, <i>Alstroemeria</i> , <i>Cucumis</i> and <i>Lycopersicon</i> spp., which are grown for vegetables, cut flowers and nursery stock in Australia (PHA 2016a; Sharman 1996). Larvae produce irregular blotches on plant leaves (Ellis 2019). The species together with other Dipteran leaf miners are known to inhabit glasshouse and flower market areas in Lithuania (Ostrauskas, Pakalniškis & Taluntytė 2005). Therefore, <i>A. cognata</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Aedes albopictus</i> (Skuse 1894) Synonym: <i>Aedes (Stegomyia) albopictus</i> (Skuse, 1894), <i>Culex albopictus</i> Skuse, 1894, <i>Stegomyia nigrizia</i> Ludlow, 1910, <i>Stegomyia quasignitria</i> Ludlow, 1911, <i>Stegomyia samarensis</i> Ludlow, 1903 [Culicidae] Asian tiger mosquito	Japan (ITIS 2018a), Indonesia, Italy, Malaysia, Mexico, Pakistan, Spain, Taiwan, Thailand, USA (GBIF Secretariat 2017), Argentina, Belgium, China, Colombia, Fiji, France, Greece, India, Israel, Madagascar, Marshall Islands, the Netherlands, New Zealand, Panama, Philippines, Singapore, South Africa, Sri Lanka, Switzerland and UK (CABI 2020b).	Present, the Torres Strait Islands and Qld (ABRS 2020; ECDC 2016; ITIS 2018a; van den Hurk et al. 2016).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	the potential to establish and spread in Australia. Yes. The genus <i>Aedes</i> is represented by several species in Australia, such as <i>Aedes notoscriptus</i> (ABRS 2020). Adult mosquitoes obtain energy by feeding on plant nectar and the adult female mosquitoes require blood to produce eggs. Although primarily a mammalian feeder, they will accept blood from a wide variety of hosts (GISD 2019). Therefore, <i>A. albopictus</i> has the potential to establish and spread in Australia.	consequences in Australia. Yes. <i>Aedes albopictus</i> can vector species of arboviruses, including yellow fever, dengue, chikungunya, Rift Valley fever and Zika viruses, which are responsible for public health problems around the world (Caglioti et al. 2013; Davies, Linthicum & James 1985; Linthicum, Davies & Kairo 1985; van den Hurk et al. 2016). <i>Aedes albopictus</i> is listed as one of the top 100 invasive species by the Invasive Species Specialist Group (GISD 2019). Therefore, <i>A. albopictus</i> has the potential to cause negative human health and economic consequences in Australia.	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)
<i>Aedes notoscriptus</i> (Skues, 1889) [Culicidae]	New Zealand, New Caledonia (ITIS 2018a), Indonesia, Papua New Guinea and USA (GBIF Secretariat 2017).	Present (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Aedes notoscriptus</i> is already present in Australia (ABRS 2020; Plant Health Australia 2020).	Yes. <i>Aedes</i> spp. can vector species of arboviruses, including yellow fever, dengue, chikungunya, Rift Valley fever and Zika viruses, which are	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					responsible for public health problems around the world (Caglioti et al. 2013; Davies, Linthicum & James 1985; Linthicum, Davies & Kairo 1985; van den Hurk et al. 2016). Therefore, <i>Aedes notoscriptus</i> has the potential to cause negative human health and economic consequences in Australia.	
<i>Aedes simpsoni</i> (Theobald 1905) [Culicidae]	Cameroon, Central African Republic, Ethiopia, Ghana, Kenya, Nigeria, Senegal, Sierra Leone, South Africa, Tanzania, and Uganda (CABI 2020b).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. The genus <i>Aedes</i> is represented by several species in Australia, such as <i>Aedes notoscriptus</i> (ABRS 2020). Therefore, <i>A. simpsoni</i> has the potential to establish and spread in Australia.	Yes. <i>Aedes simpsoni</i> is a vector of arboviruses, including yellow fever, dengue, chikungunya, Rift Valley fever and Zika viruses, which are responsible for public health problems around the world (Caglioti et al. 2013; Davies, Linthicum & James 1985; Linthicum, Davies & Kairo 1985). Therefore, <i>A. simpsoni</i> has the potential to cause negative human health and economic consequences in Australia.	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Allograpta hypoxantha</i> (Bezzi, 1923) Synonym: <i>Syrphus hypoxantha</i> (Bezzi, 1923) [Syrphidae]	Kenya, Madagascar, Tanzania and Uganda (Mengual et al. 2009).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. The genus <i>Allograpta</i> is represented by several species which are already present in Australia such as <i>Allograpta terraenovae</i> and <i>Allograpta notiale</i> (Mengual & Thompson 2015). <i>Allograpta hypoxantha</i> has established in regions with similar climatic conditions to Australia, such as New Zealand, increasing the risk to Australia. Therefore, <i>A. hypoxantha</i> has the potential to establish and spread in Australia.	Yes. Adult hoverflies feed on pollen and are considered effective pollinators. Their larvae are regarded as predators and feed on other arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Therefore, <i>Allograpta hypoxantha</i> are not regarded as plant pests of economic consequence, but their larvae have the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Allograpta ventralis</i> (Miller, 1921) [Syrphidae]	New Zealand (GBIF Secretariat 2017; ITIS 2018a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Allograpta ventralis</i> feeds on nectar and pollen, and is a predator of mealybugs (Mengual et al. 2009).	Yes. The genus <i>Allograpta</i> is represented by several species which are already present in Australia such as <i>Allograpta terraenovae</i> and <i>Allograpta notiale</i> (Mengual & Thompson 2015). <i>Allograpta ventralis</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>A. ventralis</i> has the potential to establish and spread in Australia.	Yes. Adult hoverflies feed on pollen and are considered effective pollinators. Their larvae are regarded as predators and feed on other arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Therefore, adult hoverflies are not regarded as plant pests of economic consequence, but their larvae have the potential to cause negative environmental	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Amauromyza labiatarum</i> (Hendel, 1920) [Agromyzidae]	France, UK (GBIF Secretariat 2017), Belgium, Italy and the Netherlands (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Amauromyza labiatarum</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Amauromyza labiatarum</i> has a wide plant host range which are found in Australia (APNI 2020), in plant families Liliaceae and Lamiaceae, including common herbs such as <i>Ajuga reptans</i> , <i>Melissa officinalis</i> , <i>Mentha pulegium</i> and <i>Salvia officinalis</i> (PHA 2016a; Pitkin et al. 2018). The species is distributed throughout Europe where climatic conditions are similar to regions in Australia. Therefore, <i>A. labiatarum</i> has the potential to establish and spread in Australia.	consequences in Australia. Yes. Herbs from the Lamiaceae family are grown throughout Australia both commercially and in back yards (ALA 2019). Therefore, <i>A. labiatarum</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Amauromyza chenopodivora</i> (Spencer, 1971) [Agromyzidae]	UK, the Netherlands (ITIS 2018a) and Belgium (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Amauromyza chenopodivora</i> is associated with foliage of <i>Alstroemeria</i> spp. (PHA 2016a).	Yes. <i>Amauromyza chenopodivora</i> feeds on <i>Alstroemeria</i> , <i>Amaranthus</i> and <i>Chenopodium</i> (PHA 2016a; Pitkin et al. 2018), which are present in Australia. The species is distributed throughout Europe where climatic conditions are similar to regions in Australia.	Yes. Plant species belonging to the <i>Alstroemeria</i> , <i>Amaranthus</i> and <i>Chenopodium</i> genera are naturalised or native plants in Australia (APNI 2020). When host plants are cultivated, grown in unnatural situations or in monocultures, leaf miners can build up populations	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Therefore, <i>A. chenopodivora</i> has the potential to establish and spread in Australia.	that are large enough to do serious damage (Ellis 2019). Therefore, <i>A. chenopodivora</i> has the potential to cause negative environmental consequences in Australia.	
<i>Amauromyza flavifrons</i> (Meigen, 1830) [Agromyzidae]	USA (ITIS 2018a), UK (GBIF Secretariat 2017), Belgium, France, Italy, the Netherlands and Spain (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Amauromyza flavifrons</i> is associated with foliage of <i>Dianthus</i> spp. (Ellis 2019).	Yes. <i>Amauromyza flavifrons</i> feeds on plants from the Caryophyllaceae and Chenopodiaceae species (Pitkin et al. 2018) which are present in Australia (APNI 2020). The species is distributed throughout Europe where climatic conditions are similar to regions in Australia. Therefore, <i>A. flavifrons</i> has the potential to establish and spread in Australia.	Yes. Larvae of <i>A. flavifrons</i> cause leaf mining damage on carnations and other host plants (Ellis 2019; Spencer 1973). Heavy infestations of <i>A. flavifrons</i> can reduce the number of flowers on carnations (Spencer 1973). Therefore, <i>A. flavifrons</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Amauromyza maculosa</i> (Malloch, 1913) Synonym: <i>Amauromyza (Annimyzella) maculosa</i> , <i>Nemorimyza maculosa</i> (Malloch, 1913), <i>Agromyza guaranitica</i> (Brèthes, 1920), <i>Phytobia</i>	Argentina, USA (ITIS 2018a), Chile, Colombia, Peru, the Netherlands and UK (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Amauromyza maculosa</i> is associated with foliage of <i>Chrysanthemum</i> spp. (PHA 2016a).	Yes. <i>Amauromyza maculosa</i> feeds on the leaves of marigold, chrysanthemum and <i>Aster</i> spp. (PHA 2016a) which are found throughout Australia (APNI 2020). The species has established in regions	Yes. The larvae of <i>Amauromyza maculosa</i> are leaf miners, causing large greenish-black blotches on leaves which are particularly destructive to young plants, resulting in reduced plant health and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>maculosa</i> (Malloch), <i>Nemorimyza maculosa</i> [Agromyzidae] Burdock leaf miner, Chrysanthemum leaf miner				with similar climatic conditions to Australia. Therefore, <i>A. maculosa</i> has the potential to establish and spread in Australia.	saleability (Spencer 1973). Therefore, <i>A. maculosa</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Atherigona orientalis</i> Schiner, 1868 Synonym: <i>Atherigona excisa</i> (Thomson), <i>Coenosia excisa</i> Thomson, 1869, <i>Acritochaeta pulvinata</i> Grimshaw, 1901 [Muscidae] Pepper fruit fly	Kenya (letter from KEPHIS on 29/01/2018), USA, Madagascar (ITIS 2018a), Colombia (GBIF Secretariat 2017), Argentina, British Virgin Islands, Chile, China, Ecuador, Egypt, Fiji, India, Indonesia, Israel, Japan, Kiribati, Malawi, Malaysia, Marshall Islands, Mauritius, Mexico, Nepal, Pakistan, New Caledonia, Panama, Papua New Guinea, Peru, Philippines, Pitcairn Island, Republic of Korea, Saudi Arabia, South Africa, Spain, Sri Lanka, Taiwan, Thailand, Tonga, Uganda, Tanzania, Vanuatu and Zimbabwe (CABI 2020a).	Present, NT and WA (ABRS 2020; Government of Western Australia 2017; Plant Health Australia 2020).	Australia has been notified that the species is on this pathway as a common pest in Kenya (Letter from KEPHIS on 29/01/2018).	Assessment not required	Assessment not required	No
<i>Betasyrphus adligatus</i> (Wiedemann, 1824)	Ethiopia, Kenya, Mauritania, South Africa, Tanzania (ITIS 2018a),	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Yes. The genus <i>Betasyrphus</i> is represented by several	Yes. Adult hoverflies feed on pollen and are considered effective	No.

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Synonym: <i>Syrphus adligatus</i> (Wiedemann, 1824), <i>Syrphus melas</i> Bezzi, 1915 [Syrphidae]	Malawi and Zimbabwe (GBIF Secretariat 2017).		consignments (unpublished).	species which are already present in Australia such as <i>Betasyrphus serarius</i> (Shah, Jan & Wachkoo 2014). <i>Betasyrphus adligatus</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>B. adligatus</i> has the potential to establish and spread in Australia.	pollinators. Their larvae are regarded as predators and feed on other arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Therefore, adult hoverflies are not regarded as plant pests of economic consequence, but larvae have the potential to cause negative environmental consequences in Australia.	Not a plant pest. Contaminating pest (predator)
<i>Bradysia tilicola</i> (Loew, 1850) Synonym: <i>Bradysia coprophila</i> (Comstock) [Sciaridae]	USA (GBIF Secretariat 2017), New Zealand and UK (ITIS 2018a).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. The genus <i>Bradysia</i> is represented by several species which are already present in Australia (Manners 2013). Fungus gnats have been reported on begonias, carnations, chrysanthemums, cyclamen, gerberas, asparagus, corn, cucumber and clover (Manners 2013) all naturalised or economically important plants in Australia (APNI 2020). <i>Bradysia tilicola</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>B. tilicola</i> has	Yes. Adult fungus gnats do not damage plants and their presence is primarily considered a nuisance (Batkhe & Dreistadt 2013). However, larvae will feed on plant material (Manners 2013), and in large numbers can damage roots and stunt plant growth, particularly in seedlings and young plants (Batkhe & Dreistadt 2013). <i>Bradysia</i> spp. are greenhouse pests and suitable production areas and host plants can be found in Australia (Manners 2013).	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				the potential to establish and spread in Australia.	Additionally, both adults and larvae can spread fungal diseases such as <i>Chalara</i> , <i>Botrytis</i> , <i>Pythium</i> , <i>Phytophthora</i> , <i>Fusarium</i> , <i>Rhizoctonia</i> and <i>Verticillium</i> (Manners 2013). Therefore, <i>B. tilicola</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Bradysia impatiens</i> (Johannsen, 1912) Synonym: <i>Sciara hardyi</i> Shaw, 1952, <i>Bradysia difformis</i> (Frey, 1948), <i>Bradysia agrestis</i> (Sasakawa, 1978), <i>Bradysia paupera</i> (Tuomikoski, 1960) [Sciaridae] Glasshouse black sciarid	USA and China (GBIF Secretariat 2017).	Present, NSW, ACT, SA, Qld and WA (ABRS 2020; Government of Western Australia 2017; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Cerodontha incisa</i> (Meigen, 1830) [Agromyzidae]	Italy, the Netherlands, UK, USA (GBIF Secretariat 2017), Greece, Iceland, Spain (Discover Life 2018) and Belgium (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Cerodontha incisa</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Cerodontha incisa</i> has a wide host range which are found in Australia, including <i>Cucumis</i> , <i>Lycopersicon</i> , <i>Lilium</i> and Poaceae (PHA 2016a; Pitkin et al. 2018).	Yes. <i>Cerodontha incisa</i> feeds on <i>Cucumis</i> , <i>Lycopersicon</i> , <i>Lilium</i> , Poaceae, barley, oats, rye and wheat (Spencer 1973), all naturalised or economically important	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<i>Cerodontha incisa</i> is distributed throughout Europe where climatic conditions are similar to regions in Australia. Therefore, <i>C. incisa</i> has the potential to establish and spread in Australia.	plants in Australia (APNI 2020). Therefore, <i>C. incisa</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Cerodontha lateralis</i> (Macquart, 1835) [Agromyzidae]	Japan, UK (Discover Life 2018), Belgium, France, the Netherlands and Spain (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Cerodontha lateralis</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Cerodontha lateralis</i> has a wide host range which are found in Australia, including <i>Cucumis</i> , <i>Lycopersicon</i> , <i>Lilium</i> , <i>Secale</i> , <i>Triticum</i> , <i>Poa</i> and <i>Hordeum</i> (PHA 2016a; Pitkin et al. 2018). <i>Cerodontha lateralis</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>C. lateralis</i> has the potential to establish and spread in Australia.	Yes. <i>Cerodontha lateralis</i> feeds on <i>Cucumis</i> , <i>Lilium</i> , <i>Lycopersicon</i> , <i>Secale</i> , <i>Triticum</i> , <i>Poa</i> and <i>Hordeum</i> (PHA 2016a; Pitkin et al. 2018), all naturalised or economically important plants in Australia (APNI 2020). <i>Cerodontha lateralis</i> is also capable of a rapid population build-up, which could result in a mass outbreak of leaf mining activity (Spencer 1973). Therefore, <i>C. lateralis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Cheilosia fasciata</i> (Schiner & Egger, 1853) [Syrphidae]	France (GBIF Secretariat 2017), Denmark and Germany (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Yes. Adult syrphid flies, also known as hoverflies or flower flies, hover around flowers and feed	Yes. Adult hoverflies feed on pollen and are considered effective pollinators. Their larvae	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
			consignments (unpublished).	on pollen and nectar. Their larvae feed on soft-bodied arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Hoverflies are established in areas with climatic conditions that are similar to Australia. Therefore, <i>C. fasciata</i> has the potential to establish and spread in Australia.	are regarded as predators and feed on other arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Therefore, <i>C. fasciata</i> has the potential to cause negative environmental consequences in Australia.	
<i>Chromatomyia horticola</i> (Goureau, 1851) Synonym: <i>Phytomyza nainiensis</i> (Garg, 1971), <i>Phytomyza subaffinis</i> (Malloch, 1914) [Agromyzidae] Pea leaf miner	Kenya (letter from KEPHIS on 29/01/2018), Egypt, Ethiopia, Japan, Madagascar, Morocco, South Africa (ITIS 2018a), Italy, Portugal, Spain, UK (GBIF Secretariat 2017), Belgium, China, France, India, Indonesia, Israel, Malaysia, Nepal, the Netherlands, Pakistan, Philippines, Republic of Korea, Switzerland, Taiwan, Thailand, Uganda, Vietnam (Dung & Giang 2007; Hoa, An & Takagi 2005; Tran 2009), Zimbabwe (CABI 2020a) and Iran (Fathi 2010).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Chromatomyia horticola</i> is associated with foliage of <i>Lilium</i> , <i>Helianthus</i> , <i>Dianthus</i> , <i>Chrysanthemum</i> and <i>Gerbera</i> spp. (DAFF 2013d; PHA 2016a). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Chromatomyia horticola</i> has a wide host range from 268 genera and 36 families including sunflower, pulses, carnations, chrysanthemum, gerbera, laurel, lavender, lily and rose (PHA 2016a), which are found in Australia (APNI 2020). The species is distributed throughout Europe, Asia and Africa where climatic conditions are similar to regions in Australia. Therefore, <i>C. horticola</i> has the potential to establish and spread in Australia.	Yes. <i>Chromatomyia horticola</i> larvae feed on sunflower, pulses, carnation, chrysanthemum, gerbera, laurel, lavender, lily and rose (PHA 2016a), all naturalised or economically important plants in Australia (APNI 2020). The species is highly polyphagous and poses a significant threat to Australian agriculture and horticulture (Malipatil & Ridland 2008). Therefore, <i>C. horticola</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Australia.	
<i>Coboldia fuscipes</i> (Meigen, 1830) [Scatopsidae] Oyster mushroom fly	New Zealand (MacFarlane et al. 2010), Colombia (Wolff, Nihei & De Carvalho 2016), Belgium, France, Greece, Italy, Portugal, Spain, Switzerland and the Netherlands (de Jong et al. 2019).	Present, ACT, NSW, Qld, SA, Vic. and WA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Contarinia jongi</i> (Kolesik, 2017) [Cecidomyiidae]	South America and the Netherlands (ABRS 2020; Kolesik et al. 2017).	Present, Qld and SA (ABRS 2020; Kolesik et al. 2017).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Contarinia maculipennis</i> (Felt, 1933) [Cecidomyiidae]	USA (ITIS 2018a), Japan (GBIF Secretariat 2017) and Thailand (van der Gaag et al. 2007).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished). <i>Contarinia maculipennis</i> is associated with cut flowers and foliage (Kolesik et al. 2017; Uechi et al. 2011).	Yes. <i>Contarinia maculipennis</i> is a polyphagous pest species that feeds on plants from over six different plant families which are found in Australia (APNI 2020), including Amaranthaceae, Oleaceae, Orchidaceae, Brassicaceae, Cucurbitaceae, Piperaceae and Solanaceae (Tokuda et al. 2002; Uechi et al. 2003; Uechi et al. 2011). The species is distributed throughout North	Yes. <i>Contarinia maculipennis</i> has been recorded to feed on a wide range of plant species in the families Amaranthaceae, Oleaceae, Orchidaceae, Brassicaceae, Cucurbitaceae, Piperaceae and Solanaceae (Tokuda et al. 2002; Uechi et al. 2003; Uechi et al. 2011), many of which are naturalised or economically important plants in Australia (APNI 2020).	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				America and Asia, where climatic conditions are similar to regions in Australia. Therefore, <i>C. maculipennis</i> has the potential to establish and spread in Australia.	Therefore, <i>C. maculipennis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Contarinia quinquenotata</i> (Low, 1888) [Cecidomyiidae]	UK (GBIF Secretariat 2017) and the Netherlands, Austria, Bulgaria, Czech Republic, Germany, Hungary, Latvia, Norway, Poland, Slovakia and Sweden (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Contarinia quinquenotata</i> is associated with cut flowers and foliage (Kolesik et al. 2017).	Yes. <i>Contarinia quinquenotata</i> feeds on <i>Hemerocallis</i> spp. which are found in Australia (APNI 2020; Ellis 2019). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>C. quinquenotata</i> has the potential to establish and spread in Australia.	Yes. <i>Contarinia quinquenotata</i> causes the flower buds of <i>Hemerocallis</i> to swell, distort and remain closed then dry up, which reduces the commercial quality of the plants and flowers (AHS 2012; Ellis 2019). <i>Hemerocallis</i> spp. are an important ornamental plant in Australia (APNI 2020). Therefore, <i>C. quinquenotata</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Culex quinquefasciatus</i> (Say, 1823) Synonym: <i>Culex (Culex) quinquefasciatus</i> (Say, 1823), <i>Culex fatigans</i> (Wiedemann 1828), <i>Culex</i>	Colombia, Mexico, Panama, Pakistan, USA (GBIF Secretariat 2017), American Samoa, Afghanistan, Argentina, British Virgin Islands, Cambodia, Chile, China,	Present, NSW, Qld, NT, WA, SA and Vic. (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Culex quinquefasciatus</i> is already present in Australia (ABRS 2020; Plant Health Australia 2020).	Yes. <i>Culex quinquefasciatus</i> is a vector species of animal and, or human biosecurity concern.	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>acer</i> (Walker 1848), <i>Culex macleayi</i> (Skuse 1889), <i>Culex skusii</i> (Giles 1900), <i>Culex quasilinealis</i> (Theobald, 1907), <i>Culex fuscus</i> (Taylor 1914), <i>Culex townsvillensis</i> (Taylor 1919) [Culicidae] Southern house mosquito	Ecuador, Ethiopia, Fiji, Greece, India, Indonesia, Iran, Japan, Kenya, Kiribati, Madagascar, Malaysia, Peru, Malawi, Marshall Islands, Mauritius, Nepal, New Caledonia, New Zealand, Papua New Guinea, Pitcairn Island, Philippines, Republic of Korea, Saudi Arabia, Sri Lanka, Singapore, South Africa, Taiwan, Tanzania, Thailand, Tonga, Uganda, United Arab Emirates, Vanuatu, Zimbabwe (CABI 2020b) and Vietnam (CABI 2020b; Houg et al. 2020; Hung et al. 2019).					
<i>Culicoides marksii</i> Lee & Reye, 1953 [Ceratopogonidae]	Papua New Guinea (Bellis & Dyce 2011).	Present, NSW and NT (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Culicoides marksii</i> is already present in Australia (ABRS 2020; Plant Health Australia 2020).	Yes. <i>Culicoides marksii</i> is a vector species of animal and, or human biosecurity concern.	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)
<i>Dasineura rhodophaga</i> (Coquillett, 1900) Synonym: <i>Neocerata rhodophaga</i> (Coquillett, 1900)	USA (ITIS 2018a) and China (Dong, Yang & Yang 2000).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Dasineura rhodophaga</i> is associated with flowers of <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Dasineura rhodophaga</i> is associated with <i>Rosa</i> spp. (PHA 2016a), which are found in Australia (APNI 2020), <i>Dasineura rhodophaga</i> has established in regions	Yes. <i>Dasineura rhodophaga</i> causes aborted or distorted flower buds in roses (PHA 2016a) which are economically important plants in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Cecidomyiidae]				with similar climatic conditions to Australia. Therefore, <i>D. rhodophaga</i> has the potential to establish and spread in Australia.	Therefore, <i>D. rhodophaga</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Desmometopa interfrontalis</i> (Sabrosky, 1965) [Milichiidae]	Uganda and Tanzania (ITIS 2018a).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. The genus <i>Desmometopa</i> is represented by several species which are already present in Australia (ABRS 2020; ALA 2019). This pest is present in East Africa where climatic conditions are similar to some regions in Australia. Adult female <i>Desmometopa</i> spp. are kleptoparasitic, feeding on honeybees attacked or freshly killed by spiders (Brake 2019; Heiduk et al. 2016). They also feed on honeydew produced by aphids (Brake 2019). Therefore, <i>D. interfrontalis</i> has the potential to establish and spread in Australia.	No. <i>Desmometopa interfrontalis</i> are freeloader flies and the female adult flies steal food, such as dead or dying honeybees from predatory arthropods, such as spiders (Heiduk et al. 2016). <i>Desmometopa</i> adults also feed on honeydew (Brake 2019). However, there is no evidence this is a plant pest species.	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)
<i>Desmometopa m-nigrum</i> (Zetterstedt, 1848) [Milichiidae]	Madagascar (ITIS 2018a) and Israel (Mumcuoglu & Braverman 2010).	Present, NSW and WA (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Desmometopa m-nigrum</i> is already present in Australia (ABRS 2020).	Yes. <i>Desmometopa m-nigrum</i> is a vector species of animal and, or human biosecurity concern.	No. Not a plant pest. Contaminating pest (vector of

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
						human and/or animal disease)
<i>Desmometopa varipalpis</i> (Malloch, 1927) [Milichiidae]	Madagascar (ITIS 2018a), Portugal, USA (GBIF Secretariat 2017) and Saudi Arabia (Dawah & Abdullah 2007).	Present, NSW, NT, and WA (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Desmometopa varipalpis</i> is already present in Australia (ABRS 2020).	Yes. <i>Desmometopa varipalpis</i> is a vector species of animal and, or human biosecurity concern.	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)
<i>Drosophila busckii</i> (Coquillett, 1901) Synonym: <i>Drosophila plurilineata</i> (Villeneuve, 1911), <i>Drosophila rubrostriata</i> (Becker, 1908) [Drosophilidae]	USA (ITIS 2018a), France, Portugal, South Africa, UK (GBIF Secretariat 2017), Iran, (CABI 2020a), Greece, Italy, Japan, Nepal, New Zealand, Republic of Korea and Sri Lanka (Discover Life 2018).	Present, NSW, Qld, SA, Vic., WA and Tas. (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Drosophila (Sophophora) melanogaster</i> Meigen, 1830 Synonym: <i>Drosophila melanogaster</i> Meigen, 1830, <i>Drosophila ampelophila</i> Loew, 1862, <i>Drosophila balteata</i> Bergroth, 1894 [Drosophilidae]	Cosmopolitan (ABRS 2020).	Present, widespread (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Eristalis tenax</i> (Linnaeus, 1758) [Syrphidae]	New Zealand, USA (ITIS 2018a), France, Portugal, Spain, UK, Chile, Colombia, Greece, Mexico, the Netherlands, South	Present (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Africa (GBIF Secretariat 2017), Argentina, China, Ethiopia, India, Italy, Morocco and Pakistan (CABI 2020a).					
<i>Forcipomyia pulcherrima</i> (Santos Abreu, 1918) [Ceratopogonidae]	Egypt, Japan (Szadziewski, Gwizdalska-Kentzer & Gilka 2011), Algeria, Tunisia, Spain, Israel, Lebanon, Saudi Arabia, United Arab Emirates, China, Malaysia, Taiwan and USA (Alwin-Kownacka, Szadziewski & Szwedo 2016; Grogan, Hribar & Howarth 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Forcipomyia pulcherrima</i> was introduced into and established in the USA (Grogan, Hribar & Howarth 2013), where climatic conditions are similar to parts of Australia. <i>Forcipomyia</i> spp. are vertebrate blood-feeding biting midges (Navai, Dominiak & Szadziewski 2017). Species of <i>Forcipomyia</i> are also present in Australia (APNI 2020). Therefore, <i>F. pulcherrima</i> has the potential to establish and spread in Australia.	Yes. <i>Forcipomyia</i> spp. have not been recorded to cause damage to plants or cause a reduction in crop yield. However, <i>Forcipomyia</i> spp. are biting midges and may cause negative human health consequences (Chen et al. 2005; Lee et al. 2014).	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)
<i>Hydrellia tritici</i> (Fallen, 1813) [Ephydriidae]	New Zealand and USA (Hawaii)(Mathis & Wirth 1981)	Present, ACT, NSW, Qld, SA, Tas., Vic. and WA (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Liriomyza bryoniae</i> (Kaltenbach, 1858)	Egypt, France, Greece, Israel, Morocco, Portugal (GBIF Secretariat 2017),	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza bryoniae</i> is associated with foliage of	Yes. <i>Liriomyza bryoniae</i> is a highly polyphagous species that feeds on	Yes. <i>Liriomyza bryoniae</i> feeds on sunflower, pulses, carnation,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Agromyzidae]	Belgium, China, India, Indonesia, Italy, Japan, Nepal, Republic of Korea, Spain, Taiwan, UK, (CABI 2020a), Vietnam (Andersen, Tran & Nordhus 2008; CABI 2020a; Tran 2009) and the Netherlands (EPPO 2020).		<i>Alstroemeria</i> , <i>Rosa</i> and <i>Lilium</i> spp. (PHA 2016a).	plants which are found in Australia (APNI 2020), including capsicum, <i>Cucumis</i> spp., watermelon, honeydew, rock melon, tomato, mustard, cabbage, eggplant, <i>Alstroemeria</i> , <i>Lilium</i> and <i>Rosa</i> spp. (Malipatil & Ridland 2008; PHA 2016a). <i>Liriomyza bryoniae</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>L. bryoniae</i> has the potential to establish and spread in Australia.	chrysanthemum, gerbera, laurel, lavender, lily and rose (Malipatil & Ridland 2008), all naturalised or economically important plants in Australia (Horticulture Innovation Australia 2019c). <i>Liriomyza bryoniae</i> is a highly polyphagous species that poses a significant threat to Australian agriculture and horticulture (Malipatil & Ridland 2008). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. bryoniae</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza cepae</i> (Hering, 1927) [Agromyzidae]	Japan, Taiwan (ITIS 2018a), Spain (GBIF Secretariat 2017), Germany, Hungary, the Netherlands, Belgium, and France (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza cepae</i> is associated with foliage of <i>Allium</i> spp. (Ellis 2019).	Yes. <i>Liriomyza cepae</i> feeds on <i>Allium</i> spp., in particular leeks and onions (Ellis 2019). <i>Allium</i> spp. are permitted cut flowers (DAWR 2019a). <i>Liriomyza cepae</i> has established in regions with similar climatic	Yes. <i>Liriomyza cepae</i> feeds on <i>Allium</i> spp. in particular leeks and onions (Ellis 2019), which are naturalised or economically important plants in Australia (APNI 2020). The larvae of <i>L. cepae</i> feeds on leaves	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				conditions to Australia. Therefore, <i>L. cepae</i> has the potential to establish and spread in Australia.	and can seriously interfere with the transport of plant nutrients (Spencer 1973). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. cepae</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza chinensis</i> (Kato, 1949) [Agromyzidae]	China (ITIS 2018a), Malaysia, Singapore (GBIF Secretariat 2017), France, Republic of Korea (CABI 2020a) and Vietnam (Tran 2009).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza chinensis</i> is associated with foliage of <i>Allium</i> spp. (Ellis 2019).	Yes. <i>Liriomyza chinensis</i> feeds on plants that are found in Australia (APNI 2020), including <i>Allium</i> spp. (Ellis 2019), and crops such as beans, tomatoes, watermelon, celery and onions (Johnson 1993; Ledieu & Helyer 1985). Since the puparia of <i>L. chinensis</i> can lodge on the skins of onion bulbs, it can be transported and spread easily (Malipatil & Ridland 2008). <i>L. chinensis</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>L. chinensis</i> has the	Yes. <i>Liriomyza chinensis</i> feeds on <i>Allium</i> spp. (Ellis 2019), and causes significant reduction in yield to crops such as beans, tomatoes, watermelon, celery and onions (Johnson 1993; Ledieu & Helyer 1985), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>Liriomyza chinensis</i> causes damage to plant leaves which reduces the rate of photosynthesis (Tran & Takagi 2005). Exotic <i>Liriomyza</i> spp. are also	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.	national priority pests (DAWR 2017b). Therefore, <i>L. chinensis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza congesta</i> (Becker, 1903) [Agromyzidae]	India, USA (ITIS 2018a), UK, Spain, Italy, the Netherlands, France (GBIF Secretariat 2017), Egypt (Ebadah, Mahmoud & Moawad 2006), Japan (CABI 2020a) and Belgium (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza congesta</i> is associated with foliage of <i>Dianthus</i> , <i>Lilium</i> and <i>Gerbera</i> spp. (PHA 2016a).	Yes. <i>Liriomyza congesta</i> feeds on plants which are found in Australia, including Brassicaceae, Fabaceae, <i>Cucumis</i> , <i>Dianthus</i> , <i>Lilium</i> , <i>Solanum</i> , <i>Gerbera</i> spp., laurels and lavender (PHA 2016a). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>L. congesta</i> has the potential to establish and spread in Australia.	Yes. <i>Liriomyza congesta</i> feeds on Brassicaceae, Fabaceae, <i>Cucumis</i> , <i>Dianthus</i> , <i>Lilium</i> , <i>Gerbera</i> spp., laurels, lavender and tomato (PHA 2016a), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. congesta</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Liriomyza cyclaminis</i> (Suss, 1987) [Agromyzidae]	Italy (ITIS 2018a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza cyclaminis</i> is associated with foliage of <i>Cyclamen</i> spp. (Ellis 2019).	Yes. <i>Liriomyza cyclaminis</i> feeds on Primulaceae plant hosts, which are found in Australia (APNI 2020; Ellis 2019). The species is established in	Yes. <i>Liriomyza cyclaminis</i> larvae feed on Primulaceae hosts (Ellis 2019). Species belonging to the Primulaceae family include <i>Aegiceras</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Italy, which has a similar climatic condition to parts of Australia. Therefore, <i>L. cyclaminis</i> has the potential to establish and spread in Australia.	<i>corniculatum</i> , which are native river mangrove plants in Australia (APNI 2020). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. cyclaminis</i> has the potential to cause negative environmental consequences in Australia.	
<i>Liriomyza huidobrensis</i> (Blanchard, 1926) Synonym: <i>Agromyza huidobrensis</i> (Blanchard, 1926) <i>Liriomyza cucumifoliae</i> (Blanchard, 1938) <i>Liriomyza dianthi</i> (Frick, 1958) <i>Liriomyza langei</i> (Frick, 1951) [Agromyzidae] Serpentine leaf miner	Kenya (letter from KEPHIS on 29/01/2018), Ecuador (letter from Agrocalidad on 15/02/2018), Colombia (ICA 2017), India, Thailand, Japan, Taiwan (Ali et al. 2016), USA (ITIS 2018a), Chile, Italy, Mexico, Peru, Portugal, Republic of Korea (GBIF Secretariat 2017), Belgium, China, France, Greece, Indonesia, Israel, Malaysia, Mauritius, Morocco, the Netherlands, Panama, Philippines, Saudi Arabia, Singapore, South Africa, Spain, Sri Lanka, Switzerland, UK (CABI 2020a), Argentina,	Present, NSW and Qld. <i>Liriomyza huidobrensis</i> was detected in Western Sydney NSW in October 2020. <i>Liriomyza huidobrensi</i> remains a quarantine pest for Australia pending decisions on further action by Australian states and territories regarding official control status (NSW DPI 2020a).	<i>Liriomyza huidobrensis</i> is associated with foliage of <i>Lilium</i> , <i>Chrysanthemum</i> and <i>Dianthus</i> spp. (Ali et al. 2016; DAFF 2013d; ICA 2017; MPI 2016; PHA 2016a). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Liriomyza huidobrensis</i> feeds on plants which are found in Australia (APNI 2020), including <i>Solanum</i> , <i>Dianthus</i> , <i>Chrysanthemum</i> , <i>Cucumis</i> , <i>Gerbera</i> , <i>Gypsophila</i> , <i>Lisianthus</i> spp., lettuce, and ragworts (Malipatil & Ridland 2008). <i>L. huidobrensis</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>L. huidobrensis</i> has the potential to establish and spread in Australia.	Yes. <i>Liriomyza huidobrensis</i> is a highly polyphagous species that poses a significant threat to Australian agriculture and horticulture (Malipatil & Ridland 2008). The species feeds on capsicum, carnations, chrysanthemums, <i>Cucumis</i> , <i>Gerbera</i> , <i>Gypsophila</i> and <i>Lisianthus</i> spp., lettuces, tomatoes and ragworts (Malipatil & Ridland 2008), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Exotic <i>Liriomyza</i> spp. are also national	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Zimbabwe (EPPO 2020) and Vietnam (Tran 2009).				priority pests (DAWR 2017b). Therefore, <i>L. huidobrensis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza phryne</i> (Hendel, 1931) [Agromyzidae]	Italy, the Netherlands and UK (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza phryne</i> is associated with foliage of <i>Lilium</i> and <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Liriomyza phryne</i> feeds on plants which are found in Australia, including <i>Cucumis</i> , <i>Solanum</i> , <i>Lilium</i> and <i>Rosa</i> spp. (PHA 2016a). <i>Liriomyza phryne</i> has established in regions with similar climatic conditions to parts of Australia. Therefore, <i>L. phryne</i> has the potential to establish and spread in Australia.	Yes. <i>Liriomyza phryne</i> feeds on capsicum, tomato, roses <i>Cucumis</i> and <i>Lilium</i> spp. (PHA 2016a), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Additionally, <i>Liriomyza</i> spp. cause significant reduction in yield to other commonly grown crops in Australia such as beans, tomatoes, watermelon, celery and green onions (Johnson 1993; Ledieu & Helyer 1985). Exotic <i>Liriomyza</i> spp. are also Australian national priority pests (DAWR 2017b). Therefore, <i>L. phryne</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Australia.	
<i>Liriomyza ptarmicae</i> (Meijere, 1925) [Agromyzidae]	France, UK and USA (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza ptarmicae</i> is associated with foliage of <i>Alstroemeria</i> and <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Liriomyza ptarmicae</i> feeds on plants which are found in Australia (APNI 2020), including <i>Lycopersicon</i> , <i>Rosa</i> and <i>Alstroemeria</i> spp. (PHA 2016a). <i>Liriomyza ptarmicae</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>L. ptarmicae</i> has the potential to establish and spread in Australia.	Yes. <i>Liriomyza ptarmicae</i> feeds on roses, <i>Lycopersicon</i> and <i>Alstroemeria</i> spp. (PHA 2016a), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Additionally, <i>Liriomyza</i> spp. cause significant reduction in yield to other commonly grown crops in Australia such as beans, tomatoes, watermelon, celery and green onions (Johnson 1993; Ledieu & Helyer 1985). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. ptarmicae</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Liriomyza sativae</i> (Blanchard, 1938) [Agromyzidae]	Vietnam (Tran 2009), New Caledonia, USA (ITIS 2018a), Chile, Japan, Republic of Korea (GBIF	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza sativae</i> is associated with foliage of cut flower species (Ali et al. 2016).	Yes. <i>Liriomyza sativae</i> feeds on plants from three main families which are found in Australia, the	Yes. <i>Liriomyza sativae</i> feeds on Cucurbitaceae, Solanaceae and Leguminosae (Spencer	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Vegetable leaf miner	Secretariat 2017), American Samoa, Argentina, Chile, China, Colombia, Egypt, India, Indonesia, Iran, Israel, Kenya, Malaysia, Mexico, the Netherlands, Panama, Papua New Guinea, Peru, Sri Lanka, Thailand, UK, Vanuatu, Vietnam and Zimbabwe (CABI 2020b).			Cucurbitaceae, Leguminosae and Solanaceae (Spencer 1973). <i>Liriomyza sativae</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>L. sativae</i> has the potential to establish and spread in Australia.	1973), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Additionally, <i>Liriomyza</i> spp. cause significant reduction in yield to other commonly grown crops in Australia such as beans, tomatoes, watermelon, celery and green onions (Johnson 1993; Ledieu & Helyer 1985). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. sativae</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza soror</i> (Hendel, 1931) [Agromyzidae]	UK (GBIF Secretariat 2017) and Greece (Discover Life 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza soror</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Liriomyza soror</i> feeds on plants that are found in Australia including <i>Solanum</i> , <i>Cucumis</i> , <i>Lilium</i> spp., and laurel and lavender (PHA 2016a). <i>Liriomyza soror</i> has established in regions with similar climatic conditions to Australia.	Yes. <i>Liriomyza soror</i> feeds on capsicum, <i>Lilium</i> , <i>Cucumis</i> spp., tomato, laurel and lavender (PHA 2016a), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Additionally,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Therefore, <i>L. soror</i> has the potential to establish and spread in Australia.	<i>Liriomyza</i> spp. cause significant reduction in yield to other commonly grown crops in Australia such as beans, tomatoes, watermelon, celery and green onions (Johnson 1993; Ledieu & Helyer 1985). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. soror</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza strigata</i> (Meigen, 1830) [Agromyzidae]	India (ITIS 2018a), China, Fiji, France, Italy, Singapore, UK (GBIF Secretariat 2017) and Spain (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza strigata</i> is associated with foliage of <i>Dianthus</i> spp. (PHA 2016a).	Yes. <i>Liriomyza strigata</i> is a highly polyphagous species that feeds on many crops as well as ornamental species which are found in Australia, including <i>Dianthus</i> , <i>Solanum</i> and <i>Cucumis</i> spp. (PHA 2016a). <i>Liriomyza strigata</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>L. strigata</i> has the potential to establish and spread in Australia.	Yes. <i>Liriomyza strigata</i> feeds on carnation, tomato and <i>Cucumis</i> spp. (PHA 2016a), all naturalised or economically important plants in Australia (APNI 2020). Additionally, <i>Liriomyza</i> spp. cause significant reduction in yield to other commonly grown crops in Australia such as beans, tomatoes, watermelon, celery and green onions (Johnson 1993; Ledieu & Helyer	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					1985). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. strigata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza taraxaci</i> (Hering, 1927) [Agromyzidae]	USA (ITIS 2018a), France and UK (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza taraxaci</i> is associated with foliage of <i>Dianthus</i> spp. <i>Rosa</i> and <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Liriomyza taraxaci</i> feeds on plants which are found in Australia, including Brassicaceae, <i>Solanum</i> , <i>Cucumis</i> , <i>Rosa</i> and <i>Lilium</i> spp. (PHA 2016a). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>L. taraxaci</i> has the potential to establish and spread in Australia.	Yes. <i>Liriomyza taraxaci</i> feeds on Brassicaceae, capsicum, <i>Cucumis</i> spp., tomato, <i>Lilium</i> spp. and rose (PHA 2016a), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Additionally, <i>Liriomyza</i> spp. cause significant reduction in yield to other commonly grown crops in Australia such as beans, tomatoes, watermelon, celery and green onions (Johnson 1993; Ledieu & Helyer 1985). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. taraxaci</i> has the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					potential to cause negative economic and environmental consequences in Australia.	
<i>Liriomyza trifolii</i> (Burgess, 1880) Synonym: <i>Agromyza phaseolunata</i> (Frost, 1943) <i>Liriomyza alliovora</i> (Frick, 1955) <i>Oscinis trifolii</i> (Burgess, 1880) [Agromyzidae]	Kenya (Letter from KEPHIS on 29/01/2018), Colombia (ICA 2017), India, China Japan, Taiwan (Ali et al. 2016), USA (ITIS 2018a), American Samoa, Belgium, British Virgin Islands, Chile, Egypt, Ethiopia, France, Greece, Indonesia, Iran, Israel, Italy, Peru, Madagascar, Mauritius, Mexico, Morocco, Portugal, the Netherlands, Philippines, Republic of Korea, Saudi Arabia, South Africa, Spain, Switzerland, Tanzania, Tonga, UK, United Arab Emirates, Zimbabwe (CABI 2020b) and Vietnam (Andersen, Tran & Nordhus 2008; CABI 2020a; Hoa, An & Takagi 2005).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Liriomyza trifolii</i> is associated with foliage of <i>Chrysanthemum</i> , <i>Dianthus</i> , <i>Dahlia</i> , <i>Gerbera</i> , <i>Alstroemeria</i> and <i>Verbena</i> spp. (Ali et al. 2016; DAFF 2013d; ICA 2017; MPI 2016; PHA 2016a).	Yes. <i>Liriomyza trifolii</i> feeds on a wide range of plants which are found in Australia, including <i>Chrysanthemum</i> , <i>Dianthus</i> , <i>Aster</i> , <i>Zinnia</i> , <i>Alstroemeria</i> , <i>Gypsophila</i> , <i>Gerbera</i> , <i>Begonia</i> , <i>Dahlia</i> , <i>Impatiens</i> , <i>Tagetes</i> , <i>Verbena</i> and marigold spp. (Ali et al. 2016; DAFF 2013d; ICA 2017; MPI 2016; PHA 2016a). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>L. trifolii</i> has the potential to establish and spread in Australia.	Yes. <i>Liriomyza trifolii</i> feeds on chrysanthemum, carnation, <i>Aster</i> , <i>Zinnia</i> , <i>Alstroemeria</i> , <i>Gypsophila</i> , <i>Gerbera</i> , <i>Begonia</i> , <i>Dahlia</i> , marigold and <i>Verbena</i> spp., which are all naturalised or economically important plants in Australia (APNI 2020). <i>Liriomyza trifolii</i> is a serious threat because of its polyphagous feeding habits which facilitates year-round survival via successive crops (Ledieu & Helyer 1985). Exotic <i>Liriomyza</i> spp. are also national priority pests (DAWR 2017b). Therefore, <i>L. trifolii</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Megaselia scalaris</i> (Loew, 1866) [Phoridae]	USA (ITIS 2018a), China, Colombia, Panama, Peru (GBIF Secretariat 2017), India, Italy, Malaysia, Mexico, Pakistan, Tanzania, Philippines, Thailand (CABI 2020a) and New Zealand (Discover Life 2018).	Present (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Megaselia scalaris</i> is already present in Australia (ABRS 2020; Plant Health Australia 2020).	Yes. <i>Megaselia scalaris</i> is a vector species of animal and, or human biosecurity concern.	No. Not a plant pest. Contaminating pest (vector of human and/or animal disease)
<i>Melanagromyza pubescens</i> (Hendel, 1923) [Agromyzidae]	UK, Zimbabwe (GBIF Secretariat 2017), Greece (Discover Life 2018), Belgium and Italy (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Melanagromyza pubescens</i> is associated with <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Melanagromyza pubescens</i> feeds on plants which are found in Australia, including <i>Solanum</i> , <i>Cucumis</i> , <i>Lycopersicon</i> and <i>Lilium</i> spp. (PHA 2016a). <i>M. pubescens</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>M. pubescens</i> has the potential to establish and spread in Australia.	Yes. <i>Melanagromyza pubescens</i> feeds on capsicum, <i>Cucumis</i> , <i>Lycopersicon</i> and <i>Lilium</i> spp. (PHA 2016a), which are all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Leaf miners are principally plant feeders with the majority of the species laying their eggs within the layers of the leaf, the stems, roots and flower heads of the host plant (Braun et al. 2008; Pitkin et al. 2018). Once hatched, the larvae ‘mine’ the leaf or stem as they feed on living plant tissue (PHA 2016a). Exotic <i>Liriomyza</i> spp. are also national priority pests	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					(DAWR 2017b). Therefore, <i>M. pubescens</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Melanostoma mellinum</i> (Linnaeus, 1758) [Syrphidae]	Italy, the Netherlands, UK (CABI 2020a), Spain, France, USA (GBIF Secretariat 2017), Portugal, Morocco and Iran (Ghahari et al. 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Adult <i>Melanostoma mellinum</i> feed on the pollen of grasses (Poaceae) and other wind-pollinated plants (GBIF Secretariat 2018) which are found in Australia (APNI 2020). <i>Melanostoma mellinum</i> is also an aphid predator (Hulle, Turpeau & Chaubet 2018), so suitable hosts can be found in Australia. This species has established in regions with similar climatic conditions to Australia. Therefore, <i>M. mellinum</i> has the potential to establish and spread in Australia.	Yes. Adult hoverflies feed on pollen and are considered effective pollinators. Their larvae are regarded as predators and feed on other arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Therefore, <i>Melanostoma mellinum</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Ophiomyia cunctata</i> (Hendel, 1920) [Agromyzidae]	France, Spain, UK (GBIF Secretariat 2017), Italy and the Netherlands (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Ophiomyia cunctata</i> is associated with <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Ophiomyia cunctata</i> feeds on plants which are found in Australia (APNI 2020), including Asteraceae, <i>Cucumis</i> , <i>Lycopersicon</i> and <i>Lilium</i>	Yes. <i>Ophiomyia cunctata</i> feeds on Asteraceae, <i>Cucumis</i> , <i>Lycopersicon</i> and <i>Lilium</i> spp. (Ellis 2009; PHA 2016a), all naturalised or	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				spp. (Ellis 2019; PHA 2016a). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>O. cunctata</i> has the potential to establish and spread in Australia.	economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Leaf miners are principally plant feeders with the majority of the species laying their eggs within the layers of the leaf, the stems, roots and flower heads of the host plant (Braun et al. 2008; Pitkin et al. 2018). Once hatched, the larvae 'mine' the leaf or stem as they feed on living plant tissue (PHA 2016a). Therefore, <i>O. cunctata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Phytoliriomyza arctica</i> (Lundbeck, 1901) [Agromyzidae]	UK, Greece, Italy, Portugal, Spain, Switzerland (Pitkin et al. 2018), USA (GBIF Secretariat 2017), Chile (Sasakawa 1994), Nepal (Sasakawa 2007) and Sri Lanka (Wijesekara 2002).	Present (Pitkin et al. 2018).	<i>Phytoliriomyza arctica</i> is associated with foliage of <i>Dianthus</i> spp. (PHA 2016a).	Assessment not required	Assessment not required	No
<i>Phytoliriomyza dorsata</i> (Siebke, 1864)	Widespread in continental Europe, including the UK, France	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytoliriomyza dorsata</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Phytoliriomyza dorsata</i> feeds on plants which are found in	Yes. <i>Phytoliriomyza dorsata</i> is a polyphagous pest feeding plant species	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Agromyzidae]	(Pitkin et al. 2018), Spain, USA (Zlobin 2005), Turkey (Cikman & Clvelek 2005), Iran (Shahreki, Rakhshani & Sasakawa 2012), Portugal and Japan (Cerny et al. 2018).			Australia (APNI 2020), including <i>Solanum</i> , <i>Cucumis</i> , <i>Lycopersicon</i> and <i>Lilium</i> spp. (PHA 2016a). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>P. dorsata</i> has the potential to establish and spread in Australia.	including <i>Solanum</i> , <i>Cucumis</i> , <i>Lycopersicon</i> and <i>Lilium</i> spp. which are found in Australia (PHA 2016a). Leaf miners are principally plant feeders with the majority of the species laying their eggs within the layers of the leaf, the stems, roots and flower heads of the host plant (Braun et al. 2008; Pitkin et al. 2018). Once hatched, the larvae 'mine' the leaf or stem as they feed on living plant tissue (PHA 2016a). Therefore, <i>P. dorsata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Phytomyza dianthicola</i> (Ciampolini 1949) Synonym: <i>Paraphytomyza dianthicola</i> [Agromyzidae]	Italy and Belgium (Spencer 1966).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytomyza dianthicola</i> is associated with foliage of <i>Dianthus</i> spp. (Spencer 1973).	Yes. <i>Phytomyza dianthicola</i> is a pest of carnations (Spencer 1973) which are also found in Australia (APNI 2020). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>P. dianthicola</i> has the potential to	Yes. <i>Phytomyza dianthicola</i> is described as a pest of cultivated carnations (Spencer 1966). Commercial losses occur due to reduced flower production, petal discolouration and reduced vase life (Spencer 1973). Therefore, <i>P. dianthicola</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				establish and spread in Australia.	has the potential to cause negative economic consequences in Australia.	
<i>Phytomyza aquilegiae</i> (Hardy, 1849) [Agromyzidae] Columbine leaf miner	Widespread in continental Europe, including the UK, Belgium, the Netherlands, France, Switzerland and Afghanistan (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytomyza aquilegiae</i> is associated with foliage of <i>Thalictrum</i> spp. (Ellis 2019; Pitkin et al. 2018).	Yes. <i>Phytomyza aquilegiae</i> are oligophagous feeding on Ranunculaceae species particularly Columbines and Meadow-rue (Ellis 2019; Pitkin et al. 2018), which are also found in Australia (APNI 2020). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>P. aquilegiae</i> has the potential to establish and spread in Australia.	Yes. <i>Phytomyza aquilegiae</i> is a plant pest of <i>Thalictrum</i> spp., common ornamental plants grown in Australia (APNI 2020). The larvae of <i>P. aquilegiae</i> form mines in the leaves that can turn into a large blotch on the leaf surface which often destroys the leaves, considerably weakening the plants (Pitkin et al. 2018; Spencer 1973). Therefore, <i>P. aquilegiae</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Phytomyza fallaciosa</i> (Brischke, 1881) [Agromyzidae]	Widespread and common in much of Europe including the UK, Iceland, Italy, the Netherlands, (Pitkin et al. 2018), Belgium (Mortelmans, Dekeukeleire & Baugee 2013), France, Portugal,	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytomyza fallaciosa</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Phytomyza fallaciosa</i> are polyphagous associated with <i>Lilium</i> (PHA 2016a) and Ranunculaceae spp. (Ellis 2019), which are also found in Australia (APNI 2020). The species has established in regions	Yes. <i>Phytomyza fallaciosa</i> feeds upon plant species of <i>Lilium</i> and Ranunculaceae, common ornamental plants grown in Australia (APNI 2020). Leaf miners are principally plant feeders with the majority of the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Greece and Switzerland (Cerny et al. 2018).			with similar climatic conditions to Australia. Therefore, <i>P. fallaciosa</i> has the potential to establish and spread in Australia.	species laying their eggs within the layers of the leaf, the stems, roots and flower heads of the host plant (Braun et al. 2008; Pitkin et al. 2018). Once hatched, the larvae ‘mine’ the leaf or stem as they feed on living plant tissue (PHA 2016a). Therefore, <i>P. fallaciosa</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Phytomyza gymnostoma</i> (Loew, 1858) [Agromyzidae] Onion leaf miner	UK, France, Italy, Spain, the Netherlands (Pitkin et al. 2018), Greece, Portugal, Morocco, Switzerland (Cerny et al. 2018) and restricted distribution in USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytomyza gymnostoma</i> is associated with foliage of <i>Allium</i> spp. (Ellis 2019; Pitkin et al. 2018).	Yes. <i>Phytomyza gymnostoma</i> is a known pest of <i>Allium</i> spp. (Ellis 2019; Pitkin et al. 2018) which are also found in Australia (APNI 2020). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>P. gymnostoma</i> has the potential to establish and spread in Australia.	Yes. <i>Phytomyza gymnostoma</i> is a high priority pest for the onion industry (PHA 2016c, 2018). The larvae of this species mine leaves and bulb, making the plants soft and susceptible to bacterial and fungal infections whilst heavy infestations completely destroy plants (Simoglou et al. 2008). Therefore, <i>P. gymnostoma</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Phytomyza ilicis</i> (Curtis, 1846) [Agromyzidae] Holly leaf miner	Common and widespread across continental Europe including the UK, the Netherlands, Belgium Italy, Switzerland, USA (Pitkin et al. 2018) and France (Cameron 1939).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Phytomyza ilicis</i> is a pest of <i>Ilex</i> spp. (Ellis 2019), which is also found in Australia (APNI 2020). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>P. ilicis</i> has the potential to establish and spread in Australia.	Yes. <i>Phytomyza ilicis</i> is a pest of <i>Ilex</i> spp. (Ellis 2019), common ornamental and naturalised plants in Australia (APNI 2020). The larvae of this species burrow through plant foliage causing physical and cosmetic damage reducing plant health and commercial value (Cameron 1939). Therefore, <i>P. ilicis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Phytomyza lappae</i> (Goureau, 1851) [Agromyzidae]	UK, the Netherlands, Belgium (Pitkin et al. 2018), Japan (Sasakawa 1961) and Iran (Hazini et al. 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytomyza lappae</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Phytomyza lappae</i> is a plant pest of <i>Lilium</i> (PHA 2016a) and Asteraceae spp. (Ellis 2019), which are common plants present in Australia (APNI 2020). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>P. lappae</i> has the potential to establish and spread in Australia.	Yes. <i>Phytomyza lappae</i> is plant pest of <i>Lilium</i> (PHA 2016a) and Asteraceae spp. (Ellis 2019), common ornamental and naturalised plants in Australia (APNI 2020). Leaf miners are principally plant feeders with the majority of the species laying their eggs within the layers of the leaf, the stems, roots and flower heads of the host plant (Braun et al. 2008; Pitkin et al. 2018). Once	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					hatched, the larvae 'mine' the leaf or stem as they feed on living plant tissue (PHA 2016a). Therefore, <i>P. lappae</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Phytomyza rufipes</i> (Meigen, 1830) [Agromyzidae] Cabbage leaf miner	Colombia, Portugal, UK (GBIF Secretariat 2017), Iceland (Discover Life 2018), Egypt, Spain (Civelek 2002), USA, (Cerny et al. 2018), the Netherlands, Belgium, France, Italy and Switzerland (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phytomyza rufipes</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Phytomyza rufipes</i> is associated with <i>Solanum</i> , <i>Cucumis</i> , <i>Lycopersicon</i> , <i>Lilium</i> , and Brassicaceae species (PHA 2016a) which are present in Australia (APNI 2020). The species has established in regions with similar climatic conditions to Australia. Therefore, <i>P. rufipes</i> has the potential to establish and spread in Australia.	Yes. <i>Phytomyza rufipes</i> is considered a major pest of Crucifers and Brassicaceae spp. (Spencer 1973), important vegetable crops of Australia (Horticulture Innovation Australia 2019d). Therefore, <i>P. rufipes</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Piophilidae casei</i> (Linnaeus, 1758) Synonyms: <i>Musca putris casei</i> Linnaeus, 1958, <i>Musca atrata</i> Fabricius, 1794. [Piophilidae]	Cosmopolitan (Kavazos et al. 2019).	Present, ACT, NSW, NT, Qld, SA, Tas. and WA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Cheese fly						
<i>Platycyberus scutatus</i> (Meigen, 1822) [Syrphidae]	Widespread in Iceland, Spain, Portugal, UK, Italy, Greece, Afghanistan, Japan and USA (Speight 2011).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Adult syrphid flies, also known as hoverflies or flower flies, hover around flowers and feed on pollen and nectar. Their larvae feed on soft-bodied arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Hoverflies are established in areas with climatic conditions that are similar to Australia. Therefore, <i>P. scutatus</i> has the potential to establish and spread in Australia.	Yes. Adult hoverflies feed on pollen and are considered effective pollinators. Their larvae are regarded as predators feeding on other arthropods, especially aphids (Bugg et al. 2008; UC IPM 2014). Therefore, adult hoverflies are not regarded as plant pests of economic consequence, but their larvae have the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Pseudonapomyza atra</i> (Meigen, 1830) [Agromyzidae]	UK (Encyclopedia of Life 2018), USA (ITIS 2018a), Pakistan, Portugal (GBIF Secretariat 2017), Greece (Discover Life 2018) and Spain (Gil-Ortiz, Martinez & Jimenez-Peydro 2010).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudonapomyza atra</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Pseudonapomyza atra</i> is associated with <i>Solanum</i> , <i>Cucumis</i> , <i>Lycopersicon</i> , and <i>Lilium</i> spp. (PHA 2016a) which are present in Australia (APNI 2020). This species is also found on <i>Triticum aestivum</i> and other Poaceae species and is known to be oligophagous (Ellis 2019). <i>P. atra</i> has established in regions with similar climatic	Yes. <i>Pseudonapomyza atra</i> feeds on plants which are found in Australia, including wheat, capsicum and lilies (Ellis 2019; PHA 2016a), which are naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>P. atra</i> has the potential to cause economic and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				conditions to Australia. Therefore, <i>P. atra</i> has the potential to establish and spread in Australia.	environmental consequences in Australia.	
<i>Scaptomyza graminum</i> (Fallén, 1823) [Drosophilidae]	Widespread in continental Europe including UK, the Netherlands, Belgium, France, Greece, Iceland, Italy, Portugal, Spain, Switzerland, North Africa (Pitkin et al. 2018), Japan (GBIF Secretariat 2017), Egypt and USA (Stalker 1945).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Scaptomyza graminum</i> is associated with foliage of <i>Lilium</i> spp. (PHA 2016a).	Yes. <i>Scaptomyza graminum</i> is a leaf-mining pest that feeds on plants which are found in Australia (APNI 2020), including <i>Brassica</i> spp., turnip and garden columbine (Stalker 1945). <i>Scaptomyza</i> spp. are able to breed as leaf-miners or as scavengers (Stalker 1945), which may increase the survivability and potential host range in the environment. <i>Scaptomyza graminum</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>S. graminum</i> has the potential to establish and spread in Australia.	Yes. <i>Scaptomyza graminum</i> feeds on plants which are found in Australia, including cabbage, turnip and garden columbine (Stalker 1945), all naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>S. graminum</i> has the potential to cause economic and environmental consequences in Australia.	Yes
<i>Scatella lucustris</i> (Meigen, 1830) Synonym: <i>Scatella tenuicosta</i> (Collin, 1930)	UK, Portugal, the Netherlands and USA (GBIF Secretariat 2017)	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Scatella</i> spp. feed on hosts which are continuously available in the Australian environment such as green algae, bacteria,	Yes. <i>Scatella</i> spp. are nuisance pests in short-term greenhouse crops such as lettuce, herbs, cucumber and rose, and do not directly damage	No Not a plant pest. Contaminating pest (vector and nuisance)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Ephydriidae]				yeast, or decaying animals and plants (Jacobson, Croft & Fenlon 1999; Kang & Suh 2017; Vänninen & Koskula 2003). <i>Scatella</i> spp. are associated with damp environments which are found in Australia, such as marshes, swamps, lakes, ponds and streams (Kang & Suh 2017). <i>Scatella lucustris</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>S. lucustris</i> has the potential to establish and spread in Australia.	plant crops (Jacobson, Croft & Fenlon 1999; Vänninen & Koskula 2003). <i>Scatella</i> spp. can deposit faecal specks on vegetables and ornamental plants such as cut flowers, which can result in the rejection of produce due to lower aesthetic appeal and market value (Jacobson, Croft & Fenlon 1999). <i>Scatella</i> spp. are also vectors of fungal plant diseases such as <i>Pythium aphanidermatum</i> (Goldberg & Stanghellini 1991), which causes major losses in greenhouse cucumber production (El Ghaouth et al. 1994).	
<i>Scatella septemfenestrata</i> Lamb, 1912 Synonyms: <i>Scatella septempunctata</i> Malloch, 1933, <i>Scatella gratiellae</i> Canzoneri & Raffone, 1987. [Ephydriidae]	Ghana, Kenya, Mauritius, Namibia, Nigeria, Saint Helena, Seychelles, Sudan, Republic of South Africa, French Polynesia, Japan, Malaysia and United Arab Emirates (Zatwarnicki & Irwin 2018).	Present, Qld (Zatwarnicki & Irwin 2018).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Trypeta zoe</i> (Meigen, 1826) [Tephritidae] Chrysanthemum blotch miner	Widespread in Europe including UK, the Netherlands (GBIF Secretariat 2017), Belgium, France, Italy, Spain, and Switzerland (Pitkin et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Trypeta zoe</i> is associated with foliage of <i>Chrysanthemum</i> and <i>Aster</i> spp. (PHA 2016a).	Yes. <i>Trypeta zoe</i> feeds on plants which are found in Australia (APNI 2020), including Asteraceae species such as <i>Chrysanthemum</i> , ragwort and mugwort (PHA 2016a). <i>Trypeta zoe</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>T. zoe</i> has the potential to establish and spread in Australia.	Yes. <i>Trypeta zoe</i> feeds on chrysanthemums and other Asteraceae species (PHA 2016a) which are economically important or naturalised plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). The larvae of <i>T. zoe</i> produce large irregular blotches on leaves of ornamental plants such as cut flowers (Shama & Johri 2004). Therefore, <i>T. zoe</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
Hemiptera (leafhoppers, mealybugs, psyllids, scales, true bugs, whiteflies)						
<i>Acanthococcus asteliae</i> (Hoy, 1962) Synonym: <i>Eriococcus asteliae</i> Hoy, 1962 [Eriococcidae]	New Zealand (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Acanthococcus asteliae</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Acanthococcus asteliae</i> is associated with two plant species, <i>Cordyline australis</i> and <i>Astelia nervosa</i> (García Morales et al. 2020), both are present in Australia (APNI 2020). The species is found in New Zealand (García Morales et al. 2020), where climatic conditions are similar to	Yes. <i>Acanthococcus asteliae</i> is associated with <i>Cordyline australis</i> which is an important ornamental plant in Australia (Thomas & Gollnow 2013). <i>Acanthococcus</i> spp. are known to cause branch dieback, stunt growth and blossom reduction, and facilitates black sooty	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				parts of Australia. Some <i>Acanthococcus</i> spp. are known to be invasive in the USA and are associated with the landscape trade (Borden, Martini & Dale 2018). Therefore, <i>A. asteliae</i> has the potential to establish and spread in Australia.	mould due to the production of honeydew (Wang 2017). Members in this genus are polyphagous pests of numerous plant species, some of which are of commercial value. For example, <i>A. lagerstroemiae</i> , is known to feed on 14 plants of ecological and economic importance in China, Japan and Korea, including pomegranate, fig, soybean, <i>Rubus</i> , and <i>Myrtus</i> spp. (Wang 2017). Therefore, <i>A. asteliae</i> has the potential to cause negative economic consequences in Australia.	
<i>Acanthococcus setulosus</i> (Hoy, 1962) Synonym: <i>Eriococcus setulosus</i> Hoy, 1962 [Eriococcidae]	New Zealand (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Acanthococcus setulosus</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Acanthococcus setulosus</i> is associated with four plant families which include the genera <i>Cordyline</i> , <i>Cyathodes</i> , <i>Hoheria</i> and <i>Myrsine</i> (García Morales et al. 2020), which are present in Australia (APNI 2020). The species is found in New Zealand (García Morales et al. 2020)	Yes. <i>Acanthococcus setulosus</i> is associated <i>Cordyline</i> spp. which is an important ornamental plants in Australia (Thomas & Gollnow 2013). <i>Acanthococcus</i> spp. are known to cause branch dieback, stunt growth and blossom reduction, and facilitates black sooty mould due to	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				where climatic conditions are similar to parts of Australia. Some <i>Acanthococcus</i> spp. are known to be invasive in the USA and are linked to the nursery and landscape trade (Borden, Martini & Dale 2018). Therefore, <i>A. setulosus</i> has the potential to establish and spread in Australia.	the production of honeydew (Wang 2017). Members in this genus are polyphagous pests of numerous plant species, some of which are of commercial value. For example, <i>A. lagerstroemiae</i> , is known to feed on 14 plants of ecological and economic importance in China, Japan and Korea, including pomegranate, fig, soybean, <i>Rubus</i> , and <i>Myrtus</i> spp. (Wang 2017). Therefore, <i>A. setulosus</i> has the potential to cause negative economic consequences in Australia.	
<i>Agonoscelis versicoloratus</i> (Fabricius, 1794) Synonym: <i>Agonoscelis versicolor</i> Fabricius 1794, <i>Agonoscelis pubescens</i> (Thunberg) [Pentatomidae] Sunflower seed bug	Ethiopia (Bijlmakers 2018), Sudan (Hamid 2003) and South Africa (Thomas et al. 2003).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Agonoscelis versicoloratus</i> is a known pest of several plants including <i>Jatropha curcas</i> (Abdoul Habou 2013), <i>Sorghum</i> (Kruger, van den Berg & Du Plessis 2008), <i>Gossypium</i> (Saraiva 1939), <i>Sesamum</i> , <i>Vicia</i> , <i>medicago</i> , <i>Helianthus</i> and <i>Triticum</i> spp. (El-Massad, Satti & Alabjar 2012), which are	Yes. <i>Agonoscelis versicoloratus</i> is a pest of cotton (Saraiva 1939), sesame, broad bean, alfalfa, sunflower and wheat (El-Massad, Satti & Alabjar 2012) and sorghum (Kruger, van den Berg & Du Plessis 2008), which are economically important crops in Australia (Cotton Australia 2019;	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				present in Australia (APNI 2020). The sunflower seed bug is present in Sudan (Hamid 2003) and is widely spreading in most African countries south of the Sahara (El-Massad, Satti & Alabjar 2012), areas with similar climatic conditions to parts of Australia. Therefore, <i>A. versicoloratus</i> has the potential to establish and spread in Australia.	Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). Species within the <i>Agonoscelis</i> genus are known to cause shrunken grains due to feeding and the complete loss of crops may occur in heavy infestations (Satti & El-Massad 2013). Therefore, <i>A. versicoloratus</i> has the potential to cause negative economic consequences in Australia.	
<i>Aleurodicus dispersus</i> Russell, 1965 [Aleyrodidae] Spiralling whitefly	Kenya (Letter from KEPHIS on 29/01/2018), Ecuador, France, Panama, Peru, Spain, USA (Ouvrard & Martin 2018), American Samoa, China, Colombia, Fiji, India, Indonesia, Kiribati, Malaysia, Marshall Islands, Mauritius, Morocco, the Netherlands, New Caledonia, Papua New Guinea, Philippines, Portugal, Singapore, Sri Lanka, Taiwan, Thailand, Tonga (CABI 2020a) and Vietnam (Bortha, Hardie	Present, Qld (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020); quarantine pest in Vic. (DJPR 2016); quarantine pest in NSW (NSW DPI 2016); unwanted quarantine pest in Tas. (DPIPWE Tasmania 2019); and notifiable pest in NT (DPIR 2018b).	<i>Aleurodicus dispersus</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Aleurodicus dispersus</i> has a distribution throughout humid climates (Mani 2010) and is a highly polyphagous pest of many crops and ornamental plants including <i>Capsicum</i> , <i>Citrus</i> , <i>Cocos nucifera</i> , <i>Euphorbia pulcherrima</i> , <i>Glycine max</i> , <i>Hibiscus</i> , <i>Lycopersicon esculentum</i> , <i>Mangifera indica</i> , <i>Musa</i> , <i>Persea americana</i> , <i>Prunus</i> spp., <i>Psidium guajava</i> and <i>Solanum melongena</i> (EPPO 2006a). Similar climatic conditions to the	Yes. <i>Aleurodicus dispersus</i> is known to damage various crop plants such as citrus, avocado, stone fruit and soybean (EPPO 2006a; UH-CTAHR Department of Entomology & Hawaii Department of Agriculture 2019) which are economically important in Australia (Horticulture Innovation Australia 2019c). This species is a sap-sucking pest, causing direct damage through premature defoliation,	Yes (WA, Vic., NSW, NT and Tas.)/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	& Power 2000; CABI 2020a; Suh & Ji 2014).			geographical distribution and suitable host plants are found in Australia (APNI 2020), therefore, <i>A. dispersus</i> has the potential to establish and spread in Australia.	and produces honeydew which facilitates the growth of sooty mould (UH-CTAHR Department of Entomology & Hawaii Department of Agriculture 2019). The whitefly is also associated with over 25 different plant diseases (Banjo 2010), and is known to vector <i>Cassava Brown Streak Virus</i> (CBSV) (Mware et al. 2009) which is exotic to Australia (CABI 2020a). Therefore, <i>A. dispersus</i> has the potential to cause negative economic consequences in Australia.	
<i>Aleurodicus dugesii</i> Cockerell, 1896 [Aleyrodidae] Giant whitefly	Mexico (Ouvrard & Martin 2018), Indonesia, USA (CABI 2020a), Venezuela and Pakistan (EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Aleurodicus dugesii</i> is associated with Orchidaceae, <i>Chamelaucium</i> , <i>Gladiolus</i> and <i>Begonia</i> spp. (CABI 2020a; EPPO 2020; PHA 2016a).	Yes. <i>Aleurodicus dugesii</i> is a known pest of <i>Begonia</i> , <i>Ficus</i> , <i>Citrus</i> , <i>Chamelaucium</i> , <i>Fuschia</i> , <i>Gladiolus</i> , <i>Zingiber</i> , <i>Acacia</i> , <i>Jasminum</i> , <i>Malus</i> , <i>Persea</i> , <i>Musa</i> , <i>Eucalyptus</i> spp., Orchidaceae and cucurbits (CABI 2020a; EPPO 2020; PaDIL 2020), which are all present in Australia (APNI 2020). The species has	Yes. <i>Aleurodicus dugesii</i> is a sap-sucking pest which causes damage by defoliation and stunting, as well as the production of honeydew which facilitates the growth of black sooty mould (CISR 2019). This whitefly is a serious pest of ornamentals, and has been recorded from banana, avocado, apple,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				established in Mexico, Indonesia, USA, Venezuela and Pakistan (CABI 2020a; EPPO 2020; Ouyard & Martin 2018), areas with similar climatic conditions to parts of Australia. Therefore, <i>A. dugesii</i> has the potential to establish and spread in Australia.	citrus, jasmine (PaDIL 2020) and eucalyptus (CABI 2020a), which are economically important or endemic plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>A. dugesii</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Andaspis mackieana</i> (McKenzie 1943) Synonym: <i>Lepidosaphes mackieana</i> (McKenzie, 1943) [Diaspididae]	Philippines, Singapore and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Andaspis mackieana</i> is associated with <i>Dendrobium</i> spp. (García Morales et al. 2020).	Yes. <i>Andaspis mackieana</i> is associated with <i>Dendrobium</i> orchids (Dekle 1976), which are present in Australia (APNI 2020). <i>Andaspis mackieana</i> is distributed in Hawaii, Singapore and the Philippines (García Morales et al. 2020), areas where climatic conditions are similar to parts of Australia. Therefore, <i>A. mackieana</i> has the potential to establish and spread in Australia.	Yes. <i>Andaspis mackieana</i> is associated with <i>Dendrobium</i> orchids, which are economically important ornamental plants in Australia (Flowers Australia 2019; Thomas & Gollnow 2013). All diaspid, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>A. mackieana</i> has the potential to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					negative economic consequences in Australia.	
<i>Anzaspis cordylinidis</i> (Maskell, 1879) Synonym: <i>Pseudaulacaspis cordylinidis</i> (Deitz & Tocker, 1980), <i>Mytilaspis cordylinidis</i> (Maskell, 1879) [Diaspididae]	New Zealand (García Morales et al. 2020).	Present, WA (García Morales et al. 2020; Government of Western Australia 2020).	<i>Anzaspis cordylinidis</i> is associated with <i>Cordyline</i> spp. (García Morales et al. 2020; Henderson 2011; Martin & Marinov 2017).	Assessment not required	Assessment not required	No
<i>Anzaspis neocordylinidis</i> Lagowska & Hodgson, 2012 [Diaspididae]	Fiji (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Anzaspis neocordylinidis</i> is associated with <i>Cordyline</i> spp. (García Morales et al. 2020)	Yes. <i>Anzaspis neocordylinidis</i> is associated with foliage of <i>Cordyline</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). <i>Anzaspis neocordylinidis</i> is a newly described species from Fiji (García Morales et al. 2020), a country which has similar climatic conditions to parts of Australia. Therefore, <i>A. neocordylinidis</i> has the potential to establish and spread in Australia.	Yes. Diaspidids, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). The <i>Anzaspis</i> genus is not well represented in the literature, however, they are considered polyphagous on ornamental plants such as <i>Cordyline</i> and <i>Phorium</i> spp. (García Morales et al. 2020; Henderson 2011; Martin & Marinov 2017),	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					important ornamental and naturalised plants in Australia (Thomas & Gollnow 2013). Therefore, <i>A. neocordylinidis</i> has the potential to cause negative economic consequences in Australia.	
<i>Aonidiella aurantii</i> (Maskell, 1879) Synonym: <i>Aspidiotus citri</i> Comstock 1881 [Diaspididae] Red scale	Afghanistan, Argentina, Chile, Cambodia, China, Egypt, Fiji, France, Greece, India, Israel, Indonesia, Iran, Italy, Japan, Kenya, Lebanon, Madagascar, Malaysia, Mexico, Marshall Islands, Mauritius, Morocco, Nepal, New Caledonia, New Zealand, Pakistan, Papua New Guinea, Philippines, Portugal, Saudi Arabia, South Africa, Spain, Taiwan, Tanzania, UK, Thailand, Tonga, Uganda, USA, Vanuatu, Vietnam, Zimbabwe (García Morales et al. 2020), Ethiopia, Malawi and Colombia (CABI 2020a).	Present, NSW, NT, Qld, Vic., WA, SA and Tas. (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Aonidiella aurantii</i> is associated with <i>Dracaena</i> spp. (Suh, Yu & Hong 2013).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Aonidiella citrina</i> (Coquillett, 1891) Synonym: <i>Aspidiotus citrinus</i> Coquillett 1891, <i>Aonidiella aurantii citrina</i> MacGillivray, 1921 [Diaspididae] Yellow scale	Afghanistan, Argentina, Chile, China, Ethiopia, Fiji, France, India, Indonesia, Iran, Italy, Japan, Madagascar, Malaysia, Mauritius, Mexico, Nepal, Pakistan, Papua New Guinea, Philippines, Saudi Arabia, Republic of Korea, Taiwan, Tanzania, Thailand, USA, Vietnam, Zimbabwe (García Morales et al. 2020), Egypt and Greece (CABI 2020a).	Present, NSW, SA, Vic. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished). <i>Aonidiella citrina</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Aonidiella inornata</i> McKenzie, 1938 [Diaspididae] Diaspid scale, papaya red scale	China, Ecuador, Fiji, India, Indonesia, Japan, Kiribati, Marshall Islands, Papua New Guinea, Philippines, Taiwan, Thailand, USA, Vanuatu and Vietnam (García Morales et al. 2020).	Present, Qld, WA and NT (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Aonidiella inornata</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Aonidiella lauretorum</i> (Lindinger, 1911) [Diaspididae]	Portugal and Spain (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Aonidiella lauretorum</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2020; MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Endemic to the Canary Islands and Madeira, <i>Aonidiella lauretorum</i> was introduced to mainland Portugal on its host plants (Pellizzari & Germain 2010). These regions have similar climatic conditions to parts of Australia. The	Yes. <i>Aonidiella lauretorum</i> is associated with <i>Dracaena</i> spp. which are economically important ornamental plants in Australia (Dragon Trees Australia 2019). Diaspids, armoured scale insects, feed by sucking sap from almost all parts of the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				scale is polyphagous (Pellizzari & Germain 2010), found on 14 genera within 10 plant families, including <i>Dracaena</i> spp. (García Morales et al. 2020) which is present in Australia (APNI 2020). Therefore, <i>A. lauretorum</i> has the potential to establish and spread in Australia.	host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>A. lauretorum</i> has the potential to cause negative economic consequences in Australia.	
<i>Aonidiella orientalis</i> (Newstead 1894) [Diaspididae] Oriental yellow scale	China, India, Israel, Papua New Guinea, Philippines, Sri Lanka, Thailand, USA, (ABRS 2020), Colombia, Iran, Kenya, Madagascar, Malaysia, Panama, Peru, Saudi Arabia, South Africa, Tanzania, Vietnam (García Morales et al. 2020), Nepal, Pakistan, United Arab Emirates, Ecuador, Egypt, Ethiopia and Mexico (CABI 2020a).	Present, NT, Qld and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Aonidiella orientalis</i> is associated with <i>Lilium</i> spp. (DAFF 2013d).	Assessment not required	Assessment not required	No
<i>Aonidiella tinerfensis</i> (Lindinger, 1911) Misspelling: <i>Aonidiella tinerfinensis</i> [Diaspididae]	Canary Islands, Madeira and Portugal (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Aonidiella tinerfensis</i> is associated with <i>Dracaena</i> spp. (MAF 2002; MPI 2016).	Yes. Endemic to the Canary Islands and Madeira, <i>Aonidiella tinerfensis</i> was introduced to mainland Portugal on its host plant, <i>Dracaena</i> (Pellizzari & Germain 2010). <i>Dracaena</i>	Yes. <i>Aonidiella tinerfensis</i> is associated with <i>Dracaena</i> spp. (MAF 2002), which are economically important ornamental species in Australia (Dragon Trees Australia 2019). Diaspids,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				spp. are present in Australia (APNI 2020) and current geographical distribution of the scale has similar climatic conditions to parts of Australia. Therefore, <i>A. tinerfensis</i> has the potential to establish and spread.	armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>A. tinerfensis</i> has the potential to cause negative economic consequences in Australia.	
<i>Aonidomytilus albus</i> (Cockerell, 1893) [Diaspididae] Tapioca scale	China, India, Malaysia, Thailand (Ali et al. 2016), Argentina, British Virgin Islands, Colombia, Kenya, Madagascar, Malawi, Mauritius, Mexico, Sri Lanka, Taiwan, Tanzania, Uganda, USA (García Morales et al. 2020), Indonesia, Thailand and Peru (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Aonidomytilus albus</i> is associated with <i>Chrysanthemum</i> spp. (Ali et al. 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2006d). <i>Aonidomytilus albus</i> is widely established around the world and the known hosts include species of <i>Chrysanthemum</i> , papaya, cassava, mango and <i>Solanum</i> (Biosecurity Australia 2006d). Therefore, <i>A. albus</i> has the potential to establish and spread.	Yes. Previously assessed by the department (Biosecurity Australia 2006d). This scale can infest a wide range of plant species such as <i>Chrysanthemum</i> , papaya, cassava, mango and <i>Solanum</i> (Biosecurity Australia 2006d), which are economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>A. albus</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Aphenochiton pubens</i> Henderson & Hodgson 2000 [Coccidae] Translucent scale	New Zealand (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Aphenochiton pubens</i> is associated with <i>Cordyline</i> spp. (MPI 2016).	Yes. <i>Aphenochiton pubens</i> is polyphagous and host plants include <i>Cordyline</i> , <i>Hedycarya</i> , <i>Pittosporum</i> and <i>Griselinia</i> spp. (García Morales et al. 2020; Hoare 2020), which are present in Australia (APNI 2020). <i>A. pubens</i> is only known from New Zealand (García Morales et al. 2020), where climatic conditions are similar to parts of Australia. Therefore, <i>A. pubens</i> has the potential to establish and spread in Australia.	Yes. <i>Aphenochiton pubens</i> is polyphagous and found on foliage of <i>Cordyline</i> and <i>Pittosporum</i> spp. (García Morales et al. 2020) which are important ornamentals in Australia (Thomas & Gollnow 2013). All soft scales feed on sap from the phloem or parenchyma of the host plants, which can result in loss of plant vigour, poor growth, twig or branch die-back, premature leaf-drop, potential plant death, and indirect damage by sooty mould due to honeydew excretion (Ben-Dov & Hodgson 1997). Therefore, <i>A. pubens</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Aspidiella sacchari</i> (Cockerell 1863) [Diaspididae] Brown sugarcane scale	China, Colombia, Fiji, Indonesia, Madagascar, Malaysia, Marshall Islands, Mauritius, Mexico, Pakistan, Panama, Papua New	Present, NT, Qld and WA (Government of Western Australia 2020; Plant Health Australia 2020).	<i>Aspidiella sacchari</i> is associated with <i>Dracaena</i> spp. (Miller & Davidson 2005).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Guinea, Sri Lanka and USA (CABI 2020a; García Morales et al. 2020).					
<i>Aspidiotus nerii</i> (Bouché, 1833) [Diaspididae] Oleander scale	New Zealand, Mexico, USA, Chile, Sri Lanka, Israel, Italy, Japan (ABRS 2020), Argentina, Belgium, China, Colombia, Egypt, France, Greece, Indonesia, Iran, Kenya, Lebanon, Malawi, Malaysia, Morocco, New Caledonia, New Zealand, Philippines, Portugal, Saudi Arabia, South Africa, Spain, Tanzania, Uganda, UK, USA, Zimbabwe (García Morales et al. 2020), Ethiopia, Madagascar, Ecuador and Peru (CABI 2020a).	Present, NSW, NT, Qld, SA, Vic., WA and Tas. (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Aspidiotus nerii</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Aulacaspis rosae</i> (Bouché, 1833) [Diaspididae] Rose scale	Chile, China, Fiji, Japan, Mexico, New Zealand, Taiwan, USA (ABRS 2020), Argentina, Colombia, Egypt, France, Greece, India, Iran, Israel, Italy, Mauritius, the Netherlands, New Caledonia, Pakistan, Peru, Philippines, Portugal, South Africa, Republic of Korean, Spain,	Present, NSW, Tas., WA, SA and Vic. (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Aulacaspis rosae</i> is associated with <i>Rosa</i> , <i>Hydrangea</i> and <i>Hibiscus</i> spp. (Ali et al. 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Switzerland, Tanzania, Thailand and UK (García Morales et al. 2020).					
<i>Bagrada hilaris</i> (Burmeister, 1835) [Pentatomidae] Bagrada bug	Ethiopia (Letter from MANR on 06/03/2018), Chile, Mexico, USA, Italy (EPPO 2020), Afghanistan, India, Iran, Italy, Nepal, Pakistan, Sri Lanka, Egypt, Kenya, Madagascar, Malawi, Mauritius, South Africa, Tanzania, Uganda, Zimbabwe and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Bagrada hilaris</i> is a pest of important economic crops such as sugarcane, maize, wheat, radish, kale, broccoli, mustard (Reed et al. 2013) and ornamentals including candytuft, stock and sweet alyssum. <i>B. hilaris</i> has a history of invasion in the USA (Reed et al. 2013), and has a wide distribution throughout southern and eastern Africa, southern Asia and southern Europe (LeVeen & Hodges 2018), areas with similar climatic conditions to parts of Australia. Therefore, <i>B. hilaris</i> has the potential to establish and spread in Australia.	Yes. <i>Bagrada hilaris</i> is a serious agricultural pest throughout western USA (LeVeen & Hodges 2018). As a consequence of feeding, damage can result in lesions and scorching on foliage, stems and fruit, plants may be malformed, wilted or death of the plant may occur (Reed et al. 2013). This species prefers many crops including sugarcane, wheat, cabbage, kale, maize and broccoli (Reed et al. 2013), which are economically important to Australia (Horticulture Innovation Australia 2019c). Therefore, <i>B. hilaris</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Balanococcus cordylinidis</i> (Brittin, 1938)	New Zealand (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Balanococcus cordylinidis</i> is associated with	Yes. <i>Balanococcus cordylinidis</i> is found on <i>Cordyline</i> spp. (García	Yes. <i>Balanococcus cordylinidis</i> is a pest of <i>Cordyline australis</i> and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Pseudococcidae] Cabbage tree mealybug			<i>Cordyline</i> spp. (MAF 2002; MPI 2016).	Morales et al. 2020), which are present in Australia (APNI 2020). The mealybug is present in New Zealand (García Morales et al. 2020), and it is likely that similar climatic conditions exist in Australia. Therefore, <i>B. cordylinidis</i> has the potential to establish and spread in Australia.	<i>C. indivisa</i> and is known to cause the death of juvenile trees due to their sap-sucking behaviour (England et al. 2009; Martin 2019). <i>Cordyline</i> spp. are popular ornamental plants in Australia (Thomas & Gollnow 2013) that have naturalised in SA and Vic. (APNI 2020). Therefore, <i>B. cordylinidis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Bemisia cordylinidis</i> Dumbleton, 1961 [Aleyrodidae]	New Caledonia (Ouvrard & Martin 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Bemisia cordylinidis</i> is associated with <i>Cordyline</i> spp. (MAF 2002; MPI 2016).	Yes. <i>Bemisia cordylinidis</i> is associated with <i>Cordyline</i> spp. (MAF 2002) which are found across Australia (APNI 2020). <i>Bemisia cordylinidis</i> is endemic to New Caledonia (Ouvrard & Martin 2018), where climatic conditions are similar to parts of Australia. Therefore, <i>Bemisia cordylinidis</i> has the potential to establish and spread in Australia.	Yes. Whitefly feeding can affect plant growth, causing distortion, discolouration, yellowing or silvering of tips and honeydew production which facilitates the growth of black sooty mould (Government of Western Australia 2020). <i>Bemisia cordylinidis</i> feeds on <i>Cordyline</i> spp. (Dumbleton 1961), which are popular ornamental plants in Australia (Thomas & Gollnow	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					2013) that have naturalised in SA and Vic. (APNI 2020). Other species within the genus <i>Bemisia</i> are polyphagous pests of food crops grown throughout Australia, such as cotton (Cotton Australia 2019), peanut, soybean and broadleaf weeds in tropical and subtropical regions and can vector geminiviruses (Brown 1994). Therefore, <i>B. cordylinidis</i> has the potential to cause negative economic consequences in Australia.	
<i>Bemisia tabaci</i> species complex (Gennadius, 1889) [Aleyrodidae] Tobacco whitefly, silverleaf whitefly	Afghanistan, American Samoa, Argentina, Belgium, British Virgin Islands, Cambodia, China, Colombia, Ecuador, Egypt, Ethiopia, Fiji, France, Greece, India, Indonesia, Iran, Israel, Italy, Japan, Kenya, Kiribati, Republic of Korea, Lebanon, Madagascar, Malawi, Malaysia, Marshall Islands, Mauritius, Mexico, Morocco, Nepal, the Netherlands, New	Present, ACT, NT, NSW, Vic., Qld, SA and WA (ABRS 2020; CSIRO 2017; Government of Western Australia 2020; PaDIL 2018; Plant Health Australia 2020). <i>Bemisia tabaci</i> biotypes Nauru, B and Q declared pests, prohibited entry into WA (Government of Western Australia 2018), and <i>B. tabaci</i> is a declared	<i>Bemisia tabaci</i> is associated with several ornamental and flowering plants (Ali et al. 2016; Jing et al. 2008; Weller & van S. Graver 1998). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Bemisia tabaci</i> is part of a species complex, of which the native biotype and biotype B are already present in parts of Australia (ABRS 2020; CSIRO 2017; Government of Western Australia 2020; PaDIL 2018; Plant Health Australia 2020). This species is a common tropical and subtropical inhabiting pest with a wide distribution and abundant hosts including	Yes. <i>Bemisia tabaci</i> is able to inflict damage to a range of agricultural crops through direct feeding (Konjević et al. 2018). The species is an important agricultural pest known to affect over 600 plant species, many of which are present in Australia, such as cotton (Cotton Australia 2019), soybean, peanut and broadleaf weeds. The whitefly feeds by piercing	Yes (Tas., WA)/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Caledonia, New Zealand, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Portugal, Saudi Arabia, Singapore, South Africa, Spain, Sri Lanka, Switzerland, Taiwan, Tanzania, Thailand, Tonga, United Arab Emirates, Uganda, UK, USA, Vanuatu, Vietnam and Zimbabwe (CABI 2020a; EPPO 2020).	pest in Tas. (DPIPWE Tasmania 2019).		cassava, cotton, sweet potatoes, tobacco and tomatoes (CABI 2020b). Due to their resistance to many synthetic insecticides and the passive dispersal through infested plant material, there is potential for the exotic <i>B. tabaci</i> biotypes to establish and spread through the nursery trade (Aristizábal et al. 2018).	phloem and leaf surfaces (Aristizábal et al. 2018). <i>Bemisia tabaci</i> is capable of vectoring over 100 plant viruses species (Aristizábal et al. 2018; Gilbertson et al. 2015) including Begomovirus spp., Ipomovirus spp. and Torradovirus spp. which are damaging to several important plant (Navas-Castillo, Fiallo-Olive & Sanchez-Campos 2011). Therefore, <i>B. tabaci</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Bercynthus hastator</i> (Fabricius 1798) [Pentatomidae]	Mexico, Panama and Colombia (Segarra-Carmona et al. 2015).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Bercynthus hastator</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Bercynthus hastator</i> is associated with <i>Cocos</i> (Revelo et al. 1986), <i>Phaseolus</i> (Rider 2015) and <i>Dracaena</i> spp. (USDA 2011); plant genera present in Australia (APNI 2020). The species is present in Central and Southern America (Arismendi & Thomas 2003; Segarra-Carmona et al. 2015), areas with similar climatic	Yes. <i>Bercynthus hastator</i> is associated with coconut trees (Revelo et al. 1986), beans (Rider 2015) and <i>Dracaena</i> spp. (USDA 2011), which are naturalised and economically important plants in Australia (Adkins, Foale & Samosir 2006; Horticulture Innovation Australia 2019c). Pentatomidae are mostly phytophagous,	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				conditions to parts of Australia. Therefore, <i>B. hastator</i> as the potential to establish and spread in Australia.	and feed by piercing and sucking plant juices from different parts of the host plants, especially seeds, fruits and flowers, resulting in them being recognized as agricultural pests (Da Silva, Santos & Fernandes 2018; Segarra-Carmona et al. 2015). <i>B. hastator</i> is also a possible vector of the coconut palm heartrot, <i>Phytophthora staheli</i> , a lethal disease of coconut palms (Segarra-Carmona et al. 2015; Segeren 1982) which is not present in Australia (CABI 2020a). Therefore, <i>B. hastator</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Bipuncticoris triplex</i> Eyles & Carvalho, 1995 [Miridae]	New Zealand (Larivière & Larochelle 2004).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Bipuncticoris triplex</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Bipuncticoris triplex</i> is a polyphagous pest of <i>Cordyline</i> , <i>Cassinia</i> , and <i>Olearia</i> spp. (Larivière & Larochelle 2004), which are present in Australia (APNI 2020). The species is endemic to New Zealand (Larivière &	Yes. <i>Bipuncticoris triplex</i> is a polyphagous sap-sucking insect which causes damage through feeding (Larivière & Larochelle 2004). Miridae bugs feed on buds, flowers, developing fruits and seeds, and young	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Larochelle 2004), regions where climatic conditions are similar to parts of Australia. Therefore, <i>B. triplex</i> has the potential to establish and spread in Australia.	shoots, which causes malformation at an early stage of growth of plants. This behaviours makes them more serious pests than aphids and psyllids, because even at low population levels mirids can cause large losses in production (Eyles 1999). <i>Bipuncticoris triplex</i> feeds on <i>Cordyline</i> spp. (Larivière & Larochelle 2004) which are important ornamental plants in Australia (Thomas & Gollnow 2013). Therefore, <i>B. triplex</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Caldwellioli reservata</i> (Fowler 1900) [Cicadellidae]	Costa Rica (Jaminson 2012), Panama and Ecuador (McKamey 2006; Wilson, Turner & McKamey 2009a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Caldwellioli reservata</i> is associated with <i>Dracaena</i> spp. (Jaminson 2012; USDA 2011).	Yes. <i>Caldwellioli reservata</i> has a tropical distribution throughout Panama and Ecuador (Wilson, Turner & McKamey 2009a). <i>C. reservata</i> has been recorded on plant hosts such <i>Coffea</i> and <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Caldwellioli reservata</i> is a phloem sap feeder and a known pest of coffee and <i>Dracaena</i> spp. (AFA 2017; Jaminson 2012) which are important crop and ornamental plants in Australia (Dragon Trees Australia 2019;	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Suitable host plants and climatic conditions are present, therefore <i>C. reservata</i> has the potential to establish and spread in Australia.	Horticulture Innovation Australia 2019c). In addition, <i>C. reservata</i> is a potential vector of <i>Xylella fastidiosa</i> (Jaminson 2012; McKamey 2006), which is an exotic, national priority pest for Australia (DAWR 2016f, 2017b). Therefore, <i>C. reservata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Ceroplastes floridensis</i> (Comstock 1881) [Coccidae] Florida wax scale	China, Colombia, Ecuador, Egypt, France, Greece, India, Indonesia, Iran, Israel, Italy, Japan, Kenya, Lebanon, Madagascar, Malaysia, Mauritius, Mexico, Panama, Peru, Saudi Arabia, Sri Lanka, Taiwan, Tanzania, USA, (García Morales et al. 2020), Vietnam (Danzig & Konstantonova 1990; García Morales et al. 2020) British Virgin Islands, Pakistan, Portugal, Republic of Korea, South Africa, Spain	Present, Qld and NSW (ABRS 2020; García Morales et al. 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Ceroplastes floridensis</i> is associated with <i>Asteraceae</i> spp. (CABI 2020a).	Yes. <i>Ceroplastes floridensis</i> is already present in parts of Australia (ABRS 2020), suggesting suitable climatic conditions and host plants are available. Therefore, <i>C. floridensis</i> has the potential to further establish and spread in Western Australia.	Yes. <i>Ceroplastes floridensis</i> is a serious pest of citrus in North America and causes damage through feeding, which leads to premature leaf drop, twig dieback and death of host plant (Hodges, Ruter & Braman 2001). This species is also a pest of apple, stone fruit, banana, avocado, mango and coffee (García Morales et al. 2020), which are economically important plants in Australia (Horticulture Innovation Australia	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	and Uganda (CABI 2020a).				2019c). The scale also produces honeydew that facilitates the growth of black sooty mould (Hodges, Ruter & Braman 2001). Therefore, <i>C. floridensis</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Ceroplastes sinensis</i> Del Guercio, 1900 [Coccidae] Chinese wax scale	Morocco, Italy, Spain, Chile, New Zealand (CABI 2020a), Egypt, France, Greece, Indonesia, Iran, Mexico, the Netherlands, Philippines, USA (García Morales et al. 2020), Portugal, India, Japan (EPPO 2003) and Argentina (Qin et al. 1994).	Present, Vic., Qld, NSW, ACT, WA and NT (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020; Waterhouse & Sands 2001).	<i>Ceroplastes sinensis</i> is associated with <i>Cordyline</i> spp. (Martin 2018b).	Assessment not required	Assessment not required	No
<i>Ceroplastes stellifer</i> (Westwood 1871) Synonym: <i>Vinsonia stellifera</i> (Westwood 1871) [Coccidae] Stellate scale	China, Colombia, Fiji, India, Indonesia, Italy, Kenya, Malaysia, Mauritius, the Netherlands, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Tanzania, Taiwan, Thailand, Tonga, USA (CABI 2020a; García Morales et al. 2018) and Vietnam (CABI 2020a;	Present, NT (ABRS 2020; CSIRO 2017; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Ceroplastes stellifer</i> is associated with <i>Cattleya</i> , <i>Dendrobium</i> , <i>Oncidium</i> and <i>Phalaenopsis</i> spp. (García Morales et al. 2020; Leonhardt & Sewake 1999; Swezey 1945).	Yes. <i>Ceroplastes stellifer</i> is already present in parts of Australia (ABRS 2020), suggesting suitable climatic conditions and host plants are available. Therefore, <i>C. stellifer</i> has the potential to further establish and spread in Western Australia.	Yes. <i>Ceroplastes stellifer</i> is associated with mango, coconut, figs, eucalyptus, orchids, coffee and citrus plants (García Morales et al. 2020) which are commercial or endemic plants in Australia (APNI 2020; Flowers Australia 2019; Horticulture Innovation Australia 2019c; Thomas &	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Danzig & Konstantonova 1990; García Morales et al. 2020).				Gollnow 2013). The species is considered a potential threat to mango, citrus and ornamental crops (Dekle 1969; Hamon & Williams 1984). Therefore, <i>C. stellifer</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Chionaspis tangana</i> (Lindinger, 1910) Synonym: <i>Phenacaspis tangana</i> (Lindinger, 1910) [Diaspididae]	Tanzania (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Chionaspis tangana</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2018; MPI 2016).	Yes. <i>Chionaspis tangana</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2018; MPI 2016), which are present in Australia (APNI 2020). <i>Chionaspis tangana</i> is known only from Tanzania (García Morales et al. 2020), a country where climatic conditions are similar to parts of Australia. Therefore, <i>C. tangana</i> has the potential to establish and spread in Australia.	Yes. <i>Chionaspis</i> species are sap-sucking pest, known to infest stems, branches and foliage of host plants (Pellizzari 2010). <i>Chionaspis tangana</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2020), which are economically important in Australia (Dragon Trees Australia 2019). Therefore, <i>C. tangana</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Chrysomphalus aonidum</i> (Linnaeus, 1758)	Belgium, Chile, China, Egypt, Colombia, Fiji, France, Greece, India, Indonesia, Israel, Italy,	Present, NSW, NT, Qld and WA (ABRS 2020; Government of Western	<i>Chrysomphalus aonidum</i> is associated with <i>Cordyline</i> , <i>Dracaena</i> and	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Synonym: <i>Chrysomphalus fiscus</i> Ashmead, 1880 [Diaspididae]	Japan, Kenya, Kiribati, Mexico, Lebanon, Malaysia, Mauritius, Madagascar, Morocco, Peru, New Caledonia, Pakistan, Sri Lanka, Panama, Papua New Guinea, Philippines, Portugal, Saudi Arabia, South Africa, Republic of Korea, Spain, UK, Taiwan, Tanzania, Thailand, Uganda, USA, Vietnam, Zimbabwe (García Morales et al. 2020), Ethiopia, Malawi, Argentina, the Netherlands and American Samoa (CABI 2020a; EPPO 2020).	Australia 2020; Plant Health Australia 2020).	<i>Lilium</i> spp. (DAFF 2013d; MPI 2016).			
<i>Chrysomphalus dictyospermi</i> (Morgan, 1889) [Diaspididae] Dictyospermum scale	Kenya (letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Argentina, Chile, China, Colombia, Egypt, Fiji, France, Greece, India, Indonesia, Iran, Israel, Italy, Japan, Kenya, Kiribati, Lebanon, Madagascar, Marshall Islands, Mauritius, Mexico, Morocco, New Caledonia, Panama,	Present, Qld, NSW, NT and SA (ABRS 2020; Plant Health Australia 2020) Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Chrysomphalus dictyospermi</i> is associated with <i>Cordyline</i> , <i>Dracaena</i> (MPI 2016) and Orchidaceae spp. (Suh 2016). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (Biosecurity Australia 2005a; DAWR 2019b). <i>Chrysomphalus dictyospermi</i> is already present in parts of Australia (ABRS 2020), suggesting suitable climatic conditions and host plants are available. Therefore, <i>C. dictyospermi</i> has the potential to further establish and	Yes. Previously assessed by the department (Biosecurity Australia 2005a; DAWR 2019b). <i>Chrysomphalus dictyospermi</i> is a highly polyphagous pest of plants from 192 genera in 80 families. Some of these include economically important plants in Australia such as avocado, banana, <i>Citrus</i> , fig, grape, jackfruit,	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Papua New Guinea, Peru, Philippines, Portugal, South Africa, Republic of Korea, Spain, Sri Lanka, Taiwan, Tanzania, Thailand, Tonga, Uganda, UK, USA, Zimbabwe (García Morales et al. 2020), Vietnam (García Morales et al. 2020; Suh 2016), Malaysia, and Ecuador (CABI 2020a).			spread in Western Australia.	mango, olive, orchids, passionfruit and ginger (García Morales et al. 2020; Horticulture Innovation Australia 2019c). In Turkey, <i>C. dictyospermi</i> is a major pest of citrus (Gerson & Applebaum 2015). <i>C. dictyospermi</i> injects toxic saliva into its host plant causing leaf chlorosis, drying and death of the branches, resulting in decreased plant development and fruit disfigurement (CABI 2020a). Therefore, <i>C. dictyospermi</i> has the potential to cause negative economic and environmental consequences in Western Australia.	
<i>Chrysomphalus diversicolor</i> Green, 1923 Synonym: <i>Aspidiotus (Chrysomphalus) pinnulifera diversicolor</i> Green 1923, <i>Chrysomphalus diversicolor</i> McKenzie 1939	India, Madagascar, Mauritius, Portugal, South Africa, Sri Lanka and USA (García Morales et al. 2020).	No record found (ABRS 2020).	<i>Chrysomphalus diversicolor</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Chrysomphalus diversicolor</i> is associated with host plants from 34 genera in 23 families including <i>Araucaria</i> , asparagus, <i>Dracaena</i> , avocado, <i>Ficus</i> spp., banana, <i>Callistemon rigidus</i> , <i>Dendrobium</i> spp., <i>Citrus</i> spp., and poplars	Yes. <i>Chrysomphalus diversicolor</i> is a pest of <i>Asparagus</i> , <i>Dracaena</i> , avocado, <i>Ficus</i> spp., banana, and <i>Citrus</i> spp. (Carvalho et al. 1996; García Morales et al. 2020), which are economically important ornamental plants or	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Diaspididae]				(García Morales et al. 2020), many of which are present in Australia (APNI 2020). This species has a western palearctic distribution (Smith-Pardo, Evans & Dooley 2012), areas with similar climatic conditions to Australia. Therefore, <i>C. diversicolor</i> has the potential to establish and spread in Australia.	crops in Australia (Dragon Trees Australia 2019; Horticulture Innovation Australia 2019c). <i>Chrysomphalus</i> spp. infest foliage, and are known to spread to fruit, stems and branches, causing premature leaf and fruit drop, and stem dieback (CABI 2020a). Infestations cause dark bruises on foliage, yellowing of leaves and finally defoliation (CABI 2020a). Therefore, <i>C. diversicolor</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Chrysomphalus pinnulifer</i> (Maskell, 1891) Synonym: <i>Chrysomphalus diversicolor</i> Balachowsky, 1948 [Diaspididae] False purple scale	Argentina, India, Iran, Kenya, Madagascar, Papua New Guinea, Portugal, South Africa, Spain, Thailand and Zimbabwe (García Morales et al. 2020).	Present, NSW, Qld, NSW and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Chrysomphalus pinnulifer</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2020)	Assessment not required	Assessment not required	No
<i>Cicadella viridis</i> (Linnaeus 1758)	China, Japan, Republic of Korea (CABI 2020a), Indonesia, Israel, Sri	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Cicadella viridis</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Cicadella viridis</i> has a wide range of plant hosts including rushes,	Yes. <i>Cicadella viridis</i> is polyphagous (Nickel & Remane 2002), primarily	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Cicadellidae] Green leafhopper	Lanka, Taiwan (Wilson, Turner & McKamey 2009a), Belgium, France, Greece, Italy, Spain, Switzerland, the Netherlands and UK (de Jong et al. 2019).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).		<i>Sorghum</i> , <i>Triticum</i> , <i>Zea mays</i> , peanuts and many fruit trees (Chu & Teng 1950; Tay 1972). This species has a wide distribution throughout several countries in Asia and Europe (de Jong et al. 2019), areas with similar climatic conditions to parts of Australia. With the availability of suitable host plants and climatic conditions, <i>C. viridis</i> has the potential to establish and spread in Australia.	feeding on grasses, sorghum, wheat maize and peanuts (Chu & Teng 1950; Tay 1972), which are economically important crops in Australia (Horticulture Innovation Australia 2019c). Additionally, <i>C. viridis</i> is a vector of <i>Xylella fastidiosa</i> (DAWR 2016c), which is an exotic, national priority pest for Australia (DAWR 2016f, 2017b). Therefore, <i>C. viridis</i> has the potential to cause negative economic consequences in Australia.	
<i>Cimex lectularius</i> (Linnaeus 1758) [Cimicidae] Bed bug	Cosmopolitan worldwide distribution (PaDIL 2020; Panagiotakopulu & Buckland 1999), including USA, UK, Mexico, New Zealand, Portugal, France (GBIF Secretariat 2017) and Korea (Lee et al. 2008).	Present, Tas., NSW, QLD and WA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Coccus hesperidum</i> (Linnaeus, 1758) Synonym: <i>Coccus hesperidum</i> (Linnaeus, 1758)	Afghanistan, American Samoa, Argentina, Belgium, Chile, Fiji, China, Egypt, Colombia, India, Ecuador, Ethiopia, France, UK, Greece, Indonesia,	Present, ACT, NSW, NT, Qld, SA, Tas., Vic. and WA (ABRS 2020; CABI 2020a; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Coccus hesperidum</i> is associated with <i>Dracaena</i> and <i>Cordyline</i> spp. (Biosecurity Australia 2010c; DAFF 2013d; MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Coccidae] Brown soft scale	Iran, Israel, Italy, Japan, Kenya, Kiribati, Lebanon, Madagascar, Mexico, Malawi, Malaysia, Marshall Islands, Mauritius, Morocco, the Netherlands, New Caledonia, New Zealand, Panama, Papua New Guinea, Peru, Portugal, Philippines, Saudi Arabia, Sri Lanka, South Africa, Republic of Korea, Spain, Switzerland, Taiwan, Tonga, Tanzania, Thailand, Uganda, USA, Vanuatu, Zimbabwe (García Morales et al. 2020), Nepal and Pakistan (CABI 2020a).					
<i>Coccus longulus</i> (Douglas, 1887) Synonym: <i>Coccus longulum</i> Douglas, 1887 [Coccidae] Long brown scale	American Samoa, China, Fiji, Colombia, Ecuador, Egypt, Sri Lanka, France, India, Israel, Indonesia, Philippines, New Caledonia, Japan, Kenya, New Zealand, Kiribati, Lebanon, Marshall Islands, Madagascar, Mexico, Mauritius, Taiwan, the Netherlands, Panama, Papua New Guinea, Saudi Arabia, USA, South Africa,	Present, NSW, NT, Qld, SA, WA and Vic. (ABRS 2020; Plant Health Australia 2020).	<i>Coccus longulus</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Thailand, Tonga, Uganda, UK, Vanuatu and Zimbabwe (García Morales et al. 2020).					
<i>Coccus viridis</i> (Green, 1889) Synonym: <i>Lecanium viride</i> Green, 1889; <i>Coccus viridis</i> Köhler, 1978 [Coccidae] Green coffee scale	China, Colombia, Ecuador, Egypt, Ethiopia, Fiji, India, Indonesia, Kenya, Kiribati, Madagascar, Malaysia, Mauritius, Mexico, the Netherlands, New Caledonia, Panama, Papua New Guinea, Peru, Philippines, South Africa, Sri Lanka, Taiwan, Tanzania, Thailand, Tonga, UK, USA, Vanuatu, (García Morales et al. 2020), American Samoa, British Virgin Islands, Pakistan, Portugal, Singapore and Uganda (CABI 2020a; EPPO 2020).	Present, Qld, NSW, NT and WA (ABRS 2020; EPPO 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Coccus viridis</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Collaria oleosa</i> (Distant 1883) [Miridae]	Colombia, Ecuador, Mexico, Panama, Peru and USA (Schuh 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Collaria oleosa</i> is associated with grasses (CABI 2020a).	Yes. <i>Collaria oleosa</i> is a pest of <i>Dioscorea</i> , <i>Megathyrus maximum</i> , <i>Oryza sativa</i> , <i>Triticum</i> and Poaceae species (CABI 2020a), which are present in Australia (APNI 2020). This species is widely distributed throughout North and South America (Auaud et	Yes. <i>Collaria oleosa</i> feeding damage may cause white stippling or spotting on foliage, total drying of foliage, lesions and growth disorders (Auaud et al. 2011). As a pest of many Poaceae species, <i>Collaria oleosa</i> affects crop and pasture quality and decreases	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				al. 2011), areas with similar climatic conditions to parts of Australia. Therefore, <i>C. oleosa</i> has the potential to establish and spread in Australia.	yield, sometimes greater than 95% (Aquad et al. 2011; CABI 2020a; da Silva et al. 2013). Therefore, <i>C. oleosa</i> has the potential to cause negative economic consequences in Australia.	
<i>Crypticerya multicastrices</i> (Kondo & Unruh 2009) [Monophlebidae] Multicastrices fluted scale	Colombia (CABI 2020a; García Morales et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Crypticerya multicastrices</i> is associated with several flowers and ornamental plants (Kondo, Gullan & Portilla 2012), including <i>Cordyline</i> spp. (García Morales et al. 2020).	Yes. <i>Crypticerya multicastrices</i> is a polyphagous pest on plants from 116 genera in 52 families including teak, hibiscus, figs, corn, allspice, citrus, capsicum, tomato, casuarina, breadfruit, pawpaw, mango, avocado and several tropical ornamental plants (CABI 2020a; García Morales et al. 2020; Kondo, Gullan & Portilla 2012). The scale is an invasive pest on the Colombian islands, introduced through ornamental plants from mainland Colombia (Kondo, Gullan & Portilla 2012). Similar climatic conditions exist in parts of Australia, therefore <i>C. multicastrices</i> has the	Yes. <i>Crypticerya multicastrices</i> is highly polyphagous, found on hibiscus, figs, corn, citrus, capsicum, tomato, casuarina (García Morales et al. 2020), breadfruit, pawpaw, mango, avocado (CABI 2020a; Kondo, Gullan & Portilla 2012) and several tropical ornamental plants (Kondo, Gullan & Portilla 2012), which are economically important or naturalised plants in Australia (APNI 2020; Flowers Australia 2019; Horticulture Innovation Australia 2019c). <i>Crypticerya multicastrices</i> is associated with stunted growth, defoliation and death in affected hosts	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.	(García Morales et al. 2020). Therefore, <i>C. multicastrices</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Cyrtorhinus fulvus</i> Knight, 1935 [Miridae]	American Samoa, Fiji, Indonesia, Papua New Guinea, Philippines, Tonga, Vanuatu and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Cyrtorhinus fulvus</i> is a predator of the taro planthoppers, <i>Tarophagus persephone</i> and <i>T. colocasiae</i> (CABI 2020a), which are present in Australia in parts of Australia (ABRS 2020). <i>C. fulvus</i> can be found in parts of Asia and Oceania (CABI 2020a), where climatic conditions are similar to Australia. Therefore, <i>C. fulvus</i> has the potential to establish and spread in Australia.	Yes. <i>Cyrtorhinus fulvus</i> is not regarded as a plant pest of economic consequence. However, they are regarded as a predatory arthropod of <i>Tarophagus</i> spp. (CABI 2020a). Therefore, as a predatory arthropod, <i>C. fulvus</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Dalpada oculata</i> (Fabricius, 1775) [Pentatomidae]	China (Tan, Wei & Lan 1998), India (Azim 2011), Singapore and Thailand (Thailand Nature Project 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Dalpada oculata</i> is polyphagous, with host plants including <i>Dimocarpus longan</i> , <i>Litchi chinensis</i> (Tan, Wei & Lan 1998), <i>Cajanus cajan</i> (Azim 2011), <i>Punica granatum</i> (USDA 2017) and <i>Cunninghamia lanceolata</i> (Rider 2015),	Yes, <i>Dalpada oculata</i> is reported as a pest on lychee, longans and pigeon pea (Azim 2011; Tan, Wei & Lan 1998), some of which are economically important in Australia (Horticulture Innovation Australia 2019c). The species is	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				which are present in Australia (APNI 2020). This species is found in China (Tan, Wei & Lan 1998), India (Azim 2011), Singapore and Thailand (Thailand Nature Project 2019), regions with similar climatic conditions to parts of Australia. Therefore, <i>D. oculata</i> has the potential to establish and spread in Australia.	associated with steam, leaves and fruits of host plants (Tan, Wei & Lan 1998; USDA 2017). Hemipteran bugs suck sap from the host plant which reduces plant vigour and causes plant stunting and discolouration (Azim 2011). Therefore, <i>D. oculata</i> has the potential to cause negative economic consequences in Australia.	
<i>Diaspis boisduvalii</i> Signoret 1869 [Diaspididae] Boisduval scale	Taiwan, Mexico (CABI 2020a), Argentina, Belgium, China, Colombia, Ecuador, Egypt, Fiji, France, India, Iran, Italy, Japan, Kenya, Malaysia, Mauritius, New Zealand, Panama, Portugal, Republic of Korea, Singapore, South Africa, Spain, Sri Lanka, Switzerland, Uganda, UK and USA (Watson 2018).	Present, Qld, SA, NSW, Vic. and Tas. (ABRS 2020; Plant Health Australia 2020; Watson 2018). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Diaspis boisduvalii</i> is associated with <i>Dracaena</i> , <i>Cordyline</i> , <i>Rosa</i> and Orchidaceae spp. (Espinosa et al. 2010; García Morales et al. 2020).	Yes. <i>Diaspis boisduvalii</i> is already established in parts of Australia suggesting suitable climatic conditions and host plants are available. Therefore, <i>D. boisduvalii</i> has the potential to establish and spread in Western Australia.	Yes. <i>Diaspis boisduvalii</i> is a highly polyphagous pest on plants from 126 genera in 34 families, many of which are in Australia, including <i>Mangifera indica</i> , <i>Ficus</i> , <i>Cocos</i> , <i>Cymbidium</i> , <i>Agave</i> , <i>Cordyline</i> , <i>Dracaena</i> , <i>Rosa</i> , <i>Vitis</i> , and <i>Citrus</i> spp. (García Morales et al. 2020). The Boisduval scale is an economically important pest of orchids in Florida (Espinosa et al. 2010), causing chlorosis and pitting of foliage through feeding	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					(Espinosa et al. 2010). Therefore, <i>D. boisduvalii</i> has the potential to cause negative economic and environmental consequences in Western Australia.	
<i>Dictyotus caenosus</i> (Westwood, 1837) [Pentatomidae]	New Zealand and New Caledonia (Martin 2017a).	Present, widespread (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Dysmicoccus brevipes</i> (Cockerell, 1893) Synonym: <i>Pseudococcus brevipes</i> (Cockerell), <i>Pseudococcus bromeliae</i> Green [Pseudococcidae] Pineapple mealybug	American Samoa, Argentina, Chile, China, Colombia, Egypt Ecuador, Greece, India, Italy, Indonesia, Iran, Israel, Japan, Cambodia, Kenya, Kiribati, Lebanon, Madagascar, Fiji, Malawi, Malaysia, Mexico, Marshall Islands, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Singapore, South Africa, Tanzania, USA, Sri Lanka, Taiwan, Thailand, Tonga, Uganda, Vanuatu, Vietnam (García Morales et al. 2020), Mauritius, Portugal, Spain and New Caledonia (CABI 2020a).	Present, NSW, NT, Qld and WA (ABRS 2020; CABI 2020a; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Dysmicoccus brevipes</i> is associated with <i>Dracaena</i> spp. (DAFF 2013d; MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Dysmicoccus lepelleyi</i> (Betram, 1937) [Pseudococcidae] Annona mealybug	Indonesia, Cambodia, Malaysia, Philippines, Singapore, Thailand and Vietnam (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Dysmicoccus lepelleyi</i> is associated with <i>Dracaena</i> spp. (Ma et al. 2019; Miller et al. 2014).	Yes. Previously assessed by the department (DAFF 2012b; DAWR 2019c). <i>Dysmicoccus lepelleyi</i> has a wide host range of fruits, vegetables, and ornamental plants (Ben-Dov 2011a) which are grown throughout Australia (DAFF 2012b). Therefore, <i>D. lepelleyi</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (DAFF 2012b; DAWR 2019c). <i>Dysmicoccus lepelleyi</i> is a polyphagous species (Williams 2004) of fruits, vegetables, and ornamental plants grown in Australia (APNI 2020; Horticulture Innovation Australia 2019d). Mealybugs feed on sap, stressing their host plants and reducing the yield of commercial crops. The production of honeydew by mealybugs also promotes the growth of sooty moulds, which reduces the marketability of fruit (CABI 2011; DAFF 2012b). Therefore, <i>D. lepelleyi</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Dysmicoccus neobrevipes</i> Beardsley, 1959 [Pseudococcidae]	American Samoa, China, Colombia, Ecuador, Fiji, India, Indonesia, Italy, Japan, Kiribati, Malaysia, Marshall Islands, Mexico, Pakistan, Panama, Peru,	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA	<i>Dysmicoccus neobrevipes</i> is associated with <i>Cordyline</i> spp. (Kobayashi et al. 2007).	Yes. Previously assessed by the department (Biosecurity Australia 2008b; DAWR 2019c). <i>Dysmicoccus neobrevipes</i> has shown the ability to	Yes. Previously assessed by the department (Biosecurity Australia 2008b; DAWR 2019c). <i>Dysmicoccus neobrevipes</i> is a polyphagous species	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Philippines, Singapore, Thailand, USA, Vietnam (García Morales et al. 2020), Sri Lanka and Uganda (CABI 2020a).	(Government of Western Australia 2020).		establish after being introduced to new environments (Biosecurity Australia 2008b; Williams 2004). This species is highly polyphagous and has been recorded on 85–150 plant hosts in 45–50 plant families. Many of the host plants are grown in Australia and found in many suburban gardens (Biosecurity Australia 2008b). <i>D. neobrevipes</i> has established in countries in Asia and the USA (CABI 2020a), where climatic conditions are similar to Australia. Therefore, <i>D. neobrevipes</i> has the potential to establish and spread in Australia.	reported as being a major pest of pineapple in Hawaii and of <i>Albizia saman</i> , an important amenity tree in Thailand and Australia (Biosecurity Australia 2008b; Williams 2004; Williams & Watson 1988). Therefore, <i>D. neobrevipes</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Dysmicoccus nesophilus</i> William & Watson, 1988 [Pseudococcidae] Grey pineapple mealybug	Fiji, Kiribati, Papua New Guinea and Tonga (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Dysmicoccus nesophilus</i> is associated with <i>Dracaena</i> and <i>Cordyline</i> spp. (MPI 2016).	Yes. Previously assessed by the department (DAWR 2019c). This species has a wide range of host plants including citrus, pineapple, mango, <i>Ficus</i> , mangosteen and papaya (DAWR 2019c). <i>D. nesophilus</i> is present Fiji, Kiribati, Papua New	Yes. Previously assessed by the department (DAWR 2019c). <i>Dysmicoccus nesophilus</i> has a wide range of host plants including citrus, mango, <i>Ficus</i> , mangosteen and papaya (DAWR 2019c), important fruit crops grown in Australia	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Guinea and Tonga (García Morales et al. 2020), where climatic conditions are similar to northern Australia. Therefore, <i>D. nesophilus</i> has the potential to establish and spread in Australia.	(Horticulture Innovation Australia 2019b). Mealybug damage includes leaf and fruit discolouration, leaf, flower and fruit dropping, reduction of fruit growth rate, distortion of leaves, new shoots and fruit, aborted plant shoots, development of cork tissue on fruit peel, contamination of fruit with mealybugs and honeydew, and reduction of plant vigour (DAWR 2019c). Therefore, <i>D. nesophilus</i> has the potential to cause negative economic consequences in Australia.	
<i>Edwardsiana rosae</i> (Linnaeus, 1758) [Cicadellidae] Rose leafhopper	Israel, Italy, USA (CABI 2020a), Belgium, France, Greece, Spain, Switzerland, the Netherlands and UK (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Edwardsiana rosae</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Edwardsiana rosae</i> has a wide range of host plants that are present in Australia (APNI 2020), including <i>Malus</i> (Wisniewska & Prokopy 1997), <i>Prunus</i> , <i>Rosa</i> , <i>Rubus</i> and <i>Vitis</i> spp. (CABI 2020a). This species is widespread in parts of Europe and America (de Jong et al.	Yes. <i>Edwardsiana rosae</i> is a polyphagous pest of crops such as apple (Wisniewska & Prokopy 1997), peach, rose, blackberry, raspberry and grape (CABI 2020a), which are economically important in Australia (Horticulture Innovation Australia 2019c). This species is known to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				2019), which are areas with similar climatic conditions to parts of Australia. Therefore, <i>E. rosae</i> has the potential to establish and spread in Australia.	flecked and blanchd foliage, which leads to the browning of foliage and premature leaf fall (Alford 2012). Therefore, <i>E. rosae</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Empoasca kraemeri</i> (Ross & Moore 1957) [Cicadellidae] Green leafhopper	Argentina, Colombia, Peru, USA (CABI 2020a), Mexico and Panama (Dmitriev 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Empoasca kraemeri</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Empoasca kraemeri</i> is a well-known pest of <i>Ipomoea</i> , <i>Solanum</i> , <i>Phaseolus</i> , <i>Vigna</i> , <i>Zea</i> (CABI 2020a; Galaini-Wraight et al. 1991) and <i>Jatropha</i> spp. (de Oliveira et al. 2016), which are widely grown throughout Australia (APNI 2020). This species is present in Central and South America (Galaini-Wraight et al. 1991), areas where climatic conditions are similar to part of Australia. Therefore, <i>E. kraemeri</i> has the potential to establish and spread in Australia.	Yes. <i>Empoasca kraemeri</i> is an agricultural pest (Malumphy et al. 2019) of beans (Murray et al. 2004), sweet potato, cowpea and maize (CABI 2020a; Galaini-Wraight et al. 1991) which are economically important crops in Australia (Horticulture Innovation Australia 2019c). <i>Empoasca</i> spp. are known to cause damage by sucking sap from the host plant (Calderon & Backus 1992). Therefore, <i>E. kraemeri</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Empoasca pteridis</i> (Dahlbom, 1850) [Cicadellidae]	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands and UK (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Empoasca pteridis</i> is a known pest of several crops, such as <i>Daucus</i> , <i>Hordeum</i> and <i>Triticum</i> spp. (de Jong et al. 2019; El-Wakeil et al. 2014), which are present in Australia (APNI 2020). This species is present across Europe (de Jong et al. 2019) similar climatic conditions to parts of Australia. Therefore, <i>E. pteridis</i> has the potential to establish and spread in Australia.	Yes. <i>Empoasca pteridis</i> is a known pest of several crops, such as carrot, barley, and wheat (El-Wakeil et al. 2014; Szwejdak & Wrzodak 2007), which are economically important in Australia (Horticulture Innovation Australia 2019c). <i>Empoasca</i> spp. are known to cause damage through sucking sap from the host plant (Calderon & Backus 1992). Therefore, <i>E. pteridis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Empoasca stevensi</i> (Young 1953) [Cicadellidae] Steven's leafhopper	Colombia, Panama and USA (Dmitriev 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Empoasca stevensi</i> is associated with frangipani (Hodel, Ohara & Arakelian 2017) and <i>Dracaena marginata</i> (Gill 2001).	Yes. <i>Empoasca stevensi</i> is a known pest of numerous plants including <i>Carica</i> (Davis et al. 1996), <i>Vigna</i> , <i>Plumeria</i> , <i>Phaseolus</i> (Ebesu 2004; Hodel, Ohara & Arakelian 2017) and <i>Dracaena</i> spp. (Gill 2001), which are present in Australia (APNI 2020). This species is present in Central America, the Caribbean	Yes. <i>Empoasca stevensi</i> is a known pest of ornamental and crop plants such as papaya (Davis et al. 1996), cowpea, frangipani, lima bean (Ebesu 2004; Hodel, Ohara & Arakelian 2017) and <i>Dracaena</i> (Gill 2001), which are economically important in Australia (Dragon Trees Australia 2019; Horticulture	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				and South America, and is invasive in Hawaii (Beardsley 1979), which have similar climatic conditions to parts of Australia. Therefore, <i>E. stevensi</i> has the potential to establish and spread in Australia.	Innovation Australia 2019c). This species is a sap-sucking pest, known to cause hopperburn, tip-burn, wrinkling and cupping of foliage, stunting and premature defoliation (UH-CTAHR Department of Entomology & Hawaii Department of Agriculture 2019). Therefore, <i>E. stevensi</i> has the potential to cause negative economic consequences in Australia.	
<i>Erthesina fullo</i> (Thunberg, 1783) [Pentatomidae] Yellow spotted stink bug	India, Japan, Taiwan (CABI 2020a), Vietnam (PaDIL 2018) and China (Zhang et al. 1993).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Erthesina fullo</i> is a pest of a wide variety of plant hosts that are present in Australia (APNI 2020), such as <i>Pinus</i> , <i>Populus</i> , <i>Tectona</i> and pome fruit species (PaDIL 2020). This species is present throughout Asia and it is likely that similar climatic conditions occur in parts of Australia. Therefore, <i>E. fullo</i> has the potential to establish and spread in Australia.	Yes. <i>Erthesina fullo</i> is known to cause damage by feeding on fruit, foliage and stems (Lariviere, Rhode & Scott 2016). This species is a major pest of pine and hardwood trees in Taiwan, pears in China and Chinese cinnamon in Vietnam (PaDIL 2020; Tara, Sudan & Sharma 2011). It is also a pest of <i>Melia azedarach</i> , <i>Populus</i> , <i>Tectona grandis</i> and pome fruit (PaDIL 2020). The injury rate of pear fruit is up to 60% (Zhang	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					et al. 1993). Therefore, <i>E. fullo</i> has the potential to cause negative economic consequences in Australia.	
<i>Esbenia major</i> Jensen-Haarup, 1931 [Acanthosomatidae]	South Africa (Robertson 2009).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Esbenia major</i> has not been well studied, however, it is known from South Africa (Robertson 2009), which has similar climatic conditions to Australia. Host plants are unknown, however this species has been intercepted on cut flower and foliage consignments (unpublished). Therefore, <i>E. major</i> has the potential to establish and spread in Australia.	Yes. Species from the family Acanthosomatidae are usually herbivorous and polyphagous pests of trees and shrubs (ABRS 2020; McPherson 2018) including some which are economic pests of hazelnut (Ak et al. 2018). Therefore, <i>E. major</i> has the potential to cause negative environmental consequences in Australia.	Yes
<i>Euander lacertosus</i> (Erichson, 1842) [Rhyparochromidae]	No records found	Present, native species (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Eucalymnatus tessellatus</i> (Signoret, 1873) [Coccidae] Tessellated scale	Argentina, China, Colombia, Egypt, Fiji, France, India, Indonesia, Italy, Japan, Kenya, Kiribati, Madagascar, Malaysia, Mauritius, Mexico, Morocco, New	Present, Qld, NT, NSW and SA (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA	<i>Eucalymnatus tessellatus</i> is associated <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Eucalymnatus tessellatus</i> is already present in parts of Australia, suggesting suitable climatic conditions and host plants are available.	Yes. <i>Eucalymnatus tessellatus</i> is a serious pest of tropical palms such as the coconut palm (Howard et al. 2001). This pest is known to cause damage through	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Caledonia, Papua New Guinea, South Africa, Republic of Korea, Spain, Sri Lanka, Taiwan, Tanzania, Thailand, Tonga, UK, USA, Vanuatu (García Morales et al. 2020) and Vietnam (Danzig & Gavrilov 2010; García Morales et al. 2020).	(Government of Western Australia 2020).		Therefore, <i>E. tessellatus</i> has the potential to establish and spread in Western Australia.	sap-sucking mouthparts and can produce honeydew, which facilitates the growth of sooty mould (Howard et al. 2001). This species is a polyphagous pest of many fruit, landscape and ornamental plants such as mangoes, coffee and citrus (García Morales et al. 2020). Therefore, <i>E. tessellatus</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Ferrisia dasyilirii</i> (Cockerell, 1896) [Pseudococcidae]	Chile, Colombia, Malaysia, Mexico, Panama and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Ferrisia dasyilirii</i> is associated with <i>Hibiscus</i> (Sartiami et al. 2016) and <i>Cordyline</i> spp. (Kaydan & Gullan 2012).	Yes. <i>Ferrisia dasyilirii</i> is a known pest of numerous plant hosts including <i>Hibiscus</i> (Sartiami et al. 2016), <i>Carica</i> , <i>Mangifera</i> , <i>Vitis</i> , <i>Coffea</i> , <i>Solanum</i> , <i>Manihot</i> , <i>Ipomoea</i> , <i>Psidium</i> (Marques et al. 2015) and <i>Cordyline</i> spp. (Kaydan & Gullan 2012) which are present in Australia (APNI 2020). This species is distributed throughout Central and South America (García Morales et al. 2020), areas with similar	Yes. <i>Ferrisia dasyilirii</i> is polyphagous and has been reported to feed on hibiscus (Sartiami et al. 2016), papaya, mango, grapes, coffee, tomato, cassava, sweet potato and eggplant (Marques et al. 2015) which are economically important in Australia (Horticulture Innovation Australia 2019c). When introduced into new areas with no native enemies, <i>F. dasyilirii</i> can multiply quickly on a wide variety	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				climatic conditions to parts of Australia. Therefore, <i>F. dasyliirii</i> has the potential to establish and spread in Western Australia.	of plants hosts, leading to associated economic loss on its numerous host plants (de Lima, Melo & Barros 2016). Therefore, <i>F. dasyliirii</i> has the potential to cause negative economic consequences in Australia.	
<i>Ferrisia virgata</i> (Cockerell, 1893) [Pseudococcidae] Guava mealybug	Kenya (letter from KEPHIS on 29/01/2018), Ecuador (letter from Agrocalidad on 15/02/2018), Ethiopia (letter from MANR on 06/03/2018), Argentina, China, Colombia, Egypt, Fiji, France, India, Iran, Indonesia, Japan, Cambodia, Kiribati, Madagascar, Marshall Islands, Malaysia, Mexico, New Caledonia, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Singapore, Saudi Arabia, South Africa, Sri Lanka, Taiwan, Tanzania, USA, Thailand, Tonga, Uganda, Vanuatu, Vietnam (García Morales et al. 2020), Israel, United Arab	Present, Qld, NSW, NT and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Ferrisia virgata</i> is associated with <i>Dracaena</i> and <i>Cordyline</i> (DAFF 2013d; MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Emirates, Malawi and Zimbabwe (CABI 2020a).					
<i>Fiorinia fioriniae</i> (Targioni Tozzetti, 1867) [Diaspididae] Palm fiorinia scale, avocado scale	China, Mauritius, Mexico, Sri Lanka, Taiwan, USA (ABRS 2020), Argentina, Belgium, Egypt, France, Greece, India, Indonesia, Israel, Italy, Japan, Madagascar, Mauritius, Mexico, Morocco, New Caledonia, Peru, Philippines, South Africa, Spain, Sri Lanka, Taiwan, Tanzania, UK, USA, Vanuatu (García Morales et al. 2020), Portugal, Malaysia, Chile and Papua New Guinea (Watson 2018).	Present, NSW and Qld (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Fiorinia fioriniae</i> is associated <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (DAWR 2019b). <i>Fiorinia fioriniae</i> is already present in parts of Australia, suggesting suitable hosts and climatic conditions exist in Australia. Therefore, <i>F. fioriniae</i> has the potential to establish and spread in Western Australia.	Yes. Previously assessed by the department (DAWR 2019b). <i>Fiorinia fioriniae</i> is regarded as a serious pest of avocado, causing damage by feeding on host plants (Miller & Davidson 2005). In addition, this pest is found on economically important crops such as citrus, mango, coconuts, bananas, palms, pistachio, roses and avocados (García Morales et al. 2020). Diaspids, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>F. fioriniae</i> has the potential to cause negative economic and environmental consequences in Western Australia.	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Furcaspis biformis</i> (Cockerell 1893) [Diaspididae] Orchid scale, red orchid scale	Colombia, Fiji, Indonesia, Japan, Malaysia, Mexico, Panama, Philippines, Sri Lanka, Singapore, Thailand, USA (García Morales et al. 2020; Watson 2018) and Puerto Rico (Martorell & Gaud 1974).	Present, Qld and NT (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Furcaspis biformis</i> is associated with <i>Dendrobium</i> spp. (García Morales et al. 2020).	<i>Furcaspis biformis</i> has already established in parts of Australia (ABRS 2020; CSIRO 2017), suggesting suitable climatic conditions and host plants are available in Western Australia. Therefore, <i>P. cockerelli</i> has the potential to establish and spread in Western Australia.	<i>Furcaspis biformis</i> is a known pest of orchid plant species in addition to <i>Bromelia pinguin</i> , <i>Cycas revoluta</i> , <i>Pedilanthus tithymaloides</i> , tuberoses, mango and avocado (Leonhardt & Sewake 1999; Martorell & Gaud 1974). A number of these species are important ornamental and horticultural plants to Australia (Horticulture Innovation Australia 2019c). Therefore, <i>Furcaspis biformis</i> has the potential to cause negative economic consequences in Australia.	Yes (WA)
<i>Gonocerus insidiator</i> (Fabricius, 1787) [Coreidae] Leaf-footed bug	France, Greece, Italy, Portugal, Spain (de Jong et al. 2019), and Turkey (Dursun 2012).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Gonocerus insidiator</i> is a pest of numerous plants such as <i>Cistus</i> , <i>Quercus</i> , <i>Lavandula</i> , <i>Fragaria</i> , <i>Pistacia</i> , <i>Daphne</i> and <i>Phlomis</i> spp. (van der Heyden 2017a), which occur in Australia (APNI 2020). This species is found throughout the Mediterranean region (de Jong et al. 2019), where climatic conditions are	Yes. <i>Gonocerus insidiator</i> damages seeds of host plants (Tsahar, Friedman & Izhaki 2002). This species host numerous plants including <i>Cistus</i> , <i>Quercus</i> , <i>Lavandula</i> , <i>Fragaria</i> , <i>Pistacia</i> , <i>Daphne</i> and <i>Phlomis</i> spp. (van der Heyden 2017a), which are economically important in Australia (Horticulture Innovation	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				similar to parts of Australia. Therefore, <i>G. insidiator</i> has the potential to establish and spread in Australia.	Australia 2019c). Therefore, <i>G. insidiator</i> has the potential to cause negative economic consequences in Australia.	
<i>Halyomorpha halys</i> (Stål, 1855) [Pentatomidae] Brown marmorated stink bug (BMSB)	China, Japan, Republic of Korea, Taiwan, USA (DAWR 2015b), France, Greece, Italy, Spain, Switzerland and New Zealand (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Halyomorpha halys</i> is associated with Phalaenopsis orchids and <i>Rosa</i> spp. (PHA 2016a).	Yes. Previously assessed by the department (Australian Department of Agriculture 2019). This species is found throughout the northern hemisphere and studies have shown that southwest and southeast Australia have suitable climatic conditions for a similar spread and establishment (Australian Department of Agriculture 2019). <i>H. halys</i> is highly polyphagous feeding on over 100 plant hosts including capsicum, corn, berries, soybean, tomatoes, pome fruit, citrus, roses, eggplant and apple (Australian Department of Agriculture 2019). Therefore, <i>H. halys</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (Australian Department of Agriculture 2019). This species is known to feed on foliage, shoots, stems, bark, and fruit which directly leads to economic damage to crops (Australian Department of Agriculture 2019). This causes scarred, faded, sunken areas, deformed pods, wart-like growths within seeds, stained lint, shrivelled or collapsed seeds, white spongy areas, sunken deformations, brown spots, corky spots and internal tissue damage on fruit, leading to the development of pathogens and rot, causing further damage. This species is also known to transmit the	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					phytoplasma responsible for <i>Paulownia</i> witches' broom disease, which is not known to occur in Australia (Australian Department of Agriculture 2019). Therefore, <i>H. halys</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Sardia rostrata</i> Melichar, 1903 Synonym: <i>Sardia pluto</i> (Kirkaldy, 1906), <i>Haplodelphax pluto</i> Kirkaldy, 1906 [Delphacidae]	New Zealand, Sri Lanka, Fiji and India (ABRS 2020).	Present, Qld, NSW and Vic. (ABRS 2020; Plant Health Australia 2020).	<i>Sardia rostrata</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> (MPI 2016).	Assessment not required	Assessment not required	No
<i>Hauptidia maroccana</i> (Melichar, 1907) [Cicadellidae] Glasshouse leafhopper	France, UK (CABI 2020a), Portugal, Spain (de Jong et al. 2019), Morocco and the Netherlands (Dmitriev 2013).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hauptidia maroccana</i> is associated with <i>Geranium</i> , <i>Chrysanthemum</i> , <i>Fuchsia</i> , <i>Primula</i> and <i>Salvia</i> spp. (Choudhury 2002; PHA 2016a).	Yes. <i>Hauptidia maroccana</i> is a pest of many vegetable crops and ornamental plants including <i>Capsicum</i> , <i>Cucumis</i> , <i>Solanum</i> , <i>Phaseolus</i> , <i>Gossypium</i> , <i>Geranium</i> , <i>Chrysanthemum</i> , <i>Fuchsia</i> , <i>Primula</i> and <i>Salvia</i> spp. (Choudhury 2002) which are present in Australia	Yes. <i>Hauptidia maroccana</i> is known as one of the most important economic pests in glasshouses, causing serious infestations in several countries including the UK and Spain (Aguin-Pombo & Baena 2002; Choudhury 2002). This species is a sap-sucking pest causing	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				(APNI 2020). This species is found throughout Europe (CABI 2020a) and the Mediterranean region (de Jong et al. 2019), which are areas with similar climatic conditions to parts of Australia. Therefore, <i>H. maroccana</i> has the potential to establish and spread in Australia.	chlorotic spotting on foliage, and during heavy infestations, the spots are able to coalesce into large white patches (Gillespie 1984). This species feeds on a wide range of plants including sweet pepper, cucumber, tomato, French bean, cotton (Cotton Australia 2019), <i>Geranium</i> and <i>Chrysanthemum</i> spp. (Choudhury 2002), which are important economically important in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). Therefore, <i>H. maroccana</i> has the potential to cause negative economic consequences in Australia.	
<i>Hemiberlesia cyanophylli</i> (Signoret, 1869) Synonym: <i>Abgrallaspis cyanophylli</i> (Signoret, 1869) [Diaspididae] Cyanophyllum scale	France, India, Japan, Kenya, Mauritius, Mexico, Sri Lanka, Taiwan, USA, UK (ABRS 2020), Papua New Guinea (CABI 2020a), Argentina, China, Colombia, Egypt, Fiji, France, Greece, Indonesia, Israel, Italy, Kiribati,	Present, NSW, Qld, SA and Tas. (ABRS 2020; Plant Health Australia 2020; Watson 2018). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Hemiberlesia cyanophylli</i> is associated with <i>Dracaena</i> , <i>Cordyline</i> and <i>Lilium</i> spp. (DAFF 2013d; MPI 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2006d, 2008b, a; DAWR 2015a, 2019b). <i>Hemiberlesia cyanophylli</i> already present in parts of Australia, suggesting suitable hosts and	Yes. Previously assessed by the department (Biosecurity Australia 2006d, 2008b, a; DAWR 2015a, 2019b). <i>Hemiberlesia cyanophylli</i> is a serious pest of many economically important crops such as palms in	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Madagascar, Marshall Islands, New Caledonia, New Zealand, Panama, Peru, Philippines, Spain, Thailand, Tonga, Uganda, Vanuatu (García Morales et al. 2020), Vietnam (Dao et al. 2017; García Morales et al. 2020), Chile, Iran, Malaysia and Zimbabwe (Watson 2018).			climatic conditions exist in Australia. Therefore, <i>H. cyanophylli</i> has the potential to establish and spread in Western Australia.	Florida, tea in Taiwan, mango in Israel and cocoa in Brazil (Miller & Davidson 2005). This species causes chlorotic spots on foliage and premature leaf drop (Miller & Davidson 2005). Therefore, <i>H. cyanophylli</i> has the potential to cause negative economic consequences in Australia.	
<i>Hemiberlesia diffinis</i> (Newstead 1893) [Diaspididae] Diffinis scale	Guatemala, Guyana, Mexico, Panama, Peru, USA, El Salvador, Jamaica, Canada, Ecuador, Brazil, Colombia, Nicaragua, Costa Rica, Argentina, Cuba and Dominica (García Morales et al. 2020; GBIF Secretariat 2019; Miller & Davidson 1998)	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hemiberlesia diffinis</i> is associated with <i>Dracaena</i> spp. (Stoetzel & Miller 1998).	Yes. <i>Hemiberlesia diffinis</i> is a polyphagous pest on plants from 35 genera in 27 families including <i>Cocos</i> , <i>Dracaena</i> , <i>Hevea</i> , <i>Manihot</i> , <i>Oncidium</i> , <i>Prunus</i> , pomegranate, guava, <i>Plumeria</i> , cacao, <i>Ulmus</i> (García Morales et al. 2020) and <i>Persea</i> spp. (Hernández-Rivero et al. 2013), which are present in Australia (APNI 2020). This species is known in numerous tropical countries across Central and South America (García Morales et al. 2020), suggesting tropical regions in Australia would be suitable.	Yes. <i>Hemiberlesia diffinis</i> is a pest of many ornamental and fruit crop plants including coconut, <i>Dracaena</i> , cassava, <i>Oncidium</i> orchids, <i>Prunus</i> spp., pomegranate, guava, <i>Ulmus</i> spp. (García Morales et al. 2020) and avocado (Hernández-Rivero et al. 2013; Peña 2003), which are economically important in Australia (Horticulture Innovation Australia 2019c). Diaspids, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Therefore, <i>H. diffinis</i> has the potential to establish and spread in Australia.	chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>H. diffinis</i> has the potential to cause negative economic consequences in Australia.	
<i>Hemiberlesia lataniae</i> (Signoret, 1869) Synonym: <i>Aspidiotus lataniae</i> Signoret, 1869 [Diaspididae] Latania scale	China, Indonesia, Israel, Japan, Mauritius, Mexico, New Zealand, Papua New Guinea, Sri Lanka, Taiwan, USA (ABRS 2020), Argentina, Chile, Colombia, Ecuador, Egypt, Fiji, France, Greece, India, Italy, Kenya, Kiribati, Lebanon, Madagascar, Malaysia, Marshall Islands, Morocco, New Caledonia, Pakistan, Panama, Peru, Philippines, Portugal, Saudi Arabia, South Africa, Republic of Korea, Spain, Tanzania, Thailand, Tonga, Uganda, UK, Vanuatu, Vietnam, Zimbabwe (García Morales et al. 2020), Iran, Ethiopia and Malawi (Watson 2018).	Present, NSW, Qld, WA and NT (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Hemiberlesia lataniae</i> is associated with <i>Dracaena</i> , <i>Cordyline</i> and <i>Lilium</i> spp. (DAFF 2013d; MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Hemiberlesia palmarum</i> (Cockerell, 1892) [Diaspididae] Tropical palm scale	Argentina, Chile, China, Colombia, Ecuador, Fiji, India, Indonesia, Kenya, Kiribati, Malaysia, Marshall Islands, Mexico, Panama, Papua New Guinea, Peru, Philippines, Portugal, Singapore, South Africa, Sri Lanka, Tanzania, Thailand, Tonga, UK, USA, (García Morales et al. 2020), Vietnam (Danzig & Konstantonova 1990; García Morales et al. 2020) and New Zealand (Beucke 2018).	Present, Qld (restricted dist.), and NSW (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Hemiberlesia palmarum</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (Biosecurity Australia 2008b). <i>Hemiberlesia palmarum</i> is already present in parts of Australia, suggesting suitable hosts and climatic conditions exist in Australia. Therefore, <i>H. palmarum</i> has the potential to establish and spread in Western Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2008b). <i>Hemiberlesia palmarum</i> is a pest of various crops, including coffee, citrus, avocado, tea and mango (García Morales et al. 2020), which are economically important in Australia (Horticulture Innovation Australia 2019c). This scale is known to cause yellow spots on foliage and has been found on twigs of avocado trees in Colombia (Kondo & Muñoz 2016). <i>H. palmarum</i> is considered a pest of oil palm and banana in Malaysia where it can be found in large numbers on the leaves of these plants (Borchsenius 1966; Kondo & Muñoz 2016). Therefore, <i>H. palmarum</i> has the potential to cause negative economic consequences in Australia.	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Hemiberlesia rapax</i> (Comstock, 1881) Synonym: <i>Aspidiotus rapax</i> Comstock, 1881 [Diaspididae] Greedy scale	New Zealand, Mexico, USA, Sri Lanka, Taiwan, Israel, Japan (ABRS 2020), Argentina, Chile, China, Colombia, Egypt, Ecuador, France, Greece, Iran, India, Indonesia, Kenya, Peru, Lebanon, Madagascar, Nepal, Malawi, Mauritius, Morocco, New Caledonia, Philippines, Portugal, South Africa, Spain, Tanzania, Zimbabwe (García Morales et al. 2020), Malaysia, Pakistan, Italy, UK, Spain and Papua New Guinea (CABI 2020b).	Present, NSW, Qld, Vic., WA, Tas. and SA (ABRS 2020; CABI 2020a; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Hemiberlesia rapax</i> is associated with <i>Cordyline</i> spp. (García Morales et al. 2020; MPI 2016).	Assessment not required	Assessment not required	No
<i>Heterogaster urticae</i> (Fabricius, 1775) [Heterogastridae]	Europe, the Canary Islands, North Africa, New Zealand and the Chatham Islands (Scudder & Eyles 2003).	No records found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Heterogaster urticae</i> is polyphagous, feeding on <i>Leptospermum scoparium</i> , <i>Zantedeschia aethiopica</i> , <i>Urtica</i> and <i>Ammophila</i> spp. (Scudder & Eyles 2003), plants which are common in Australia (APNI). The species is present in areas of Europe, North Africa and New Zealand (Scudder & Eyles 2003), where climatic conditions are similar to parts of	Yes. <i>Heterogaster urticae</i> is polyphagous, feeding on <i>Leptospermum scoparium</i> , <i>Zantedeschia aethiopica</i> , <i>Urtica</i> and <i>Ammophila</i> spp. (Scudder & Eyles 2003). While these plants are not of major economic value, this species polyphagous nature may lead to adverse damage to Australian flora. Therefore, <i>H. urticae</i> has the potential to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Australia. Therefore, <i>H. urticae</i> has the potential to establish and spread in Australia.	negative environmental consequences in Australia.	
<i>Homalodisca vitripennis</i> (Germar, 1821) [Cicadellidae] Glassy winged sharpshooter	USA, Mexico (Wilson, Turner & McKamey 2009a) and Chile (CABI 2020a).	No record found (ABRS 2020; EPPO 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020); declared pest for Vic. (DEDJTR 2017); declared pest for SA (PIRSA 2019); emergency pest for NSW (NSW DPI 2016).	<i>Homalodisca vitripennis</i> is associated with , <i>Chrysanthemum</i> , <i>Cordyline</i> and <i>Dracaena</i> spp. (DAF & NGIA 2017; MPI 2016).	Yes. <i>Homalodisca vitripennis</i> is a pest of a wide variety of plant hosts across 300 genera including, <i>Chrysanthemum</i> , <i>Eucalyptus</i> , <i>Cordyline</i> , <i>Dracaena</i> , <i>Jacaranda</i> , <i>Vitis</i> , <i>Citrus</i> , <i>Prunus</i> , <i>Azalea</i> , <i>Olea</i> , <i>Persea</i> , <i>Pinus</i> , <i>Coffea</i> , <i>Pyrus</i> , <i>pecan</i> , <i>Ulmus</i> , <i>Acer</i> and <i>Quercus</i> spp. (DAF & NGIA 2017) which are present in Australia (APNI 2020). This species is present in numerous countries across the American continents (CABI 2020a; Wilson, Turner & McKamey 2009a), which are areas with similar climatic conditions to parts of Australia. Therefore, <i>H. vitripennis</i> has the potential to establish and spread in Australia.	Yes. <i>Homalodisca vitripennis</i> is a pest of many plants including <i>Chrysanthemum</i> , <i>Eucalyptus</i> , <i>Cordyline</i> , <i>Dracaena</i> , <i>Jacaranda</i> , <i>Vitis</i> , <i>Citrus</i> , <i>Prunus</i> , <i>Azalea</i> , <i>Olea</i> , <i>Persea</i> , <i>Pinus</i> , <i>Coffea</i> , <i>Pyrus</i> , <i>pecan</i> , <i>Ulmus</i> , <i>Acer</i> and <i>Quercus</i> spp. (DAF & NGIA 2017), which are economically important or endemic plants in Australia (APNI 2020; Dragon Trees Australia 2019; Horticulture Innovation Australia 2019c). This species feeds heavily on plant sap, damaging the plant through feeding (DAF & NGIA 2017). Additionally, <i>H. vitripennis</i> is a vector of the bacterium <i>Xylella fastidiosa</i> (Rathé et al. 2011), which is an exotic, national priority pest for Australia (DAWR 2016f, 2017b). Therefore,	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					<i>H. vitripennis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Horridipamera nietneri</i> (Dohrn, 1860) [Rhyparochromidae]	China, Fiji, Sri Lanka, Indonesia, India, Japan, Malaysia, New Caledonia, Philippines (ABRS 2020), Cambodia and Thailand (Dellapé & Henry 2018).	Present, NT, Qld, SA, WA and NSW (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Howardia biclavis</i> (Comstock, 1883) [Diaspididae] Mining scale	Mauritius, Mexico, Japan, Papua New Guinea, Sri Lanka, Taiwan, UK, USA (ABRS 2020), Argentina, China, Colombia, Ecuador, Fiji, France, India, Indonesia, Italy, Kenya, Madagascar, Malaysia, New Caledonia, Panama, Papua New Guinea, Peru, Philippines, Portugal, Singapore, South Africa, Spain, Tonga, Vanuatu and Zimbabwe (García Morales et al. 2020).	Present, Qld (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Howardia biclavis</i> is associated with <i>Cordyline</i> spp. (MPI 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2009c). <i>Howardia biclavis</i> is already present in parts of Australia, suggesting suitable hosts and climatic conditions exist in Australia. Therefore, <i>H. biclavis</i> has the potential to establish and spread in Western Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2009c). <i>Howardia biclavis</i> is highly polyphagous and known to feed on plants from 196 genera in 69 families, including avocados, <i>Cordyline</i> , apricots, almonds, apples, <i>Camellia</i> , citrus, cherries, coffee, <i>Gardenia</i> , lychees, mango, macadamia, <i>Dracaena</i> , nectarines, peaches, plums, papaw, <i>Solanum</i> spp. and walnut (García Morales et al. 2020), which are economically important plants in Australia (Horticulture Innovation Australia 2019c).	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					<p><i>Howardia biclavis</i> is a sap-sucking pest which can cause loss of vigour, deformation, defoliation and death of plant host (UH-CTAHR Department of Entomology & Hawaii Department of Agriculture 2019). Therefore, <i>H. biclavis</i> has the potential to cause negative economic consequences in Western Australia.</p>	
<p><i>Hypogeococcus pungens</i> Granara de Willink, 1981 [Pseudococcidae] Cactus mealybug</p>	<p>Argentina, France, Greece, Italy, Peru, South Africa, Spain and USA (García Morales et al. 2020; Matile-Ferrero & Étienne 2006; Poveda-Martinez et al. 2019; Williams & Granara de Willink 1992).</p>	<p>Not present, <i>Hypogeococcus pungens</i> is listed as present in ABRS (2020) and García Morales et al. (2020) based on the paper by Poveda-Martinez et al. (2019) and Mani and Shivaraju (2016). However, Poveda-Martinez et al. (2019) actually concludes that the species introduced into Australia for biological control of Cactaceae is an undescribed species of <i>Hypogeococcus</i>.</p>	<p><i>Hypogeococcus pungens</i> is associated with <i>Rosa</i>, <i>Gardenia</i>, <i>Viola</i> and <i>Hibiscus</i> spp. (García Morales et al. 2020).</p>	<p>Yes. Previously assessed by the department (DAWR 2019c). <i>Hypogeococcus pungens</i> is associated with Amaranthaceae, Cactaceae, Portulacaceae and Euphorbiaceae, however exact host associations are cautioned due to taxonomic uncertainty of the species (Poveda-Martinez et al. 2019). This species is present in numerous countries across the American continents and Europe (CABI 2020a; Wilson, Turner & McKamey</p>	<p>Yes. Previously assessed by the department (DAWR 2019c). <i>Hypogeococcus pungens</i> is a known plant pest species in the families of Amaranthaceae, Cactaceae, Portulacaceae and Euphorbiaceae (Poveda-Martinez et al. 2019), and also associated with other cut flowers and ornamental plants including <i>Rosa</i>, <i>Gardenia</i>, <i>Viola</i> and <i>Hibiscus</i> spp. (García Morales et al. 2020). Many of these plants are economically important or naturalised plants in</p>	<p>Yes</p>

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				2009a), which are areas with similar climatic conditions to parts of Australia. Therefore, <i>H. pungens</i> has the potential to establish and spread in Australia.	Australia (APNI 2020; Dragon Trees Australia 2019; Horticulture Innovation Australia 2019c). Therefore, <i>H. pungens</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Icerya seychellarum</i> (Westwood, 1855) [Monophlebidae]	China, Colombia, Egypt, Fiji, France, India, Indonesia, Japan, Kenya, Kiribati, Malawi, Madagascar, Malaysia, Papua New Guinea, Mauritius, New Caledonia, Pakistan, South Africa, Philippines, Sri Lanka, Taiwan, Thailand, Tonga, Uganda, Vanuatu (García Morales et al. 2020), Nepal, American Samoa, Portugal, New Zealand and Tanzania (CABI 2020a).	Present, NT, Qld and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Icerya seychellarum</i> is associated with <i>Cordyline</i> spp. (García Morales et al. 2020; MPI 2016).	Assessment not required	Assessment not required	No
<i>Insignorthezia insignis</i> (Browne, 1887) Synonym: <i>Orthezia insignis</i> Browne, 1887	Kenya (letter from KEPHIS on 29/01/2018), Argentina, British Virgin Islands, China, Colombia, Ecuador, Egypt, France, India, Indonesia, Italy,	Present (García Morales et al. 2020; Lapolla et al. 2008). Declared pest, prohibited entry into WA	<i>Insignorthezia insignis</i> is associated with <i>Cordyline</i> , <i>Dracaena</i> , <i>Rosa</i> and <i>Chrysanthemum</i> spp. (García Morales et al. 2020; MPI 2016).	Yes. <i>Insignorthezia insignis</i> is already present in parts of Australia, suggesting suitable hosts and climatic conditions exist in Australia.	Yes. <i>Insignorthezia insignis</i> is a highly polyphagous glasshouse pest (Malumphy et al. 2019) of plants from 120 genera in 45 families. It is	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Ortheziidae]	Japan, Kenya, Madagascar, Malaysia, Mexico, Morocco, New Caledonia, Panama, Peru, Portugal, South Africa, Sri Lanka, Switzerland, Taiwan, Tanzania, Uganda, UK, USA (García Morales et al. 2020), Malawi, Mauritius, Zimbabwe, Spain (CABI 2020a) and Ethiopia (Belay, Gofitshu & Kassaye 2018).	(Government of Western Australia 2020).		Therefore, <i>I. insignis</i> has the potential to establish and spread in Western Australia.	a severe pest of jacaranda, citrus, lantana, sweet potato, eggplant and roses (García Morales et al. 2020; Mardiningsih 2011), which are economically important crops or ornamental plants in Australia (Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). In Egypt, <i>I. insignis</i> is known as a pest of <i>Chrysanthemum</i> and infests twigs and branches, as well as producing honeydew that can facilitate the growth of sooty mould (Malumphy et al. 2019). Therefore, <i>I. insignis</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Ischnaspis longirostris</i> (Signoret, 1882)	Japan, New Zealand, Panama, Papua New Guinea, Sri Lanka, UK, USA (ABRS 2020), Argentina, Colombia, Ecuador, Egypt, Ethiopia, Fiji, France, India, Indonesia, Italy, Kenya,	Present, Qld, SA and NT (ABRS 2020; García Morales et al. 2020; Plant Health Australia 2020).	<i>Ischnaspis longirostris</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> and <i>Orchidaceae</i> spp. (García Morales et al. 2020; MPI 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2009c; DAFF 2012b, 2013e). <i>Ischnaspis longirostris</i> is already present in parts of Australia, suggesting	Yes. Previously assessed by the department (Biosecurity Australia 2009c; DAFF 2012b, 2013e). <i>Ischnaspis longirostris</i> is a highly polyphagous pest of host plants from 145 genera in	Yes (WA)
[Diaspididae]						
Black thread scale		Declared pest, prohibited entry into WA				

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Madagascar, Malaysia, Mauritius, Mexico, New Caledonia, Philippines, Portugal, Singapore, South Africa, Sri Lanka, Taiwan, Tanzania, Tonga, Uganda, Vanuatu and Zimbabwe (García Morales et al. 2020).	(Government of Western Australia 2020).		suitable hosts and climatic conditions exist in Australia. Therefore, <i>I. longirostris</i> has the potential to establish and spread in Western Australia.	50 families, including palms, greenhouse floriculture crops (orchids), cotton, lychees, mango, capsicum, coffee, citrus and banana (Espinosa et al. 2019; García Morales et al. 2020), which are economically important crops or ornamental plants in Australia (Cotton Australia 2019; Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). This species is a sap-sucking pest, feeding on fronds, petioles and fruit of host plants (Espinosa et al. 2019). During heavy infestations, feeding can result in loss of vigour, deformation of infested plant parts, lesions, defoliation, and chlorosis which leads to yield and quality loss (Espinosa et al. 2019). Therefore, <i>I. longirostris</i> has the potential to cause negative economic and environmental	

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Western Australia.	
<i>Kallitaxila sinica</i> (Walker, 1851) [Tropiduchidae]	China, Taiwan and Japan (Hayashi & Fujinuma 2016).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Kallitaxila sinica</i> is associated with <i>Sapium sebiferum</i> (Ding et al. 2018) which are present in Australia (APNI 2020). Host plants for <i>K. sinica</i> are not well studied, however, other species in the genus are polyphagous, suggesting <i>K. sinica</i> may also be polyphagous. The closely related species <i>Kallitaxila granulata</i> is known as an invasive and polyphagous plant pest of multiple host plants, including guava, grapefruit, hapuu (<i>Cibotium chamissoi</i>), uluhe (<i>Dicranopteris linearis</i>), ohialihua (<i>Metrosideros polymorpha</i>), <i>Cordyline fruticosa</i> , <i>Erythrina variegata</i> , and plumeria (Yang, Alyokhin & Messing 2001). This species is found in China, Taiwan and Japan (Yang, Alyokhin & Messing 2001), in regions with similar climatic	Yes. <i>Kallitaxila sinica</i> is a new pest of Chinese tallow tree (<i>Sapium sebiferum</i>) in China (Ding et al. 2018). Further information is limited about the impact of this pest, however a closely related species, <i>Kallitaxila granulata</i> , is invasive and known to cause damage to economically and or environmentally important plants such as guava, grapefruit and <i>Cordyline fruticosa</i> . Damage included scarring of foliage. Evidence suggests <i>Kallitaxila</i> species have the potential to significantly impact agricultural and forest ecosystems in Hawaii (Yang, Alyokhin & Messing 2001). <i>Kallitaxila granulata</i> has also been found on citrus and mango in Christmas Island (Bellis et al. 2004). Therefore, <i>K. sinica</i> has the potential to cause negative economic	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				conditions to Australia. Therefore, <i>K. sinica</i> has the potential to establish and spread in Australia.	consequences in Australia.	
<i>Kilifia acuminata</i> (Signoret 1873) [Coccidae] Acuminate scale	India, Fiji (CABI 2020a), Argentina, China, Colombia, Egypt, France, Japan, Malaysia, Mexico, Panama, Papua New Guinea, Sri Lanka, Taiwan, Tonga, USA and Vanuatu (García Morales et al. 2020).	Present, Qld. (unpublished) Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Kilifia acuminata</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (García Morales et al. 2020).	Yes. <i>Kilifia acuminata</i> is found in the Pacific, Asian and American regions (García Morales et al. 2020), which are areas with similar climatic conditions to Australia. It is associated with host plants from 53 genera in 35 families, including <i>Annona</i> , <i>Anthurium</i> , <i>Citrus</i> , <i>Persea</i> , <i>Pyrus</i> , <i>Psidium</i> , <i>Mangifera</i> , <i>Ananus</i> and <i>Plumeria</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). Therefore, <i>K. acuminata</i> has the potential to establish and spread in Australia.	Yes. <i>Kilifia acuminata</i> is highly polyphagous and an important economic pests of mango, citrus, pears, guava and other fruit trees and ornamental crops in Egypt (Gerson & Applebaum 2019; Nabil 2013), which are also economically important plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). This pest causes severe damage to flowers (Carrillo, Duncan & Pena 2017), foliage and fruit, which may result in defoliation (Monzer, Srour & Abd El-Ghany 2013). Therefore, <i>K. acuminata</i> has the potential to cause significant negative economic and environmental consequences in Australia.	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Labidaspis myersi</i> (Green, 1929) [Diaspididae]	New Zealand (García Morales et al. 2020) and New Caledonia (Mille et al. 2016).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Labidaspis myersi</i> species is associated with the <i>Astelia</i> spp. (Mille et al. 2016).	Yes. <i>Labidaspis myersi</i> has a limited host range and found on <i>Astelia</i> spp. in New Caledonia and New Zealand (Mille et al. 2016), which are present in Australia (APNI 2020). Climatic conditions in parts of Australia are similar to the geographical range of the pest. Therefore, <i>L. myersi</i> has the potential to establish and spread in Australia.	Yes. <i>Labidaspis myersi</i> is a plant pest of <i>Astelia</i> spp. (Mille et al. 2016), including <i>Astelia chathamica</i> and <i>Astelia nervosa</i> or rare native flora such as <i>Astelia australiana</i> (Mille et al. 2016), which are economically important ornamental or endemic plants in Australia (APNI 2020). Diaspids, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>L. myersi</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Lecanodiaspis dendrobii</i> (Douglas 1892) [Coccidae] False pit scale	Argentina, Colombia and Mexico (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lecanodiaspis dendrobii</i> is associated with <i>Dendrobium</i> spp. (García Morales et al. 2020).	Yes. <i>Lecanodiaspis dendrobii</i> is polyphagous and feeds on a variety of plant species such as <i>Anacardium</i> , <i>Croton</i> , <i>Acacia</i> , <i>Dendrobium</i> ,	Yes. <i>Lecanodiaspis dendrobii</i> is a pest of a variety of plant species such as cashew, <i>Acacia</i> , teak, fig, mulberry, orchids and <i>Citrus</i> (García	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<i>Citrus</i> , <i>Leucaena</i> , <i>Morus</i> , <i>Lippia</i> , <i>Ficus</i> and <i>Tectona</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). This scale is found in Central and South America (García Morales et al. 2020), areas with similar climatic conditions to parts of Australia. Therefore, <i>L. dendrobii</i> has the potential to establish and spread in Australia.	Morales et al. 2020), which are economically important or naturalised plants in Australia (Horticulture Innovation Australia 2019c). <i>Lecanodiaspis dendrobii</i> is known to cause drying of apical branches, defoliation, death of host and as a result of honeydew production the development of sooty mould can occur (Marsaro et al. 2016). Therefore, <i>L. dendrobii</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Lepidosaphes beckii</i> (Newman, 1869) Synonym: <i>Cornuaspis beckii</i> Newman, 1868 [Diaspididae] Citrus mussel scale	Fiji, Japan, Mauritius, New Zealand, Papua New Guinea, Portugal, Sri Lanka, Taiwan, USA (ABRS 2020), Argentina, Chile, China, Colombia, Egypt, Ecuador, Ethiopia, France, Greece, India, Indonesia, Iran, Israel, Italy, Kiribati, Lebanon, Madagascar, Malaysia, Marshall Islands, Mexico, Morocco, Nepal, the	Present, NSW, Qld, SA, Tas. Vic. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020). Notifiable pest, state freedom for NT (DPIR 2018b).	<i>Lepidosaphes beckii</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2020).	Yes. <i>Lepidosaphes beckii</i> is already present in parts of Australia, suggesting suitable hosts and climatic conditions exist in Australia. Therefore, <i>L. beckii</i> has the potential to establish and spread in Northern Territory.	Yes. <i>Lepidosaphes beckii</i> is a polyphagous pest that feeds on host plants from 45 genera in 11 families and is known as an important destructive pest of citrus in Egypt (Dewer, Abdel-razak & Barakat 2012). This species is known to attack major economic crops in Australia such as orange, mango, coconut, roses,	Yes (NT)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Netherlands, New Caledonia, Peru, Philippines, South Africa, Spain, Thailand, Tonga, Uganda, UK, Vanuatu, Zimbabwe (García Morales et al. 2020), Vietnam (Dao et al. 2017; García Morales et al. 2020; Waterhouse 1993b), Pakistan, Singapore, Kenya, Malawi and Tanzania and Panama (CABI 2020a).				figs and breadfruit (PaDIL 2020). The pest damages foliage, fruit and stems, causing chlorosis of foliage, defoliation, discolouration and poor maturation of the fruit and desiccation, weakening and dieback of the branches or entire trees (Dewer, Abdel-razak & Barakat 2012). Therefore, <i>L. beckii</i> has the potential to cause negative economic and environmental consequences in Northern Territory.	
<i>Lepidosaphes chinensis</i> Chamberlin 1925 [Diaspididae] Chinese lepidosaphes scale, Chinese mussel scale	China, Philippines, Singapore, Taiwan, UK and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lepidosaphes chinensis</i> is associated with <i>Dracaena</i> and <i>Cymbidium</i> spp. (Biosecurity Australia 2010c; Malumphy, Halstead & Salisbury 2012).	Yes. <i>Lepidosaphes chinensis</i> is a polyphagous sap-sucking pest on host plants from 13 genera in 8 families (Malumphy, Halstead & Salisbury 2012) including <i>Dracaena</i> , <i>Liriope</i> , <i>Yucca</i> , <i>Euphorbia</i> , <i>Cymbidium</i> , <i>Magnolia</i> , <i>Cordyline</i> , <i>Michelia</i> and <i>Pandanus</i> spp. (Stocks 2014), which are present in Australia (APNI 2020). This species is invasive in California (Malumphy, Halstead &	Yes. <i>Lepidosaphes chinensis</i> is a serious pest of orchids, palms, <i>Cordyline</i> and <i>Dracaena</i> (García Morales et al. 2020), which are economically important plants in Australia (Dragon Trees Australia 2019; Flowers Australia 2019; Horticulture Innovation Australia 2019c). This species is known to cause chlorotic and necrotic patches on foliage, new shoots and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Salisbury 2012) and has a wide distribution throughout Asia and USA (Stocks 2014), which are areas with similar climatic conditions to parts of Australia. Therefore, <i>L. chinensis</i> has the potential to establish and spread in Australia.	stems which lead to the death of foliage (Stocks 2014), resulting in reduced marketability of ornamentals. Therefore, <i>L. chinensis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Lepidosaphes cornuta</i> Ramakrishna Ayyar, 1937 [Diaspididae] Betelvine scale insect	India (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Relatively little is known about <i>Lepidosaphes cornuta</i> . Plant host records include <i>Piper</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). <i>Lepidosaphes cornuta</i> is present in India (García Morales et al. 2020), a region where climatic conditions are similar to parts of Australia. Therefore, <i>L. cornuta</i> has the potential to establish and spread in Australia.	Yes. <i>Lepidosaphes cornuta</i> is known to feed on <i>Piper betle</i> (García Morales et al. 2020). Species within the <i>Lepidosaphes</i> genus are known to cause chlorotic and necrotic patches which lead to the death of foliage (Stocks 2014). Plants within these genera are used as herbs in Australia (Australian National Botanic Gardens & Australian National Herbarium 2008). Therefore, <i>L. cornuta</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Lepidosaphes laterochitinsa</i> Green, 1925 Synonym: <i>Parainsulaspis laterochitinsa</i> Borchsenius, 1963 [Diaspididae]	China, Indonesia, Japan, Malaysia, Philippines, Taiwan, Thailand, UK and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lepidosaphes laterochitinsa</i> is associated with <i>Dracaena</i> spp. (Suh, Yu & Hong 2013).	Yes. Previously assessed by the department (Biosecurity Australia 2006d). This scale has a wide host range including mango, citrus, grapevine, and other agricultural and ornamental species (Biosecurity Australia 2006d). Over 20 species of <i>Lepidosaphes</i> spp. are established in Australia (Biosecurity Australia 2006d), suggesting <i>L. laterochitinsa</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2006d). There is limited information available on the economic significance of <i>L. laterochitinsa</i> . However, other related species such as <i>Lepidosaphes ulmi</i> , <i>L. pineti</i> and <i>L. beckii</i> are economically significant on fruit crops and forestry plants (Biosecurity Australia 2006d). Species within the <i>Lepidosaphes</i> genus are known to cause chlorotic and necrotic patches which lead to the death of foliage (Stocks 2014).	Yes
<i>Lepidosaphes orsomi</i> Mamet, 1954 Synonym: <i>Insulaspis orsoni</i> Mamet; Borchsenius, 1966 [Diaspididae]	Madagascar (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lepidosaphes orsomi</i> is associated with <i>Dracaena</i> and <i>Gastrophysalis</i> spp. (MPI 2016); (García Morales et al. 2020).	Yes. <i>Lepidosaphes orsomi</i> is endemic to Madagascar (García Morales et al. 2020), an island which shares similar climatic conditions with parts of Australia. Over 20 species of <i>Lepidosaphes</i> spp. are established in Australia (Biosecurity Australia 2006d), and host plants	Yes. <i>Lepidosaphes orsomi</i> is known from <i>Dracaena</i> spp. (García Morales et al. 2020) which are economically important ornamental plants in Australia (Dragon Trees Australia 2019). Species within the <i>Lepidosaphes</i> genus are known to cause chlorotic and necrotic	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				available in Australia include <i>Dracaena</i> and <i>Schefflera</i> spp. (APNI 2020; García Morales et al. 2020). Therefore, <i>L. orsomi</i> has the potential to establish and spread in Australia.	patches which lead to the death of foliage (Stocks 2014). Therefore, <i>L. orsomi</i> has the potential to cause negative economic consequences in Australia.	
<i>Lepidosaphes pinnaeformis</i> (Bouche, 1851) [Diaspididae] Citrus mussel scale	New Zealand, Israel, UK, USA (ABRS 2020), Argentina, China, Egypt, France, Greece, India, Iran, Italy, Japan, Morocco, Portugal, Republic of Korea, Spain, Taiwan (García Morales et al. 2020) and Malaysia (Watson 2018).	Present, Vic., NSW, Qld, Tas., NT and SA (ABRS 2020; García Morales et al. 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lepidosaphes pinnaeformis</i> associated with <i>Dracaena</i> , <i>Cordyline</i> spp. and Orchidaceae (García Morales et al. 2020).	Yes. <i>Lepidosaphes pinnaeformis</i> is already present in parts of Australia (ABRS 2020; García Morales et al. 2020; Plant Health Australia 2020), suggesting suitable hosts and climatic conditions exist in Australia. Therefore, <i>L. pinnaeformis</i> has the potential to establish and spread in Western Australia.	Yes. <i>Lepidosaphes pinnaeformis</i> hosts include <i>Dracaena</i> , <i>Cordyline</i> spp. and Orchidaceae spp. (García Morales et al. 2020). <i>L. pinnaeformis</i> causes medium to heavy damage to orchids, including <i>Dendrobium</i> spp. (Malumphy & Badmin 2012; Meena, Pal & Barman 2018). Species within the <i>Lepidosaphes</i> genus are known to cause chlorotic and necrotic patches which lead to the death of foliage (Stocks 2014). Therefore, <i>L. pinnaeformis</i> has the potential to cause negative economic consequences in Western Australia.	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Lepidosaphes tokionis</i> (Kuwana, 1902) [Diaspididae] Croton mussel scale	India, Japan, Madagascar, Sri Lanka, Mexico, Papua New Guinea, Singapore, Taiwan, USA (ABRS 2020), Indonesia (CABI 2020a), Fiji, Thailand, Philippines, (García Morales et al. 2020), China, Malaysia, Pakistan, Mauritius, Tanzania, Colombia, Ecuador, Panama and Tonga (Watson 2018).	Present, Qld, SA and NT (ABRS 2020; Plant Health Australia 2020).	<i>Lepidosaphes tokionis</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Leptoglossus occidentalis</i> Heidemann, 1910 [Coreidae] Western conifer-seed bug	Lebanon, Israel, Italy, Morocco, Mexico, USA, Belgium, Greece, the Netherlands, Portugal, Switzerland, Spain, France, UK, Japan, Chile and Republic of Korea (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Leptoglossus occidentalis</i> is a polyphagous pest; hosts include <i>Pinus</i> , <i>Cedrus</i> , <i>Abies</i> , <i>Pseudotsuga</i> (CABI 2020a) and <i>Pistacia</i> spp. (Ahn et al. 2013; van der Heyden 2017b), all of which are present in Australia (APNI 2020). The species is endemic to North America, and has spread via import and export commodities to Europe, Republic of Korea and Japan (Ahn et al. 2013; Fent & Kment 2011; van der Heyden 2017b). These regions have similar climatic conditions to parts of	Yes. <i>Leptoglossus occidentalis</i> feeds on conifer seeds and flowers, resulting in damaged flowers, cones and seeds. Feeding behaviour causes seed infertility and seed abortion (Ahn et al. 2013; van der Heyden 2017b). The species also known to feed on pistachios and almonds (Plant Health Australia Ltd 2016; van der Heyden 2017b). Conifers, pistachios and almonds are economically important plants in Australia (Plant Health Australia Ltd 2016). Therefore, <i>L. occidentalis</i> has the potential to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Australia, and plant hosts are widely available, therefore, <i>L. occidentalis</i> has the potential to establish and spread in Australia.	negative economic consequences in Australia.	
<i>Leptoglossus phyllopus</i> (Linnaeus, 1767) Synonym: <i>Veneza phyllopus</i> (Linnaeus) [Coreidae] Eastern leaf-footed bug	USA, Mexico and South America (CoreoideaSF Team 2015).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Leptoglossus phyllopus</i> is associated with <i>Gerbera</i> , <i>Hibiscus</i> and <i>Rosa</i> spp. (Mead 2010; PHA 2016a).	Yes. <i>Leptoglossus phyllopus</i> is found in North and South Americas (CoreoideaSF Team 2015), regions with similar climatic conditions to Australia. The species has a wide host range, including <i>Solanum</i> , <i>Citrus</i> , <i>Vaccinium</i> , <i>Phaseolus</i> , <i>Zea</i> , <i>Prunus</i> , <i>Hibiscus</i> , <i>Rosa</i> , <i>Gerbera</i> , and <i>Malus</i> spp. (Kuhar, Jenrette & Doughty 2010; Mitchell 2006), all of which are present in Australia (APNI 2020). Therefore, <i>L. phyllopus</i> has the potential to establish and spread in Australia.	Yes. <i>Leptoglossus phyllopus</i> has been reported as a major pest in citrus groves (Mead 2019). <i>L. phyllopus</i> frequents a wide range of economically important crops including legumes, tomato, citrus (Mitchell 2006), apple, beans, blueberry, corn, eggplant, peach (Kuhar, Jenrette & Doughty 2010) and gerbera, gladiolus, hibiscus and roses (Mead 2019), all of which are economically important in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). The species is known to attack tender shoots and opening buds, leading to premature colour break in fruit, fruit drop, crop loss and allows secondary pathogens to enter and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					cause disease (Mead 2019). Therefore, <i>L. phyllopus</i> has the potential to cause significant negative economic consequences in Australia.	
<i>Leucaspis cordylinidis</i> Maskell, 1893 Misspelling: <i>Leucaspis cordylinidis</i> [Diaspididae]	New Zealand (ABRS 2020; García Morales et al. 2020).	Present, NSW (ABRS 2020).	<i>Leucaspis cordylinidis</i> is associated with <i>Cordyline</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Leucaspis gigas</i> (Maskell, 1879) [Diaspididae] Keikie scale	New Zealand (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Leucaspis gigas</i> is associated with <i>Astelia</i> spp. (García Morales et al. 2020).	Yes. <i>Leucaspis gigas</i> is polyphagous, with several host plants commonly grown in Australia, including <i>Griselinia</i> , <i>Hedycarya</i> , <i>Leptecophylla</i> and <i>Pittosporum</i> spp. (García Morales et al. 2020) which are present in Australia (APNI 2020). <i>L. gigas</i> is endemic to New Zealand (García Morales et al. 2020), which has similar climatic conditions to parts of Australia. Therefore, <i>L. gigas</i> has the potential to establish and spread in Australia.	Yes. <i>Leucaspis gigas</i> is polyphagous on 14 genera in 11 families of host plants, including <i>Pittosporum</i> spp. (García Morales et al. 2020) which are grown as ornamentals and found throughout the Australian environment (APNI 2020; PlantNet 2019). The <i>Leucaspis</i> genus is known to damage foliage, leading to yellowing and defoliation (Gerson & Applebaum 2015). Therefore, <i>L. gigas</i> has the potential to cause significant negative	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					economic consequences in Australia.	
<i>Leucaspis morrisi</i> (Brittin, 1915) [Diaspididae]	New Zealand (de Boer & Valentine 1977).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Leucaspis morrisi</i> is associated with <i>Cordyline</i> spp. (MPI 2016).	Yes. <i>Leucaspis morrisi</i> is polyphagous, found on <i>Pseudopanax</i> , <i>Griselinia</i> and <i>Pittosporum</i> spp. (García Morales et al. 2020) which are present in Australia (APNI 2020). <i>L. morrisi</i> is endemic to New Zealand (García Morales et al. 2020), which has similar climatic conditions to parts of Australia. Therefore, <i>L. morrisi</i> has the potential to establish and spread in Australia.	Yes. <i>Leucaspis morrisi</i> is polyphagous on 4 genera in 3 families of host plants, including <i>Pittosporum</i> spp. (García Morales et al. 2020) which are grown as ornamentals and found throughout the Australian environment (APNI 2020; PlantNet 2019). The <i>Leucaspis</i> genus is known to damage foliage, leading to yellowing and defoliation (Gerson & Applebaum 2015). Therefore, <i>L. morrisi</i> has the potential to cause significant negative economic consequences in Australia.	Yes
<i>Lindingaspis rossi</i> (Maskell, 1892) Synonym: <i>Aspidiotus rossi</i> Maskell, 1892, <i>Aonidiella subrossi</i> Laing, 1929 [Diaspididae] Ross's black scale	Argentina, China, Philippines, New Zealand, South Africa, Sri Lanka, USA, New Caledonia, Chile, Colombia, Egypt, Japan, France, India, Mauritius, Peru, Mexico, Portugal, Spain, Taiwan, Tanzania, Zimbabwe (García Morales et al.	Present, NSW, NT, Qld, SA, Tas., Vic. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020; Watson 2018).	<i>Lindingaspis rossi</i> is associated with <i>Dracaena</i> and <i>Cordyline</i> spp. (Biosecurity Australia 2010c; MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	2020) and UK (Watson 2018).					
<i>Lopholeucaspis cockerelli</i> (Grandpré & Charmoy, 1899) [Diaspididae] Cockerell scale, diaspine scale	Colombia, Ecuador, Fiji, Greece, India, Indonesia, Japan, Kenya, Kiribati, Madagascar, Mauritius, Mexico, Panama, Peru, Philippines, Sri Lanka, Tanzania, Tonga, UK, USA, Vanuatu (García Morales et al. 2020), China and New Caledonia (Watson 2018).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lopholeucaspis cockerelli</i> is associated with <i>Dracaena</i> , <i>Rosa</i> spp., and Orchidaceae (García Morales et al. 2020; MPI 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2006c). Little is published about <i>Lopholeucaspis cockerelli</i> , however it is known to be a pest of <i>Citrus</i> and <i>Pinus</i> spp. (Biosecurity Australia 2006c). <i>L. cockerelli</i> has a widespread distribution (García Morales et al. 2020) in areas that have similar climatic conditions to parts of Australia. Therefore, <i>L. cockerelli</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2006c). <i>Lopholeucaspis cockerelli</i> , is a pest of <i>Citrus</i> and <i>Pinus</i> spp. (Biosecurity Australia 2006c), economically important plants in Australia (Horticulture Innovation Australia 2019c). Therefore, <i>L. cockerelli</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Loxa viridis</i> (Palisot, 1805) [Pentatomidae]	Colombia, Ecuador, Mexico, Panama, Peru and USA (Da Silva, Santos & Fernandes 2018; Discover Life 2018; ITIS 2018a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Loxa viridis</i> is associated with <i>Dracaena</i> spp. cut foliage (USDA 2011).	Yes. <i>Loxa viridis</i> is a polyphagous pest on <i>Malpighia</i> , <i>Senna</i> , <i>Dracaena</i> , <i>Acacia</i> and <i>Citrus</i> spp. (Perez-Gelabert & Thomas 2005; Raw 2015; Young 1984) which are present in Australia (APNI 2020). <i>L. viridis</i> is distributed across the American continents (Da Silva, Santos & Fernandes	Yes. Little research has been undertaken on this pentatomid, however <i>Loxa viridis</i> has been observed feeding on citrus (Perez-Gelabert & Thomas 2005), which is economically important in Australia (Horticulture Innovation Australia 2019c). This species has been observed feeding on seed pods and leaves	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				2018), where climatic conditions are similar to parts of Australia. Therefore, <i>L. viridis</i> has the potential to establish and spread in Australia.	(Raw 2015; Young 1984). Pentatomid seed damage results in irreversible direct damage to developing seeds (Panizzi & Slansky 1985). Therefore, <i>L. viridis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Lygus lineolaris</i> (Palisot, 1818) [Miridae] Tarnished plant bug	Mexico and USA (CABI 2020a; Schuh 2013).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lygus lineolaris</i> is associated with peonies, chrysanthemum, foxgloves and zinnias (Biosecurity Australia 2010b; PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2010b; DAFF 2013b). <i>Lygus lineolaris</i> has a wide host range including <i>Prunus</i> spp. and is distributed in a variety of environments across central and Northern America with similarities to Australia, suggesting potential for establishment and spread (Biosecurity Australia 2010b).	Yes. Previously assessed by the department (Biosecurity Australia 2010b; DAFF 2013b). <i>Lygus lineolaris</i> has a wide host range including <i>Prunus</i> spp. (Biosecurity Australia 2010b), which are economically important in Australia (Horticulture Innovation Australia 2019c). Therefore, <i>L. lineolaris</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Lygus pratensis</i> (Linnaeus, 1758)	China, Nepal, France, (CABI 2020a), UK, Belgium, Greece, India,	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Yes. <i>Lygus pratensis</i> has 52 host plants from 18 families, such as	Yes. <i>Lygus pratensis</i> feeds on several agricultural crops including cotton,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Miridae]	Iran, Italy (Schuh 2013), Portugal, Spain, Switzerland and the Netherlands (de Jong et al. 2019).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).	consignments (unpublished).	<i>Gossypium</i> , <i>Vitis</i> and <i>Pyrus</i> spp. (Liu et al. 2015), which are present in Australia (APNI 2020). This cosmopolitan pest is distributed throughout Europe, Northern Africa, the Middle East, Northern India, China and Siberia (Zhang et al. 2017), and it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>L. pratensis</i> has the potential to establish and spread in Australia.	alfalfa, grape and pear (Liu et al. 2015), which are economically important in Australia (Cotton Australia 2019; Horticulture Innovation Australia 2019c). Feeding behaviour causes stunting, bolls and fruit malformation, and in some cases significant damage above 30% loss (Liu et al. 2015). Therefore, <i>L. pratensis</i> has the potential to cause negative economic consequences in Australia.	
<i>Maconellicoccus hirsutus</i> (Green, 1908) [Pseudococcidae] Grape mealybug, hirsutus mealybug	Cambodia, China, Colombia, Egypt, Fiji, India, Indonesia, Iran, Israel, Japan, Kenya, Lebanon, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Tanzania, Thailand, Tonga, UAE, USA, Vietnam (García Morales et al. 2020), Mexico and British Virgin Islands (CABI 2020a).	Present, NSW, NT, Qld, SA, Vic. and WA (ABRS 2020; CABI 2020a; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Maconellicoccus hirsutus</i> is associated with cut foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Megacopta cribraria</i> (Fabricius, 1798) [Plataspidae] Kudzu bug	China, India, Indonesia, Japan, Republic of Korea, Malaysia, Nepal, New Caledonia, Pakistan, Sri Lanka, Taiwan, Thailand, USA (CABI 2020a) and Vietnam (Blount 2016; CABI 2020a; Hosokawa, Nikoh & Fukatsu 2014).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Megacopta cribraria</i> is a polyphagous pest of numerous plants including soybean, kidney bean, field bean, Kudzu, common bean, sweet potato, rice, sugarcane, wheat, citrus and potato (Eger et al. 2010) which are present in Australia (APNI 2020). <i>Megacopta cribraria</i> is found in Asia, it is invasive in USA (Eger et al. 2010), and it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>M. cribraria</i> has the potential to establish and spread in Australia.	Yes. <i>Megacopta cribraria</i> is recognised as a pest of beans, bean, sweet potato, rice, sugarcane, wheat, citrus and potato (Eger et al. 2010), which are economically important in Australia (Horticulture Innovation Australia 2019c). <i>Megacopta cribraria</i> is considered a significant economic pest of several crops, capable of reducing yield by up to 50% in soybean (Eger et al. 2010). During high infestations, <i>M. cribraria</i> feeds on the underside of foliage and the stem of host plants, which leads to abnormal pod development and necrotic areas (Poplin & Hodges 2012). Therefore, <i>M. cribraria</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Melanaspis corticosa</i> (Brain, 1919) [Diaspididae]	South Africa and Zimbabwe (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Melanaspis corticosa</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Melanaspis corticosa</i> is a polyphagous pest of plants from 7 genera in 4 families, including	Yes. <i>Melanaspis corticosa</i> attacks various economically important fruit crops including	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<i>Celastrus</i> , <i>Sclerocarya birrea</i> , <i>Virgilia oroboides</i> and <i>Robinia</i> (García Morales et al. 2020), which are present in Australia (APNI 2020). The species has been found in parts of southern Africa (García Morales et al. 2020), and it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>M. corticosa</i> has the potential to establish and spread in Australia.	<i>Celastrus</i> , <i>Sclerocarya birrea</i> , <i>Virgilia oroboides</i> and <i>Robinia</i> (García Morales et al. 2020). Species within the genus <i>Melanaspis</i> cause feeding damage such as necrosis, dieback of twigs and branches (Chong & Camacho 2014). Therefore, <i>M. corticosa</i> has the potential to cause negative economic consequences in Australia.	
<i>Melanaspis elaeagni</i> McKenzie, 1957 [Diaspididae] Black elaeagnus scale	Mexico and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Melanaspis elaeagni</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Melanaspis elaeagni</i> is a polyphagous pest associated with several plant genera that are present in Australia, such as <i>Elaeagnus</i> , <i>Dracaena</i> , <i>Yucca</i> , <i>Fraxinus</i> , <i>Rosa</i> and <i>Populus</i> (APNI 2020; García Morales et al. 2020). <i>Melanaspis elaeagni</i> is distributed in southern USA and Central America (García Morales et al. 2020) and it is likely that similar climatic conditions exist in parts of Australia. Therefore,	Yes. <i>Melanaspis elaeagni</i> is associated with <i>Dracaena</i> , <i>Yucca</i> , <i>Rosa</i> and <i>Populus</i> (García Morales et al. 2020), many of which are commonly found in Australia as ornamentals or plants of economic value (APNI 2020; Dragon Trees Australia 2019; Horticulture Innovation Australia 2019c). Species within the genus <i>Melanaspis</i> cause feeding damage such as necrosis, dieback	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<i>M. elaeagni</i> has the potential to establish and spread in Australia.	of twigs and branches (Chong & Camacho 2014). Therefore, <i>M. elaeagni</i> has the potential to cause negative economic consequences in Australia.	
<i>Melanaspis nigropunctata</i> (Cockerell, 1896) [Diaspididae]	Mexico, Panama and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Melanaspis nigropunctata</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Melanaspis nigropunctata</i> is associated with host plants in 21 genera from 15 families, many of which are present in Australia, including <i>Philodendron</i> , <i>Dracaena</i> , <i>Persea</i> , <i>Ficus</i> , <i>Fraxinus</i> , <i>Orchidaceae</i> , <i>Abies</i> and <i>Prunus</i> spp. (APNI 2020; García Morales et al. 2020). The species is distributed in southern USA, Mexico and Central America (García Morales et al. 2020) and it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>M. nigropunctata</i> has the potential to establish and spread in Australia.	Yes. <i>Melanaspis nigropunctata</i> is a plant pest of valuable commercial crops in Australia including avocado, fig and plums, peaches, almonds and nectarines, orchids and <i>Dracaena</i> spp. (Dragon Trees Australia 2019; García Morales et al. 2020; Horticulture Innovation Australia 2019c). Species within the genus <i>Melanaspis</i> cause feeding damage such as necrosis, dieback of twigs and branches (Chong & Camacho 2014). Therefore, <i>M. nigropunctata</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Melacoryphus lateralis</i> (Dallas, 1852) Synonym: <i>Melanocoryphus lateralis</i> [Lygaeidae]	USA and Mexico (Larson & Scudder 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Melacoryphus lateralis</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Melacoryphus lateralis</i> is distributed in the USA and Mexico (ITIS 2018a), and it is likely that similar climatic conditions exist in parts of Australia. The species feeds on a variety of vegetation and seeds (Longtine 2018), including <i>Prosopis</i> spp. (Ward et al. 1977) which are widespread in Australia (ALA 2019). Therefore, <i>M. lateralis</i> has the potential to establish and spread in Australia.	Yes. <i>Melacoryphus lateralis</i> feeds on a variety of vegetation and seeds (Longtine 2018) and has been recorded on mesquite in Mexico (Ward et al. 1977) and milkweeds (Larson & Scudder 2018). Several species of <i>Prosopis</i> are invasive weeds in Australia (CABI 2020a) and a variety of vegetation are not specified, suggesting native flora may be affected. Lygaeoid nymphs and adults are known to feed on seeds and tree sap (Burdfield-Steel & Shuker 2014; Larson & Scudder 2018) which may affect seed set or interfere with growth. Therefore, <i>M. lateralis</i> has the potential to cause negative environmental consequences in Australia.	Yes
<i>Melanopleurus bistriangularis</i> (Say, 1832) [Lygaeidae]	Mexico and USA (Dellapé & Henry 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Melanopleurus bistriangularis</i> is associated with <i>Dracaena</i> (USDA 2011).	Yes. <i>Melanopleurus bistriangularis</i> is distributed in the USA, Colombia and Mexico (ITIS 2018a) and it is	Yes. Host plants of Lygaeoid bugs are poorly studied, however these insects are generally associated with marsh	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				likely that similar climatic conditions exist in parts of Australia. The species is associated with <i>Dracaena</i> spp. (USDA 2011), which are present in Australia (GBIF Secretariat 2017). Therefore, <i>M. bistrangularis</i> has the potential to establish and spread in Australia.	plants, especially sedges, bulrushes and rushes (Larson & Scudder 2018). Lygaeid nymphs and adults are known to feed on seeds and tree sap (Burdfield-Steel & Shuker 2014; Larson & Scudder 2018). Therefore, <i>M. bistrangularis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Metadelphax propinqua</i> (Fieber, 1866) [Delphacidae]	North and South America including USA, Mexico, Argentina, Chile, Colombia, Ecuador, Peru, Egypt, Ethiopia, India, Israel, Japan, Kenya, Madagascar, Morocco, Thailand, Turkey, United Arab Emirates, Zimbabwe (Gonzon & Bartlett 2007) and Indonesia (ABRS 2020).	Present, NT, Qld and NSW (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes , <i>Metadelphax propinqua</i> is already established in Queensland, Northern Territory and New South Wales (ABRS 2020; Plant Health Australia 2020), suggesting suitable climatic conditions and plant hosts are available for further establishment.	Yes , <i>Metadelphax propinqua</i> is a known vector of several viruses not present in Australia, Cynodon chlorotic streak nucleorhabdovirus and Maize rough dwarf virus (Fletcher et al. 2017). As <i>Metadelphax propinqua</i> feeds on Poaceae plant species, including rice, barley, maize and sugarcane (Fletcher et al. 2017) introduction of infected <i>M. propinqua</i> has the potential to cause negative economic consequences in Australia.	No/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Metcalfa pruinosa</i> (Say 1830) [Flatidae]	Mexico, USA (Bourgoin 2018), France, Greece, Italy, Republic of Korea, Spain and Switzerland (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Metcalfa pruinosa</i> is associated with <i>Lilium</i> , <i>Dahlia</i> , <i>Magnolia</i> , and <i>Camellia</i> spp. (Mead 2004; PHA 2016a).	Yes. <i>Metcalfa pruinosa</i> feeds on over 200 plant species, many which are in Australia, including citrus, grapevines, apple, peach, hazel, fig, pear, plum, <i>Wisteria</i> , <i>Crataegus</i> , <i>Laurus</i> , <i>Quercus</i> , <i>Spartium</i> , <i>Lonicera</i> , hops, kiwifruit, olive, persimmon, hibiscus, dahlias, salvias and privet (APNI 2020; CABI 2020b; Wilson & McPherson 1981). The species is found in North America and parts of Europe, where it is invasive (Strauss 2010), and it is likely that similar climatic conditions occur in Australia. Therefore, <i>M. pruinosa</i> has the potential to establish and spread in Australia.	Yes. <i>Metcalfa pruinosa</i> is a highly polyphagous pest which causes feeding damage to dahlias, salvia, lime, citrus, alder, birch, mulberry, black cherry, blackberry (Strauss 2010; Wilson & McPherson 1981), which are economically important or naturalised plants in Australia (Horticulture Innovation Australia 2019c). It is considered to be an economic pest in orchards and vineyards in Europe (Strauss 2010). Therefore, <i>M. pruinosa</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Milviscutulus mangiferae</i> (Green, 1889) Synonym: <i>Protopulvinaria mangiferae</i> (Green 1889) [Coccidae] Mango shield scale	Colombia, Ecuador, Fiji, India, Indonesia, Israel, Japan, Kenya, Madagascar, Malaysia, Mauritius, Mexico, Pakistan, Panama, Papua New Guinea, Philippines, Singapore, South Africa, Sri Lanka, Taiwan,	Present, Qld, WA and NT (ABRS 2020; Government of Western Australia 2020; PaDIL 2018; Plant Health Australia 2020).	<i>Milviscutulus mangiferae</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Tanzania, Thailand, Tonga, USA (García Morales et al. 2020) and Vietnam (Danzig & Konstantonova 1990; García Morales et al. 2020).					
<i>Murgantia histrionica</i> (Hahn, 1834) [Pentatomidae]	Mexico and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Murgantia histrionica</i> is associated with <i>Dahlia</i> , <i>Rosa</i> and <i>Chrysanthemum</i> spp. (PHA 2016a).	Yes. <i>Murgantia histrionica</i> is a polyphagous pest, found on Brassicaceae crops (Wallingford et al. 2011), <i>Solanum</i> , <i>Dahlia</i> , <i>Chrysanthemum</i> and <i>Rosa</i> spp. (PHA 2016a), which are present in Australia (APNI 2020). The species is known from continental USA and Mexico (CABI 2020a), and it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>M. histrionica</i> has the potential to establish and spread in Australia.	Yes. <i>Murgantia histrionica</i> is a serious pest of Brassicaceae crops such as broccoli, brussels sprouts, cabbage, cauliflower, collard, kale and kohlrabi, in some situations leading to the complete destruction of whole crops (Wallingford et al. 2011). Additional plant hosts include other Brassicaceae, <i>Dahlia</i> , <i>Chrysanthemum</i> and <i>Rosa</i> spp. (PHA 2016a), which are economically important plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). This species damages host plants by sucking sap, resulting in wilting, browning and eventual death of the host (Knox	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					2018). Therefore, <i>M. histrionica</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Mycetaspis personata</i> (Comstock, 1883) [Diaspididae] Masked scale	Argentina, Belgium, Colombia, Egypt, France, India, Indonesia, Mexico, the Netherlands, Panama, Peru, Philippines, Sri Lanka, UK, USA (García Morales et al. 2020), China, Israel, Lebanon and South Africa (Watson 2018).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Mycetaspis personata</i> is associated with <i>Cordyline</i> spp. (MAF 2002; MPI 2016).	Yes. <i>Mycetaspis personata</i> is polyphagous, on 28 genera in 19 families of host plants including <i>Persea</i> , <i>Areca</i> , <i>Musa</i> , <i>Camellia</i> , <i>Anacardium</i> , <i>Citrus</i> , <i>Cocos</i> , <i>Ficus</i> , <i>Jasminum</i> , <i>Mangifera</i> and <i>Manilkara</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). The species is present in South America, Africa, Europe and Asia (García Morales et al. 2020), and it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>M. personata</i> has the potential to establish and spread in Australia.	Yes. <i>Mycetaspis personata</i> is highly polyphagous, and has been recorded as a pest on several commercial crops including, mangos in Egypt and bananas in Brazil (Chua & Wood 1990; Claps, Wolff & Gonzalez 2001), citrus, fig, jasmine and avocado (García Morales et al. 2020), which are economically important in Australia (Horticulture Innovation Australia 2019c). Diaspids, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>M. personata</i> has the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					potential to cause negative economic consequences in Australia.	
<i>Mycetaspis sphaerioides</i> (Cockerell, 1895) [Diaspididae]	Mexico, Panama and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Mycetaspis sphaerioides</i> is associated with <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Mycetaspis sphaerioides</i> is associated with <i>Phormium</i> spp. (García Morales et al. 2020), <i>Dracaena</i> (MAF 2002) and <i>Ficus</i> (Arriola Padilla et al. 2016), which are present in Australia (APNI 2020). <i>Mycetaspis sphaerioides</i> is known from North and Central America (García Morales et al. 2020), and it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>M. sphaerioides</i> has the potential to establish and spread in Australia.	Yes. <i>Mycetaspis sphaerioides</i> is associated with ornamental fig (Arriola Padilla et al. 2016) and <i>Dracaena</i> (MAF 2002), which are grown commercially in Australia (Dragon Trees Australia 2019; Horticulture Innovation Australia 2019c). Diaspids, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>M. sphaerioides</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Neoselenaspidus silvaticus</i> (Lindinger, 1909)	Ethiopia, Kenya, Madagascar, South Africa, Tanzania, Uganda and	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Neoselenaspidus silvaticus</i> is associated with cut foliage and branches of	Yes. <i>Neoselenaspidus silvaticus</i> is highly polyphagous, found on host plants from 27	Yes. <i>Neoselenaspidus silvaticus</i> affects citrus, <i>Cordyline</i> , cabbage and date palms, grapes and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Synonym: <i>Selenaspidus silvaticus</i> Lindinger, 1909</p> <p>[Diaspididae]</p> <p>Silvaticus scale</p>	Zimbabwe (García Morales et al. 2020).		<i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	genera in 21 families including, <i>Mangifera</i> , <i>Cordyline</i> , <i>Euphorbia</i> , <i>Cassia</i> , <i>Ficus</i> , <i>Gardenia</i> , <i>Citrus</i> and <i>Vitis</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). The species is distributed in the Afrotropical region (García Morales et al. 2020), areas with similar climatic conditions to parts of Australia. Therefore, <i>N. silvaticus</i> has the potential to establish and spread in Australia.	mango plants (García Morales et al. 2020), which are naturalised or economically important in Australia (Horticulture Innovation Australia 2019c). Scale insects feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Varshney, Jadhav & Sharma 2015). <i>Neoselenaspidus silvaticus</i> is a known pest on tea plants in Kenya and Malawi, and citrus in Zimbabwe (García Morales et al. 2020). Therefore, <i>N. silvaticus</i> has the potential to cause negative economic consequences in Australia.	
<p><i>Nesidiocoris tenuis</i> (Reuter, 1895)</p> <p>[Miridae]</p> <p>Tomato bug</p>	France, Italy, Spain, China, Fiji, India, Indonesia, Iran, Israel, Japan, Republic of Korea, USA, Nepal, Malaysia, Philippines, Saudi Arabia, Sri Lanka, Egypt, Singapore, Vietnam, Malawi, Madagascar,	Present, WA, NSW and Vic. (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Mexico, Morocco, South Africa, Tanzania, New Caledonia, Uganda, Papua New Guinea, Zimbabwe and Tonga (CABI 2020a; PaDIL 2020).					
<i>Nezara viridula</i> (Linnaeus, 1758) [Pentatomidae] Green stink bug	Afghanistan, Cambodia, China, India, Indonesia, Iran, Israel, Japan, Republic of Korea, Nepal, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam, Egypt, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Morocco, South Africa, Tanzania, Uganda, Zimbabwe, USA, Mexico, British Virgin Islands, Argentina, Chile, Ecuador, Belgium, France, Greece, Italy, Spain, UK, American Samoa, Fiji, Kiribati, New Caledonia, New Zealand, Papua New Guinea, Tonga and Vanuatu (CABI 2020a).	Present, Qld, NSW, ACT, SA, WA, Tas., Vic. and NT (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Nipaecoccus nipae</i> (Maskell 1892) [Pseudococcidae] Coconut mealybug	Argentina, China, Colombia, Ecuador, Fiji, India, Indonesia, Mexico, Morocco, Pakistan, Panama, Peru, Philippines, Portugal,	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA	<i>Nipaecoccus nipae</i> is associated with cut foliage and branches of <i>Dracaena</i> spp. (MPI 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2008b) (DAWR 2019c). <i>Nipaecoccus nipae</i> is polyphagous and has	Yes. Previously assessed by the department (Biosecurity Australia 2008b) (DAWR 2019c). This polyphagous pest species affects 80 plant	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Republic of Korea, Spain, UK, USA, (García Morales et al. 2020) Vietnam (Ben-Dov 1994; García Morales et al. 2020; Liem 2006; Waterhouse 1993a; Winotai 2014), Madagascar, South Africa, Zimbabwe, British Virgin Islands, France, Italy (CABI 2020a) and the Netherlands (de Jong et al. 2019).	(Government of Western Australia 2020).	Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	been recorded on plant hosts from 80 genera in 43 families. These hosts include commercial fruit, non-commercial plants, ornamental plants including palms and orchids (Biosecurity Australia 2008b). The species is distributed in the American continents and Europe (García Morales et al. 2020), areas with similar climatic conditions to parts of Australia. Therefore, <i>N. nipae</i> has the potential to establish and spread in Australia.	genera in 43 families including avocado, banana, custard apple, guava, mango, grapes, olives, palms, and orchids. Damage caused by <i>N. nipae</i> may result in ornamental plants, fruit or cut flowers losing their market value (Biosecurity Australia 2008b; CABI 2020a). Therefore, <i>N. nipae</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Nipaecoccus viridis</i> (Newstead, 1894) [Pseudococcidae] Spherical mealybug	Worldwide, including China, Afghanistan, Egypt, India, Indonesia, Iran, Israel, Japan, Cambodia, Kenya, Kiribati, Madagascar, Malawi, Mexico, Malaysia, Pakistan, Nepal, New Caledonia, Papua New Guinea, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Tanzania, Thailand, Uganda, USA and Zimbabwe (García Morales et al. 2020).	Present, NT, Qld and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Nipaecoccus viridis</i> is associated with <i>Chrysanthemum</i> spp. (García Morales et al. 2020).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Nysius caldoniae</i> Distant, 1920 Synonym: <i>Nysius clevelandensis</i> (Evans, 1929) [Lygaeidae]	Fiji, New Caledonia, New Zealand, Philippines and Vanuatu (Dellapé & Henry 2018).	Present, ACT, NSW, NT, Qld, SA, Tas., Vic. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Nysius huttoni</i> White, 1878 [Lygaeidae] Wheat bug	Belgium, France, the Netherlands, New Zealand and UK (CABI 2020a; de Jong et al. 2019; EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Nysius huttoni</i> is polyphagous and known plant host species include <i>Brassica</i> , <i>Medicago</i> , <i>Trifolium</i> , <i>Avena</i> , <i>Bromus</i> , <i>Hordeum</i> , <i>Lolium</i> , <i>Secale</i> , and <i>Triticum</i> spp. (EPPO 2020), which are present throughout Australia (APNI 2020). <i>Nysius huttoni</i> is distributed in parts of Europe and New Zealand, which have climatic conditions similar to parts of Australia. Therefore, <i>N. huttoni</i> has the potential to establish and spread in Australia.	Yes. <i>Nysius huttoni</i> is an economically important pest, causing severe damage to Poaceae and Brassicaceae crops in New Zealand (Bonte et al. 2010; EPPO 2020; PaDIL 2020). Additional host plant families affected are Asteraceae, Cruciferae, Myrtaceae, Rosaceae, Caryophyllaceae, Geraniaceae and Leguminosae (PaDIL 2020). <i>Nysius huttoni</i> has also been recorded as a pest of alfalfa, clovers, barley, oat and rye (EPPO 2020). Furthermore, it can feed on almost any plant or weed species (Bonte et al. 2010; PaDIL 2020). Therefore, <i>N. huttoni</i> had the potential to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					negative economic and environmental consequences in Australia.	
<i>Nysius plebeius</i> Distant, 1883 [Lygaeidae]	Japan, China, Republic of Korea and Taiwan (Schaefer & Panazzi 2000).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Nysius plebeius</i> is associated with <i>Chrysanthemum</i> spp. (PHA 2016a). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Nysius plebeius</i> is polyphagous on over 20 herbaceous host plants, including weeds and crop plants, including <i>Fragaria</i> , <i>Oryza</i> , <i>Sorghum</i> and <i>Chrysanthemum</i> spp. (Schaefer & Panazzi 2000) which are present throughout Australia (APNI 2020). The species is distributed throughout East Asia (Schaefer & Panazzi 2000) where climatic conditions are similar to parts of Australia. Therefore, <i>N. plebeius</i> has the potential to establish and spread in Australia.	Yes. <i>Nysius plebeius</i> is a pest on chrysanthemum, sorghum, strawberry and rice (Schaefer & Panazzi 2000), which are economically important plants in Australia (Horticulture Innovation Australia 2019c). This species causes discolouration and wilting on chrysanthemums due to attacks on leaves and flowers. In sorghum, <i>N. plebeius</i> damaged grain to the point the grain did not develop fully, or were considerably smaller, softer and lighter than undamaged grain, causing a reduction in yield. Therefore, <i>N. plebeius</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Nysius senecionis</i> subsp. <i>binotatus</i> (Germar, 1837) Synonym: <i>Nysius binotatus</i> (Germar, 1837) [Lygaeidae]	Ethiopia, Egypt, Israel, South Africa, Uganda (Dellapé & Henry 2018), Kenya (Kagali et al. 2013) and Saudi Arabia (Linnavuori 1989).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Nysius senecionis binotatus</i> is distributed in tropical Africa (Dellapé & Henry 2018), areas where climatic conditions are similar to parts of Australia. <i>Nysius senecionis binotatus</i> has been found on vegetable and flowers crops, including <i>Amaranthus</i> (Kagali et al. 2013), <i>Helianthus</i> , <i>Prunus</i> and <i>Brassica</i> spp. (du Plessis, Byrne & van den Berg 2013), which are present throughout Australia (APNI 2020). Therefore, <i>N. senecionis binotatus</i> has the potential to establish and spread in Australia.	Yes. <i>Nysius senecionis binotatus</i> is known to destroy turnips, peaches and sunflower (du Plessis, Byrne & van den Berg 2013; Schaefer & Panazzi 2000), which are economically important plants in Australia (Horticulture Innovation Australia 2019c). <i>Nysius</i> spp. feed on vascular tissues of young host plants which causes wilting and mortality, and damage to seeds in sunflower heads results in reduced yield (du Plessis, Byrne & van den Berg 2013). Therefore, <i>N. senecionis binotatus</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Nysius vinitor</i> Bergroth, 1891 [Lygaeidae] Rutherglen bug, Australian fly-bug	Philippines (Dellapé & Henry 2018).	Present, ACT, NSW, NT, Qld, SA, Tas., Vic. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Oceanaspidotus spinosus</i> (Comstock, 1883) Synonym: <i>Aspidiotus spinosus</i> Comstock 1883 [Diaspididae] Avocado scale	Argentina, China, Colombia, Egypt, India, Iran, Israel, Italy, Japan, Madagascar, Mexico, Morocco, Nepal, Peru, Portugal, South Africa, Spain, Tanzania, UK and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Oceanaspidotus spinosus</i> is associated with <i>Dendrobium</i> , <i>Camellia</i> , <i>Rosa</i> , <i>Cordyline</i> and <i>Dracaena</i> spp. (García Morales et al. 2018; MPI 2016; Swezey 1945).	Yes. <i>Oceanaspidotus spinosus</i> is highly polyphagous, feeding on host plants from 49 genera in 38 families, including <i>Dendrobium</i> , <i>Camellia</i> (Swezey 1945), <i>Dracaena</i> (Suh & Bombay 2015), <i>Actinidia</i> , <i>Persea</i> , <i>Camellia</i> , <i>Citrus</i> , <i>Ficus</i> , <i>Solanum</i> , <i>Vitis</i> , <i>Hydrangea</i> , <i>Litchi</i> , <i>Rhapis</i> , <i>Mangifera</i> , <i>Magnolia</i> , <i>Rubus</i> and <i>Rosa</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). <i>Oceanaspidotus spinosus</i> is an invasive species (Wyckhuys et al. 2013) which is widely distributed in the tropics and warm areas of the world (Takagi & Moghaddam 2005), similar to climatic conditions in parts of Australia. Therefore, <i>O. spinosus</i> has the potential to establish and spread in Australia.	Yes. <i>Oceanaspidotus spinosus</i> is a polyphagous pest of numerous fruit and ornamental plants such as orchid, citrus, avocado, figs, eggplants, grapes, hydrangea, rose, mango, <i>Dracaena</i> and <i>Rubus</i> spp. (García Morales et al. 2018; Suh & Bombay 2015; Swezey 1945), which are economically important in Australia (Horticulture Innovation Australia 2019c). Diaspidids, armoured scale insects, feed by sucking sap from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>O. spinosus</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Ochrimnus carnosulus</i> (Van Duzee, 1914)	USA and Mexico (Dellapé & Henry 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Ochrimnus carnosulus</i> is associated with the	Yes. <i>Ochrimnus carnosulus</i> is known from USA and Mexico (Dellapé	Yes. <i>Ochrimnus</i> spp. oviposit and feed on seeds of preferred host	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Synonym: <i>Ochrimnus</i> (<i>Parochrimnus</i>) <i>carnosulus</i> (Van Duzee, 1914)</p> <p>[Lygaeidae]</p>			foliage of <i>Dracaena</i> spp. (USDA 2011).	& Henry 2018), areas which have similar climatic conditions to parts of Australia. Information on host preference is limited for this pest, however it is associated with <i>Dracaena</i> spp. which is present throughout Australia (APNI 2020). Therefore, <i>O. carnosulus</i> has the potential to establish and spread in Australia.	plants; this behaviour can decrease the fitness of host plants over time (Gould & Sweet 2000). Host plants of <i>O. carnosulus</i> are not well known, however its association with <i>Dracaena</i> spp., which are present throughout Australia, and seed damaging behaviour of <i>Ochrimnus</i> spp. suggests that <i>Ochrimnus carnosulus</i> has the potential to cause negative economic and environmental consequences in Australia.	
<p><i>Oncometopia clarior</i> (Walker 1851)</p> <p>[Cicadellidae]</p>	Central and South America, including Mexico, Panama and Colombia (Alvarez et al. 2012; Wilson, Turner & McKamey 2009b).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Oncometopia clarior</i> is associated with <i>Dracaena</i> foliage (USDA 2011).	Yes. <i>Oncometopia clarior</i> is distributed in South and Central America (Wilson, Turner & McKamey 2009b), areas with climatic conditions are similar to parts of Australia. This species is polyphagous, with associated host plants from Malvaceae, Amaranthaceae, Asclepidaceae and Poaceae families,	Yes. <i>Oncometopia clarior</i> is known to feed on several host plants including cucurbits, bean, sesame, maize and citrus (Takiya & Dmitriev 2019) which are economically important in Australia (APNI 2020). This species directly causes damage by sucking sap from the xylem, consequently weakening host plants (Alvarez et al. 2012;	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				including <i>Glycine</i> , <i>Coffea</i> , <i>Dracaena</i> , <i>Cucumis</i> , <i>Cucurbita</i> , <i>Phaseolus</i> , <i>Vigna</i> , <i>Zea</i> , <i>Citrus</i> , <i>Nicotiana</i> and <i>Lantana</i> spp. (Alvarez et al. 2012; Jaminson 2012; Takiya & Dmitriev 2019), which are present in Australia (APNI 2020). Therefore, <i>O. clarior</i> has the potential to establish and spread in Australia.	Jaminson 2012). Additionally, <i>O. clarior</i> is a vector of the bacterium <i>Xylella fastidiosa</i> (Jaminson 2012), which is an exotic, national priority plant pest for Australia (DAWR 2016f, 2018d). Therefore, <i>O. clarior</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Opuntiaspis carinata</i> (Cockerell, 1896) [Diaspididae] Carmate scale	Mexico, Panama, Peru and USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Opuntiaspis carinata</i> is associated with <i>Oncidium</i> , <i>Philodendron</i> and <i>Dracaena</i> spp. (García Morales et al. 2018; MPI 2016).	Yes. <i>Opuntiaspis carinata</i> is polyphagous, found on <i>Anthurium</i> , <i>Euphorbia</i> , <i>Philodendron</i> , <i>Agave</i> , <i>Dracaena</i> , <i>Yucca</i> , <i>Oncidium</i> and <i>Citrus</i> (García Morales et al. 2020), which are present in Australia (APNI 2020). This armoured scale is present throughout southern USA, Central and South America (García Morales et al. 2020), areas with similar climatic conditions to parts of Australia. Therefore, <i>O. carinata</i> has	Yes. <i>Opuntiaspis carinata</i> is a pest on citrus, agave, orchids, <i>Dracaena</i> and <i>Euphorbia</i> spp. (García Morales et al. 2020), which are economically important and or naturalised plants in Australia (APNI 2020; Flowers Australia 2019; Horticulture Innovation Australia 2019c). Armoured scale insects feed by sucking sap from phloem cells or parenchyma from almost all parts of the host plant, which can lead to deformities such as	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				the potential to establish and spread in Australia.	chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>O. carinata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Orius majusculus</i> (Reuter, 1879) Synonym: <i>Orius (Heterorius) majusculus</i> (Reuter, 1879) [Anthocoridae]	France, Italy, Spain. Switzerland, UK (CABI 2020a), Iran (Ghahari, Carpintero & Ostovan 2009), Belgium, Greece, Portugal and the Netherlands (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Orius majusculus</i> is a predator of flying insects including thrips, common insects on Australian plants (Arnó, Roig & Riudavets 2008; EPPO 2020). The species is common throughout Central and Southern Europe (CABI 2020a; de Jong et al. 2019), areas with similar climatic conditions to parts of Australia. Therefore, <i>O. majusculus</i> has the potential to establish and spread in Australia.	Yes. <i>Orius majusculus</i> is a predator of flying insects (CABI 2020a) and has been used as a biological control agent for thrips (Arnó, Roig & Riudavets 2008; EPPO 2020). Therefore, as a predatory arthropod, <i>O. majusculus</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator)
<i>Orius insidiosus</i> (Say, 1832) [Anthocoridae]	Belgium, France, Italy, Mexico, the Netherlands and USA (CABI 2020a). <i>Orius insidiosus</i> is used as a BCA by Ecuador (letter	No record found (ABRS 2020; Plant Health Australia 2020).	Australia has been notified that <i>Orius insidiosus</i> is on this pathway as a BCA from Ecuador (letter from Agrocalidad 15/02/2018).	Yes. <i>Orius insidiosus</i> has a wide range of arthropod prey, and is distributed in Europe, Mexico and Ecuador (CABI 2020a; de Jong et al. 2019). It is likely that suitable	Yes. <i>Orius insidiosus</i> is used as a biological control agent against several species of small insects, notably thrips, however they will also prey on mites, aphids and	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	from Agrocalidad 15/02/2018).			climates and suitable prey can be found in parts of Australia, therefore, <i>O. insidiosus</i> has the potential to establish and spread in Australia.	caterpillars (CABI 2020a). Therefore, as a predatory arthropod, <i>O. insidiosus</i> has the potential to cause negative environmental consequences in Australia.	
<i>Ovaticoccus agavium</i> (Douglas 1888) Misspelling: <i>Oviticoccus agavium</i> [Eriococcidae] Agave ovaticoccin	Ethiopia, France, Israel, Italy, UK, USA (García Morales et al. 2020) and the Netherlands (de Jong et al. 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Ovaticoccus agavium</i> is associated with cut foliage and branches of <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Ovaticoccus agavium</i> feeds on <i>Agave</i> , <i>Dracaena</i> , <i>Yucca</i> and <i>Aloe</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). The species was introduced from USA via trade of ornamental <i>Agave</i> spp. from European and Ethiopian regions (Pellizzari & Kozár 2011), areas which have similar climatic conditions to parts of Australia. Therefore, <i>O. agavium</i> has the potential to establish and spread in Australia.	Yes. <i>Ovaticoccus agavium</i> is recorded on ornamental and cultivated <i>Agave</i> spp. in several regions of Italy (Mazzeo et al. 2014; Mazzeo, Suma & Russo 2008). Additionally, <i>O. agavium</i> is also recorded feeding on <i>Dracaena</i> and <i>Aloe vera</i> (García Morales et al. 2020). These plants are all grown commercially in Australia (Dragon Trees Australia 2019; PIRSA 2017; Thomas & Gollnow 2013). The scales are found primarily deep in the leaf pod and cause wilt-like infection of agave foliage (Fetykó & Szita 2012). Therefore, <i>O. agavium</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Australia.	
<i>Oxycareus hyalinipennis</i> (Costa, 1847) Synonym: <i>Oxycareus (Oxycareus) hyalinipennis</i> (Costa, 1847) [Oxycarenidae] Cottonseed bug	Kenya (Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Argentina, Cambodia, China, Egypt, France, Greece, India, Iran, Israel, Italy, Madagascar, Malawi, Morocco, Pakistan, Philippines, Portugal, Saudi Arabia, South Africa, Spain, Sri Lanka, Tanzania, Thailand, Uganda, Vietnam and Zimbabwe (CABI 2020a; de Jong et al. 2019; Dellapé & Henry 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Oxycareus hyalinipennis</i> is polyphagous; host plants include <i>Gossypium</i> , <i>Ficus</i> , <i>Persea</i> , <i>Hibiscus</i> , <i>Phoenix</i> , <i>Vigna</i> and <i>Zea</i> spp. (CABI 2019a), which are naturalised or commercially grown in Australia (APNI 2020; Horticulture Innovation Australia 2019c). The species is widely distributed throughout Africa, Asia, Europe and South America (CABI 2020a), which are areas with similar climatic conditions to Australia. Therefore, <i>O. hyalinipennis</i> has the potential to establish and spread in Australia.	Yes. <i>Oxycareus hyalinipennis</i> is polyphagous on plants from the families Malvaceae, Sterculiaceae and Tiliaceae (Slater & Baranowski 1994). This species is a major pest of cotton (EPPO 2020; Smith & Brambila 2008) and is also associated with fig, mallow, avocado, date-palm and maize (CABI 2020a). Feeding damage on cotton seeds reduces quality, germination and oil content, and crushed bodies during processing stains cotton (Halbert & Dobbs 2010; Smith & Brambila 2008). Adult <i>O. hyalinipennis</i> can feed on fruits and seeds of non-malvaceous plants, causing significant damage (Halbert & Dobbs 2010). Aggregation of bugs on buildings emit unpleasant odours and are nuisance pests at night (Halbert & Dobbs 2010). Therefore,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					<i>O. hyalinipennis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Oxycareus multiformis</i> Samy, 1969 Synonym: <i>Oxycareus (Oxycareus) multiformis</i> Samy, 1969 [Oxycarenidae]	Kenya, Tanzania and Uganda (Dellapé & Henry 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Oxycareus multiformis</i> is known from East Africa (Abdel-Aziz 1968), which has similar climatic conditions to parts of Australia. Host plants present in Australia include <i>Gossypium</i> , <i>Hibiscus</i> , <i>Pavonia</i> , <i>Prunus</i> , <i>Sida</i> and <i>Euryops</i> spp. (Abdel-Aziz 1968; APNI 2020; Schaefer & Panazzi 2000). Therefore, <i>O. multiformis</i> has the potential to establish and spread in Australia.	Yes. <i>Oxycareus multiformis</i> is a pest of crops such as peaches, hibiscus and cotton (Abdel-Aziz 1968; Schaefer & Panazzi 2000). <i>Oxycareus</i> spp. feed on sap from seeds, fruits and foliage which damages plant reproduction, growth, health and fruit production (Abdel-Aziz 1968; Fletcher 2007). Some species cause significant damage resulting in yield reduction (Fletcher 2007; Halbert & Dobbs 2010). Therefore, <i>O. multiformis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Oxycareus zimbabwei</i> Samy, 1969	Zimbabwe (Dellapé & Henry 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. There is little information regarding <i>Oxycareus zimbabwei</i> , however, members of the genus are typically	Yes. There is little information regarding <i>Oxycareus zimbabwei</i> , however, members of the genus are typically	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Synonym: <i>Oxycarenus</i> <i>(Oxycarenus) zimbabwei</i> Samy, 1969 [Oxycarenidae]</p>				<p>polyphagous plant pests of several commercially important crops such as capsicum, chilli, pea, grapes and cotton (PaDIL 2020). <i>O. zimbabwei</i> is known from Zimbabwe (Dellapé & Henry 2018), areas where climatic conditions are similar to parts of Australia. The availability of possible host plants and suitable climatic conditions in Australia suggest that this pest could establish and spread.</p>	<p>polyphagous plant pests of several commercially important crops such as capsicum, chilli, pea, grapes and cotton (PaDIL 2020). <i>Oxycarenus</i> spp. feed on sap from seeds and fruits (Abdel-Aziz 1968; Fletcher 2007). Therefore, <i>O. zimbabwei</i> has the potential to cause negative economic consequences in Australia.</p>	
<p><i>Pangaeus bilineatus</i> (Say 1825) [Cydnidae]</p>	USA and Mexico (Schaefer & Panazzi 2000).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pangaeus bilineatus</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	<p>Yes. <i>Pangaeus bilineatus</i> is known from Central and North America and is associated with <i>Arachis</i>, <i>Gossypium</i>, <i>Fragaria</i>, <i>Spinacia</i>, <i>Capsicum</i> spp. and other vegetable crops (Schaefer & Panazzi 2000). Australia has similar climatic conditions to the geographic distribution and suitable host plants available. Therefore, <i>P. bilineatus</i> has the potential to establish and spread in Australia.</p>	<p>Yes. <i>Pangaeus bilineatus</i> is a polyphagous pest, known to cause serious damage on cotton, pepper, strawberry, spinach, peanuts and other vegetable crops (Schaefer & Panazzi 2000). <i>P. bilineatus</i> is an economically important pest of peanut in the USA (Chapin et al. 2006). Adults and nymphs pierce peanut pods using needle-like mouthparts, which causes lesions and reduces nut quality and</p>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					yield (Chapin et al. 2006; Schaefer & Panazzi 2000). Therefore, <i>P. bilineatus</i> has the potential to cause negative economic consequences in Australia.	
<i>Paracoccus glaucus</i> (Maskell, 1879) [Pseudococcidae]	New Zealand (CABI 2020a; García Morales et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Paracoccus glaucus</i> is associated with cut flowers and foliage of <i>Cordyline</i> spp. (Martin 2018d).	Yes. Previously assessed by the department (DAWR 2019c). <i>Paracoccus glaucus</i> is a polyphagous pest of many ornamental and fruit crops including <i>Cordyline</i> , <i>Pittosporum</i> , <i>Rubus</i> , <i>Citrus</i> and <i>Phormium</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). This mealybug is endemic to New Zealand (Martin 2018d), an area where climatic conditions are similar to parts of Australia. Therefore, <i>P. glaucus</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (DAWR 2019c). <i>Paracoccus glaucus</i> is polyphagous, feeding on host plants from 20 genera in 19 families including <i>Pittosporum</i> , <i>Rubus</i> , citrus, <i>Phormium</i> (García Morales et al. 2020), ferns, club mosses (Henderson, Sultan & Robertson 2010) and Agavaceae (von Ellenrieder & Stocks 2014). Adult females and nymphs have sucking mouthparts to feed on phloem sap from the leaf or stem (Martin 2018d). Mealybug damage includes leaf and fruit discolouration; leaf, flower and fruit dropping, reduction of fruit growth rate, distortion of leaves, new shoots and fruit,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					aborted plant shoots, development of cork tissue on fruit peel, honeydew, and reduction of plant vigour (DAWR 2019c). Therefore, <i>P. glaucus</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Paracoccus interceptus</i> (Cox & Ben-Dov, 1986) Synonym: <i>Paracoccus interceptus</i> Lit, 1997, <i>Paracoccus morrisoni</i> Cox & Ben-Dov, 1986 [Pseudococcidae] Intercepted mealybug	Benin (DOA South Africa), India, Indonesia, Cambodia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Paracoccus interceptus</i> is associated with <i>Dendrobium</i> spp. (García Morales et al. 2020). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (DAWR 2019c). <i>Paracoccus interceptus</i> has a wide range of host plants, including many tropical fruit (García Morales et al. 2020) and ornamentals such as Orchidaceae and <i>Hoya</i> spp. (Williams 2004). The species is found in South Asia (García Morales et al. 2020), areas where climatic conditions are similar to parts of Australia. Therefore, <i>P. interruptus</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (DAWR 2019c). <i>Paracoccus interceptus</i> is polyphagous, feeding on plants from 18 genera in 25 families, including mango, guava, pepper, rambutan, mangosteen, lychee, breadfruit, fig, bamboo, ginger, <i>Dendrobium</i> , longan and key lime (García Morales et al. 2020), which are commercial or naturalised plants in Australia (Horticulture Innovation Australia 2019c). Therefore, <i>P. interceptus</i> has the potential to cause negative economic and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					environmental consequences in Australia.	
<i>Paracoccus marginatus</i> Williams & Granara de Willink 1992 [Pseudococcidae] Papaya mealybug	British Virgin Islands, China, India, Indonesia, Israel, Cambodia, Kenya, Malaysia, Mauritius, Mexico, Pakistan, Philippines, Sri Lanka, Taiwan, United Republic of Tanzania, Thailand, USA (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Paracoccus marginatus</i> is associated with <i>Helianthus</i> , <i>Philodendron</i> and <i>Hibiscus</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department in multiple pest risk analyses (Biosecurity Australia 2002a; DAWR 2018b, 2019c; Department of Agriculture 2019d). <i>Paracoccus marginatus</i> is native to Central America and now found in 48 countries in Africa, Asia, North America, and Oceania as well as Central and South America. It is highly polyphagous, being reported on 134 genera of 49 families of plants (García Morales et al. 2020). Therefore, <i>P. marginatus</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department in multiple pest risk analyses (Biosecurity Australia 2002a; DAWR 2018b, 2019c; Department of Agriculture 2019d). <i>Paracoccus marginatus</i> is known to damage avocado, citrus, tomato, cotton, sweet potato and other crops grown in Australia, leading to stunted growth and cosmetic damage (Department of Agriculture 2019d; University of Florida 2014). This pest has caused significant damage to cassava in Central America and has the capacity to seriously affect other tropical fruit and ornamentals such as <i>Papaya</i> , <i>Hibiscus</i> and <i>Annona</i> species (CABI 2020a). On papaya, the pest infests the veins of older leaves and all parts	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					of young leaves and fruits. Papaya trees can die within a few months of becoming infested (Muniappan et al. 2008). Therefore, <i>P. marginatus</i> has the potential to cause negative economic and environmental consequences in Australia	
<i>Parasaissetia nigra</i> (Nietner, 1861) Synonym: <i>Lecamium nigrum</i> Nietner, 1861 [Coccidae] Nigra scale	Cosmopolitan species (Lin et al. 2017; Miller et al. 2014): American Samoa, Argentina, Belgium, Chile, China, Egypt, Colombia, Ecuador, Fiji, India, France, Greece, Indonesia, Israel, Italy, Japan, Kenya, Kiribati, Madagascar, Mexico, Malaysia, Mauritius, New Caledonia, the Netherlands, New Zealand, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Portugal, Saudi Arabia, Singapore, South Africa, Republic of Korea, Spain, Sri Lanka, Taiwan, Tanzania, Thailand, Tonga, Uganda, UK, USA, Vanuatu, Vietnam, Zimbabwe (García	Present, Qld, NSW, NT, Vic., WA and SA (ABRS 2020; Government of Western Australia 2020; Lin et al. 2017; PaDIL 2018; Plant Health Australia 2020).	<i>Parasaissetia nigra</i> is associated with cut foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Morales et al. 2020), Nepal, British Virgin Islands and Marshall Islands (CABI 2020a).					
<i>Parlatoria blanchardi</i> (Targioni, 1892) [Diaspididae] Parlatoria date scale, date palm scale	India, Iran, Israel, USA (ABRS 2020), Afghanistan, Argentina, Egypt, France, Italy, Mauritius, Morocco, Pakistan, Saudi Arabia, Spain (de Jong et al. 2019; García Morales et al. 2018), UAE (CABI 2020a) and Kenya (Miller et al. 2014).	Present, NSW, NT and Qld (ABRS 2020; Plant Health Australia 2020). Declared, emergency plant pest for SA (PIRSA 2019) and declared pest, but not notifiable in NT (DPIR 2018a).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Parlatoria blanchardi</i> is already established in parts of Australia (ABRS 2020). Host plants affected are <i>Phoenix</i> spp., <i>Hyphaene</i> spp. and <i>Washingtonia filifera</i> (PIRSA 2020). Therefore, <i>P. blanchardi</i> has the potential to establish and spread in South Australia.	Yes. <i>Parlatoria blanchardi</i> is a serious pest due to the damage it inflicts on its primary host plant, the date palm. The primary feeding site on hosts is the succulent white tissue at the base of the leafstalk which results in discolouration of foliage and reduces plant vigour (PIRSA 2020). Therefore, <i>P. blanchardi</i> has the potential to cause negative economic and environmental consequences in South Australia.	Yes (SA)
<i>Parlatoria mytilaspiformis</i> Green, 1899 [Diaspididae]	Hawaiian Islands, India, Philippines, Sri Lanka and Taiwan (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Parlatoria mytilaspiformis</i> is associated with the cut flowers and foliage and <i>Dracaena</i> spp. (García Morales et al. 2020).	Yes. <i>Parlatoria mytilaspiformis</i> is polyphagous, found on <i>Citrus</i> , <i>Camellia</i> , <i>Dracaena</i> , <i>Hibiscus</i> , <i>Cycas</i> and <i>Vanda</i> spp. (García Morales et al. 2020), which are all present in Australia (APNI 2020). This armoured scale is known from India, South Asia and Oceania (García	Yes. <i>Parlatoria mytilaspiformis</i> is found on citrus, camellia, <i>Dracaena</i> , hibiscus, and orchids (García Morales et al. 2018; Swezey 1945), which are naturalised or economically important plants in Australia (Dragon Trees Australia 2019; Flowers Australia	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Morales et al. 2020), areas where climatic conditions are similar to parts of Australia. Therefore, <i>P. mytilaspiformis</i> has the potential to establish and spread in Australia.	2019; Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). <i>Parlatoria</i> spp. cause discolouration of foliage and reduce plant vigour due to feeding (PIRSA 2020). Therefore, <i>P. mytilaspiformis</i> has the potential to cause negative economic or environmental consequences in Australia.	
<i>Parlatoria pergandii</i> Comstock 1881 Synonym: <i>Parlatoria pergandei</i> [Diaspididae] Black parlatoria scale	Argentina, China, India, Colombia, Ecuador, Egypt, France, Greece, Indonesia, Iran, Israel, Italy, Japan, Lebanon, Malaysia, Mexico, New Zealand, Morocco, Saudi Arabia, Philippines, South Africa, Portugal, Republic of Korea, Spain, Switzerland, Taiwan, Thailand, UK, USA, Vietnam (García Morales et al. 2020), Pakistan, Singapore, Tanzania and Peru (CABI 2020a; Watson 2018).	Present, Qld, NSW and NT (ABRS 2020; CSIRO 2017; Plant Health Australia 2020) Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Parlatoria pergandii</i> is associated with <i>Camellia</i> , <i>Dracaena</i> , <i>Antherium</i> and <i>Hibiscus</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department (Biosecurity Australia 2005a). <i>Parlatoria pergandii</i> hosts include <i>Asparagus setaceus</i> (asparagus fern); <i>Citrus</i> spp, (lime, lemon, pummelo, mandarin, navel orange, and grapefruit); <i>Malus pumila</i> (apple) and <i>Prunus</i> (stone fruit). This species has shown the ability to adapt to new hosts and environments (Hanks & Denno 1994). <i>P. pergandii</i> is already established in parts of Australia,	Yes. Previously assessed by the department (Biosecurity Australia 2005a). <i>Parlatoria pergandii</i> feeds on fruit tissue, which sometimes leads to fruit abscission (Davies & Albrigo 1994). The species causes green spots on fruit, making them unsuitable for the fresh market (Cartwright & Browning 2003). Adults and nymphs feed on leaves, stems and fruit, which can sometimes lead to fruit drop. Chaff scales are often	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				indicating that suitable environments for their establishment and spread are available in Western Australia (Biosecurity Australia 2005a).	associated with gumming, flaking and splitting of bark, causing dieback of branches and sometimes killing the tree (Biosecurity Australia 2005a). <i>P. pergandii</i> has been found to cover nearly 100% of bark and 70% of twigs of <i>Citrus sinensis</i> in the Cook Islands (Walker & Deitz 1979). Therefore, <i>P. pergandii</i> has the potential to cause negative economic and environmental consequences in Western Australia (Biosecurity Australia 2005a).	
<i>Parlatoria pittospori</i> Maskell, 1891 Synonym: <i>Parlatoria myrtus</i> Maskell, 1891, <i>Parlatoria dryandrae</i> Fuller, 1897, <i>Parlatoria petrphilae</i> Fuller 1899 [Diaspididae] Mauve Pittosporum scale	South Africa, New Zealand, USA (ABRS 2020), UK (García Morales et al. 2020) and Chile (Naves, Bonifácio & de Sousa 2016).	Present, NSW, Qld, SA, Tas. Vic. and WA (ABRS 2020; CSIRO 2017; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Parlatoria pittospori</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (García Morales et al. 2018; MPI 2016).	Assessment not required	Assessment not required	No
<i>Parlatoria proteus</i> (Curtis, 1843)	Argentina, Belgium, China, Colombia, Ecuador, Egypt, Fiji, France, India,	Present, NSW, Qld, NT, SA, Vic. and WA (ABRS 2020; Government of	<i>Parlatoria proteus</i> is associated with the cut foliage of <i>Cordyline</i> and	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Diaspididae] Proteus scale	Indonesia, Iran, Israel, Italy, Japan, Malaysia, Mauritius, Mexico, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Spain, South Africa, Republic of Korea, UK, Taiwan, Tanzania, Thailand, USA and Vietnam (García Morales et al. 2018; Watson 2018).	Western Australia 2020; Plant Health Australia 2020).	<i>Dracaena</i> spp. (Biosecurity Australia 2010c; DAFF 2013d; MPI 2016).			
<i>Genaparlatoria pseudaspidotus</i> (Lindinger, 1905) Synonym: <i>Parlatoria pseudaspidotus</i> (Lindinger, 1905) [Diaspididae] Vanda orchid scale	China, India, Japan, Malaysia, Papua New Guinea, Singapore, Philippines, Sri Lanka, UK, USA (ABRS 2020), Colombia, Fiji, Indonesia, Italy, Japan, Pakistan, Panama, Taiwan, South Africa, Thailand and Vietnam (de Jong et al. 2019; García Morales et al. 2018; Watson 2018).	Present, Qld and NT (ABRS 2020; Plant Health Australia 2020).	<i>Parlatoria pseudaspidotus</i> is associated with <i>Dendrobium</i> spp. (Biosecurity Australia 2010c; García Morales et al. 2018).	Assessment not required	Assessment not required	No
<i>Phenacoccus avenae</i> Borchsenius, 1949 [Pseudococcidae] Oat mealybug	Israel, Italy, the Netherlands, and Turkey (García Morales et al. 2018; Kaydan & Kozár 2010; Williams 1985, 1989).	No record found (García Morales et al. 2020).	<i>Phenacoccus avenae</i> is associated with <i>Gladiolus</i> , <i>Iris</i> , and <i>Tulipa</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department (DAWR 2019c). <i>Phenacoccus avenae</i> has a wide range of host plants including plants from families Gramineae, Amaryllidaceae, Iridaceae and Liliaceae; also on grasses, oats and cut	Yes. Previously assessed by the department (DAWR 2019c). <i>Phenacoccus avenae</i> is polyphagous, on roots, corms and rhizomes of various ornamental plants and inside the leaf sheaths of grasses (Malumphy & Badmin	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				flower hosts (DAWR 2019c). Therefore, <i>P. avenae</i> has the potential to establish and spread in Australia.	2012). Mealybug damage includes leaf and fruit discolouration; leaf, flower and fruit dropping, reduction of fruit growth rate, distortion of leaves, new shoots and fruit, aborted plant shoots, development of cork tissue on fruit peel, contamination of fruit with mealybugs and honeydew, and reduction of plant vigour (DAWR 2019c; Franco, Zada & Mendel 2009). Therefore, <i>P. avenae</i> has the potential to cause negative economic consequences throughout Australia.	
<i>Phenacoccus madeirensis</i> Green, 1923 [Pseudococcidae] Madeira mealybug	Argentina, British Virgin Islands, Cambodia, China, Colombia, Ecuador, France, Greece, India, Italy, Mexico, Pakistan, Panama, Peru, Philippines, Portugal, Spain, Taiwan, Thailand, USA, Zimbabwe (García Morales et al. 2020), Vietnam (García Morales et al. 2020; Muniappan 2011; Williams 2004),	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited in WA (Government of Western Australia 2020).	<i>Phenacoccus madeirensis</i> is associated with <i>Hibiscus</i> and <i>Chrysanthemum</i> spp. (PHA 2016a). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (DAWR 2019c; Department of Agriculture 2019d). <i>Phenacoccus madeirensis</i> has a wide host range including citrus, cotton, pineapple, and other crops grown in Australia (García Morales et al. 2020) and ornamental host plants (Pellizzari &	Yes. Previously assessed by the department (DAWR 2019c; Department of Agriculture 2019d). <i>Phenacoccus madeirensis</i> is known to attack citrus, cotton, pineapple and other crops grown in Australia (García Morales et al. 2020). This species is also known to attack <i>Acacia</i> spp. (Plantwise	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Japan, Malawi, Mauritius (CABI 2020a) and the Netherlands (de Jong et al. 2019).			Germain 2010), which occur throughout Australia (Department of Agriculture 2019d). Therefore, <i>P. madeirensis</i> has the potential to establish and spread in Australia.	2019) and may therefore pose a threat to Australia's natural ecosystems (Department of Agriculture 2019d). Therefore, <i>P. madeirensis</i> has the potential to cause negative economic and environmental consequences throughout Australia.	
<i>Phenacoccus solani</i> Ferris, 1918 Synonym: <i>Phenacoccus defectus</i> Ferris, 1950 [Pseudococcidae] Solanum mealybug	American Samoa, China, India, Colombia, Ecuador, Egypt, UK, Iran, France, Israel, Italy, USA, Japan, Kiribati, Mexico, Peru, Marshall Islands, Singapore, South Africa, Spain, Taiwan, Thailand, Vietnam, Zimbabwe (CABI 2020a; García Morales et al. 2018) and Indonesia (Sartiami et al. 2016).	Present, Qld, NT, Vic. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020) (Victorian Department of Jobs, Precincts and Regions 2019, pers. comm.).	<i>Phenacoccus solani</i> is associated with cut foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Phenacoccus solenopsis</i> Tinsley, 1898 [Pseudococcidae] Cotton mealybug	USA, Ecuador, Brazil, Chile, Argentina, the Netherlands, Pakistan, India, UK, Vietnam, Colombia, China, Taiwan and Sri Lanka (Fand & Suroshe 2015).	Present, Qld and NT (Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (DAWR 2019c). <i>Phenacoccus solenopsis</i> is already present in parts of Australia, suggesting suitable climatic conditions and host plants are available. Therefore, <i>P. solenopsis</i>	Yes. Previously assessed by the department (DAWR 2019c). <i>Phenacoccus solenopsis</i> is a highly polyphagous pest of over 200 plant species capable of causing up to 60% crop losses in cotton (Fand & Suroshe 2015). Therefore, <i>Phenacoccus</i>	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				has the potential to establish and spread in Western Australia.	<i>solenopsis</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Philaenus spumarius</i> (Linnaeus, 1758) [Aphrophoridae] Meadow spittlebug	Afghanistan, Belgium, China, France, Greece, Italy, Japan, Morocco, the Netherlands, Portugal, Spain, Switzerland, UK (de Jong et al. 2019; Dmitriev 2013), Iceland, Iran, New Zealand and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Philaenus spumarius</i> has a wide host range with over 1,000 species of plants, including <i>Beta</i> , <i>Eucalyptus</i> , <i>Fragaria</i> , <i>Lavandula</i> , <i>Poaceae</i> , <i>Prunus</i> , <i>Rubus</i> , <i>Solanum</i> and <i>Vitis</i> spp. (CABI 2020a), which are present in Australia. <i>P. spumarius</i> has a wide geographic distribution, occurring in most terrestrial habitats in Europe, and has been accidentally introduced and established in North America and New Zealand (Yurtsever 2000), areas where climatic conditions are similar to Australia. Therefore, <i>P. spumarius</i> has the potential to establish and spread in Australia.	Yes. <i>Philaenus spumarius</i> is highly polyphagous, affecting eucalyptus, strawberry, stone fruit, tomato, potato, grape, raspberry, blackberry and beetroot (CABI 2020a), which are endemic, naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). This species can cause stunting and reduce seed and fruit yield due to feeding behaviour (CABI 2020a). Additionally, <i>P. spumarius</i> is a vector of xylem-transmitted diseases such as the bacterium <i>Xylella fastidiosa</i> (Santoemma et al. 2019), which is an exotic, national priority plant pest for Australia (DAWR 2016f, 2018d). Therefore, <i>P. spumarius</i> has the potential to cause	Yes/potential regulated article

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					negative economic and environmental consequences in Australia.	
<i>Phloeococcus cordylinidis</i> Hoy 1962 [Eriococcidae]	New Zealand (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phloeococcus cordylinidis</i> is associated with cut foliage and branches of <i>Cordyline</i> spp. (MPI 2016).	Yes. <i>Phloeococcus cordylinidis</i> is endemic to the North and South Island of New Zealand (García Morales et al. 2020) and it is likely that similar climatic conditions occur in Australia. The only known host plant, <i>Cordyline australis</i> (García Morales et al. 2020), which is present in Australia (APNI 2020). Therefore, <i>P. cordylinidis</i> has the potential to establish and spread in Australia.	Yes. <i>Phloeococcus cordylinidis</i> is known from <i>Cordyline australis</i> (García Morales et al. 2020) which is an ornamental tree in Australia. Scale insects suck sap from plants; feeding on foliage may cause yellowing and plants can appear water stressed (Manners 2016). Many Eriococcids, or felt scales, are also known to induce galls on hosts (Henderson 2011). Therefore, <i>P. cordylinidis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Pinnaspis aspidistrae</i> (Signoret, 1869) Synonym: <i>Chinoaspis aspidistrae</i> Signoret, 1869, <i>Chinoaspis brasiliensis</i> Signoret, 1869, <i>Chinoaspis latus</i> Cockerell, 1896	Indonesia, Malaysia, Peru, Philippines (CABI 2020a), Argentina, Belgium, Chile, Fiji, China, Colombia, Egypt, Iran, France, India, Israel, Italy, Japan, Kiribati, Madagascar, Mauritius, Mexico, Morocco, the	Present, ACT, NSW, NT, Qld, SA and Tas. (ABRS 2020; García Morales et al. 2018; Plant Health Australia 2020). Declared pest, prohibited entry into WA	<i>Pinnaspis aspidistrae</i> is associated with <i>Phloidendron</i> , <i>Ruscus</i> , <i>Lilium</i> , <i>Cordyline</i> and <i>Dracaena</i> spp. (DAFF 2013d; García Morales et al. 2018; MPI 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2006c; DAWR 2019b). <i>Pinnaspis aspidistrae</i> is polyphagous, with known hosts including avocado, citrus and other crops grown commercially in	Yes. Previously assessed by the department (Biosecurity Australia 2006c; DAWR 2019b). This species is known to attack avocado, citrus and other crops grown commercially in Australia (DAWR 2019b; García et	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Diaspididae] Fern scale	Netherlands, New Caledonia, New Zealand, Panama, Papua New Guinea, Portugal, South Africa, Republic of Korea, Sri Lanka, Spain, Taiwan, United Republic of Tanzania, USA, UK, Thailand, Vietnam (García Morales et al. 2020), Lebanon, Pakistan, Saudi Arabia, Papua New Guinea, Tonga and Vanuatu (Watson 2018).	(Government of Western Australia 2020).		Australia (García et al. 2017). This species is distributed throughout the world including Asia, Europe, North and South America, and parts of Australia (García et al. 2017), and it is likely that similar climatic conditions exist in parts of Western Australia. The availability of host plants and suitable climatic conditions suggest that this pest could establish and spread in Western Australia (DAWR 2019b).	al. 2017). <i>Pinnaspis</i> scales can be a quarantine problem on exports of nursery stock and cut foliage (Tenbrink & Hara 1992) and have a significant potential for economic consequences (Biosecurity Australia 2006c).	
<i>Pinnaspis buxi</i> (Bouché, 1851) [Diaspididae]	Argentina, China, Colombia, Ecuador, Egypt, Fiji, France India, Indonesia, Italy, Japan, Madagascar, Malaysia, Mauritius, Mexico, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Singapore, Republic of Korea, Spain, Sri Lanka, Switzerland, Taiwan, Tanzania, Thailand, Tonga, UK, USA, Vietnam (García Morales et al. 2020) and Zimbabwe (Watson 2018).	Present, NSW, NT, Qld and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Pinnaspis buxi</i> is associated with cut foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Pinnaspis dracaenae</i> (Cooley, 1899) Misspelling: <i>Pinnaspis dracaenae</i> [Diaspididae]	India, Indonesia and Sri Lanka (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pinnaspis dracaenae</i> is associated with the cut flowers and foliage of <i>Dracaena</i> spp. (García Morales et al. 2018; MAF 2002; MPI 2016).	Yes. <i>Pinnaspis dracaenae</i> is polyphagous on plants from four families and four genera, including <i>Dracaena</i> , <i>Hevea</i> and <i>Pachira</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). <i>Pinnaspis dracaenae</i> is distributed throughout the Indian subcontinent and parts of southeast Asia (García Morales et al. 2020) and it is likely that similar climatic conditions occur in parts of Australia. Therefore, <i>P. dracaenae</i> has the potential to establish and spread in Australia.	Yes. <i>Pinnaspis dracaenae</i> known hosts include <i>Dracaena</i> , <i>Hevea</i> and <i>Pachira</i> spp. (García Morales et al. 2020) which are ornamental or naturalised plants in Australia (APNI 2020; Dragon Trees Australia 2019). Diaspids, or armoured scale insects, feeding by sucking sap from phloem or parenchyma from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>P. dracaenae</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Pinnaspis strachani</i> (Cooley, 1899) [Diaspididae]	British Virgin Islands, Cambodia, Chile, China, Colombia, Ecuador, Egypt, Fiji, France, India, Indonesia, Iran, Italy, Japan, Kenya, Kiribati, Madagascar, Malaysia,	Present, NSW, NT, Qld, SA and WA (ABRS 2020; García Morales et al. 2018; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Pinnaspis strachani</i> is associated with cut foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MAF 2002; MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Marshall Islands, Mauritius, Mexico, Nepal, New Caledonia, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Saudi Arabia, Singapore, South Africa, Republic of Korea, Sri Lanka, Taiwan, Tanzania, Thailand, Tonga, Uganda, UK, USA, Vanuatu, Vietnam (García Morales et al. 2020), Malawi (CABI 2020a), Spain and New Zealand (Watson 2018).					
<i>Pinnaspis theae</i> (Maskell, 1891) Synonym: <i>Chinoaspis theae</i> Maskell, 1891 [Diaspididae]	China, Colombia, India, Japan, Sri Lanka and Taiwan (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pinnaspis theae</i> is associated with cut foliage and branches of <i>Cordyline</i> spp. (García Morales et al. 2018; MAF 2002; MPI 2016).	Yes. <i>Pinnaspis theae</i> is polyphagous and known host plants include <i>Cordyline</i> , <i>Punica</i> , and <i>Camellia</i> spp. (García Morales et al. 2020), which are present in Australia (APNI 2020). The species is present in several countries in Asia, south America and the Caribbean (García Morales et al. 2020), which are areas with similar climatic conditions to parts of Australia. Therefore, <i>P. theae</i> has the potential	Yes. <i>Pinnaspis theae</i> is known to feed on economic crops such as <i>Camellia sinensis</i> , pomegranate and <i>Cordyline</i> spp. (García Morales et al. 2020), which are economically important in Australia (DAWR 2018a; Gleeson 2013; Maddison 1993b). This species is considered a significant pest species of <i>Camellia sinensis</i> (Evans & Dooley 2013; Nagarkatti & Sankaran 1990). Therefore, <i>P. theae</i> has the potential to cause negative economic	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Pinnaspis yamamotoi</i> (Takagi 1965) [Diaspididae]	China and Venezuela (García Morales et al. 2020; Hua 2000).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pinnaspis yamamotoi</i> is associated with cut flowers and foliage of <i>Dracaena</i> spp. (García Morales et al. 2020).	to establish and spread in Australia. Yes. <i>Pinnaspis yamamotoi</i> is known to feed on <i>Dracaena</i> (García Morales et al. 2020), which are present throughout Australia (APNI 2020). <i>Pinnaspis yamamotoi</i> is known from China and Venezuela (García Morales et al. 2020), and it is likely that similar climatic conditions occur in Australia. Therefore, <i>P. yamamotoi</i> has the potential to establish and spread in Australia.	consequences in Australia. Yes. <i>Pinnaspis yamamotoi</i> is known from <i>Dracaena</i> spp., which are ornamental plants in Australia (Thomas & Gollnow 2013). Diaspidids, or armoured scale insects, feed by sucking sap from parenchyma or phloem from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Some species of this genus are known to cause economic damage to their host plants (García Morales et al. 2020). Therefore, <i>P. yamamotoi</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Planococcus citri</i> (Risso, 1813) [Pseudococcidae]	Cosmopolitan (Williams 2004), Kenya (letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018),	Present, ACT, NSW, NT, Qld, SA, Tas., SA, Vic. and WA (ABRS 2020; CABI 2020a; CSIRO 2017; Government of Western	<i>Planococcus citri</i> is associated with the cut flowers and foliage of <i>Cordyline</i> and <i>Dracaena</i>	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Citrus mealybug	Afghanistan, Argentina, Chile, China, Egypt, Colombia, Ecuador, Fiji, India, France, Greece, Indonesia, Sri Lanka, Iran, Israel, Italy, Japan, Spain, Kiribati, Lebanon, New Zealand, Malaysia, Marshall Islands, Mexico, Morocco, New Guinea, Peru, Pakistan, Papua Philippines, Portugal, Saudi Arabia, South Africa, Republic of Korea, Taiwan, Switzerland, Thailand, Tonga, UK, USA, Vietnam and Zimbabwe (García Morales et al. 2020), Belgium, Cambodia, British Virgin Islands, Madagascar, Malawi, Mauritius, Uganda, United Republic of Tanzania and the Netherlands (CABI 2020a).	Australia 2020; Plant Health Australia 2020).	spp. (DAFF 2013d; MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).			
<i>Planococcus lilacinus</i> (Cockerell, 1905) [Pseudococcidae] Coffee mealybug	China, Colombia, India, Indonesia, Japan, Cambodia, Kenya, Madagascar, Malaysia, Mauritius, Papua New Guinea, Philippines, Sri Lanka, Taiwan, Thailand	Present in the Torres Strait only, under official control (QDAF 2018d). Declared pest, prohibited entry into WA (Government of Western Australia 2020);	<i>Planococcus lilacinus</i> is associated with <i>Rhododendron</i> and <i>Vanda</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department in multiple pest risk analyses (AQIS 1999c, a; Biosecurity Australia 2006d, 2008a, 2009c; DAFF 2012b, 2013e; DAWR 2016d, 2019c).	Yes. Previously assessed by the department in multiple pest risk analyses (AQIS 1999c, a; Biosecurity Australia 2006d, 2008a, 2009c; DAFF 2012b, 2013e; DAWR 2016d, 2019c).	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	and Vietnam (García Morales et al. 2020).	prescribed and notifiable pest for Qld (Office of the Queensland Parliamentary Counsel 2016).		<i>Planococcus lilacinus</i> has a wide host range including several garden ornamentals (Ben-Dov, Miller & Gibson 2005); insects are easily dispersed by wind and plant material (Biosecurity Australia 2009c; Williams & Watson 1988). On numerous host plants including mango, coffee, mangosteen, citrus, lychee, grapevine, apple, grapefruit, cacao, pomegranate, yam and soya bean (DAWR 2019c; Ezzat & McConnell 1956; García Morales et al. 2018; Kondo & Kawai 1995; Reddy, Bhat & Naidu 1997; Suresh & Mohanasundaram 1996). Therefore, <i>P. lilacinus</i> has the potential to establish and spread in Australia.	<i>Planococcus lilacinus</i> is common in southern Asia and has been reported attacking many economically important crops (Williams 2004). This species is considered a major threat to agriculture (DAWR 2018b; Miller, Miller & Watson 2002). <i>P. lilacinus</i> is a serious pest of cocoa (Cox 1989) causing severe damage to young trees by killing the tips of branches. <i>P. lilacinus</i> is such an important pest of coffee, cocoa, custard apples, coconuts and mandarins in parts of India that chemical control is warranted (Ben-Dov 1994; Biosecurity Australia 2009c; CAB International 2007). Therefore, <i>P. lilacinus</i> has the potential to cause negative economic consequences in Australia.	
<i>Planococcus mali</i> Ezzat & McConnell, 1956 [Pseudococcidae]	New Zealand (García Morales et al. 2020).	Present, NSW and Tas. (ABRS 2020; García Morales et al. 2018; Plant Health Australia 2020).	<i>Planococcus mali</i> is associated with cut foliage and branches of	Yes. Previously assessed by the department (Biosecurity Australia 2011c; DAWR 2019c).	Yes. Previously assessed by the department (Biosecurity Australia 2011c; DAWR 2019c).	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
		Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Dracaena</i> spp. (MPI 2016).	<i>Planococcus mali</i> is on a number of host plants including <i>Acacia</i> , apple, pear, <i>Olearia chathamica</i> , blackcurrant and citrus (Charles 1993; Cox 1989; DAWR 2019c; García Morales et al. 2018). Additionally, <i>P. mali</i> is already present in parts of Australia, suggesting suitable conditions exist for it to further establish and spread in Western Australia.	<i>Planococcus mali</i> is a pest of blackcurrants in New Zealand (Cox 1989). Mealybug damage includes leaf and fruit discolouration; leaf, flower and fruit dropping, reduction of fruit growth rate, distortion of leaves, new shoots and fruit, aborted plant shoots, development of cork tissue on fruit peel, contamination of fruit with mealybugs and honeydew, and reduction of plant vigour (DAWR 2019c; Franco, Zada & Mendel 2009). Therefore, <i>P. mali</i> has the potential to cause negative economic consequences in Australia.	
<i>Planococcus minor</i> (Maskell, 1897) Synonym: <i>Planococcus pacificus</i> Cox, 1981 [Pseudococcidae] Pacific mealybug, passionvine mealybug	American Samoa, Argentina, Cambodia, Colombia, Fiji, India, Indonesia, Kiribati, Madagascar, Malaysia, Mauritius, Mexico, New Caledonia, Papua New Guinea, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Tonga, USA, Vanuatu, Vietnam	Present, ACT, Qld, NT, NSW, Vic. and SA (ABRS 2020; CSIRO 2017; Plant Health Australia 2020). Declared pest, prohibited into WA (Government of Western Australia 2020).	<i>Planococcus minor</i> is associated with the cut flowers and foliage of <i>Cordyline</i> and <i>Dracaena</i> (Biosecurity Australia 2010c; MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (AQIS 1999a; Biosecurity Australia 2008b; DAFF 2012b, a, 2013e, c; DAWR 2018b, 2019c; Department of Agriculture 2019d). <i>Planococcus minor</i> is a pest of plants including cocoa, citrus, capsicum	Yes. Previously assessed by the department (AQIS 1999a; Biosecurity Australia 2008b; DAFF 2012b, a, 2013e, c; DAWR 2018b, 2019c; Department of Agriculture 2019d). <i>Planococcus minor</i> is a known pest of banana, soybean, mango and	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	(García Morales et al. 2020) and Portugal (CABI 2020a).			(García Morales et al. 2020), coffee (Reddy, Bhat & Naidu 1997), eggplant (Lit, Caasi-Lit & Calilung 1998), pineapple (Culik, Ventura & dos S. Martins 2009; DAWR 2019c). <i>P. minor</i> is already present in parts of Australia, suggesting suitable conditions exist for it to further establish and spread in Western Australia.	other fruit crops (Roda et al. 2013). Feeding by <i>P. minor</i> causes stunted growth and encourages growth of sooty mould through the excretion of honeydew (Francis, Kairo & Roda 2012), reducing the value of commodities infested by this pest (Department of Agriculture 2019d). Additionally, <i>P. minor</i> is a vector of <i>Piper yellow mottle virus</i> (PYMoV) which is not present in Australia and causes decline in black pepper production in many areas of Southeast Asia (Lockhart et al. 1997). Therefore, <i>P. minor</i> has the potential to cause negative economic consequences in Australia.	
<i>Plautia affinis</i> (Dallas, 1851) [Pentatomidae] Green Stink Bug	Indonesia and Papua New Guinea (Cassis & Gross 2002).	Present, all states (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Poliaspis floccosa</i> Henderson, 2011	New Zealand (García Morales et al. 2018; Henderson 2011).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Poliaspis floccosa</i> is associated with the cut foliage of <i>Cordyline</i> spp.	Yes. <i>Poliaspis floccosa</i> is a polyphagous pest of plants in 6 genera from 3	Yes. <i>Poliaspis floccosa</i> is found on <i>Dianella</i> , <i>Cordyline</i> , and <i>Phormium</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Diaspididae] Flax scale			(García Morales et al. 2020).	families, including <i>Dianella</i> , <i>Cordyline</i> , and <i>Phormium</i> spp. (García Morales et al. 2020; Henderson 2011), which are present in Australia (APNI 2020). The scale is present in New Zealand, so it is likely that similar climatic conditions occur in Australia. Therefore, <i>P. floccosa</i> has the potential to establish and spread in Australia.	spp. (Henderson 2011) which are commonly grown ornamental or naturalised plants in Australia (ALA 2019; Thomas & Gollnow 2013). Diaspids, armoured scale insects, feed by sucking sap from phloem or parenchyma from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). In New Zealand, the incidence of this species has increased in urban and native restoration areas through the planting of its host <i>Phormium tenax</i> , where the leaf blades can appear ‘painted’ white with their colonies (Henderson 2011), consequently affecting appearance of ornamental plants. Therefore, <i>P. floccosa</i> has the potential to cause negative economic and environmental	

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Protopulvinaria pyriformis</i> (Cockerell 1894) Synonym: <i>Pulvinaria pyriformis</i> Cockerell 1894 [Coccidae] Pyriform scale	Widely distributed in tropical and subtropical regions of Africa, Middle East, North and South America, and throughout the Palearctic region (Stathas et al. 2009), including France, Israel, Italy, South Africa (CABI 2020a), Argentina, Chile, Colombia, Greece, Japan, Mauritius, Mexico, Peru, Portugal, Spain, Taiwan, USA, Zimbabwe (García Morales et al. 2020) Vietnam (Danzig & Konstantonova 1990; García Morales et al. 2020; Kondo & Muñoz 2016), and the Netherlands (de Jong et al. 2019).	Present, WA (Government of Western Australia 2020; Plant Health Australia 2020). Declared or prescribed pest, prohibited entry into Queensland (QDAF 2019); South Australia (PIRSA 2019); New South Wales (New South Wales Government 2017); and Victoria (DJPR 2019).	<i>Protopulvinaria pyriformis</i> is associated with <i>Cordyline</i> , <i>Dracaena</i> (MPI 2016), <i>Canna</i> , <i>Cymbidium</i> , <i>Gardenia</i> and <i>Viburnum</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department (Biosecurity Australia 2006d). <i>Protopulvinaria pyriformis</i> is a polyphagous pest attacking many agricultural hosts (Swirski, Wysoki & Ben-Dov 1997). Plant hosts are present, and the environment is conducive to establishment of this species in Australia (Biosecurity Australia 2006d). Additionally, <i>P. pyriformis</i> is known to spread through infested fruit and ornamental plants (NSW DPI 2015). <i>P. pyriformis</i> is already established in Perth, therefore, has the potential to further establish and spread in other regions of Australia.	consequences in Australia. Yes. Previously assessed by the department (Biosecurity Australia 2006d). Economic importance of the Coccidae mainly results from reduced host plant vigour due to sap feeding. <i>P. pyriformis</i> is considered a minor pest of mango (Biosecurity Australia 2006d; Swirski, Ben-Dov & Wysoki 1997), but has been reported as a serious pest of fruit trees and ornamentals in several tropical and subtropical countries (Ben-Dov 1985; de Meijer et al. 1989; Hamon & Williams 1984; NSW DPI 2015). Therefore, <i>P. pyriformis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes (Qld, SA, NSW, Vic.)
<i>Pseudaonidia trilobitiformis</i> (Green 1896)	Argentina, Cambodia, China, Colombia, Ecuador, Egypt, Fiji, India, Indonesia, Japan, Kenya,	Present, NT and Qld (ABRS 2020; Plant Health Australia 2020).	<i>Pseudaonidia trilobitiformis</i> is associated with cut foliage and branches of	Yes. Previously assessed by the department (Biosecurity Australia	Yes. Previously assessed by the department (Biosecurity Australia 2006c, 2009c; DAFF	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Diaspididae] Trilobite scale	Madagascar, Malawi, Mauritius, New Caledonia, Pakistan, Panama, Peru, Philippines, South Africa, Sri Lanka, Taiwan, Tanzania, Thailand, Uganda, USA, Vanuatu, Vietnam (Dao et al. 2017; Feng & Wei 2011; García Morales et al. 2020), Malaysia, Singapore, Zimbabwe and Mexico (Watson 2018).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	2006c, 2009c; DAFF 2012b; DAWR 2015a). <i>Pseudaonidia trilobitiformis</i> has a wide plant host range (Williams & Watson 1988) and suitable climates are present in Australia. Therefore, <i>P. trilobitiformis</i> has the potential to establish and spread in Western Australia.	2012b; DAWR 2015a). <i>Pseudaonidia trilobitiformis</i> affects the trunks, leaves and fruit of hosts (Pantoja & Peña 2006), including <i>Citrus maxima</i> (Morton 1987). Therefore, <i>P. trilobitiformis</i> has a significant potential for economic consequences in Western Australia (Biosecurity Australia 2006c).	
<i>Pseudaulacaspis brimblecombei</i> Williams, 1973 [Diaspididae]	Italy, New Zealand and UK (García Morales et al. 2020).	Present, Qld and NSW (ABRS 2020; García Morales et al. 2018; Plant Health Australia 2020).	<i>Pseudaulacaspis brimblecombei</i> is associated with the cut flowers and foliage of <i>Cordyline</i> spp. (García Morales et al. 2020).	Assessment not required	Assessment not required	No
<i>Pseudaulacaspis cockerelli</i> (Cooley 1897) [Diaspididae]	Kenya (letter from KEPHIS on 29/01/2018), Cambodia, China, Egypt, Fiji, France, India, Indonesia, Italy, Japan, Kenya, Madagascar, Malaysia, Mauritius, Nepal, New Caledonia, Papua New Guinea, Philippines, Singapore, South Africa, Republic of Korea, Sri Lanka, Taiwan, Thailand, Tonga, UK, USA, Vanuatu, Vietnam,	Present, NT, Qld, NSW and Vic. (ABRS 2020; CSIRO 2017; Plant Health Australia 2020) (Victorian Department of Jobs, Precincts and Regions 2019, pers. comm.). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Pseudaulacaspis cockerelli</i> is associated with cut foliage and branches of <i>Dracaena</i> spp. (MAF 2002; MPI 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2008b). <i>Pseudaulacaspis cockerelli</i> has already established in parts of Australia (ABRS 2020; CSIRO 2017; Plant Health Australia 2020), suggesting suitable climatic conditions and host plants are available in Western Australia. Therefore, <i>P. cockerelli</i>	Yes. Previously assessed by the department (Biosecurity Australia 2008b). <i>Pseudaulacaspis cockerelli</i> has significant potential for economic consequences (Biosecurity Australia 2008b). Considered the most serious pest of ornamental plants in Florida (Hamon & Fasulo 2000) this species is also	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Zimbabwe (García Morales et al. 2020), Argentina and Tanzania (CABI 2020a).			has the potential to establish and spread in Western Australia.	an important pest of mango (Biosecurity Australia 2008b; Crane & Campbell 1994). Therefore, <i>P. cockerelli</i> has the potential to cause negative economic consequences in Australia.	
<i>Pseudaulacaspis eugeniae</i> (Maskell, 1892) Synonym: <i>Chinoaspis eugeniae</i> Maskell, 1892 [Diaspididae]	China, Japan, Malaysia, New Zealand, Philippines, South Africa, Sri Lanka and Taiwan (García Morales et al. 2020).	Present, NSW, SA, Tas., Vic. and WA (ABRS 2020; CSIRO 2017; García Morales et al. 2018; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Pseudaulacaspis eugeniae</i> is associated with the cut flowers and foliage of <i>Cordyline</i> spp. (García Morales et al. 2020).	Assessment not required	Assessment not required	No
<i>Pseudaulacaspis pentagona</i> (Targioni-Tozzetti, 1886) [Diaspididae] Peach white scale	China, Fiji, India, Indonesia, Italy, Japan, Mauritius, Mexico, New Zealand, Panama, Papua New Guinea, South Africa, Sri Lanka, Switzerland, Taiwan, UK, USA (ABRS 2020), Argentina, Chile, Colombia, Egypt, France, Greece, Iran, Israel, Madagascar, Malawi, Malaysia, the Netherlands, New Caledonia, Peru, Portugal, Singapore, Republic of Korea, Spain, Tanzania, Tonga, Vanuatu, Vietnam,	Present, NSW and Qld (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Pseudaulacaspis pentagona</i> is associated with foliage of <i>Phalaenopsis</i> spp. (García Morales et al. 2020). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department and Western Australian government (Biosecurity Australia 2002c, 2009b; DAFF 2004b; DAFWA 2015; DAWR 2016c). <i>Pseudaulacaspis pentagona</i> is highly polyphagous (García et al. 2015) with many host plants present in Western Australia. Therefore the current geographic distribution and host range indicates that <i>P. pentagona</i> has the	Yes. Previously assessed by the department Western Australian government (Biosecurity Australia 2002c, 2009b; DAFF 2004b; DAFWA 2015; DAWR 2016c). <i>Pseudaulacaspis pentagona</i> is a highly destructive pest of fruit trees and woody ornamentals throughout the world (DAFWA 2015; García et al. 2015; Hanks & Denno 1993). Therefore, <i>P. pentagona</i> has the potential to cause	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Zimbabwe (García Morales et al. 2020), Nepal and Philippines (CABI 2020a; Watson 2018).			potential to establish and spread in Western Australia (DAFWA 2015; DAWR 2016c).	negative economic consequences in Australia.	
<i>Pseudischnaspis bowreyi</i> (Cockerell, 1893) [Diaspididae] Bowrey scale	Argentina, Colombia, Mexico, Panama, Peru, USA (García Morales et al. 2020) and Chile (Watson 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudischnaspis bowreyi</i> is associated with <i>Dracaena</i> (MAF 2002; MPI 2016), <i>Hibiscus</i> , <i>Jasmine</i> , <i>Rosa</i> and <i>Cattleya</i> spp. (García Morales et al. 2020; Swezey 1945).	Yes. <i>Pseudischnaspis bowreyi</i> is polyphagous on 37 genera from 27 families including mango, <i>Agave</i> , <i>Dracaena</i> , <i>Persea</i> , <i>Hibiscus</i> , <i>Cacao</i> , <i>Rosa</i> , <i>Musa</i> , <i>Eucalyptus</i> , <i>Jasmine</i> , <i>Prunus</i> , <i>Citrus</i> , <i>Camellia</i> and <i>Vitis</i> spp. (García Morales et al. 2018; Swezey 1945). The species is widely distributed in South and North America (García Morales et al. 2020) and it is likely that similar climatic conditions occur in Australia. Therefore, <i>P. bowreyi</i> has the potential to establish and spread in Australia.	Yes. <i>Pseudischnaspis bowreyi</i> is highly polyphagous on several crops that are commercially grown in Australia including mango, agave, <i>Dracaena</i> , avocado, hibiscus, cacao, rose, banana, <i>Jasmine</i> , <i>Prunus</i> , <i>Citrus</i> , <i>Camellia</i> , orchids and <i>Vitis</i> sp. (Dragon Trees Australia 2019; Flowers Australia 2019; García Morales et al. 2018; Horticulture Innovation Australia 2019c). Feeding behaviour affects vegetative growth, flowering and fruiting stages of host plants (Watson 2019). In addition, <i>P. bowreyi</i> is also recorded on eucalyptus (García Morales et al. 2020) which are endemic species in Australia. Therefore, <i>P. bowreyi</i> has	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					the potential to cause negative economic and environmental consequences in Australia.	
<i>Pseudococcus baliteus</i> (Lit, 1994) [Pseudococcidae] Aerial root mealybug	Cambodia, China, India, Indonesia, Philippines, Singapore, Thailand and Vietnam (García Morales et al. 2020; Soysouvanh & Hong 2016; Suh & Bombay 2015; Wang et al. 2018; Williams 2004).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudococcus baliteus</i> is associated with the cut flowers and foliage of <i>Dracaena</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department (DAFF 2012b; DAWR 2019c). <i>Pseudococcus baliteus</i> has a wide host range, including fruit trees (Ben-Dov 2011b), with many susceptible hosts present in Australia (DAWR 2019c). The species is widely distributed in Asia (García Morales et al. 2020) and it is likely that similar climatic conditions occur in Australia. Therefore, <i>P. baliteus</i> has the potential to establish and spread in Australia	Yes. Previously assessed by the department (DAFF 2012b; DAWR 2019c). <i>Pseudococcus baliteus</i> has a wide host range, including fruit trees (Ben-Dov 2011b), with many susceptible hosts and economically important hosts present in Australia (DAWR 2019c; Williams 2004). Mealybugs feed on sap, stressing their host plants and reducing the yield of commercial crops. The production of honeydew by mealybugs also promotes the growth of sooty moulds, which reduces the marketability of fruit (CABI 2011; DAFF 2012b). Therefore, <i>P. baliteus</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Pseudococcus calceolariae</i> (Maskell, 1879) [Pseudococcidae] Citrophilus mealybug, scarlet mealybug	Belgium, Chile, China, Colombia, France, Greece, Indonesia, Italy, Madagascar, Mexico, Morocco, New Zealand, Portugal, South Africa, Spain, UK, USA (García Morales et al. 2020), the Netherlands (CABI 2020a; de Jong et al. 2019) and India (Joshi, Rameshkumar & Mohanraj 2017).	Present, ACT, NSW, Qld, SA, Tas. and Vic. (ABRS 2020; CSIRO 2017; García Morales et al. 2018; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Pseudococcus calceolariae</i> is associated with cut foliage and branches of <i>Dracaena</i> spp.(MPI 2016).	Yes. Previously assessed by the department and Western Australian government (AQIS 2000; Biosecurity Australia 2005a, b, 2006b, 2010a, b, 2011c; DAFWA 2015; DAWR 2019c). Ben-Dov (2010) lists an extensive host range for the species, many of which are grown in WA (DAFWA 2015). Presence of <i>P. calceolariae</i> in parts of Australia also suggests suitable conditions are available for establishment and spread in Western Australia.	Yes. Previously assessed by the department and Western Australian government (AQIS 2000; Biosecurity Australia 2005a, b, 2006b, 2010a, b, 2011c; DAFWA 2015; DAWR 2019c). Furness and Charles (2003) indicates that a heavy infestation of this species can render a crop unsaleable (DAFWA 2015; Nicholas, Magarey & Wachtel 1994). Therefore, <i>P. calceolariae</i> has the potential to cause negative economic and environmental consequences in Western Australia.	Yes (WA)
<i>Pseudococcus comstocki</i> (Kuwana, 1902) [Pseudococcidae] Comstock mealybug	Afghanistan, Argentina, Cambodia, China, Colombia, France, Greece, Indonesia, Iran, Italy, Japan, Malaysia, Mexico, Republic of Korea, USA and Vietnam (García Morales et al. 2020), Sri Lanka, Taiwan, Thailand and Portugal (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020)	<i>Pseudococcus comstocki</i> is associated with <i>Lilium</i> , <i>Zinnia</i> (DAFF 2013d; Ervin, Moffitt & Meyerdirk 1983; PHA 2016a), and <i>Hypericum</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department (AQIS 1998a, b, 1999b; Biosecurity Australia 2003b, 2009c, 2010a, b, 2011a, b; DAFF 2013d; DAWR 2019c). <i>Pseudococcus comstocki</i> is polyphagous and has a wide host range including commercial fruit trees, ornamental shrubs and creepers, amenity trees	Yes. Previously assessed by the department (AQIS 1998a, b, 1999b; Biosecurity Australia 2003b, 2009c, 2010a, b, 2011a, b; DAFF 2013d; DAWR 2019c). <i>Pseudococcus comstocki</i> is an economically significant pest of many crops (Ben-Dov, Miller & Gibson 2012). Therefore, <i>P. comstocki</i> has the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				and natives (CABI 2012; DAFF 2013d). The species is widely distributed in Asia and north and south America (García Morales et al. 2020). Therefore, <i>P. comstocki</i> has the potential to establish and spread in Australia.	potential to cause negative economic consequences in Australia	
<i>Pseudococcus dendrobiorum</i> Williams, 1985 [Pseudococcidae] Dendrobium mealybug	India, Indonesia, Malaysia, Papua new Guinea, Philippines, Republic of Korea, Sri Lanka, Thailand, USA (García Morales et al. 2020) and China (CABI 2020a).	Present, NSW, NT and QLD (ABRS 2020; García Morales et al. 2018; Plant Health Australia 2020).	<i>Pseudococcus dendrobiorum</i> is associated with <i>Dendrobium</i> spp. (García Morales et al. 2020).	Assessment not required	Assessment not required	No
<i>Pseudococcus floriger</i> Ferris in Zimmerman, 1948 [Pseudococcidae]	Hawaii (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudococcus floriger</i> is associated with the cut foliage and branches of <i>Dracaena</i> spp. (García Morales et al. 2018; MAF 2002; MPI 2016).	Yes. <i>Pseudococcus floriger</i> is known to feed on <i>Dracaena</i> spp. (García Morales et al. 2018; von Ellenrieder & Watson 2016), which are present in Australia (APNI 2020). This species is known from Hawaii (García Morales et al. 2020), where climatic conditions are similar to parts of Australia. Therefore, <i>P. floriger</i> has the potential to establish and spread in Australia.	Yes. <i>Pseudococcus floriger</i> is a pest of <i>Dracaena</i> spp. which are commercial ornamentals in Australia (Dragon Trees Australia 2019). Mealybug damage includes leaf and fruit discolouration; leaf, flower and fruit dropping, reduction of fruit growth rate, distortion of leaves, new shoots and fruit, aborted plant shoots, development of cork tissue on fruit peel, contamination of fruit with mealybugs and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					honeydew, and reduction of plant vigour (DAWR 2019c; Franco, Zada & Mendel 2009). Therefore, <i>P. floriger</i> has the potential to cause negative economic consequences in Australia.	
<i>Pseudococcus jackbeardsleyi</i> (Gimpel & Miller 1996) [Pseudococcidae] Jack Beardsley mealybug	Cambodia, China, Colombia, India, Indonesia, Kiribati, Malaysia, Mexico, Panama, Papua New Guinea, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, USA and Vietnam (CABI 2020a; García Morales et al. 2020; Muniappan et al. 2009; Wang et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Pseudococcus jackbeardsleyi</i> is associated with <i>Anthurium</i> , <i>Dracaena</i> , <i>Cordyline</i> , <i>Dendrobium</i> , <i>Cattleya</i> and <i>Hibiscus</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department (AFFA 2002; Biosecurity Australia 2006d, 2008b; DAFF 2012a, 2013e; DAWR 2016e, b, 2018b, 2019c; Department of Agriculture 2019d). <i>Pseudococcus jackbeardsleyi</i> feeds on a wide variety of commercial fruit, including banana, tomato and hibiscus (CABI 2020a). The species is widely distributed in Asia and American continents (CABI 2020a; García Morales et al. 2018; Muniappan et al. 2009), and it is likely that similar climatic conditions occur in Australia. Therefore, <i>P. jackbeardsleyi</i> has the	Yes Previously assessed by the department (AFFA 2002; Biosecurity Australia 2006d, 2008b; DAFF 2012a, 2013e; DAWR 2016e, b, 2018b, 2019c; Department of Agriculture 2019d). <i>Pseudococcus jackbeardsleyi</i> is reported on many vegetable and ornamental crop species including banana, tomato, potato, pepper and hibiscus (DAWR 2018b; García Morales et al. 2018). Therefore, <i>P. jackbeardsleyi</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Pseudococcus landoi</i> (Balachowsky 1959) [Pseudococcidae] Lando mealybug	Colombia, Ecuador, Mexico and Panama (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudococcus landoi</i> is associated with cut flowers and foliage of orchids, <i>Anthurium</i> and <i>Dracaena</i> spp. (García Morales et al. 2020; Gill 2001; Gimpel & Miller 1996).	potential to establish and spread in Australia. Yes. Previously assessed by the department (DAWR 2019c). <i>Pseudococcus landoi</i> is polyphagous on plants from 25 genera in 17 families including <i>Philodendron</i> , <i>Yucca</i> , <i>Phaseolus</i> , <i>Persea</i> , <i>Cacao</i> , <i>Ficus</i> , <i>Musa</i> and <i>Coffea</i> spp. (García Morales et al. 2020) which are present in Australia (APNI 2020). The species is distributed across Mexico, Central America, South America and the Caribbean (García Morales et al. 2020), which are areas with similar climatic conditions to parts of Australia. Therefore, <i>P. landoi</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (DAWR 2019c). <i>Pseudococcus landoi</i> is polyphagous on several crops grown commercially in Australia including <i>Philodendron</i> , <i>Yucca</i> , beans, avocado, cacao, fig, banana, coffee and ginger (García Morales et al. 2018; Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). Mealybug damage includes leaf and fruit discolouration, leaf, flower and fruit dropping, reduction of fruit growth rate, distortion of leaves, new shoots and fruit, aborted plant shoots, development of cork tissue on fruit peel, contamination of fruit with mealybugs and honeydew, and reduction of plant vigour (DAWR 2019c; Franco, Zada & Mendel 2009). Therefore, <i>P. landoi</i> has the potential	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					to cause negative economic consequences in Australia.	
<i>Pseudococcus longispinus</i> (Targioni Tozzetti, 1867) Synonym: <i>Dactylopius longispinus</i> Targioni Tozzetti, 1867 [Pseudococcidae] Long tailed mealybug	Afghanistan, Argentina, Chile, China, Colombia, Egypt, Fiji, France, Greece, India, Italy, Indonesia, Iran, Israel, Japan, Kenya, Lebanon, Malawi, Malaysia, Mexico, Morocco, New Caledonia, New Zealand, Panama, Papua New Guinea, Peru, Portugal, Philippines, Republic of Korea, Singapore, South Africa, Spain, Sri Lanka, Taiwan, Tanzania, Thailand, UK, USA, Vanuatu, Vietnam, Zimbabwe (García Morales et al. 2020), Belgium, Kiribati, Madagascar, Mauritius and the Netherlands (CABI 2020a).	Present, Vic., NSW, SA, Qld, WA, ACT and Tas. (ABRS 2020; Baker & Huynh 2016; CSIRO 2017; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Pseudococcus longispinus</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. (Biosecurity Australia 2010c; DAFF 2013d; MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Pseudococcus maritimus</i> (Ehrhorn 1900) [Pseudococcidae] Grape mealybug	Argentina, Chile, Colombia, Indonesia, Mexico and USA, (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020), and Vic. (DEDJTR 2017).	<i>Pseudococcus maritimus</i> is associated with cut foliage of <i>Dracaena</i> (MAF 2002; MPI 2016), rhododendron and orchid species (García Morales et al. 2020).	Yes. Previously assessed by the department (AQIS 2000; Biosecurity Australia 2005b, 2010b, 2011a; DAWR 2016e, 2019b, c). <i>Pseudococcus maritimus</i> is currently distributed through North, Central	Yes. Previously assessed by the department (AQIS 2000; Biosecurity Australia 2005b, 2010b, 2011a; DAWR 2016e, 2019b, c). Mealybugs feed on sap, stressing their host plants and reducing yield of	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				and South America, Eastern Europe and South East Asia. The species is polyphagous with plant hosts in at least 44 families, including <i>Acer</i> , <i>Annona</i> , <i>Acacia</i> , <i>Trifolium</i> , <i>Grevillea</i> , <i>Malus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Rubus</i> , <i>Citrus</i> , <i>Solanum</i> and <i>Vitis</i> spp. (García et al. 2017). The wide host range and distribution of this pest suggest that it could establish and spread in Australia (DAWR 2019b).	commercial crops. Production of honeydew also promotes growth of sooty moulds, which reduces the marketability of fruit (CABI 2016; DAWR 2016e). This specie is identified as a high priority pest for the viticulture industry by Plant Health Australia, <i>Pseudococcus maritimus</i> is also a pest of pears and apricots (DAWR 2019c, b; García et al. 2017; Madsen & McNelly 1960). Therefore, <i>P. maritimus</i> has the potential to cause negative economic consequences in Australia.	
<i>Pseudococcus orchidicola</i> Takahashi 1939 [Pseudococcidae]	Fiji, Kiribati, Marshall Islands, Republic of Korea, Tonga, Vanuatu (García Morales et al. 2020) and India (Devasahayam 2000).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudococcus orchidicola</i> is associated with <i>Cordyline</i> (MPI 2016) and orchid species (García Morales et al. 2018; Swezey 1945).	Yes. Previously assessed by the department (DAWR 2019c). <i>Pseudococcus orchidicola</i> feeds on many host plants, including banana, black pepper, <i>Pandanus</i> , taro and orchids (DAWR 2019c; García Morales et al. 2020; Swezey 1945) which are present in Australia. <i>P. orchidicola</i> is distributed across several	Yes. Previously assessed by the department (DAWR 2019c). <i>Pseudococcus orchidicola</i> is highly polyphagous on several important economic crops that are grown in Australia including banana, bulbs, garlic, onion, ginger, potato, sweet potato, taro, yams and ornamentals such as orchids, <i>Monstera</i> ,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				countries of Oceania (García Morales et al. 2020), which have areas with similar climatic conditions to parts of Australia. Therefore, <i>P. orchidicola</i> has the potential to establish and spread in Australia.	<i>Cordyline</i> , <i>Dracaena</i> and <i>Heliconia</i> (García Morales et al. 2018; PaDIL 2020). Therefore, <i>P. orchidicola</i> has the potential to cause negative economic consequences in Australia.	
<i>Pseudococcus philippinus</i> Williams 2004 [Pseudococcidae]	China and Philippines (García Morales et al. 2020; Wang & Wu 2010).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudococcus philippinus</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2020).	Yes. Previously assessed by the department (DAWR 2019c). <i>Pseudococcus philippinus</i> feeds on a few host plants including mangosteen, <i>Lansium</i> and <i>Dracaena</i> spp. (García Morales et al. 2020), which are present in Australia. Therefore, <i>P. philippinus</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (DAWR 2019c). Mealybugs feed on sap, stressing their host plants and reducing yield of commercial crops. Production of honeydew also promotes growth of sooty moulds, which reduces the marketability of fruit (CABI 2016; DAWR 2016e). Therefore, <i>P. philippinus</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Pseudococcus viburni</i> (Signoret, 1875) [Pseudococcidae] Obscure mealybug	Afghanistan, Argentina, Belgium, Chile, China, Ecuador, France, Greece, Indonesia, Iran, Israel, Italy, Mexico, Morocco, the Netherlands, New Zealand, Panama, Peru,	Present, ACT, NSW, NT, Qld, SA, Tas., Vic. and WA (ABRS 2020; Baker & Huynh 2016; CSIRO 2017; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Pseudococcus viburni</i> is associated with <i>Dracaena</i> , <i>Helianthus</i> , <i>Dianthus</i> , <i>Ruscus</i> , <i>Rhododendron</i> , <i>Lilium</i> , <i>Tulipa</i> , <i>Hibiscus</i> , <i>Cattleya</i> and <i>Rosa</i> spp.	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Philippines, Portugal, South Africa, Spain, Sri Lanka, UK, USA, Zimbabwe (García Morales et al. 2020), Republic of Korea and Switzerland (CABI 2020a).		(García Morales et al. 2020).			
<i>Pseudoparlatoria parlatorioides</i> (Comstock 1883) [Diaspididae] False parlatoria scale	Argentina, Belgium, Colombia, France, India, Italy, Mexico, the Netherlands, New Zealand, Panama, Spain, Sri Lanka, Tanzania, UK, USA (de Jong et al. 2019; García Morales et al. 2018) and Japan (Watson 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pseudoparlatoria parlatorioides</i> is associated with foliage and stems of <i>Dianthus</i> , <i>Rosa</i> , <i>Gerbera</i> , <i>Hibiscus</i> , <i>Jasminum</i> , <i>Oncidium</i> , <i>Dracaena</i> , <i>Cattleya</i> and <i>Cymbidium</i> spp. (García Morales et al. 2018; Swezey 1945; Watson 2019).	Yes. <i>Pseudoparlatoria parlatorioides</i> is a highly polyphagous species that has been recorded from hosts belonging to 54 plant families, including <i>Begonia</i> , <i>Camellia</i> , <i>Carica</i> , <i>Cattleya</i> , <i>Cinnamomum</i> , <i>Cymbidium</i> , <i>Dianthus</i> , <i>Eugenia</i> , <i>Ficus</i> , <i>Hedera</i> , <i>Hibiscus</i> , <i>Jasminum</i> , <i>Magnolia</i> , <i>Musa</i> , <i>Myrciaria</i> , <i>Oncidium</i> , <i>Persea</i> , <i>Piper</i> , <i>Prunus</i> , and <i>Vanilla</i> (García Morales et al. 2018; Watson 2019). This scale has a wide host range and widespread geographic distribution (García Morales et al. 2018; Watson 2019) with similar climatic conditions to parts of Australia. Therefore, <i>P. parlatorioides</i> has the	Yes. <i>Pseudoparlatoria parlatorioides</i> is associated with banana, citrus, rose, avocado, breadfruit, <i>Camellia</i> , coconut, coffee, guava, <i>Hibiscus</i> , <i>Jasminum</i> , mango, <i>Magnolia</i> , olive, orchids, peach, pines and vanilla (García Morales et al. 2018; PaDIL 2020; Watson 2019), which are economically important or naturalised plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). <i>Pseudoparlatoria parlatorioides</i> has been identified as a pest of economic importance of several crops on cacao, <i>Acalypha</i> , palms and orchids in California (García Morales et al.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.	2020). Diaspid, armoured scale insects, feed by sucking sap from phloem or parenchyma from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>P. parlatorioides</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Pulvinaria floccifera</i> (Westwood 1870) [Coccidae]	Argentina, China, Egypt, France, Greece, India, Iran, Italy, Japan, Mexico, the Netherlands, New Zealand, Portugal, Saudi Arabia, South Africa, Republic of Korea, Spain, Switzerland, UK, USA and Vietnam (Danzig & Konstantinova 1990; de Jong et al. 2019; García Morales et al. 2018).	Present, NSW, Vic. and SA (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Pulvinaria floccifera</i> is associated with <i>Rosa</i> , <i>Dracaena</i> , <i>Anthurium</i> , <i>Chrysanthemum</i> , <i>Helianthus</i> , <i>Rhododendron</i> , <i>Magnolia</i> , <i>Hibiscus</i> , <i>Jasminum</i> and <i>Camellia</i> spp. (García Morales et al. 2020).	Yes. <i>Pulvinaria floccifera</i> is already present in parts of Australia suggesting suitable climatic conditions and host plants are available (ABRS 2020; García Morales et al. 2020). Therefore, <i>P. floccifera</i> has the potential to establish and spread in Western Australia.	Yes. <i>Pulvinaria floccifera</i> is polyphagous with more than 80 host plant species worldwide (Lagowska et al. 2017). The species is associated with blueberries, capsicum, citrus, figs, rose, chrysanthemum, sunflowers, jasmine, camellia, orchids, <i>Solanum</i> and <i>Prunus</i> spp. (García Morales et al. 2020). <i>Pulvinaria floccifera</i> is a serious pest of fruit trees and ornamentals in countries	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					with tropical and sub-tropical climates, and is reported as the most important pest of citrus and tea in orchards in the Middle East (Lagowska et al. 2017). Significant damage has been reported on citrus and tea from Turkey and Iran (Gentry 1965). Due to polyphagy, <i>P. floccifera</i> has the potential to damage native plant species and evergreen trees (Lagowska et al. 2017). Therefore, <i>P. floccifera</i> has the potential to cause negative economic and environmental consequences in Western Australia.	
<i>Pulvinaria psidii</i> Maskell, 1893 [Coccidae]	Afghanistan, Cambodia, China, Colombia, Egypt, Fiji, India, Indonesia, Israel, Japan, Kenya, Kiribati, Madagascar, Malawi, Malaysia, Marshall Islands, Mauritius, Mexico, Nepal, New Caledonia, New Zealand, Papua New Guinea, Philippines,	Present, ACT, NT, Qld, SA, NSW and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Pulvinaria psidii</i> is associated with cut foliage and branches of <i>Cordyline</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Singapore, South Africa, Sri Lanka, Taiwan, Tanzania, Thailand, Tonga, Uganda, UK, USA, Vanuatu, Zimbabwe (García Morales et al. 2020), Spain (CABI 2020a) and the Netherlands (de Jong et al. 2019).					
<i>Pulvinaria urbicola</i> Cockerell, 1893 [Coccidae] Urbicola soft scale	Colombia, Egypt, Fiji, India, Israel, Japan, Kiribati, Madagascar, Mauritius, Mexico, New Caledonia, Papua New Guinea, South Africa, Tanzania, Uganda, USA, Vanuatu and Zimbabwe (García Morales et al. 2020).	Present, Qld, NT, WA and NSW (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Pulvinaria urbicola</i> is associated with cut foliage and branches of <i>Cordyline</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No
<i>Remaudiereana inornata</i> (Walker, 1872) [Rhyparochromidae]	New Zealand, New Caledonia and Palau (Larivière & Larochelle 2004).	Present, Tas., NSW, WA, Qld and Vic. (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Saissetia coffeae</i> (Walker, 1852) [Coccidae] Coffee root mealybug,	Afghanistan, Argentina, China, Cambodia, Chile, Colombia, Egypt, France, Greece, India, Indonesia, Israel, Italy, Japan, Kenya, Fiji, Marshall Islands, Madagascar, Mexico, Peru, Panama, Mauritius, Morocco, New Caledonia,	Present, widespread (ABRS 2020; CSIRO 2017; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Saissetia coffeae</i> is associated with the cut flowers and foliage of <i>Cordyline</i> and <i>Dracaena</i> spp. (Biosecurity Australia 2010c; DAFF 2013d; MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	the Netherlands, New Zealand, Iran, Papua New Guinea, Philippines, Portugal, Republic of Korea, Saudi Arabia, South Africa, Sri Lanka, Spain, Switzerland, UK, Taiwan, Thailand, Tonga, USA, Uganda, Vanuatu, Vietnam, Zimbabwe (García Morales et al. 2020), Belgium, British Virgin Islands, Ecuador, Ethiopia, Kiribati, Lebanon, Malawi, Malaysia, Nepal, Pakistan, Singapore and Tanzania (CABI 2020a).					
<i>Saissetia oleae</i> subsp. <i>oleae</i> (Olivier, 1791) Synonym: <i>Saissetia oleae</i> [Coccidae] Black olive scale	Argentina, Belgium, Chile, China, Colombia, Egypt, Iran, France, Greece, India, Italy, Indonesia, Israel, Japan, Peru, Kenya, Madagascar, Malawi, Malaysia, Marshall Islands, Mauritius, Mexico, Morocco, the Netherlands, New Caledonia, New Zealand, Pakistan, Spain, Panama, Philippines, Portugal, Saudi Arabia, South Africa, Sri Lanka, Switzerland, Taiwan,	Present, widespread (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Saissetia oleae</i> is associated with cut foliage and branches of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Tanzania, Thailand, Uganda, UK, USA and Zimbabwe (García Morales et al. 2020), Cambodia, Ecuador, British Virgin Islands, Papua New Guinea, Fiji and Lebanon (CABI 2020a).					
<i>Scolypopa australis</i> (Walker, 1851) [Ricanidae] Passionvine hopper	Fiji and New Zealand (Bourgoin 2018).	Present, ACT, NSW, Qld, SA, Tas., WA and Vic. (ABRS 2020; Government of Western Australia 2020).	<i>Scolypopa australis</i> is associated with <i>Cordyline</i> spp. (Martin 2018e).	Assessment not required	Assessment not required	No
<i>Selenaspidus antsingyi</i> Mamet 1950 [Diaspididae]	Madagascar (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Selenaspidus antsingyi</i> is associated with <i>Dracaena</i> spp. (MPI 2016).	Yes. <i>Selenaspidus antsingyi</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2020) which are present in Australia (APNI 2020). The species is found in Madagascar, where climatic conditions are similar to parts of Australia. Therefore, <i>S. antsingyi</i> has the potential to establish and spread in Australia.	Yes. <i>Selenaspidus antsingyi</i> is associated with <i>Dracaena</i> spp., which are commercial ornamental and naturalised plants in Australia (APNI 2020; Dragon Trees Australia 2019; García Morales et al. 2020). <i>Selenaspidus</i> species suck sap, resulting in chlorosis and sometimes death of plant tissue in the area of feeding (Watson 2019). Therefore, <i>S. antsingyi</i> has the potential to cause negative economic	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Selenaspidus articulatus</i> (Morgan, 1889) Misspelling: <i>Selenaspidus articulates</i> [Diaspididae] West Indian red scale, rufous scale	Kenya (letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), China, Colombia, Ecuador, Fiji, India, Japan, Madagascar, Mauritius, Mexico, Panama, Peru, Philippines, South Africa, Sri Lanka, Taiwan, Tanzania, Uganda, UK, USA and Zimbabwe (CABI 2020a; García Morales et al. 2018) and Morocco (Watson 2018).	Not present, <i>Selenaspidus articulatus</i> is listed as present in Mamet (1958), however is considered absent due to the unreliability of records. Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Selenaspidus articulatus</i> is associated with <i>Rosa</i> , <i>Dracaena</i> and <i>Cordyline</i> spp. (García Morales et al. 2020; MPI 2016; PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2008b; DAFF 2013a). <i>Selenaspidus articulatus</i> is already present in parts of Australia suggesting suitable climatic conditions and host plants are available (ABRS 2020; García Morales et al. 2020). Therefore <i>S. articulatus</i> has the potential to establish and spread in Western Australia if introduced (DAFF 2013e).	consequences in Australia. Yes. Previously assessed by the department (Biosecurity Australia 2008b; DAFF 2013a). <i>Selenaspidus articulatus</i> is known as a serious plant pest in many parts of the world (DAFF 2013e; Miller & Davidson 1990). The species is an important pest of agricultural crops including citrus, coffee and olives (Biosecurity Australia 2008b; Watson 2005). Therefore, <i>S. articulatus</i> has the potential to cause negative economic consequences in Western Australia.	Yes
<i>Selenaspidus littoralis</i> Mamet 1954 [Diaspididae]	Madagascar (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Selenaspidus littoralis</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2018; MPI 2016).	Yes. <i>Selenaspidus littoralis</i> is associated with <i>Dracaena</i> spp. (García Morales et al. 2020) which are present in Australia (APNI 2020). The scale is found in Madagascar, where climatic conditions are similar to parts of Australia. Therefore,	Yes. <i>Selenaspidus littoralis</i> is associated with <i>Dracaena</i> spp. which are commercial ornamental and naturalized plants in Australia (APNI 2020; Dragon Trees Australia 2019; García Morales et al. 2020). <i>Selenaspidus</i> species suck sap,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				<i>S. littoralis</i> has the potential to establish and spread in Australia.	resulting in chlorosis and sometimes death of plant tissue in the area of penetration (Watson 2019). Therefore, <i>S. littoralis</i> has the potential to cause negative economic consequences in Australia.	
<i>Sophonia orientalis</i> (Matsumura, 1912) Synonym: <i>Sophonia rufofascia</i> Kuoh and Kuoh, 1983 [Cicadellidae]	China, Japan, Taiwan (Dmitriev 2013; Li & Chen 2005), India, Pakistan, Portugal, Singapore, Spain and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Sophonia orientalis</i> is associated with the cut flowers and foliage of <i>Cordyline</i> spp. (Alyokhin, Yang & Messing 2001; CABI 2016).	Yes. <i>Sophonia orientalis</i> is polyphagous and known hosts include over 300 plant species within 83 families, including <i>Cordyline</i> , <i>Coffea</i> , <i>Mangifera</i> , <i>Citrus</i> , <i>macadamia</i> , <i>Musa</i> and <i>Citrus</i> spp. (Aguin-Pombo, Aguiar & Kuznetsova 2007). The species is distributed throughout Asia, Europe, the USA, and has been recently introduced into Hawaii (CABI 2020a; Dmitriev 2013; Wilson et al. 2011), which are all areas with similar climatic conditions to Australia. Therefore, <i>S. orientalis</i> has the potential to establish and spread in Australia.	Yes. <i>Sophonia orientalis</i> is considered a major agricultural pest in Hawaii, known to feed on coffee, banana, citrus, mango and macadamia nuts (Aguin-Pombo, Aguiar & Kuznetsova 2007), which are also economically important plants in Australia (Horticulture Innovation Australia 2019c). Feeding behaviour and oviposition can result in the death of whole plants. Main symptoms caused are chlorosis, vein browning, and shortening of stem length. Oviposition into mid-veins damages plant vascular bundles, resulting in symptoms	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					similar to phytopathogen infections (Aguin-Pombo, Aguiar & Kuznetsova 2007). Additionally, due to extreme polyphagy, <i>S. orientalis</i> is also considered as a threat to endemic Hawaiian flora (Aguin-Pombo, Aguiar & Kuznetsova 2007). Therefore, <i>S. orientalis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Spanioneura fonscolombii</i> Foerster, 1848 Misspelling: <i>Spanioneura fonscolombeii</i> Foerster, 1848 [Psyllidae] Jumping plant-lice	Belgium, France, Italy, Spain, Switzerland, UK and USA (Ouvrard 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Spanioneura fonscolombii</i> is monophagous; known hosts include <i>Buxus</i> spp., which are present in Australia (APNI 2020; Manci 2018; O'Connor & Malumphy 2011; Ouvrard 2018). <i>S. fonscolombii</i> is distributed throughout western Europe and USA (Manci 2018), where climatic conditions are similar to parts of Australia. Therefore, <i>S. fonscolombii</i> has the potential to establish and spread in Australia.	Yes. <i>Spanioneura fonscolombii</i> is known to attack <i>Buxus</i> spp., (Manci 2018; O'Connor & Malumphy 2011), which are grown commercially in Australia (Plantmark 2019). <i>Spanioneura fonscolombii</i> sucks on plant sap and causes damage similar to <i>Psylla buxi</i> (Gertsson 2015), which produces galls or distort leaves (Hodkinson 2009; O'Connor & Malumphy 2011). Therefore, <i>S. fonscolombii</i> has the potential to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					negative economic consequences in Australia.	
<i>Symeria pyriformis</i> (Maskell, 1879) [Diaspididae] Pukatea pear-shaped scale	New Zealand and UK (García Morales et al. 2020).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Symeria pyriformis</i> is associated with <i>Rosa</i> and <i>Cordyline</i> spp. (García Morales et al. 2020).	Yes. <i>Symeria pyriformis</i> is polyphagous and known to attack 46 genera within 31 families including <i>Cordyline</i> , <i>Rosa</i> , <i>Pittosporum</i> , <i>Carex</i> and <i>Pinus</i> spp. (García Morales et al. 2020) which are present in Australia (APNI 2020). This scale is distributed throughout New Zealand and the UK (García Morales et al. 2020), where climatic conditions are similar to parts of Australia. Therefore, <i>S. pyriformis</i> has the potential to establish and spread in Australia.	Yes. <i>Symeria pyriformis</i> is a pest of roses and <i>Cordyline</i> spp. (García Morales et al. 2020), which are grown commercially, in Australia (Horticulture Innovation Australia 2019c). Diaspids, armoured scale insects, feed by sucking sap from phloem or parenchyma from almost all parts of the host plant, which can lead to deformities such as chlorotic spot, pits and galls (Morse & Normark 2006; Varshney, Jadhav & Sharma 2015). Therefore, <i>S. pyriformis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Taylorilygus apicalis</i> (Fieber, 1861) Synonym: <i>Taylorilygus pallidulus</i> (Blanchard 1852)	Chile, Colombia, Ecuador, Egypt, France, Israel, Italy, Madagascar, Mexico, New Zealand, Peru, Saudi Arabia, South Africa, Republic of Korea, Spain, Sri Lanka, Switzerland,	Present, Qld, NSW, SA and Vic. (ABRS 2020; CSIRO 2017; Plant Health Australia 2020) (Victorian Department of Jobs, Precincts and	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Taylorilygus apicalis</i> is already present in parts of Australia, suggesting suitable climatic conditions and host plants are available in Australia. Therefore,	Yes. <i>Taylorilygus apicalis</i> is known to feed on host plants in the Asteraceae family and sorghum (ALA 2019; Kruger, van den Berg & Du Plessis 2008). Miridae bugs feed on	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Miridae] Brokenback bug	USA (Schuh 2013), Argentina, Ethiopia, India, Iran, Japan, Morocco, Portugal (CABI 2020a), Greece and Spain (de Jong et al. 2019).	Regions 2019, pers. comm.). Declared pest, prohibited entry into WA (Government of Western Australia 2020).		<i>T. apicalis</i> has the potential to establish and spread in Western Australia.	buds, flowers, developing fruits and seeds, and young shoots, which causes malformation at an early stage of growth of plants. This behaviour makes them more serious pests than aphids and psyllids, because even at low population levels mirids can cause large losses in production (Eyles 1999). Therefore, <i>T. apicalis</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Thaumastocoris peregrinus</i> Carpintero and Dellapé, 2006 [Thaumastocoridae] Bronze bug	Israel, Tanzania, Italy, Mexico, Portugal, Kenya, South Africa, Zimbabwe, Malawi, Portugal. Spain, Chile and New Zealand (CABI 2020a).	Present, native species (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Thaumastocoris peregrinus</i> is already present in parts of Australia, suggesting suitable climatic conditions and host plants are available in Australia. Therefore, <i>T. peregrinus</i> has the potential to establish and spread in Western Australia.	Yes. <i>Thaumastocoris peregrinus</i> is a serious pest of eucalyptus in the Southern hemisphere (BiCEP 2020; Laudonia & Sasso 2012; Soliman et al. 2012). Currently <i>T. peregrinus</i> has been recorded on over 40 species of <i>Corymbia</i> and <i>Eucalyptus</i> , many of which are endemic and commercially important plants to Australian (APNI 2020). Feeding of the insect inhibits	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					photosynthetic capacity leading to stunted growth and in extreme cases of infestation death of host trees (Saavedra, Withers & Holwell 2015). Therefore, <i>T. peregrinus</i> has the potential to cause negative economic consequences in Western Australia.	
<i>Trialeurodes vaporariorum</i> (Westwood, 1856) [Aleyrodidae] Glasshouse whitefly	Kenya (Letter from KEPHIS on 29/01/2018), Ecuador (letter from Agrocalidad on 15/02/2018), Ethiopia (letter from MANR on 06/03/2018), Argentina, Belgium, Chile, Colombia, Ecuador, France, India, Iran, Italy, Mexico, Morocco, New Zealand, Papua New Guinea, Peru, South Africa, Spain, Sri Lanka, Switzerland, USA, UK, Zimbabwe (Ouvrard & Martin 2018), China, Greece, Indonesia, Israel, Japan, the Netherlands, Republic of Korea, Panama, Philippines, Portugal and Singapore (CABI 2020a; EPPO 2020).	Present, widespread (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	<i>Trialeurodes vaporariorum</i> is associated with cut foliage and branches of <i>Dracaena</i> spp. (MPI 2016). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Veterna natalensis</i> (Stål, 1854) [Pentatomidae]	South Africa (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Veterna natalensis</i> is recorded on <i>Gossypium</i> spp. (Rider 2015), which are present in Australia (APNI 2020). <i>Veterna natalensis</i> is distributed throughout South Africa (GBIF Secretariat 2017), therefore, it is likely that similar climatic conditions exist in parts of Australia. Therefore, <i>V. natalensis</i> has the potential to establish and spread in Western Australia.	Yes. <i>Veterna natalensis</i> is known to feed on <i>Gossypium</i> spp. (cotton) (Rider 2015), which are grown commercially in Australia (Cotton Australia 2019). Most pentatomids are phytophagous and feed on the plant foliage and stems or immature fruits and seeds, which causes wilting and abortion of fruit and seeds (ABRS 2020). Therefore, <i>V. natalensis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Veterna sanguineirostris</i> (Thunberg, 1822) [Pentatomidae]	South Africa (Leston 1953).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Veterna sanguineirostris</i> is recorded on <i>Gossypium</i> spp. (Rider 2015) which is present in Australia (APNI 2020). The species is distributed in South Africa (Leston 1953), a region where climatic conditions are similar to Australia. Therefore, <i>V. sanguineirostris</i> has the	Yes. <i>Veterna</i> species are known to attack cotton (Rider 2015), which is an economically important plant in Australia (Cotton Australia 2019). Most pentatomids are phytophagous and feed on the plant foliage and stems or immature fruits and seeds, which causes wilting and abortion of fruit and seeds (ABRS	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.	2020). Therefore, <i>V. sanguineirostris</i> has the potential to cause negative economic consequences in Australia.	
<i>Xylocoris flavipes</i> (Reuter, 1875) Synonym: <i>Xylocoris (Arrostelus) flavipes</i> (Reuter, 1875) [Anthocoridae]	India, Indonesia, Thailand, Egypt and USA (CABI 2019).	Present, WA, NT and NSW (Plant Health Australia 2019).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
Hymenoptera (ants, wasps and bees)						
<i>Allantus cinctus</i> (Linnaeus, 1758) [Tenthredinidae] Banded rose sawfly	UK (Encyclopedia of Life 2018; NBN 2018), USA, the Netherlands and France (GBIF 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Allantus cinctus</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Allantus cinctus</i> is polyphagous and a pest of <i>Rosa</i> and <i>Fragaria</i> species (Smith 1979), which are present throughout Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>Allantus cinctus</i> is distributed throughout Europe and USA (GBIF Secretariat 2018), where climatic conditions are similar to parts of Australia. Therefore, <i>A. cinctus</i> has the potential to establish and spread in Australia.	Yes. <i>Allantus cinctus</i> feeds on <i>Rosa</i> and <i>Fragaria</i> species (Smith 1979), which are naturalised or economically important plants in Australia (APNI 2019). Adult species belonging to the family Tenthredinidae feed on nectar and plant juice; larvae feed on plant tissue including leaves, stems, and fruits (Tuzun & Sakaltaş 2009). <i>Allantus cinctus</i> is a known pest of strawberry in Latvia (Petrova, Jankevica &	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					Samsone 2013). Larvae of this species also known to skeletonize rose leaves (Stroom, Fetzner & Krischik 1997). Therefore, <i>A. cinctus</i> has the potential to cause negative economic consequences in Australia.	
<i>Anoplolepis gracilipes</i> (Smith, 1857) [Formicidae] Yellow crazy ant	Fiji, Philippines, Mauritius, Thailand, USA, Malaysia (GBIF Secretariat 2017), South Africa, India, Indonesia, Papua New Guinea, Sri Lanka, Madagascar, New Caledonia, Vanuatu, Ecuador (PaDIL 2018), Tanzania, China, Japan, Chile, New Zealand, Mexico, Singapore, Cambodia, Tonga and Taiwan (Guénard & Dunn 2012; Wetterer 2005) and Vietnam (Anh, Ogata & Hosoiishi 2010; Dac & Phuong 2016; Eastwood, Kitching & Manh 2005).	Present, NT and Qld (Plant Health Australia 2020), Christmas Island (ABRS 2020), and NSW (QDAF 2016). Declared pest, prohibited entry into WA (Government of Western Australia 2020). <i>Anoplolepis gracilipes</i> is subject to ongoing eradication in Qld (Department of the Environment and Energy & DAWR 2018) and NSW (NSW DPI 2019).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). Climate-modelling has predicted that coastal parts of Queensland provide suitable climatic conditions for the distribution and spread of <i>A. gracilipes</i> , which is consistent with detections of yellow crazy ants along the Queensland coast (QDAF 2016). Food sources for invasive ants such as <i>A. gracilipes</i> include dead animals, carbohydrate-rich plants and insect	Yes. The farming of scale insects by yellow crazy ants is known to cause an increase in sooty mould infections on plants, and can result in tree mortality (O'Dowd, Green & Lake 1999). The introduction of <i>A. gracilipes</i> to Christmas Island has also been attributed to reduced native species such as red crabs, which has drastically changed the local rainforest ecosystem (Crean 2011; QDAF 2016). <i>Anoplolepis gracilipes</i> also has negative human health impacts as it can spray formic acid which causes burning and irritates the skin and eyes (QDAF	Yes (WA, Qld and NSW)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				exudates, such as honey dew (Holway et al. 2002), which are present in the Australian environment. <i>Anoplolepis gracilipes</i> has also been assessed as having the potential to establish as a significant pest in Queensland (QDAF 2016). Therefore, <i>A. gracilipes</i> has the potential to establish and spread in Australia.	2016). In addition eradication costs are high, for example, the Australian Government spending \$4 million between 2011-12 and 2014-15 to control <i>A. gracilipes</i> on Christmas Island (Crean 2011). Therefore, <i>A. gracilipes</i> has the potential to cause economic and environmental consequences in Australia.	
<i>Aphelinus asychis</i> Walker, 1839 [Aphelinidae]	Argentina, Chile, China, Colombia, Egypt, France, Greece, India, Iran, Israel, Italy, Japan, Mexico, Morocco, Nepal, Pakistan, the Netherlands, Portugal, South Africa and Spain (GBIF Secretariat 2017).	Present, WA, NSW and Vic. (ABRS 2020; Government of Western Australia 2020; Waterhouse & Sands 2001).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Aphidius colemani</i> Viereck, 1912 Synonym: <i>Aphidius platensis</i> Brèthes, 1913, <i>Aphidius transcaspicus</i> (Telenga) [Braconidae]	Kenya, Vietnam, Argentina, Chile, China, Colombia, Egypt, France, Greece, India, Iran, Israel, Italy, Japan, Kenya, Lebanon, Morocco, Madagascar, New Caledonia, Pakistan, Peru, Portugal, South Africa,	Present, NSW, SA, WA, ACT and Vic. (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020; Waterhouse & Sands 2001).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Spain, Tonga and the UK (GBIF Secretariat 2017). <i>Aphidius colemani</i> is used as a BCA by Kenya (letter from KEPHIS on 29/01/2018) and Vietnam (letter from PPD on 28/02/2018).					
<i>Aphidius ervi</i> Haliday, 1834 [Braconidae]	Afghanistan, Argentina, Chile Belgium, China, France, Iran, Greece, India, Israel, Italy, Japan, Republic of Korea, UK, Lebanon, Mexico, Morocco, the Netherlands, New Zealand, Pakistan, Portugal, Saudi Arabia, Spain and Switzerland (GBIF Secretariat 2017).	Present (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020; Waterhouse & Sands 2001).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Apis cerana</i> Fabricius, 1793 [Apidae] Asian honey bee	Papua New Guinea, Indonesia, China, Thailand, Malaysia, Japan, Sri Lanka, Afghanistan, Philippines and India (Egelie et al. 2015; Koetz 2013).	Present, Qld (ABRS 2020; Plant Health Australia 2020) where it is currently under official control (Department of Agriculture 2018). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Apis cerana</i> is a pollinator of a variety of Australian native and exotic flora (Department of the Environment and Energy 2019). <i>Apis cerana</i> has successfully established in subtropical and tropical Queensland (Egelie et al. 2015). This indicates that <i>A. cerana</i> has the potential to invade and establish	Yes. <i>Apis cerana</i> feeds on pollen and nectar only (Egelie et al. 2015). However, the introduction of this species has the potential to create competition with native fauna for floral resources and nesting sites (Carr 2011). <i>Apis cerana</i> is also a natural host of a number of exotic bee pests and	No. Not a plant pest. Contaminating pest (vector of animal disease)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				throughout the tropical and coastal regions of Australia. Therefore, <i>A. cerana</i> has the potential to establish and spread in Australia.	diseases, including Varroa mite (<i>Varroa destructor</i> and <i>V. jacobsoni</i>) (Egelie et al. 2015), which are not present in Australia (ABRS 2020). If <i>Varroa</i> mite were to become established in Australia, healthy populations of honey bees and the pollination services they provide, could be reduced by 90 - 100% (Department of Agriculture 2019a). As a result, higher costs could be faced by producers of crops such as almonds, apples and cherries that rely on pollination from bees (Department of Agriculture 2019a). Therefore, <i>A. cerana</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Apis dorsata</i> Fabricius, 1793 [Apidae]	Afghanistan, China, India, Indonesia, Japan, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Singapore	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Apis dorsata</i> feeds on pollen and nectar only (Jack, Lucky & Ellis 2019). <i>Apis dorsata</i> uses several hundred plant species as	Yes. <i>Apis dorsata</i> feeds on pollen and nectar only (Jack, Lucky & Ellis 2019). However, the introduction of this	No. Not a plant pest. Contaminating pest (vector of animal disease)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Asian giant honeybee, giant honey bee	and Republic of Korea (Discover Life 2018).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).		sources of pollen and nectar (Raghunandan & Basavarajappa 2014), such as species of <i>Allium</i> and <i>Ranunculus</i> which are present throughout Australia (APNI 2020; Sajjad, Ali & Saeed 2017). The current distribution of <i>A. dorsata</i> is throughout southern Asia (Jack, Lucky & Ellis 2019), which has similar climatic conditions to parts of Australia. <i>Apis dorsata</i> is already present in Queensland (ABRS 2020; Plant Health Australia 2020), indicating that it is likely to find suitable host plants on which to grow and reproduce. Therefore, <i>A. dorsata</i> has the potential to establish and spread in Australia.	species has the potential to create competition with native fauna for floral resources and nesting sites (Carr 2011). <i>Apis dorsata</i> is also a natural host of a number of exotic bee pests and diseases, including <i>Varroa</i> mite (<i>Varroa jacobsoni</i>) (Egelie et al. 2015), which is not present in Australia (ABRS 2020). If <i>Varroa</i> mite were to become established in Australia, healthy populations of honey bees and the pollination services they provide, could be reduced by 90 - 100% (Department of Agriculture 2019a). As a result, higher costs could be faced by producers of crops such as almonds, apples and cherries that rely on pollination from bees (Department of Agriculture 2019a). Therefore, <i>A. dorsata</i> has the potential to cause negative economic and environmental	

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Apis mellifera</i> Linnaeus, 1758 [Apidae] Western honey bee, European honey bee	Widespread throughout North America, Central America, South America, Africa, Asia, Europe and Oceania (Discover Life 2018).	Present (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Not applicable to <i>Apis mellifera</i> , which is already widely distributed in Australia. However, <i>A. mellifera</i> is a natural host of a number of exotic bee pests and diseases, including <i>Varroa</i> mite (<i>Varroa destructor</i> and <i>V. jacobsoni</i>) (Egelie et al. 2015), which are not present in Australia (ABRS 2020).	consequences in Australia.	No. Not a plant pest. Contaminating pest (vector of animal disease)
					Yes. <i>Apis mellifera</i> is a natural host of a number of exotic bee pests and diseases, including <i>Varroa</i> mite (<i>Varroa destructor</i> and <i>V. jacobsoni</i>) (Egelie et al. 2015), which are not present in Australia (ABRS 2020). If <i>Varroa</i> mite were to become established in Australia, healthy populations of honey bees and the pollination services they provide, could be reduced by 90 - 100% (Department of Agriculture 2019a). As a result, higher costs could be faced by producers of crops such as almonds, apples and cherries that rely on pollination from bees (Department of Agriculture 2019a). Therefore, <i>A. mellifera</i> that hosts exotic bee pests and diseases has the potential to cause negative economic	

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Australia.	
<i>Arge ochropus</i> (Gmelin, 1790) [Argidae] Rose sawfly	France, Greece, Italy, UK (Discover Life 2018), Iran (Sheykhnejad et al. 2014) and the Netherlands (GBIF 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Arge ochropus</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Arge ochropus</i> is associated with <i>Rosa</i> spp. and <i>Berberis vulgaris</i> (barberries) (PHA 2016a). It is distributed throughout Europe and the Middle East (Özbek & Çalmaşur 2005), which has similar climatic conditions to parts of Australia. <i>Arge ochropus</i> is found on species of <i>Rosa</i> (Özbek & Çalmaşur 2005; Sheykhnejad et al. 2014), which is present throughout Australia (PlantNet 2019). Therefore, <i>A. ochropus</i> has the potential to establish and spread in Australia.	Yes. In Iran, <i>Arge ochropus</i> is known as a major pest of wild and cultivated <i>Rosa</i> spp. (Sheykhnejad et al. 2014) and barberries (PHA 2016a), which are naturalised or economically important plants in Australia (APNI 2020; Flowers Australia 2019). Heavy infestations of <i>A. ochropus</i> lead to defoliation of host plants (Sheykhnejad et al. 2014). Therefore, <i>A. ochropus</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Arge xanthogaster</i> (Cameron 1876) [Argidae]	Asia (Wei, Nie & Taeger 2006), including India (Firake et al. 2013) and China (Wei, Nie & Taeger 2006; Yan, Wei & He 2009) .	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Arge xanthogaster</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Arge xanthogaster</i> adults collect pollen from a number of host plants, including various <i>Rosa</i> spp. (Firake et al. 2013), which are present throughout Australia (APNI 2020). This species is distributed throughout Asia (Wei, Nie & Taeger 2006), which has similar	Yes. In India, <i>Arge xanthogaster</i> is known as a major pest of wild and cultivated <i>Rosa</i> spp. (Firake et al. 2013), which are naturalised or economically important plants in Australia (Flowers Australia 2019). Infestations of <i>A. xanthogaster</i> often	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				climatic conditions to parts of Australia. Therefore, <i>A. xanthogaster</i> has the potential to establish and spread in Australia.	results in complete defoliation of roses through feeding of larvae (Firake et al. 2013). Therefore, <i>A. xanthogaster</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Cardiocondyla emeryi</i> (Forel, 1881) [Formicidae] Emery's sneaking ant	Madagascar, USA, South Africa, Mauritius, Egypt, Zimbabwe, Tanzania, Uganda, Spain, Kenya, Morocco, Ethiopia, Israel, India, Japan, Papua New Guinea, Saudi Arabia, Sri Lanka, Nepal, United Arab Emirates, Philippines, Indonesia, Thailand, Switzerland, Italy, France, Pitcairn Island, Vanuatu, Fiji, Tonga, New Caledonia, British Virgin Islands, Ecuador and Colombia (Wetterer 2012).	Present, NSW (ABRS 2020; AntWeb 2019).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Cephalonomia waterstoni</i> (Gahan, 1931) Misspelling: <i>Cephalonomia watersoni</i>	USA (CABI 2020a; GBIF Secretariat 2017), Italy (Amante et al. 2017), Spain (Castañé & Riudavets 2015), Kenya, Indonesia and Portugal	Present (ABRS 2020; Gates 1995; Hagstrum & Subramanyam 2016).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Bethylidae]	(Hagstrum & Subramanyam 2016).					
<i>Cladius difformis</i> (Panzer, 1799) Panzer, 1799 [Tenthredinidae] Bristly rose slug	Mexico, USA (Discover Life 2018), Italy, Spain, Portugal and Switzerland (GBIF 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Cladius difformis</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Cladius difformis</i> adults feeds on pollen of <i>Fragaria</i> , <i>Filipendula</i> and <i>Rosa</i> (Davis 1978), which are present throughout Australia (APNI 2020). <i>Cladius difformis</i> is distributed throughout North America and Europe (Price, Roininen & Ohgushi 2005), which has similar climatic conditions to parts of Australia. Therefore, <i>C. difformis</i> has the potential to establish and spread in Australia.	Yes. The larvae of the Tenthredinidae family feed either externally on leaves, or internally such as in buds, flowers, fruits, leaves, stems, or various galls (Nyman et al. 2006). <i>Cladius difformis</i> larvae damage rose leaves by chewing away a layer of the leaves except for the veins (Stroom, Fetzner & Krischik 1997). Therefore, <i>C. difformis</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Coccidoxenoides perminutus</i> Girault, 1915 [Encyrtidae]	The Netherlands, Kenya, Israel, Italy and UK (CABI 2020b). <i>Coccidoxenoides perminutus</i> is used as a BCA by the Netherlands and Kenya (letter from KEPHIS on 29/01/2018).	Present, Qld (ABRS 2020; CABI 2020a).	Australia has been notified that species is on this pathway as a BCA (letter from KEPHIS on 29/01/2018).	Assessment not required	Assessment not required	No
<i>Cotesia glomerata</i> (Linnaeus, 1758) [Braconidae]	Spain (de Jong et al. 2019), USA, New Zealand, France, Portugal, Republic of Korea, Japan,	Present, Tas., Vic., WA, SA, NSW and Qld (ABRS 2020; CABI 2020a; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	China, India, Israel, Nepal, Pakistan, Philippines, Taiwan, Chile, Switzerland, UK, Papua New Guinea (CABI 2020a) and the Netherlands (Bleeker 2005).		consignments (unpublished).			
<i>Diaeretiella rapae</i> (McIntosh, 1855) [Braconidae]	Afghanistan, Argentina, Belgium, Chile, China, Egypt, France, Greece, India, Iran, Israel, Italy, Japan, Kenya, Lebanon, Mexico, Morocco, the Netherlands, New Zealand, Pakistan, Peru, Poland, Saudi Arabia, South Africa, Spain, Sri Lanka and UK (GBIF Secretariat 2017).	Present, SA and WA (ABRS 2020; CABI 2020a; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Diglyphus begini</i> (Ashmead, 1904) [Eulophidae]	Iran, Mexico, USA and Colombia (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Diglyphus begini</i> has been recorded parasitising several species of leaf mining flies in the family Agromyzidae which are present in Australia (Capinera 2017b). The species is present in USA, Mexico and Colombia (CABI 2020a), regions with similar climatic conditions to Australia. Therefore, <i>D. begini</i> has	Yes. <i>Diglyphus begini</i> is a parasitoid wasp which parasitises several species of leaf mining flies in the family Agromyzidae (Capinera 2017b). It is not considered a plant pest, however it is regarded as a predator of leaf miners, therefore <i>D. begini</i> has the potential to cause negative environmental	No. Not a plant pest. Contaminating pest (parasitoid)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				the potential to establish and spread in Australia.	consequences in Australia.	
<i>Diglyphus isaea</i> (Walker, 1838) [Eulophidae]	Kenya, Ecuador, France, Italy, Japan, the Netherlands, New Zealand, Spain, UK (GBIF Secretariat 2017), Belgium, China, India, Israel and USA (CABI 2020a). <i>Diglyphus isaea</i> is used as a BCA by Kenya (Letter from KEPHIS on 29/01/2018) and Ecuador (letter from Agrocalidad on 15/02/2018).	Present (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Diplolepis rosae</i> (Linnaeus, 1758) [Cynipidae] Rose bedeguar gall wasp	Greece, Italy, Spain, UK, USA (Discover Life 2018), France (GBIF Secretariat 2017), North Africa, North America, Western, Central and Southern Europe, Turkey, Western Asia and Central Asia (Urban 2018)	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Diplolepis rosae</i> is associated with <i>Rosa</i> spp. (DEEDI 2019; PHA 2016a; Stille 1984; Todorov et al. 2012).	Yes. <i>Diplolepis rosae</i> is a parthenogenetic gall-forming wasp which does not require fertilisation of eggs and utilises over 20 species of <i>Rosa</i> (Stille 1984; Todorov et al. 2012), which are present throughout Australia, as plant hosts (APNI 2020). <i>Diplolepis rosae</i> is distributed throughout Europe (Discover Life 2018; Urban 2018), which has similar climatic	Yes. <i>Diplolepis rosae</i> damages <i>Rosa</i> spp. (Todorov et al. 2012), which are naturalised or economically important plants in Australia (APNI 2020). <i>D. rosae</i> is a common pest in Turkey (Mete & Mergen 2016) and has caused heavy economic losses in China (Guo et al. 2013). <i>Diplolepis rosae</i> is known to form large, complex and multi-chambered	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				conditions to parts of Australia. Therefore, <i>D. rosae</i> has the potential to establish and spread in Australia.	galls on foliage and leaf buds of host plants (Mete & Mergen 2016; Stille 1984). Therefore, <i>D. rosae</i> has the potential to cause negative economic consequences in Australia.	
<i>Encarsia formosa</i> Gahan, 1924 [Aphelinidae]	Kenya, Ecuador, Ethiopia, Fiji, New Zealand, South Africa, Tonga, USA (GBIF Secretariat 2017), China, Egypt, Greece, Japan, the Netherlands, Spain and Thailand (Discover Life 2018). <i>Encarsia formosa</i> is used as a BCA by the Netherlands, Kenya letter from KEPHIS on 29/01/2018), Ecuador (letter from Agrocalidad on 15/02/2018) and Ethiopia (letter from MANR on 06/03/2018).	Present (ABRS 2020; Plant Health Australia 2020).	Australia has been notified that species is on this pathway as a BCA (letter from KEPHIS on 29/01/2018; letter from Agrocalidad on 15/02/2018; and letter from MANR on 06/03/2018).	Assessment not required	Assessment not required	No
<i>Endelomyia aethiops</i> (Fabricius 1781) [Tenthredinidae]	Belgium, France, Italy, Switzerland, the Netherlands, UK and USA (de Jong et al. 2019; Discover Life 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Endelomyia aethiops</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Endelomyia aethiops</i> is phytophagous and known hosts include various cultivated and wild <i>Rosa</i> spp. (PHA 2016a; Sponable & Pellitteri 2008), which are present throughout	Yes. <i>Endelomyia aethiops</i> feeds on roses (PHA 2016a; Sponable & Pellitteri 2008), which are naturalised or economically important plants in Australia (APNI 2020). The larvae of	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Australia (APNI 2020). <i>Endelomyia aethiops</i> is distributed throughout Europe and USA (Discover Life 2018), which has similar climatic conditions to parts of Australia. Therefore, <i>E. aethiops</i> has the potential to establish and spread in Australia.	<i>E. aethiops</i> skeletonise rose leaves through feeding (Stroom, Fetzter & Krischik 1997), and are a common pest of <i>Rosa</i> spp. in USA (Barrows & Smith 2014). Therefore, <i>E. aethiops</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Eretmocerus eremicus</i> Rose & Zolnerowich, 1997 [Aphelinidae]	Kenya, Ecuador, Ethiopia, USA (Discover Life 2018), Belgium, Egypt, Italy, Morocco, Spain, United Arab Emirates (ITIS 2018a) and Japan (Mochizuki 2010). <i>Eretmocerus eremicus</i> is used as a BCA by Kenya (letter from KEPHIS on 29/01/2018), Ecuador (letter from Agrocalidad on 15/02/2018) and Ethiopia (letter from MANR on 06/03/2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Australia has been notified that species is on this pathway as a BCA (letter from KEPHIS on 29/01/2018; letter from Agrocalidad on 15/02/2018; letter from MANR on 06/03/2018).	Yes. <i>Eretmocerus eremicus</i> is a whitefly parasitoid (Collier & Hunter 2001) and known hosts include <i>Trialeurodes vaporariorum</i> , <i>T. abutlonea</i> , <i>Bemisia argentifolii</i> , <i>B. tabaci</i> and various species within Aleyrodidae (Hoddle 2019). <i>Bemisia tabaci</i> is found in eastern Australia and the Northern Territory (Business Queensland 2018). <i>Eretmocerus eremicus</i> is distributed globally across different countries (ITIS 2018a), where climatic conditions are	Yes. <i>Eretmocerus eremicus</i> is known to attack various whitefly species (Hoddle 2019). Heavy infestations can result in the extinction of non-target enemies, and increased competition with and displacement of natural enemies (Mochizuki 2010). Therefore, <i>E. eremicus</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (parasitoid)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				similar to Australia. Therefore, <i>E. eremicus</i> has the potential to establish and spread in Australia.		
<i>Hartigia bicincta</i> (Provancher, 1875) [Cephididae]	USA (Smith 2006).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hartigia bicincta</i> is associated with foliage of <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Hartigia bicincta</i> is a pest of numerous plant species including <i>Rosa</i> , <i>Rubus</i> and <i>Salix</i> spp. (Smith 1986), which are present throughout Australia (APNI 2020). The species is distributed throughout the US (Smith 2006), which has similar climatic conditions to parts of Australia. Therefore, <i>H. bicincta</i> has the potential to establish and spread in Australia.	Yes. <i>Hartigia bicincta</i> is polyphagous as larvae feed upon plants such as <i>Rosa</i> , <i>Rubus</i> and <i>Salix</i> spp. (Smith 1986), which are naturalised or economically important plants in Australia (APNI 2020). In North America, <i>H. bicincta</i> is considered a pest of berry crops and rose plantings. <i>Hartigia</i> spp. larvae tunnel into raspberry canes, infesting new growth and killing the stem (Smith 1986). High infestations of larvae can cause cane tips to wilt and die, reducing the second cycle blooms and fruit (Flint & Karlik 2008). Therefore, <i>H. bicincta</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Hartigia cressoni</i> (Kirby 1882) [Cephididae]	USA (Flint & Karlik 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hartigia cressoni</i> is associated with <i>Rosa</i> (PHA 2016a) and <i>Rubus</i> spp. (Smith 1986).	Yes. <i>Hartigia cressoni</i> hosts include various <i>Rosa</i> and <i>Rubus</i> spp. (Bolda & Bettiga 2015), which are present throughout Australia (APNI 2020). <i>Hartigia cressoni</i> is distributed throughout the USA, where severe infestations are common (Alston & Black 2011; Flint & Karlik 2008) and which has similar climatic conditions to parts of Australia. Therefore, <i>H. cressoni</i> has the potential to establish and spread in Australia.	Yes. <i>Hartigia cressoni</i> feeds on species of <i>Rubus</i> (Bolda & Bettiga 2015), which are naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>Hartigia cressoni</i> larvae are stem borers of raspberry canes (Smith 1986) and are recorded as the most economically important cane boring pest of raspberry in northern Utah (Alston & Black 2011). Therefore, <i>H. cressoni</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Hartigia mexicana</i> (Guérin, 1844) [Cephididae] Berry borer, rose stem-borer	USA and Mexico (Smith 1986).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hartigia mexicana</i> is associated with <i>Rosa</i> (PHA 2016a) and <i>Rubus</i> spp. (Smith 1986).	Yes. <i>Hartigia mexicana</i> has known hosts including various <i>Rosa</i> and <i>Rubus</i> spp. (Middlekauff 1969), which are present throughout Australia (APNI 2020). <i>Hartigia mexicana</i> is distributed throughout North America and Mexico	Yes. <i>Hartigia mexicana</i> feeds on species of <i>Rosa</i> and <i>Rubus</i> (Middlekauff 1969), which are naturalised or economically important plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>Hartigia</i> spp. larvae tunnel into	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				(Smith 1986), which has similar climatic conditions to parts of Australia. Therefore, <i>H. mexicana</i> has the potential to establish and spread in Australia.	raspberry canes and infest new growth, killing the stems (Smith 1986). High infestations of larvae can cause cane tips to wilt and die, reducing the second cycle blooms and fruit (Flint & Karlik 2008). Therefore, <i>H. mexicana</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Hylaeus (Prosopistemon) relegatus</i> (Smith, 1876) [Colletidae] Yellow-faced bee	New Zealand (Discover Life 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hylaeus relegatus</i> is associated with <i>Cordyline</i> spp. (Donovan 2007).	Yes. <i>Hylaeus relegatus</i> is polyphagous and known plant hosts include a wide variety of introduced and native flowers within 14 plant families including Rosaceae, Asteraceae, Fabaceae and Alliaceae (Donovan 2007; Hartley 2018), which are present throughout Australia (APNI 2020). <i>Hylaeus relegatus</i> is distributed throughout New Zealand (Donovan 2007), which has similar climatic conditions to parts of Australia. Therefore, <i>H. relegatus</i> has the	No. <i>Hylaeus relegatus</i> builds nests within plant material and wood (Donovan 2007; Webber et al. 2012). Indirect damage through this behaviour is not considered to have the potential to cause economic damage.	No. Not a plant pest. Contaminating pest (vector of animal disease)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Lepisiota canescens</i> (Emery, 1897) [Formicidae] Browsing ant	Madagascar, Saudi Arabia, Kenya (GBIF Secretariat 2017), Ethiopia (Sorger et al. 2017), United Arab Emirates (Sharaf et al. 2016) and Israel (Vonshak & Armin 2009).	Present, NT, however under eradication in Darwin, NT (Department of the Environment and Energy & DAWR 2018).	Species has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	potential to establish and spread in Australia. Yes. While individual worker ants arriving in Australia will be unable to establish, There is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). <i>Lepisiota canescens</i> is polyphagous and known hosts include live and dead insects, and honeydew-producing Hemipteran insects, such as aphids, mealybugs and scales (Department of Primary Industries and Regional Development 2017), which are present in the Australian environment (Plant Health Australia 2020). <i>Lepisiota canescens</i> has been introduced into NT and is currently under eradication (Department of the Environment and Energy & DAWR 2018). Therefore, <i>L. canescens</i> has the potential to establish and spread in Australia.	Yes. <i>Lepisiota canescens</i> attacks live and dead insects and will tend sap-sucking honey-dew producing pests such as aphids, mealybugs and scales. It is also known to form multi-queened, super colonies spanning up to 38km (Department of Primary Industries and Regional Development 2017). Heavy infestations can cause displacement of native species and other invertebrates, as well as causing environmental damage (Sorger et al. 2017). Therefore, <i>L. canescens</i> has the potential to cause negative economic and environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator and nuisance)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Leioproctus imitatus</i> Smith, 1853 [Colletidae] Plaster bee	New Zealand (Encyclopedia of Life 2018; GBIF Secretariat 2017).	No record found (ABRS 2018; Plant Health Australia 2018).	<i>Leioproctus imitatus</i> is associated with <i>Cordyline</i> spp. (Donovan 2007).	Yes. <i>Leioproctus imitatus</i> is a pollinator of a variety of Australian native and exotic flora. Plant hosts include <i>Cordyline australis</i> , <i>Hebe</i> , <i>Kunzea</i> , <i>Leptospermum</i> , <i>Phormium tenax</i> , <i>Citrus</i> , <i>Lupinus</i> and <i>Digitalis</i> spp. (Donovan 2007), which are present throughout Australia (APNI 2020). <i>Leioproctus imitatus</i> is distributed throughout New Zealand (Donovan 2007), which has similar climatic conditions to parts of Australia. Therefore, <i>L. imitatus</i> has the potential to establish and spread in Australia.	Yes. While not a plant pest <i>Leioproctus imitatus</i> , like other bee species is capable of vectoring pathogens of biosecurity concern (Evison & Jensen 2018; Fung 2017). Therefore, the introduction of <i>Leioproctus imitatus</i> the potential to cause negative economic and environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (vector of animal disease)
<i>Linepithema humile</i> (Mayr, 1868) [Formicidae] Argentine ant	Argentina, Belgium, Chile, Ecuador, France, Greece, Iran, Italy, Japan, Malaysia, Mexico, Morocco, New Zealand, the Netherlands, UK, Panama, Peru, Portugal, Singapore, South Africa, USA, Spain, Switzerland, United Arab Emirates, Thailand (Janicki et al. 2016), Colombia and Vanuatu (AntWeb 2018).	Present, WA, SA, Vic., NSW, Tas. and ACT (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Lophyrotoma interrupta</i> (Klug, 1814) [Pergidae] Green long-tailed sawfly	No records found.	Present, Tas., SA, NSW, Vic., ACT and Qld (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Megastigmus aculeatus</i> (Swederus, 1795) [Torymidae] Rose seed megastigmus, rose-hip chalcid	Widely distributed in Holarctic and Australasian regions, Ethiopia, South Africa (van Noort 2018), Spain and USA (Discover Life 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Megastigmus aculeatus</i> is associated with <i>Rosa</i> spp. (Jesse et al. 2013; PHA 2016a).	Yes. <i>Megastigmus aculeatus</i> feeds on various species of <i>Rosa</i> (Jesse et al. 2013), which are present throughout Australia (APNI 2020). <i>Megastigmus aculeatus</i> is distributed throughout Eurasia (Kurir 1975), which has similar climatic conditions to parts of Australia. Therefore, <i>M. aculeatus</i> has the potential to establish and spread in Australia.	Yes. <i>Megastigmus aculeatus</i> feeds on various species of <i>Rosa</i> (Jesse et al. 2013), which are naturalised or economically important plants in Australia (Horticulture Innovation Australia 2019c). This species is also known to cause significant damage rose hips and seeds of various <i>Rosa</i> spp. (Hindal & Wong 1988; Kurir 1975). <i>M. aculeatus</i> is reported as a potential bio-control agent of invasive rose species, such as the Sweet Brier, <i>Rosa rubiginosa</i> (van Noort 2018). Therefore, <i>M. aculeatus</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Monomorium antarcticum</i> (Smith, 1858) [Formicidae] Southern ant	New Zealand (AntWeb 2018; Janicki et al. 2016).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). Ants in the <i>Monomorium</i> genera are already present in Australia (CSIRO 2011). Ants are highly adaptive, competitive and are general predators or scavengers, feeding on a wide range of prey including other arthropods and seeds (CSIRO 2011), which are present in Australian environment. Therefore, <i>M. antarcticum</i> has the potential to establish and spread in Australia.	Yes. Invasive ant species will compete for resources with native species (Department of the Environment and Heritage 2004; GISD 2019). The potential impact on native invertebrates in regions lacking native predacious ants is particularly great and invasive ants have been implicated in the decline of many non-ant invertebrates (GISD 2010). Therefore, <i>M. antarcticum</i> has the potential to cause negative environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator and nuisance)
<i>Monomorium floricola</i> (Jerdon, 1851) [Formicidae] Floral ant	American Samoa, British Virgin Islands, Chile, China, Colombia, Ecuador, Fiji, New Caledonia, India, Indonesia, Japan, Kiribati, Madagascar, Malaysia, Marshall Islands, Mexico, the Netherlands, New Zealand, Panama, Papua	Present, WA, NT and Qld (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	New Guinea, Philippines, Sri Lanka, Singapore, South Africa, Republic of Korea, Taiwan, United Republic of Tanzania, Thailand, Tonga, UK, USA, Vanuatu (Janicki et al. 2016) and Mauritius (AntWeb 2018).					
<i>Monomorium pharaonis</i> (Linnaeus, 1758) [Formicidae] Pharaoh ant	American Samoa, Argentina, Belgium, Cambodia, British Virgin Islands, Chile, China, Colombia, Ecuador, Egypt, Fiji, France, Greece, India, Indonesia, Iran, Israel, Italy, Japan, Kenya, Kiribati, New Caledonia, Madagascar, New Zealand, Malaysia, Marshall Islands, Mexico, Morocco, the Netherlands, Panama, Peru, Papua New Guinea, Saudi Arabia, Spain, South Africa, Republic of Korea, Portugal, Philippines, Sri Lanka, United Arab Emirates, Switzerland, Taiwan, United Republic of Tanzania, USA, UK, Tonga, Thailand, Uganda, Vanuatu, Zimbabwe (Janicki et al. 2016) and	Present, WA, NSW, NT, Qld and Vic. (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Singapore (AntWeb 2018).					
<i>Monomorium salomonis</i> (Linnaeus, 1758) [Formicidae]	British Virgin Islands, Egypt, Ethiopia, Israel, Madagascar, Morocco, the Netherlands, Saudi Arabia, Spain, Sri Lanka (Janicki et al. 2016) Iran and UK (AntWeb 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). <i>Monomorium salomonis</i> is polyphagous and known hosts include living and dead insects, insect eggs, nectar, seeds and sap-sucking pests (CABI 2020a). <i>Monomorium salomonis</i> is distributed throughout Africa, Saudi Arabia and Kuwait (Sharaf & Al-Zailaie 2006), which have similar climatic conditions to parts of Australia. Therefore, <i>M. salomonis</i> has the potential to establish and spread in Australia.	Yes. Invasive ant species will compete for resources with native species (Department of the Environment and Heritage 2004; GISD 2019). <i>Monomorium salomonis</i> is known to feed on nectar and seeds and will tend sap-sucking pests present on plant hosts (CABI 2020a). <i>M. salomonis</i> has the potential to cause negative environmental consequences in Australia, however, is not consider a plant pest.	No. Not a plant pest. Contaminating pest (predator and nuisance)
<i>Nylanderia bourbonica</i> (Forel, 1886) [Formicidae] Robust crazy ant	American Samoa, British Virgin Islands, China, Fiji, India, Italy, Kiribati, Mexico, Madagascar, UK, Marshall Islands, Mauritius, New	Not present, <i>Nylanderia bourbonica</i> is listed as present in ABRS (2020), however is considered absent due to incorrectly identified	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a	Yes. Invasive ant species will compete for resources with native species (Department of the Environment and Heritage 2004; GISD	No. Not a plant pest. Contaminating pest (predator and nuisance)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Caledonia, the Netherlands, New Zealand, Philippines, Papua New Guinea, USA, Sri Lanka, United Republic of Tanzania, Tonga, (Janicki et al. 2016), Vietnam (Janicki et al. 2016; Zryanin 2011), Chile, Indonesia, Kenya, Pitcairn Islands and Vanuatu (AntWeb 2018).	native species (Steven Shattuck unpublished).		queen to establish (Gruber, Cooling & Burne 2019). Ants in the <i>Nylanderia</i> genera are already present in Australia (CSIRO 2011). Ants are highly adaptive, competitive and are general predators or scavengers, feeding on a wide range of prey including other arthropods and seeds (CSIRO 2011), which are present in Australian environment. Therefore, <i>Nylanderia bourbonica</i> has the potential to establish and spread in Australia.	2019). The potential impact on native invertebrates in regions lacking native predacious ants is particularly great and invasive ants have been implicated in the decline of many non-ant invertebrates (GISD 2010). Therefore, <i>Nylanderia bourbonica</i> has the potential to cause negative environmental consequences in Australia.	
<i>Nylanderia vaga</i> (Forel, 1901) [Formicidae] Forest parrot ants	Fiji, Papua New Guinea, New Caledonia, New Zealand, (Plant Health Australia 2020), Tonga, American Samoa, Vanuatu (GBIF Secretariat 2017), Ecuador, Indonesia, Vietnam (AntWeb 2018) and the Afro-tropics (Lapolla, Hawkes & Fisher 2011).	<i>Nylanderia vaga</i> is listed as present in ABRS (2019), however is considered absent due to incorrectly identified native species (Steven Shattuck unpublished).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). Ants in the <i>Nylanderia</i> genera are already present in Australia (CSIRO 2011). Ants are highly adaptive, competitive and are	Yes. Invasive ant species will compete for resources with native species (Department of the Environment and Heritage 2004; GISD 2019). The potential impact on native invertebrates in regions lacking native predacious ants is particularly great and invasive ants have been implicated in the decline of many non-ant	No. Not a plant pest. Contaminating pest (predator and nuisance)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				general predators or scavengers, feeding on a wide range of prey including other arthropods and seeds (CSIRO 2011), which are present in Australian environment. Therefore, <i>Nylanderia vaga</i> has the potential to establish and spread in Australia.	invertebrates (GISD 2010). Therefore, <i>Nylanderia vaga</i> has the potential to cause negative environmental consequences in Australia.	
<i>Ochetellus glaber</i> (Mayr, 1862) [Formicidae]	China, India, Indonesia, New Zealand, Philippines, South Africa, Sri Lanka, USA, Vanuatu (Janicki et al. 2016), Japan, New Caledonia and Republic of Korea (AntWeb 2018).	Present, NSW, Tas., Qld and Vic. (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Odontomachus simillimus</i> Smith, 1858 Misspelling: <i>Odontomachus similimus</i> [Formicidae] Trap jaw ant	American Samoa, Fiji, India, Indonesia, Kiribati, Panama, Malaysia, Marshall Islands, New Caledonia, Philippines, New Zealand, Singapore, Sri Lanka, Papua New Guinea, Thailand, Vanuatu, Vietnam, Tonga (Janicki et al. 2016), Cambodia and Japan (AntWeb 2018).	Present, NT, Qld, Tas., Christmas Island and WA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Oecophylla smaragdina</i> (Fabricius, 1775) [Formicidae]	Cambodia, China, Malaysia, India, Indonesia, Singapore, Nepal, the Netherlands,	Present, WA, NT, Qld and Tas. (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Weaver ant	Papua New Guinea, New Zealand, Philippines, Thailand, Sri Lanka and Vietnam (AntWeb 2018; Janicki et al. 2016).		consignments (unpublished).			
<i>Oncastichus goughi</i> Headrick & LaSalle, 1995 [Eulophidae] Geraldton wax wasp	Israel (Gerson & Applebaum 2017) and USA (ITIS 2018a).	Present, native species (ABRS 2020).	<i>Oncastichus goughi</i> is associated with <i>Chamelaucium</i> spp. (PHA 2016a).	Assessment not required	Assessment not required	No
<i>Paratrechina longicornis</i> (Latreille, 1802) [Formicidae] Black crazy ant	American Samoa, Argentina, Belgium, Cambodia, China, British Virgin Islands, Egypt, Colombia, Ecuador, France, Ethiopia, Fiji, India, Japan, Indonesia, Iran, Kenya, New Caledonia, Kiribati, Marshall Islands, Madagascar, Nepal, Malaysia, Mexico, Morocco, the Netherlands, New Zealand, Pakistan, Philippines, Peru, Papua New Guinea, Saudi Arabia, Singapore, South Africa, Spain, Switzerland, Sri Lanka, Taiwan, United Republic of Tanzania, United Arab Emirates, Thailand, Tonga, Uganda,	Present, WA, NT and Qld (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	UK, USA, Vanuatu, Vietnam, Zimbabwe (Janicki et al. 2016), Chile, Israel, Malawi, Mauritius and Panama (AntWeb 2018).					
<i>Pheidole fervens</i> Smith, 1858 [Formicidae]	American Samoa, China, Fiji, India, Indonesia, Kiribati, Iran, Madagascar, Malaysia, the Netherlands, Philippines, New Caledonia, Papua New Guinea, Singapore, Taiwan, Sri Lanka, Thailand, Tonga, USA, Vietnam (Janicki et al. 2016), Marshall Islands, France, Japan, Pitcairn Islands, Mauritius and Vanuatu (AntWeb 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Pheidole fervens</i> is recognised as a pest of household food, and known hosts include living and dead insects and seeds (Stanley, Harris & Berry 2012), which are present in the Australian environment. <i>Pheidole fervens</i> is distributed throughout the world (AntWeb 2018; Wetterer 2007), which has similar climatic conditions to parts of Australia. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gates 1995). Therefore, <i>P. fervens</i> has the potential to establish and spread in Australia.	Yes. The genus <i>Pheidole</i> is known to attack and chew through electrical wires, communication cables, and irrigation tubing when nesting within households (Wetterer 2005). The ants protect sap-sucking pests from predators and parasites while feeding on honeydew that the pests produce, and are known to predate on native fauna (Wetterer 2005). The genus <i>Pheidole</i> also has the potential to disrupt natural nutrient cycling, and will lead to the loss of native plant and animal species (Wetterer 2005). This ant can also be a pest in houses (AntWiki 2019). Therefore, <i>P. fervens</i> has the potential to cause negative economic and	No. Not a plant pest. Contaminating pest (predator and nuisance)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					environmental consequences in Australia.	
<i>Pheidole megacephala</i> (Fabricius, 1793) [Formicidae] Big-headed ant	American Samoa, Argentina, British Virgin Islands, China, Cambodia, Egypt, Ethiopia, Fiji, France, India, Indonesia, Iran, Italy, Japan, Kiribati, Kenya, Madagascar, Malawi, Malaysia, Marshall Islands, Mexico, Morocco, Pakistan, the Netherlands, New Zealand, New Caledonia, Papua New Guinea, Panama, Singapore, Peru, Philippines, Taiwan, Saudi Arabia, South Africa, Spain, Sri Lanka, Thailand, Tonga, United Republic of Tanzania, Uganda, United Arab Emirates, UK, USA, Vanuatu, Vietnam, Zimbabwe (Janicki et al. 2016), Colombia, Mauritius, Ecuador and Greece (AntWeb 2018).	Present widespread (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Pheidole punctatissima</i> Mayr, 1873 [Formicidae]	Colombia, Mexico, the Netherlands, Panama (Janicki et al. 2016) and USA (AntWeb 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pheidole punctatissima</i> is associated with <i>Dracaena</i> spp. (USDA 2011).	Yes. <i>Pheidole punctatissima</i> is a polyphagous ant and known hosts include small live arthropods, dead insects, seeds and fruit (Birkemoe & Aak 2008), which are present in the Australian environment. <i>Pheidole punctatissima</i> is distributed throughout Europe and Northern America (Birkemoe & Aak 2008; Ivanov 2016), which has similar climatic conditions to parts of Australia. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). Therefore, <i>P. punctatissima</i> has the potential to establish and spread in Australia.	Yes. The genus <i>Pheidole</i> is known to attack and chew through electrical wires, communication cables, and irrigation tubing when nesting within households (Wetterer 2005). The ants protect the sap-sucking pests from predators and parasites while feeding on honeydew that the pests produce, and are known to predate on native fauna (Wetterer 2005). The genus <i>Pheidole</i> also has the potential to disrupt natural nutrient cycling, and will lead to the loss of native plant and animal species (Wetterer 2005, 2007). <i>Pheidole punctatissima</i> can also be a pest in houses (AntWiki 2019). Therefore, <i>P. punctatissima</i> has the potential to cause negative economic and environmental consequences in Australia.	No. Not a plant pest. Contaminating pest (predator and nuisance)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Carebara affinis</i> (Jerdon, 1851) Synonym: <i>Pheidologeton affinis</i> [Formicidae] Marauder ant	Papua New Guinea, Indonesia (Plant Health Australia 2020), Malaysia (GBIF Secretariat 2017), India and Philippines (AntWeb 2018).	Present, Qld and NT (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Plagiolepis pygmaea</i> (Latreille, 1798) Synonym: <i>Plagiolepis pygmaea</i> (Latreille) [Formicidae] Asian marauder ant	Afghanistan, Belgium, China, Egypt, France, Iran, Italy, Morocco, the Netherlands, Portugal, Saudi Arabia, Spain (Janicki et al. 2016), Greece, Israel, South Africa, Switzerland and Zimbabwe (AntWeb 2018).	No record found (ABRS 2020; Plant Health Australia 2020)	Species has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. The genus <i>Plagiolepis</i> is known to have a wide range of hosts including sweet, greasy materials, starch, and plant and animal materials (Yates 1992), which are found in the Australian environment. In addition, <i>Plagiolepis pygmaea</i> is recorded to feed on nectar and honeydew, and attends whiteflies and aphids (Martínez-Ferrer & Campos-Rivela 2017), which are present in the Australian environment (APNI 2020). <i>Plagiolepis pygmaea</i> is distributed throughout Europe and some Mediterranean countries (Thurin & Aron 2008), which has similar climatic conditions to parts of Australia. While	Yes. Hosts of <i>Plagiolepis pygmaea</i> include plant materials (Yates 1992), and heavy infestations can lead to a disruption of the natural biological control of honeydew-producing pests, such as aphids, mealybugs and scale insects (Martínez-Ferrer & Campos-Rivela 2017). Therefore, <i>P. pygmaea</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). Therefore, <i>P. pygmaea</i> has the potential to establish and spread in Australia.		
<i>Polistes chinensis</i> (Fabricius, 1793) Synonym: <i>Polistes chinensis antennalis</i> [Vespidae] Asian, Chinese, Japanese paper wasp	Japan, China, Russia, Republic of Korea, Norfolk Island and New Zealand (PaDIL 2018).	Present, NSW (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Adults of the genus <i>Polistes</i> feed on nectar and catch caterpillars to feed to their larvae (The Australian Museum 2019). <i>Polistes chinensis</i> is already present in parts of Australia (ABRS 2020) therefore, it is likely that <i>P. chinensis</i> has the potential to establish and spread in Western Australia.	Yes. <i>Polistes chinensis</i> can have a significant impact on the local invertebrate fauna. This wasp is a considerable public nuisance, stinging people when it is disturbed and constructing its nest in houses (PaDIL 2018; The Australian Museum 2019). Therefore, <i>P. chinensis</i> has the potential to cause negative environmental and human health consequences in Western Australia.	No. Not a plant pest. Contaminating pest (predator and nuisance)
<i>Polyrhachis rastellata</i> (Latreille, 1802) Synonym: <i>Polyrhachis rastellata</i> (Latreille)	China, India, Indonesia, Malaysia, Nepal, Philippines, Papua New Guinea, Singapore, Sri Lanka, Taiwan, Thailand	No record found (ABRS 2020; Plant Health Australia 2020).	Species has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Polyrhachis rastellata</i> has a variety of known hosts including citrus, foliage, dead and live insects, nectar, and is known to tend sap-	Yes. The genus <i>Polyrhachis</i> hide their nests within woven foliage held together by silk and are recorded to predate on other insects	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Formicidae] Weaver ants	and Vietnam (Janicki et al. 2016).			sucking pests (Blüthgen, Gebauer & Fiedler 2003), which are found in the Australian environment. <i>Polyrhachis rastellata</i> is distributed throughout Asia and Oceania (Dias 2015), which has similar climatic conditions to parts of Australia. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). Therefore, <i>P. rastellata</i> has the potential to establish and spread in Australia.	(Dorow, Maschwitz & Rapp 1990), which can potentially result in the loss of native insects. Therefore, <i>P. rastellata</i> has the potential to cause negative environmental consequences in Australia.	
<i>Solenopsis geminata</i> (Fabricius, 1804) [Formicidae] Tropical fire ant	American Samoa, Argentina, British Virgin Islands, Cambodia, Chile, China, Colombia, Ecuador, Fiji, Greece, India, Indonesia, Kiribati, Italy, Madagascar, Malaysia, Marshall Islands, Mauritius, Mexico, the Netherlands, New Caledonia, New Zealand, Pakistan, Panama, Papua New Guinea, Peru,	Present, NT, WA, Qld and Christmas Island (ABRS 2020). <i>Solenopsis geminata</i> is undergoing eradication in parts of mainland Australia (Lenancker & CSIRO 2018). Declared pest, prohibited entry into WA	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Solenopsis geminata</i> is omnivorous and has a variety of known hosts including seeds, small mammals and birds (Lenancker & CSIRO 2018), which are found in the Australian environment. <i>Solenopsis geminata</i> is distributed across Asia, South America and North America (AntWeb 2018;	Yes. <i>Solenopsis geminata</i> is a dominant invasive ant species that can push out native ants once it becomes established (Lenancker & CSIRO 2018). Worker <i>S. geminata</i> ants can also indirectly damage crops by protecting pest insects such as aphids for honeydew. <i>Solenopsis geminata</i> has been	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Philippines, Republic of Korea, Singapore, South Africa, Sri Lanka, Taiwan, Thailand, Tonga, United Arab Emirates, UK, USA, Vietnam (Janicki et al. 2016), Chile (EPPO 2020), Japan and Vanuatu (AntWeb 2018).	(Government of Western Australia 2020).		EPPO 2020; Janicki et al. 2016), which have similar climatic conditions to parts of Australia. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). Therefore, <i>S. geminata</i> has the potential to establish and spread in Australia.	recorded to harm sea bird and turtle nests in Ashmore Reef (Lenancker & CSIRO 2018). <i>Solenopsis geminata</i> also has negative health impacts by causing anaphylactic shock in people allergic to ant stings (Lenancker & CSIRO 2018). Therefore, <i>S. geminata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Tapinoma melanocephalum</i> (Fabricius, 1793) [Formicidae] Ghost ant	Afghanistan, American Samoa, Cambodia, British Virgin Islands, China, Fiji, Colombia, Ecuador, France, India, Indonesia, Kiribati, Italy, Japan, Kenya, Mexico, Madagascar, Marshall Islands, Malaysia, Mauritius, the Netherlands, Pakistan, New Caledonia, New Zealand, Papua New Guinea, Peru, Philippines, Pitcairn Islands, Republic of Korea, Saudi Arabia, Singapore, Spain, Sri Lanka, Switzerland,	Present, NT, Qld and WA (ABRS 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Taiwan, Thailand, Tonga, United Arab Emirates, UK, USA, Vanuatu, Vietnam (Janicki et al. 2016), Panama and Belgium (AntWeb 2018).					
<i>Technomyrmex albipes</i> (Smith, 1861) [Formicidae] White-footed ant	American Samoa, Cambodia, China, India, Indonesia, United Arab Emirates, Italy, Kenya, Madagascar, Malaysia, Mauritius, New Zealand, the Netherlands, Papua New Guinea, Philippines, UK, Pitcairn Islands, Saudi Arabia, Singapore, South Africa, Switzerland, Taiwan, Sri Lanka, United Republic of Tanzania, Thailand, Tonga, Vanuatu and Vietnam (Janicki et al. 2016), Fiji, Japan, Marshall Islands, New Caledonia, Samoa, South Korea and Zimbabwe (AntWeb 2018).	Present, NSW, Qld and WA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Technomyrmex pallipes</i> (Smith, 1876) [Formicidae] Pallid-footed ants	Kenya, Madagascar, Mauritius, South Africa, Tanzania, Zimbabwe, New Zealand (AntWeb 2018) and Italy (Jucker, Rigato & Regalin 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	Species has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single queen or a colony with a queen to establish (Gruber, Cooling & Burne	Yes. <i>Technomyrmex pallipes</i> is an invasive ant and may alter an ecosystem by interfering with mutualistic relationships (GISD 2019). Invasive ant species will compete for	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				2019). The genus <i>Technomyrmex</i> is known to feed on nectar and honeydew produced by sap-sucking pests (GISD 2019), and also predate on sap-sucking invertebrates (Warner & Scheffrahn 2002), which are present in the Australian environment. <i>Technomyrmex pallipes</i> is distributed throughout the world (Pech & Bezděk 2016), which has similar climatic conditions to parts of Australia. Therefore, <i>T. pallipes</i> has the potential to establish and spread in Australia.	resources with native species (GISD 2010). Ants can cause indirect damage through protecting honeydew secreting pests, such as aphids and mealybugs. The potential impact on native invertebrates in regions lacking native predacious ants is particularly great and invasive ants have been implicated in the decline of many non-ant invertebrates (GISD 2010). Therefore, <i>T. pallipes</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Technomyrmex sophiae</i> (Forel, 1902) [Formicidae]	Australia (AntWeb 2018).	Present, Qld and NSW (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Technomyrmex vitiensis</i> Mann, 1921	American Samoa, Fiji, Indonesia, Kenya, Madagascar, Malaysia, Mauritius, New Caledonia, the	Present, Qld (unpublished data). Declared pest, prohibited entry into WA	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. While individual worker ants arriving in Australia will be unable to establish, there is the potential for a single	Yes. <i>Technomyrmex vitiensis</i> is known to occupy various environments and can extend from the ground	No. Not a plant pest. Contaminating pest (predator)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Synonym: <i>Technomyrmex albipes vitiensis</i> Mann, 1921</p> <p>[Formicidae]</p>	<p>Netherlands, Papua New Guinea, Philippines, Singapore, Thailand, UK, USA, Vanuatu (Janicki et al. 2016), Belgium, India and Switzerland (AntWeb 2018).</p>	<p>(Government of Western Australia 2020).</p>		<p>queen or a colony with a queen to establish (Gruber, Cooling & Burne 2019). The genus <i>Technomyrmex</i> is known to feed on nectar and honeydew produced by sap-sucking pests (GISD 2019), and also predate on sap-sucking invertebrates (Warner & Scheffrahn 2002), which are present in the Australian environment. <i>Technomyrmex vitiensis</i> is distributed throughout the world (Pech & Bezděk 2016), which has similar climatic conditions to parts of Australia. Therefore, <i>T. vitiensis</i> has the potential to establish and spread in Australia.</p>	<p>to the tree canopy (Delabie, Groc & Dejean 2011). <i>Technomyrmex vitiensis</i> can disturb vertebrate pollination and seed dispersion of endangered flora, and outnumber native ant species (Delabie, Groc & Dejean 2011). Therefore, <i>T. vitiensis</i> has the potential to cause negative environmental consequences in Australia.</p>	
<p><i>Tetramorium bicarinatum</i> (Nylander, 1846)</p> <p>[Formicidae]</p> <p>Pennant ant</p>	<p>American Samoa, Argentina, British Virgin Islands, China, Colombia, Ecuador, Egypt, Fiji, France, India, Italy, UK, Indonesia, Madagascar, New Zealand, Malaysia, Marshall Islands, Mauritius, Mexico, Morocco, New Caledonia, Pakistan, Philippines,</p>	<p>Present, NSW, NT, Qld, WA, Vic. and Tas. (ABRS 2020; Plant Health Australia 2020).</p>	<p>Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).</p>	<p>Assessment not required</p>	<p>Assessment not required</p>	<p>No</p>

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Papua New Guinea, Peru, Pitcairn Islands, Singapore, Saudi Arabia, South Africa, Spain, Taiwan, Thailand, Tonga, United Arab Emirates, USA, Vanuatu, Vietnam (Janicki et al. 2016), the Netherlands, Sri Lanka, Belgium, Greece, Israel, Japan, Kiribati, Spain, Panama and Republic of Korea (AntWeb 2018).					
<i>Tetramorium pacificum</i> (Mayr, 1870) [Formicidae]	China, Fiji, Indonesia, India, Tonga, Malaysia, Mauritius, Philippines, Sri Lanka, USA, Switzerland, Thailand and Vanuatu (AntWeb 2018).	Present, NSW, NT and Qld (ABRS 2020; AntWeb 2018; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Tetramorium simillimum</i> (Smith, 1851) [Formicidae] Similar groove-headed ant	American Samoa, British Virgin Islands, China, Egypt, France, Ecuador, Ethiopia, Fiji, India, Japan, Kenya, Kiribati, Malawi, Malaysia, Marshall Islands, Mauritius, Mexico, the Netherlands, New Caledonia, New Zealand, UK, Papua New Guinea, Peru, Philippines, Pitcairn Islands, Saudi Arabia, Singapore, South Africa, Taiwan, Tonga, USA, United Republic of	Present, NSW, NT, Qld and WA (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Tanzania, Thailand, Uganda, Vietnam, Zimbabwe (Janicki et al. 2016), Afghanistan, Colombia, Indonesia, Iran, Israel, Madagascar, Nepal, Spain, Sri Lanka and United Arab Emirates (AntWeb 2018).					
<i>Trichomyrmex destructor</i> Jerdon, 1851 Synonym: <i>Monomorium destructor</i> (Jerdon, 1851) [Formicidae] Destructive trailing ant	Afghanistan, American Samoa, Cambodia, British Virgin Islands, Ecuador, Egypt, Ethiopia, Fiji, India, Iran, Israel, Kenya, Kiribati, Madagascar, Malaysia, Marshall Islands, Mauritius, Mexico, Morocco, Pakistan, the Netherlands, New Zealand, Philippines, Papua New Guinea, Saudi Arabia, USA, Singapore, South Africa, Spain, Sri Lanka, Taiwan, United Arab Emirates, United Republic of Tanzania, Thailand, UK (Janicki et al. 2016), China, Colombia, Indonesia, Japan, Nepal and Uganda (AntWeb 2018).	Present, NSW, NT, Qld and WA (ABRS 2020; AntWeb 2018; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Vespula vulgaris</i> (Linnaeus, 1758) [Vespidae] Common wasp, common yellow jacket	France, Italy, Greece, China, UK, India, Iran, Israel, Japan, Republic of Korea, Mexico, USA, Belgium, Iceland, New Zealand, the Netherlands, Spain, and Switzerland (CABI 2020a).	Present, Vic., Tas., SA and ACT (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Vespula vulgaris</i> is widespread in most of Australia and it is likely that similar climatic conditions exist in parts of Western Australia.	Yes. <i>Vespula vulgaris</i> is a generalist pest, feeding on other arthropods, fruit and food sources. While this wasp feeds on plant products it is not considered a plant pest. However, due to its sting and feeding habits does have a significant impact on animal ecologies (Matthews et al. 2000).	No. Not a plant pest. Contaminating pest (nuisance)
Lepidoptera (moths and butterflies)						
<i>Acleris bergmanniana</i> (Linnaeus, 1758) Synonym: <i>Croesia bergmanniana</i> (Linnaeus, 1758), <i>Tortrix bergmanniana</i> Linnaeus, 1758 [Tortricidae] Yellow rose button moth	Belgium, France, Italy, Spain, Switzerland, Norway, UK (Karsholt & Nieukerken 2019) and Republic of Korea (Discover Life 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Acleris bergmanniana</i> is associated with foliage of <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Acleris bergmanniana</i> feeds on <i>Rosa</i> spp. (Bruun 2005; Kimber 2019; PHA 2016a; Ziarkiewicz & Kozłowska 1973) which are present as agricultural or environmental plants in Australia (APNI 2020; Flowers Australia 2019; PHA 2016a). This species is present in Europe and Korea where climatic conditions are similar to regions in Australia. As a result of suitable climates and host plants, <i>A. bergmanniana</i> has the	Yes. <i>Acleris bergmanniana</i> is an injurious pest of roses, in particular <i>Rosa rugosa</i> (Ziarkiewicz & Kozłowska 1973). The adult moth and larvae feed on leaves and shoots of commercial grown and wild plants in the Rosaceae family, particularly <i>Rosa</i> spp. (Bruun 2005; Kimber 2019). Therefore, <i>A. bergmanniana</i> has the potential to cause negative environmental and economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.		
<i>Acrolepiopsis incertella</i> (Chambers, 1872) [Acrolepiidae] Carrion flower moth	USA and Canada (Discover Life 2019; Landry 2007).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Acrolepiopsis incertella</i> is associated with foliage and bulbs of <i>Lilium</i> and <i>Smilax</i> spp. (Landry 2007; PHA 2016a).	Yes. <i>Acrolepiopsis incertella</i> attacks multiple plant species from the genus <i>Smilax</i> (Landry 2007; PHA 2016a). <i>Smilax</i> spp. are present in Australia, including several endemic plants (APNI 2020). The species is present in the USA where climatic conditions are similar to some regions in Australia. Therefore, <i>A. incertella</i> has the potential to establish and spread in Australia.	Yes. <i>Acrolepiopsis incertella</i> feeds on foliage of <i>Smilax</i> spp., forming leaf cocoon-shelters and skeletisation leaves (Landry 2007). Some reports of <i>A. incertella</i> have also stated they are also bulb pests of <i>Lilium</i> spp. (DAFF 2013d; PHA 2016a). Therefore, <i>A. incertella</i> has the potential to cause negative environmental consequences in Australia.	Yes
<i>Acronicta psi</i> Linnaeus, 1758 Synonym: <i>Acronicta (Triaena) psi</i> Linnaeus, 1758 [Noctuidae] Grey dagger moth	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands, UK (Karsholt & Nieukerken 2019), Northern Africa, Iran, Central Asia, Lebanon and Israel (Kravchenko et al. 2006).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Acronicta</i> is associated with many plants, including <i>Rosa</i> spp. (CSIRO 2010; Kravchenko et al. 2006; PHA 2016a).	Yes. <i>Acronicta psi</i> is polyphagous and is known to attack plant host species including <i>Rosa</i> and <i>Prunus</i> spp. (CSIRO 2010; Kravchenko et al. 2006; PHA 2016a) which are present throughout Australia (APNI 2020). It is found in riverine areas and woodlands and is distributed in the Palearctic region (Kravchenko et al. 2006)	Yes. <i>Acronicta psi</i> is polyphagous, and has been found feeding on deciduous trees and shrubs, such as <i>Salix</i> spp. (Kravchenko et al. 2006), and plants of the Rosaceae family, including <i>Malus</i> , (Stastna & Psota 2013), <i>Rosa</i> (PHA 2016a) and <i>Prunus</i> spp. (Halperin & Sauter 1991; Kravchenko et al. 2006). The Noctuidae is an important plant pest	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				which has climatic conditions similar to parts of Australia. Other species of the genus <i>Acronicta</i> are also present in Australia. This suggests <i>A. psi</i> has the potential to establish and spread in Australia.	family due to damage caused by the voracious appetites of larvae for foliage (CSIRO 2010). Therefore, <i>A. psi</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Adoxophyes orana</i> Fischer von Röslerstamm, 1834 [Tortricidae] Summer fruit tortrix	China, Japan, Republic of Korea, Belgium, France, Greece, Italy, the Netherlands, Spain, Switzerland and UK (CABI 2020a; Karsholt & Nieukerken 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Adoxophyes orana</i> is associated with various plants including <i>Rosa</i> spp. (PHA 2016a).	Yes. Previously assessed by the department (AQIS 1998b; Biosecurity Australia 2003b, 2009c, a, 2010a; DAFF 2004a, 2013e; DAWR 2016c). <i>Adoxophyes orana</i> is a polyphagous species that feeds on more than 50 different plant species from multiple families. Host plants of this species are distributed commonly and widely throughout Australia. The species is known to have established and spread outside its native range in areas where it has been introduced, for example, Greece and Britain (Biosecurity Australia 2010a; Carter 1984; Milonas & Savopoulou-	Yes. Previously assessed by the department (AQIS 1998b; Biosecurity Australia 2003b, 2009c, a, 2010a; DAFF 2004a, 2013e; DAWR 2016c). <i>Adoxophyes orana</i> is a major pest of fruit tree crops in China and elsewhere in the world. This pest been reported to cause up to 50% crop loss over large areas (Davis, French & Venette 2005). The polyphagous nature of <i>A. orana</i> indicates the potential for negative economic and environmental consequences across a wide range of fruit growing industries, as well as for wild plants	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Soultani 2004). Therefore, <i>A. orana</i> has the potential to establish and spread in Australia.	(Biosecurity Australia 2010a).	
<i>Aglossa caprealis</i> (Hübner, 1809) [Pyralidae] Murky meal moth	Belgium, New Zealand, UK, USA (Herbison-Evans & Crossley 2019), Portugal, the Netherlands, France, Greece, Italy and Spain (Karsholt & Nieukerken 2019).	Present, NSW, Qld, Vic and SA (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (Ikin et al. 1999). <i>Aglossa caprealis</i> is widespread in most of Australia and it is likely that similar climatic conditions exist in parts of Western Australia.	Yes. Previously assessed by the department (Ikin et al. 1999). <i>Aglossa caprealis</i> is a pest of many plant products, including grain, maize, garlic, <i>Momordica</i> spp., avocado and rotting vegetable matter (Solis 2006). Therefore, <i>A. caprealis</i> has the potential to cause negative economic consequences in Western Australia.	Yes (WA)
<i>Agrochola lychnidis</i> Denis & Schiffermüller, 1775 [Noctuidae] Beaded chestnut moth	UK (Kimber 2019), Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland (Karsholt & Nieukerken 2019), Morocco, Israel, Lebanon (Kravchenko et al. 2008) and Iran (Feizpoor & Shirvani 2014).	No record found (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	<i>Agrochola lychnidis</i> is associated with foliage of <i>Dianthus</i> spp. (OGTR 2006; Robinson et al. 2019).	Yes. <i>Agrochola lychnidis</i> is polyphagous and is known to feed on deciduous shrubs and trees in early life stages, to herbaceous plants in later life stages (Kravchenko et al. 2008; Robinson et al. 2019). This includes <i>Dianthus</i> spp. which is present in Australia as commercial and naturalised plants (APNI 2020; OGTR 2006; Robinson et al. 2019). <i>A. lychnidis</i> widespread in	Yes. <i>Agrochola lychnidis</i> are known to feed on <i>Dianthus caryophyllus</i> , <i>Crataegus</i> spp. (Robinson et al. 2019), <i>Quercus</i> spp. (Vegliante & Zilli 2007) and <i>Rumex</i> spp. (Kravchenko et al. 2008), which are naturalised or commercially grown plants in Australia (APNI 2020; Flowers Australia 2019). The Noctuidae is an important plant pest family due to the damage caused by voracious	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				temperate and semi-arid areas (Kravchenko et al. 2008), suggesting similar climatic and environmental conditions in Australia is suitable for the pest. Therefore, <i>A. lychnidis</i> has the potential to establish and spread in Australia.	appetites of most larvae for foliage (CSIRO 2010). Therefore, <i>A. lychnidis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Agrotis infusa</i> (Boisduval, 1835) [Noctuidae] Bogong moth	New Zealand (ALA 2018).	Present, ACT, NSW, Qld, SA, Tas., Vic. and WA (ABRS 2020; Government of Western Australia 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Agrotis segetum</i> (Denis & Schiffermüller, 1775) [Noctuidae] Turnip moth	Ethiopia (Letter from MANR on 06/03/2018), Afghanistan, China, India, Indonesia, Iran, Israel, Japan, Republic of Korea, Lebanon, Malaysia, Nepal, Pakistan, Philippines, Saudi Arabia, Sri Lanka, Taiwan, Vietnam, Egypt, Kenya, Malawi, Morocco, South Africa, Tanzania, Uganda, Zimbabwe, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, UK (CABI 2020a) and Iceland	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Agrotis segetum</i> is associated with leaves of <i>Dianthus</i> , <i>Helianthus</i> and <i>Galdiolus</i> spp. (DAFF 2013d; PHA 2016a).	Yes. <i>Agrotis segetum</i> has a wide range of host plants, is tolerant of a range of climatic conditions, has high reproduction rates, adults are strong fliers and human aided dispersal can contribute to rapid and wide spread (Office of the Chief Plant Protection Officer 2011). Therefore, <i>A. segetum</i> has the potential to establish and spread in Australia.	Yes. <i>Agrotis segetum</i> is highly polyphagous and feeds on leaves, stems and roots of host plants (Biosecurity Australia 2009b; Office of the Chief Plant Protection Officer 2011; PHA 2016a). This species is known to cause significant crop losses of up to 30% in regions of Europe, Africa and Asia (Office of the Chief Plant Protection Officer 2011). <i>A. segetum</i> has a wide range of economically important host species present in Australia and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	(Karsholt & Nieukerken 2019).				therefore has the potential to cause negative economic and environmental consequences in Australia.	
<i>Amerila carneola</i> (Hampson, 1916) Synonym: <i>Amerila puella</i> subsp. <i>carneola</i> (Hampson, 1916), <i>Rhodogastria carneola</i> Hampson, 1916 [Erebidae]	East Africa, Ethiopia, Uganda, Tanzania, Kenya and Malawi (Häuser & Boppré 1997).	No record found (ABRS 2020; Plant Health Australia 2020)	<i>Amerila carneola</i> is associated with foliage of <i>Dracaena</i> spp. (MPI 2016; Robinson et al. 2019).	Yes. <i>Amerila carneola</i> is known to feed on <i>Dracaena</i> spp. (Robinson et al. 2019), which is present throughout Australia (APNI 2020). The species is distributed throughout the Afrotropical region (Robinson et al. 2019), which has similar tropical climatic conditions to parts of Australia. Some <i>Amerila</i> spp. are also present in Australia (ABRS 2020). Therefore, <i>A. carneola</i> has the potential to establish and spread in Australia.	Yes. <i>Amerila carneola</i> is known to feed on <i>Dracaena</i> spp. (Robinson et al. 2019), which are naturalised or commercially grown throughout tropical climates of Australia (APNI 2020; DEEDI 2019; NRM Biosecurity 2017; Thomas & Gollnow 2013). Therefore, <i>A. carneola</i> has the potential to cause negative environmental and economic consequences in Australia.	Yes
<i>Amorbia emigratella</i> Busck, 1909 [Tortricidae] Mexican leaf-roller	Mexico, USA and Central America (Gilligan & Epstein 2014).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Amorbia emigratella</i> is associated with <i>Rosa</i> , <i>Cordyline</i> , <i>Dracaena</i> and <i>Phaius</i> spp. (Gilligan & Epstein 2014; MPI 2016; Robinson et al. 2019).	Yes. <i>Amorbia emigratella</i> is polyphagous with a wide host range, known to feed on 27 different host plant families (Gilligan & Epstein 2014; Mau & Martin Kessing 1992; Robinson et al. 2019), which are present	Yes. <i>Amorbia emigratella</i> is known to feed on economically important ornamental, fruit and vegetable crops, such as cotton, corn, macadamia, sweet orange, orchids, roses, gardenia, cordyline, dracaena,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				in Australia (APNI 2020). The species is distributed throughout southern USA, the Hawaiian Islands and Central America (Gilligan & Epstein 2014) where it is most active in the summer months (International Tropical Fruits Network 2011). The climates in these regions are similar to climatic conditions in Australia. Therefore, <i>A. emigratella</i> has the potential to establish and spread in Australia.	eggplant, cabbage, beans, papaya, sweet potato, avocado and tomato which are present in Australia (Gilligan & Epstein 2014; Horticulture Innovation Australia 2019c; Mau & Martin Kessing 1992; Robinson et al. 2019). The larvae feed on and damage large amounts of foliage and tender shoots (International Tropical Fruits Network 2011). Feeding behaviour affects fruit, for example damage on avocado fruit results in reduced marketability and reduced fruit crop size (Coria et al. 2007; Mau & Martin Kessing 1992). Therefore, <i>A. emigratella</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Amphipyra pyramidea</i> Linnaeus, 1758 [Noctuidae]	USA (Lotts & Naberhaus 2018), Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt &	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Amphipyra pyramidea</i> is associated with foliage of <i>Rosa</i> spp. (Alford 2012; MPI 2016)	Yes. <i>Amphipyra pyramidea</i> is polyphagous and feeds on various trees and shrubs, including <i>Rosa</i> , <i>Betula</i> ,	Yes. <i>Amphipyra pyramidea</i> is part of the family Noctuidae which is an important plant pest family due to the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Copper underwing moth	Nieukerken 2019), UK (Kimber 2019), Republic of Korea, Japan (Discover Life 2019), Iran (Rabieh 2018) and India (Dar, Kirti & Khan 2015).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).		<i>Prunus</i> , <i>Quercus</i> , and <i>Salix</i> spp. (Alford 2012) which are commonly present in Australia (APNI 2020; Flowers Australia 2019). Other <i>Amphipyra</i> spp. are also present in Australia (ABRS 2020), suggesting Australian climatic and environmental conditions are suitable for the pest. Therefore, <i>A. pyramidea</i> has the potential to establish and spread in Australia.	voracious appetites of most larvae for foliage (CSIRO 2010). Larvae are known to attack foliage of <i>Rosa</i> , <i>Betula</i> , <i>Prunus</i> , <i>Quercus</i> , and <i>Salix</i> spp. which are naturalised or grown commercially in Australia (Alford 2012; APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>A. pyramidea</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Amphipyra tragopoginis</i> (Clerck, 1759) [Noctuidae] Mouse moth	Iran (Rabieh 2018), USA (Lotts & Naberhaus 2018), Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland (Karsholt & Nieukerken 2019) and UK (Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Amphipyra tragopoginis</i> is associated with flowers of <i>Rosa</i> spp. (PHA 2016a; Robinson et al. 2019; Rotter & Holeski 2017).	Yes. <i>Amphipyra tragopoginis</i> is a polyphagous pest and is known to affect 30 different host plant genera, including <i>Rosa</i> spp. (Robinson et al. 2019; Vegliante & Zilli 2007). Most of these host plants are present in Australia (APNI 2020). The species is distributed throughout north America and Europe (Crabo et al. 2019; Rotter & Holeski 2017;	Yes. <i>Amphipyra tragopoginis</i> is polyphagous on many plants (Vegliante & Zilli 2007) and larvae feed upon flowers and foliage (Crabo et al. 2019; Rotter & Holeski 2017). This pest is known to attack plants which are economically important in Australia, including <i>Rosa</i> , <i>Rubus</i> , <i>Prunus</i> and <i>Vitis</i> spp. (Flowers Australia 2019; Horticulture Innovation	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Thompson & Nelson 2003; Vegliante & Zilli 2007). Cooler regions of Australia have similar climatic conditions. This species is also thought to have been introduced in northern America (Rotter & Holeski 2017) suggesting it can be considered an invasive species. Therefore, <i>A. tragopoginis</i> has the potential to establish and spread in Australia.	Australia 2019c; Robinson et al. 2019; Vegliante & Zilli 2007). The species is also known as a pest of some nursery crops (Crabo et al. 2019). Other host plants are commonly present and important in the Australian environment such as <i>Quercus</i> , <i>Salix</i> and <i>Populus</i> spp. (APNI 2020). Therefore, <i>A. tragopoginis</i> has the potential to cause negative environmental and economic consequences in Australia.	
<i>Alysina purdii</i> (Fereday, 1883) Synonym: <i>Leucania purdii</i> Fereday, 1883, <i>Tmetolophota purdii</i> (Fereday, 1883) [Noctuidae] The orange astelia wainscot	New Zealand (Beccaloni et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Alysina purdii</i> is associated with foliage of <i>Cordyline</i> spp. (Chappell 1929; Hoare 2009).	Yes. In New Zealand, hosts plants of <i>Alysina purdii</i> include <i>Astelia</i> , <i>Collospermum</i> and <i>Cordyline</i> spp. (Chappell 1929). Regions in Australia have similar climatic conditions to New Zealand, and host plants are present in Australia (APNI 2020). Therefore, <i>A. purdii</i> has the potential to establish and spread in Australia.	Yes. <i>Alysina purdii</i> is known to feed on species of plants within <i>Astelia</i> , <i>Cordyline</i> and <i>Collospermum</i> genera (Chappell 1929; Hoare 2009). These are naturalised or commercially grown plants in Australia (APNI 2020; Thomas & Gollnow 2013). <i>Alysina purdii</i> is part the family Noctuidae which is an important plant pest family due to the voracious appetites of	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					most larvae for foliage (CSIRO 2010). This would lower the quality and saleability of ornamentals and cut foliage of <i>Cordyline</i> spp. Therefore, <i>A. purdii</i> has the potential to cause negative environmental and economic consequences in Australia.	
<i>Aloa lactinea</i> (Cramer, 1777) Synonym: <i>Amsacta lactinea</i> (Cramer, 1777) [Erebidae] Red tiger moth	Bangladesh, India, China, Thailand, Malaysia (Ali et al. 2016), Japan, Indonesia, Sri Lanka, (Beccaloni et al. 2018), Republic of Korea (CABI 2020a) and Taiwan (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Yes. <i>Aloa lactinea</i> is associated with orchids such as <i>Phalaenopsis</i> spp. (Ali et al. 2016; Biosecurity Australia 2010c).	Yes. <i>Aloa lactinea</i> is polyphagous on various flowering plants including bean species, sunflower, <i>Phalaenopsis</i> and <i>Oncidium</i> orchid species (Ali et al. 2016; Gentry 1965), all of which are distributed throughout Australia (APNI 2020). The species is distributed throughout several tropical and subtropical countries in Asia (Gentry 1965), suggesting similar climatic conditions in parts of Australia would be suitable for the pest. Other <i>Aloa</i> spp. are also present in Australia (ABRS 2020), confirming <i>A. lactinea</i> has the	Yes. <i>Aloa lactinea</i> is polyphagous and a known pest of flowering plants and crops such as rice, corn, sunflower, pea, bean species, tea, and cotton (Ali et al. 2016; Gentry 1965; Robinson et al. 2019), plants grown commercially as vegetable and ornamental crops, or are naturalised in Australia (APNI 2020; Brisbane City Council 2018; Horticulture Innovation Australia 2019c). Larvae feed on and damage newly formed soft stem, foliage and flowers. Infestations can lead to plant seedling mortality or lower crop yield in vulnerable crops	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.	species such as peanuts and beans (Ali et al. 2016). This species is an important pest of flowers and foliage in established countries in Asia (Ali et al. 2016). Therefore, <i>A. lactinea</i> has the potential to cause negative economic and environmental and consequences in Australia.	
<i>Aphomia sabella</i> Hampson, 1901 Synonym: <i>Arenipses sabella</i> Hampson, 1901 [Pyralidae] Greater date moth	Algeria, Egypt, Iran, Israel, Iraq, Jordan, Kuwait, Libya, Oman, Saudi Arabia, India and Sudan (Al-Zadjali, Abd-Allah & El-Haidari 2006; Al Antary, Al-Khawaldeh & Ateyyat 2015; Blumberg 2008; Kehat & Amitai 1967; Khairi, Elhassan & Bashab 2010).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Yes. Previously assessed by the department (DAWR 2019d). The host range is restricted to date palm (<i>Phoenix dactylifera</i>) but sometimes Canary Island date palm (<i>P. canariensis</i>) is also attacked (Gerson & Applebaum 2017; Kehat & Greenberg 1969). Both palms are widely distributed, although localised, in drier areas of NT, Qld, SA and WA (APNI 2020). <i>Aphomia sabella</i> is distributed throughout North Africa and the Middle East (Al-Antary, Al-Khawaldeh & Ateyyat 2014), areas with similar	Yes. Previously assessed by the department (DAWR 2019d). Infestation by larvae destroys date fruit. <i>Aphomia sabella</i> is considered a serious economic pest of date palms throughout its native range across north Africa, the Middle East, and northern India (Al-Antary, Al-Khawaldeh & Ateyyat 2014; Carpenter & Elmer 1978). In Iraq, 50% of the spathes and fruit bunches on 70% of the palms in some localities may be damaged (Hussain 1963), while in Iran damage	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				climatic and environmental conditions to Australia. This indicates <i>A. sabella</i> has the potential to establish and spread in Australia.	amounts to 5%–15% of the crop (Gharib 1969). Therefore, <i>A. sabella</i> has the potential to cause negative economic consequences in Australia.	
<i>Archips micaceana</i> Walker, 1862 Synonym: <i>Archips micaceanus</i> Walker, 1863 [Tortricidae]	Malaysia, Singapore, Thailand, Vietnam, Laos and Myanmar (CABI 2020a), China and India (Hua 2005; Wilsterman et al. 2016).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Archips micaceana</i> is associated with foliage of <i>Cordyline</i> , <i>Dracaena</i> , <i>Gerbera</i> , and <i>Helianthus</i> spp. (MPI 2016; Robinson et al. 2019; Wilsterman et al. 2016).	Yes. Previously assessed by the department (Biosecurity Australia 2011a; DAWR 2016d). <i>Archips micaceana</i> larvae feed on a wide range of plants including eucalyptus, grapes, lychee, citrus, mango, soybean, tea, pineapple, strawberry and groundnut which are present in Australia (Biosecurity Australia 2011a). Many parts of Australia have similar climates to the native countries of <i>A. micaceana</i> (Biosecurity Australia 2011a). Therefore, <i>A. micaceana</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2011a; DAWR 2016d). <i>Archips micaceana</i> has caused damage to grapevines at Bangalore and Mysore in India (Puttarudriah, Kataoihallimath & Chandrasekhar 1961). This leafroller is polyphagous and causes considerable damage to eucalyptus seedlings (Biosecurity Australia 2011a; Maddison 1993a). Additionally, heavy infestations cause defoliation. Crop losses of up to 30% have been observed in Thailand peanuts, and larvae are known to bore into fruits (Wilsterman et al. 2016). Therefore, <i>A. micaceana</i> has the potential to cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					negative economic and environmental consequences in Australia.	
<i>Archips rosana</i> (Linnaeus, 1758) Synonym: <i>Archips rosanus</i> (Linnaeus, 1758) [Tortricidae] European Leaf-roller	USA, Belgium, France, Greece, Italy, the Netherlands, Spain, Switzerland, UK (CABI 2020a; GBIF Secretariat 2017) and Portugal (Karsholt & Nieukerken 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Archips rosana</i> is associated with flowers and foliage of <i>Rhododendron</i> and <i>Rosa</i> spp. (Meijerman & Ulenberg 2016; PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2010b). <i>Archips rosana</i> has a wide host range distributed across Europe and found in localised environments in North America similar to those in Australia, suggesting the potential for establishment and spread of this pest in Australia (Biosecurity Australia 2010b).	Yes. Previously assessed by the department (Biosecurity Australia 2010b). Surface feeding damage to young fruit may result in reduced marketability (Biosecurity Australia 2010b). Therefore, <i>Archips rosana</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Argyrotaenia franciscana</i> (Walsingham, 1879) Synonym: <i>Argyrotaenia citrana</i> Fernald, 1889 [Tortricidae] Orange tortrix	USA (CABI 2020a; Gilligan & Epstein 2014) and Mexico (EPPO 2020).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Argyrotaenia franciscana</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. Previously assessed by the department (Biosecurity Australia 2010b) as <i>Argyrotaenia citrana</i> . <i>Argyrotaenia franciscana</i> has a wide host range and is present in USA and Mexico, suggesting the potential for establishment and spread of <i>A. franciscana</i> in Australia (Biosecurity Australia 2010b).	Yes. Previously assessed by the department (Biosecurity Australia 2010b). <i>Argyrotaenia franciscana</i> larvae feed on leaves, buds, and the surface of fruit, causing severe damage, as well as contamination with their excrement, resulting in unmarketable fruit. Low populations can cause significant damage (Biosecurity Australia 2010b). Therefore, <i>A.</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					<i>franciscana</i> has the potential to cause negative economic consequences in Australia.	
<i>Artitropa comus</i> (Stoll, 1782) Synonym: <i>Artitropa comus</i> (Cramer, 1782) [Hesperiidae] Skipper butterfly	Africa, including Kenya, Tanzania, Zimbabwe and South Africa (Beccaloni et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Artitropa comus</i> is associated with foliage of <i>Dracaena</i> spp. (MPI 2016; Robinson et al. 2019).	Yes. <i>Artitropa comus</i> attacks <i>Dracaena</i> spp. (MAF 2002; Robinson et al. 2019) which are present in Australia (APNI 2020). The species is distributed throughout the Afrotropical region (Cock, Congdon & Collins 2015) which has similar climatic conditions to regions in Australia. Therefore, <i>A. comus</i> has the potential to establish and spread in Australia.	Yes. <i>Artitropa comus</i> attacks <i>Dracaena</i> spp. (Cock, Congdon & Collins 2015) which are commercially grown or naturalised in Australia (Thomas & Gollnow 2013; Williams 2019a). Adults feed on flowers, while larvae damage and feed on younger plants and foliage (Cock, Congdon & Collins 2015; Williams 2019a). Therefore, <i>A. comus</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Astrogenes chrysograptus</i> Meyrick, 1921 [Tineidae]	New Zealand (Beccaloni et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Astrogenes chrysograptus</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Astrogenes chrysograptus</i> attacks <i>Cordyline indivisa</i> and has been reared on <i>C. australis</i> (Guthrie 2008). The latter is present in Australia (APNI 2020). The species is only found in mountainous areas of	Yes. <i>Astrogenes chrysograptus</i> attacks <i>Cordyline</i> spp. (Guthrie 2008) which are distributed throughout the Australian environment (APNI 2020). The pest mines inside <i>Cordyline</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				New Zealand (Guthrie 2008) which has similar climatic conditions to regions in Australia. Therefore, <i>A. chrysograpt</i> has the potential to establish and spread in Australia.	inflorescence tissue (Guthrie 2008) which would reduce aesthetic value and plant health. Therefore, <i>A. chrysograpt</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Astrogenes insignita</i> Philpott, 1930 [Tineidae]	New Zealand (Beccaloni et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Astrogenes insignita</i> is associated with <i>Cordylina indivisa</i> (Guthrie 2008).	Yes. <i>Astrogenes insignita</i> is an abundant pest of <i>Cordylina indivisa</i> (Guthrie 2008). Many <i>Cordylina</i> species are present in Australia, providing potential hosts (APNI 2020). The species is only found in New Zealand's North Island (Guthrie 2008) where climatic conditions are similar to Australia. Therefore, <i>A. insignita</i> has the potential for to establish and spread in Australia.	Yes. <i>Astrogenes insignita</i> attacks <i>Cordylina</i> spp. (Guthrie 2008) which are distributed throughout the Australian environment (APNI 2020). <i>Astrogenes</i> spp. mine inside <i>Cordylina</i> inflorescence tissue (Guthrie 2008) which would reduce aesthetic value. Therefore <i>A. insignita</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Autographa gamma</i> (Linnaeus, 1758) [Noctuidae]	Belgium, France, Greece, Iceland, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), China,	No record found (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	<i>Autographa gamma</i> is associated with <i>Rhododendron</i> , <i>Dianthus</i> , <i>Chrysanthemum</i> and	Yes. <i>Autographa gamma</i> is polyphagous, known to feed on over 200 plant species belonging to 26 plant families (Robinson	Yes. <i>Autographa gamma</i> is considered a polyphagous defoliator of cultivated plants (Noma et al. 2010). The species	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Beet worm	India, Iran, Israel, Japan, Saudi Arabia, Egypt, Morocco, UK (CABI 2020a), Ethiopia and United Arab Emirates (De Prins & De Prins 2018).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Pelagronium</i> spp. (Alford 2012). Species intercepted at Australian points of entry on cut flower and foliage consignments and confirmed with DNA testing (unpublished data).	et al. 2019; Vegliante & Zilli 2007). Hosts include <i>Rhododendron</i> , <i>Dianthus</i> , <i>Chrysanthemum</i> , <i>Pelagronium</i> , <i>Daucus</i> , <i>Zea</i> , <i>Gossypium</i> , <i>Brassica</i> , <i>Vitis</i> , <i>Phaseolus</i> , <i>Allium</i> , <i>Lactuca</i> , <i>Pisum</i> , <i>Capsicum</i> , <i>Solanum</i> , <i>Helianthus</i> , <i>Ribes</i> , <i>Rosa</i> and <i>Lycopersicon</i> spp. (Alford 2012; CABI 2020a; Robinson et al. 2019; Venette et al. 2003), all present throughout Australia (APNI 2020). The species is distributed throughout Europe, North Africa and Asia (Noma et al. 2010), regions where climatic conditions are similar to parts of Australia. The pest is also capable of long distance dispersal (Venette et al. 2003). Therefore, <i>A. gamma</i> has the potential to establish and spread in Australia.	causes major damage to plants such as rhododendron, carnation, rose, chrysanthemum, maize, cotton, <i>Brassica</i> spp., alliums, grapes, capsicums, potato, tomato and beans (Alford 2012; Venette et al. 2003), which are economically important vegetable or ornamental crops in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). Therefore, <i>A. gamma</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Brithys crini</i> (Fabricius 1775) [Noctuidae]	China, India, Indonesia, Taiwan (CABI 2020a), Kenya, Madagascar, Malawi, Mauritius, South Africa, Tanzania,	Present, NSW, Qld, NT and WA (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	<i>Brithys crini</i> is associated with <i>Lilium</i> spp. cut flowers (DAFF 2013d).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Lily Borer	Zimbabwe (De Prins & De Prins 2018), France, Greece, Italy, Portugal and Spain (Karsholt & Nieukerken 2019).					
<i>Cacoecimorpha pronubana</i> Hübner 1799 [Tortricidae] Carnation tortrix mot	Japan (Ali et al. 2016), Israel, Morocco, South Africa, USA, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland and UK (CABI 2020a; Karsholt & Nieukerken 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Cacoecimorpha pronubana</i> is associated with <i>Dianthus</i> , <i>Chrysanthemum</i> , <i>Rhododendron</i> and <i>Rosa</i> spp. (Ali et al. 2016; Biosecurity Australia 2005a; OGTR 2006; PHA 2016a).	Yes. <i>Cacoecimorpha pronubana</i> is highly polyphagous, attacking 35 species from 25 different plant families (Robinson et al. 2019; Van De Vrie 1991) including olives, <i>Acacia</i> , <i>Azalea</i> , <i>Solanum</i> , <i>Phaseolus</i> , <i>Dianthus</i> , <i>Chrysanthemum</i> , <i>Rhododendron</i> , <i>Rosa</i> , <i>Citrus</i> , <i>Euphorbia</i> , <i>Malus</i> , <i>Prunus</i> , <i>Rubus</i> , <i>Acacia</i> and <i>Brassica</i> spp. (PHA 2016a; Van De Vrie 1991). This pest is distributed throughout Europe, USA, parts of Africa and Asia (CABI 2020a; Karsholt & Nieukerken 2019), regions where climatic conditions are similar to parts of Australia. The larvae quickly moves to, or are carried in the wind to young growing points or flowers, while adults	Yes. <i>Cacoecimorpha pronubana</i> is highly polyphagous, attacking 35 species from 25 different plant families (Robinson et al. 2019; Van De Vrie 1991), which are economically important vegetable or ornamental crops in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). Most economic damage by <i>Cacoecimorpha pronubana</i> occurs on ornamental flowering plants due to feeding behaviour. Larvae are voracious feeders, attacking foliage, flowers and fruits (Meijerman & Ulenberg 2016). Serious damage has caused crop losses on carnation crops in the Mediterranean region since 1920s, while	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				fly locally (Biosecurity Australia 2005a; Van De Vrie 1991). Therefore, <i>C. pronubana</i> has the potential for establishment and spread in Australia.	in France, from 1972-1973, 25%-35% of carnation crops were lost (Van De Vrie 1991). Therefore, <i>C. pronubana</i> species has the potential to cause negative economic impact in Australia.	
<i>Cadra cautella</i> (Walker, 1863) [Pyralidae] Dried currant moth	Cosmopolitan (Beccaloni et al. 2018), Iran, Sri Lanka, UK, USA (Herbison-Evans & Crossley 2019), Afghanistan, China, India, Indonesia, Israel, Japan, Republic of Korea, Lebanon, Malaysia, Nepal, Pakistan, Philippines, Saudi Arabia, Singapore, Taiwan, Thailand, Vietnam, Egypt, Ethiopia, Kenya, Malawi, Morocco, South Africa, Argentina, Colombia, Ecuador, Peru, Belgium, France, Greece, Italy, Portugal, Spain, Switzerland and New Zealand (CABI 2020a).	Present, NT, Qld, NSW, Vic., Tas., SA and WA (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Catamacta lotinana</i> Meyrick, 1883 [Tortricidae]	New Zealand (Guthrie 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Catamacta lotinana</i> is associated with foliage of <i>Cordyline</i> (Guthrie 2008; MPI 2016).	Yes. <i>Catamacta lotinana</i> is a pest of <i>Cordyline</i> spp. which are present in Australia as ornamental plants (APNI 2020;	Yes. <i>Catamacta lotinana</i> host plants, <i>Cordyline</i> spp. are distributed throughout the Australian environment often as	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Guthrie 2008; Thomas & Gollnow 2013). It is found throughout New Zealand (Guthrie 2008), where climatic conditions are similar to regions in Australia. Therefore, <i>C. lotinana</i> has the potential to establish and spread in Australia.	garden plants (APNI 2020). <i>C. lotinana</i> larvae attacks <i>Cordyline</i> spp. by mining into the fleshy part of the underside of <i>Cordyline</i> leaves, resulting in brown mining patterns (Guthrie 2008). This reduces the quality and appearance of the ornamental plant species (Thomas & Gollnow 2013). Therefore, <i>C. lotinana</i> has the potential to cause negative economic consequences in Australia.	
<i>Chlenias auctaria</i> Guenée, 1858 [Geometridae]	Australia (ABRS 2019).	Present, Qld, NSW, Vic, Tas. and SA (ABRS 2020; CSIRO 2018; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Chliaria othona</i> (Hewitson, 1865) Misspelling: <i>Chliaria orthona</i> Synonym: <i>Hypolycaena othona</i> Hewitson, 1865 [Lycaenidae] Orchid tit	India (Kasambe 2016), Malaysia, Indonesia (Fiedler 1992), Thailand and Nepal (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Chliaria othona</i> is associated with <i>Phaius</i> , <i>Dendrobium</i> , <i>Oncidium</i> and <i>Phalaenopsis</i> spp. orchids (MPI 2017; PHA 2016a).	Yes. <i>Chliaria othona</i> is known to feed on plants from the Orchidaceae family (Fiedler 1992; Robinson et al. 2019) which are present throughout Australia (APNI 2020). The species is present in India, Thailand, Malaysia and	Yes. <i>Chliaria othona</i> feeds on orchid species (Fiedler 1992) which are naturalised or commercially grown in Australia (Flowers Australia 2019; PHA 2016a; Robinson et al. 2019; Thomas & Gollnow 2013). Larvae cause	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Indonesia, where similar climatic conditions to Australia exist. Therefore, <i>C. othona</i> has the potential for establishment and spread in Australia.	significant damage by boring into and hollowing out flower buds, unripe seed pods and stems (Fiedler 1992). Pupation and oviposition on flowers also cause damage (Fiedler 1992), reducing the quality of flowers and result in crop loss. Therefore, <i>C. othona</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Choristoneura orae</i> Freeman, 1967 [Tortricidae] Spruce budworm	USA (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Yes. Known hosts of <i>Choristoneura orae</i> include <i>Abies</i> and <i>Picea</i> spp. (Robinson et al. 2019) which are present in Australia (APNI 2020). The species is present in North America where climatic conditions are similar to regions in Australia. Therefore, <i>C. orae</i> has the potential to establish and spread in Australia.	No. <i>Choristoneura orae</i> is known to feed on spruce and fir trees (Robinson et al. 2019), which are landscape plants in Australia (APNI 2020). <i>Choristoneura</i> larvae feed on leaves, buds, and small fruit, causing partial defoliation, and they spin silk to roll leaves together (Berry 1998). Therefore, <i>C. orae</i> has the potential to cause negative environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Choristoneura rosaceana</i> Harris, 1841 [Tortricidae] Oblique-banded leaf roller	USA and Mexico (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020), Vic. (DEDJTR 2017).	<i>Choristoneura rosaceana</i> is associated with foliage of <i>Rosa</i> and <i>Dianthus</i> spp. (OGTR 2006; PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2010b). <i>Choristoneura rosaceana</i> has a wide host range, distributed across North America with similar environments to Australia, suggesting the potential for establishment and spread of this pest (Biosecurity Australia 2010b).	Yes. Previously assessed by the department (Biosecurity Australia 2010b). The fruit are scarred and distorted by early feeding, reducing marketability. Fruit contamination during harvesting can lead to further economic losses (Biosecurity Australia 2010b). Therefore, <i>C. rosaceana</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Chrysodeixis acuta</i> (Walker, 1858) [Noctuidae] Tomato semi-looper	Ethiopia, India, UK (Herbison-Evans & Crossley 2019), France (Karsholt & Nieukerken 2019), Afghanistan, Indonesia, Japan, Nepal, Vietnam, Kenya, Madagascar, Malawi, South Africa, Tanzania, Uganda, Zimbabwe, Spain and Fiji (CABI 2020a).	Present, NT, QLD and NSW (Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments and confirmed with DNA sequencing (unpublished data).	Assessment not required	Assessment not required	No
<i>Chrysodeixis chalcites</i> (Esper 1789) [Noctuidae]	Kenya (Letter from KEPHIS on 29/01/2018), India, Iran, Israel, Lebanon, Egypt, Madagascar, Malawi,	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Chrysodeixis chalcites</i> is associated with foliage of <i>Cordyline</i> and <i>Dracaena</i> spp. (MPI 2016).	Yes. Previously assessed by the department (DAFF 2003). <i>Chrysodeixis chalcites</i> has a wide host range of commercial	Yes. Previously assessed by the department (DAFF 2003). Larvae feed on tomato leaves and make holes in fruit and foliage	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Golden twin-spot moth	Mauritius, Morocco, South Africa, Uganda, Zimbabwe, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, UK (CABI 2020a) and New Zealand (MAF 2002).	Declared pest, prohibited entry into WA (Government of Western Australia 2020)		crops readily available in Australia. It is well known as a migratory species and would spread readily within Australia (DAFF 2003).	(McDougall et al. 2013). Therefore, <i>C. chalcites</i> has the potential to cause negative economic consequences in Australia.	
<i>Chrysodeixis eriosoma</i> (Doubleday, 1843) [Noctuidae] Green looper caterpillar	China, India, New Zealand, Papua New Guinea, South Africa (CSIRO 2018), Cambodia, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam, USA, Fiji, Tonga (CABI 2020a), Taiwan and Pakistan (GBIF Secretariat 2017).	Present, ACT, NSW, NT, Qld, SA, Tas., Vic. and WA (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Assessment not required	Assessment not required	No
<i>Chrysodeixis includens</i> (Walker, 1857) Synonym: <i>Pseudoplusia includens</i> (Walker, 1857) [Noctuidae] Soybean looper	USA, Argentina, Chile, Colombia, Ecuador, Peru, Virgin Islands (CABI 2020a; EPPO 2015a) and Mexico (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020). Note: CABI (2020a) record is considered an error since species is not mentioned in the citation provided (EPPO 2015b).	<i>Chrysodeixis includens</i> is associated with foliage of <i>Dianthus</i> , <i>Helianthus</i> , <i>Chrysanthemum</i> and <i>Geranium</i> spp. (Carter & Gillett-Kaufman 2017; EPPO 2015a).	Yes. <i>Chrysodeixis includens</i> is highly polyphagous and known to feed on 174 species within 39 plant families (Carter & Gillett-Kaufman 2017), of which many are present throughout Australia (APNI 2020; Carter & Gillett-Kaufman 2017). This species is established in areas with similar climatic conditions to Australian	Yes. <i>Chrysodeixis includens</i> attacks many vegetable and ornamental crops including peanut, cotton, corn, sweet potatoes, tomatoes, capsicum, cucumber, peas, carnation, watermelon, geranium, chrysanthemum and sunflower (Carter & Gillett-Kaufman 2017) which are economically important in Australia	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				regions. Therefore, <i>C. includens</i> has the potential to establish and spread in Australia.	(Flowers Australia 2019; Horticulture Innovation Australia 2019c). Heavy infestations cause total defoliation in vulnerable crops (EPPO 2015a). Therefore, <i>C. includens</i> has the potential to cause negative economic consequences in Australia.	
<i>Clepsia spectrana</i> Treitschke, 1835 [Tortricidae] Cyclamen tortrix	Widespread in Europe, UK (Kimber 2019), Belgium, France, Italy, Portugal, Switzerland, the Netherlands and Spain (Karsholt & Nieukerken 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Clepsia spectrana</i> is associated with flowers and foliage of <i>Rosa</i> , <i>Cyclamen</i> , <i>Iris</i> , <i>Rhododendron</i> and <i>Dianthus</i> spp. (Alford 2012; Van De Vrie 1991). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Yes. <i>Clepsia spectrana</i> is polyphagous on a range of plant hosts, including fruit and flower species such as <i>Malus</i> , <i>Pyrus</i> , <i>Fragaria</i> , <i>Iris</i> , <i>Gerbera</i> , <i>Rosa</i> , <i>Alstroemeria</i> , <i>Begonia</i> , <i>Dianthus</i> and <i>Rhododendron</i> spp. (Alford 2012; Meijerman & Ulenberg 2016; Van De Vrie 1991), all present throughout Australia (APNI 2020). As a greenhouse pest (Van De Vrie 1991), this species is established in areas with similar climatic conditions to Australian regions. Therefore, <i>C. spectrana</i> has the potential to establish and spread in Australia.	Yes. <i>Clepsia spectrana</i> attacks many fruit and ornamental plants (Meijerman & Ulenberg 2016) which are economically important in Australia (Horticulture Innovation Australia 2019c). On apple and pear, larvae attack foliage (Meijerman & Ulenberg 2016). In greenhouses, larvae destroy flowers and flower buds, and cause considerable damage to plants such as roses, carnation, cyclamen and gerbera (Alford 2012; Van De Vrie 1991). Therefore, <i>C. spectrana</i> has the potential to cause negative economic	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Cnaemidophorus rhododactyla</i> (Denis & Schiffermüller, 1775) Synonym: <i>Platyptilia koreana</i> Matsumura [Pterophoridae] Rose plume moth	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), USA (Lotts & Naberhaus 2018), UK (Kimber 2019) and Iran (Alipanah & Gielis 2010).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Cnaemidophorus rhododactyla</i> is associated with <i>Rosa</i> spp. (PHA 2016a; Robinson et al. 2019)	Yes. <i>Cnaemidophorus rhododactyla</i> attacks <i>Rosa</i> spp. (Özbek 2008) which are present throughout Australia (APNI 2020; Thomas & Gollnow 2013). The species is distributed throughout north America, Europe and Asia (Özbek 2008) which have similar climatic conditions to regions in Australia. Therefore, <i>C. rhododactyla</i> has the potential to establish and spread in Australia.	consequences in Australia. Yes. <i>Cnaemidophorus rhododactyla</i> feeds on roses (Özbek 2008), which are economically important ornamental and floriculture species in Australia (Flowers Australia 2019). Özbek (2008) reported larvae feeding on rose buds could result in 60% bud damage. Therefore, <i>C. rhododactyla</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Cochylis caulocatax</i> Razowski, 1984 [Tortricidae]	USA and Venezuela (Lotts & Naberhaus 2018; Pogue & Friedlander 1987).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Cochylis caulocatax</i> is associated with leaves, stem and flowers of <i>Eustoma</i> spp. (PHA 2016a; Robinson et al. 2019).	Yes. <i>Cochylis caulocatax</i> is only known to feed on <i>Eustoma</i> spp. and possibly other genera in the family Gentianaceae (Pogue & Friedlander 1987), plants which are present in Australia (APNI 2020). The species is present in the USA which has similar climatic conditions to regions in Australia. Therefore, <i>C. caulocatax</i> has the	Yes. <i>Cochylis caulocatax</i> is known to attack <i>Eustoma</i> spp. (Pogue & Friedlander 1987), an important floriculture species in Australia (Thomas & Gollnow 2013). Emergence of the adult moth leaves a tunnel in flowers and larval damage is apparent (Pogue & Friedlander 1987). This behaviour would reduce aesthetic value of <i>Eustoma</i> flowers.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				potential to establish and spread in Australia.	Therefore, <i>C. caulocatax</i> has the potential to cause negative economic consequences in Australia.	
<i>Coleophora dianthi</i> Herrich-Schäffer, 1855 [Coleophoridae]	France, Greece, Italy, Spain, Switzerland (Karsholt & Nieukerken 2019) and Portugal (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Coleophora dianthi</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. <i>Coleophora dianthi</i> only attacks <i>Dianthus</i> spp., (Robinson et al. 2019) which are present in Australia (APNI 2020). The species is distributed throughout Europe where climatic conditions are similar to regions in Australia. Therefore, <i>C. dianthi</i> has the potential to establish and spread in Australia.	Yes. <i>Coleophora dianthi</i> attacks <i>Dianthus</i> spp., which are commercially important ornamental and floriculture plants in Australia (Flowers Australia 2019). Larvae are often found together in mature flowers, feeding on ripening seeds and damaging flowers in the process (Ellis 2019). Therefore, <i>C. dianthi</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Coleophora gryphipennella</i> Hübner, 1796 [Coleophoridae] Rose Case-bearer	Belgium, France, Italy, Portugal, Switzerland, the Netherlands (Karsholt & Nieukerken 2019) and UK (Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Coleophora gryphipennella</i> is associated with foliage of <i>Rosa</i> spp. (PHA 2016a; van Roosmalen & Doorenweerd 2015).	Yes. <i>Coleophora gryphipennella</i> is a pest of the Rosaceae family, including <i>Rosa</i> , <i>Rubus</i> and <i>Fragaria</i> spp. (van Roosmalen & Doorenweerd 2015), plants present throughout Australia (APNI 2020; Flowers Australia 2019). van Roosmalen and	Yes. <i>Coleophora gryphipennella</i> feeds and completes its lifecycle on <i>Rosa</i> and <i>Fragaria</i> (wild strawberry) species (van Roosmalen & Doorenweerd 2015). Larvae mine through foliage, creating brown flecks or windows in the leaves, reducing the visual quality of host	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Doorenweerd (2015) also stated that <i>Fragaria vesca</i> is probably an adapted plant host. This suggests <i>C. gryphipennella</i> is capable of adapting to other host plants in the Rosaceae family when preferred hosts are not available. The species is distributed throughout Europe which has similar climatic conditions to regions in Australia. Therefore, <i>C. gryphipennella</i> has the potential to establish and spread in Australia.	plants (van Roosmalen & Doorenweerd 2015), which would reduce the marketability of ornamental and floriculture plants. Therefore, <i>C. gryphipennella</i> has the potential to cause negative economic consequences in Australia.	
<i>Coleophora potentillae</i> Elisha, 1885 [Coleophoridae] Shaded Case-bearer	Belgium, France, the Netherlands (Karsholt & Nieukerken 2019) and UK (Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Coleophora potentillae</i> is associated with <i>Rosa</i> spp. foliage (Alford 2012; PHA 2016a).	Yes. <i>Coleophora potentillae</i> feeds on hosts from the Rosaceae family. Known hosts include <i>Rosa</i> , <i>Potentilla</i> , <i>Rubus</i> and <i>Fragaria</i> (Alford 2012), which are present throughout Australia (APNI 2020). The species is distributed throughout Europe where climatic conditions are similar to regions in Australia. Therefore <i>C. potentillae</i> has the potential to	Yes. <i>Coleophora potentillae</i> is a pest of ornamental trees, shrubs and flowers, such as roses, strawberry, and <i>Rubus</i> spp. (Alford 2012), naturalised or economically important plants in Australia (Alford 2012; Flowers Australia 2019; Horticulture Innovation Australia 2019c). Larvae mine through foliage, causing small brown blotch mines in the leaves (Alford	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				establish and spread in Australia.	2012), consequently reducing the aesthetics and value of floriculture plants. Therefore, <i>C. potentillae</i> has the potential to cause negative economic consequences in Australia.	
<i>Coleophora rosacella</i> Clemens, 1864 [Coleophoridae] Tubular leaf case-bearer	USA (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Coleophora rosacella</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Coleophora rosacella</i> is known to attack <i>Rosa</i> spp. and is distributed throughout the Nearctic region (Bucheli, Landry & Wenzel 2002). Roses are widely present in Australia (APNI 2020), and similar climatic conditions to USA exist in Australia. Therefore, <i>C. rosacella</i> has the potential to establish and spread in Australia.	Yes. <i>Coleophora rosacella</i> is a pest of roses which are important ornamental and floriculture plants in Australia (Bucheli, Landry & Wenzel 2002; Horticulture Innovation Australia 2019c). This particular species feeds on rose buds (Bucheli, Landry & Wenzel 2002), leading to damage of the flower and reduction in quality and marketability of the plants. Therefore, <i>C. rosacella</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Coleophora rosaefoliella</i> Clemens, 1864 [Coleophoridae]	USA (Beccaloni et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Coleophora rosaefoliella</i> is associated with <i>Rosa</i> spp. (PHA 2016a)	Yes. <i>Coleophora rosaefoliella</i> is known to feed on <i>Rosa</i> spp. and is distributed throughout the Nearctic region (Pohl	Yes. <i>Coleophora rosaefoliella</i> is a pest of roses which are important ornamental and floriculture plants in	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Case-bearer moth				et al. 2005). Roses are widely present as naturalised and commercial plants (APNI 2020), and similar climatic conditions to USA exist in Australia. Therefore, <i>C. rosaefoliella</i> has the potential to establish and spread in Australia.	Australia (Horticulture Innovation Australia 2019c; Pohl et al. 2005). Larvae feed on foliage, causing small brown blotch mines in the leaves (Pohl et al. 2005; van Roosmalen & Doorenweerd 2015). This would reduce the value and marketability of roses. Therefore, <i>C. rosaefoliella</i> has the potential to cause negative economic consequences in Australia.	
<i>Copitarsia corruda</i> Pogue and Simmons 2008 [Noctuidae]	Mexico, Colombia, Ecuador and Peru (Pogue & Simmons 2008).	No record found (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	<i>Copitarsia corruda</i> is associated with <i>Iris</i> spp. (Pogue & Simmons 2008). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Yes. <i>Copitarsia corruda</i> is polyphagous and known to attack <i>Aster</i> , <i>Iris</i> and <i>Asparagus</i> spp. (Pogue & Simmons 2008) which are present in Australia (APNI 2020). The species is distributed in Mexico, Colombia, Ecuador and Peru (Pogue & Simmons 2008) where climatic conditions are similar to parts of Australia. Therefore, <i>C. corruda</i> has the potential to establish and spread in Australia.	Yes. <i>Copitarsia corruda</i> feeds on <i>Aster</i> , <i>Iris</i> and <i>Asparagus</i> spp. (Pogue & Simmons 2008), which are naturalised or economically important plants in Australia (Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). <i>Copitarsia</i> spp. are agricultural pests of many crops in South America and larvae are often found on cut flowers (Pogue & Simmons 2008). <i>Copitarsia</i> larvae feeding	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					behaviour causes damage to fruit, foliage, and florets of host plants (Cardon, Londono & Jaramillo 2004; EPPO 2015b; Venette & Gould 2006). Therefore <i>C. corruda</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Copitarsia decolora</i> Guenée, 1852 Synonym: <i>Copitarsia heydenreichii</i> (Freyer, 1851), <i>Copitarsia turbata</i> Herric-Shaffer, 1852, [Noctuidae]	Colombia, Mexico, Chile, Argentina, Ecuador and Peru (Simmons & Pogue 2004).	No record found (ABRS 2020; Gould, Simmons & Venette 2010). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data). It is associated with foliage and above ground parts of <i>Alstroemeria</i> and <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Copitarsia decolora</i> is polyphagous and known hosts include mixed cut flowers and plant species from 15 families (Simmons & Scheffer 2004) which are present in Australia (APNI 2020). The species is distributed from Central to South America (Simmons & Scheffer 2004), where climatic conditions are similar to Australia. Therefore, <i>C. decolora</i> has the potential to establish and spread in Australia.	Yes. <i>Copitarsia</i> larva feeding behaviour causes damage to fruit, foliage, and florets of host plants, while boring in thicker non-woody tissues has also been observed (Cardon, Londono & Jaramillo 2004; EPPO 2015b; Venette & Gould 2006). <i>Copitarsia</i> spp. reduced marketability of some vegetable crops including artichokes by 24%-54%, and quinoa yields by 80%-90% in South America (Simmons & Pogue 2004; Venette & Gould 2006). In its native area, damage by <i>Copitarsia</i> larvae reduces	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					the quality and yield of crops, affecting export markets since the consumed parts of fruit and vegetables are affected (Venette & Gould 2006). Due to polyphagy, environmental impact is also anticipated due to possible feeding on native plants (Venette & Gould 2006). Therefore, <i>C. decolora</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Copitarsia incommoda</i> Walker, 1865 Synonym: <i>Copitarsia consueta</i> (Walker, 1857) [Noctuidae]	Chile, Colombia, Peru, Argentina and Ecuador (Simmons & Pogue 2004).	No record found (ABRS 2020; Gould, Simmons & Venette 2010). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Copitarsia incommoda</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. <i>Copitarsia incommoda</i> is known to feed on <i>Asparagus</i> , <i>Dianthus</i> , <i>Solanum</i> and <i>Nicotiana</i> spp. (Robinson et al. 2019; Simmons & Pogue 2004) which are all present in Australia (APNI 2020). The species is distributed in South American countries where climatic conditions are similar to Australia. Therefore, <i>C. incommoda</i> has the potential to	Yes. Some host plants are still unclear for <i>Copitarsia incommoda</i> due to historic taxonomic confusion (Peña 2013). <i>Copitarsia</i> larva feeding behaviour causes damage to fruit, foliage, and florets host plants, while boring in thicker non-woody tissues has also been observed (Cardon, Londono & Jaramillo 2004; EPPO 2015b; Venette & Gould 2006). <i>Copitarsia</i> spp. reduced	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				establish and spread in Australia.	marketability of some vegetable crops including artichokes by 24%-54%, and quinoa yields by 80-90% in South America (Simmons & Pogue 2004; Venette & Gould 2006). Damage caused by <i>Copitarsia</i> spp. lowers quality and yield of crops, affecting export market since the consumed parts of fruit and vegetables are affected (Venette & Gould 2006). Due to uncertainty about host plants and polyphagy, environmental consequences are also anticipated due to possible feeding on native plants in Australia (Venette & Gould 2006).	
<i>Crocallis elinguaris</i> (Linnaeus, 1758) [Geometridae] Scalloped oak moth	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands, UK (Karsholt & Nieukerken 2019) and Japan (Stadie & Fiebig 2014).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Crocallis elinguaris</i> is associated with foliage of <i>Rosa</i> spp. (Alford 2012; PHA 2016a).	Yes. <i>Crocallis elinguaris</i> is polyphagous and known plant hosts from 11 plant families include <i>Malus</i> , <i>Quercus</i> , <i>Betula</i> , <i>Calluna</i> , <i>Lonicera</i> , <i>Populus</i> , <i>Prunus</i> , <i>Ribes</i> , <i>Rosa</i> , <i>Rubus</i> , <i>Salix</i> , <i>Sorbus</i> , <i>Syringa</i> , <i>Tilia</i> and <i>Vaccinium</i> spp., which are present in Australia (Alford 2012; APNI 2020;	Yes. <i>Crocallis elinguaris</i> is known to attack foliage of crops such as rose, <i>Prunus</i> , <i>Rubus</i> , <i>Malus</i> , <i>Quercus</i> and <i>Vaccinium</i> spp. (Alford 2012; Stadie & Fiebig 2014), naturalised or economically important plants in Australia (Horticulture Innovation	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Robinson et al. 2019; Stadie & Fiebig 2014). The pest is distributed throughout Europe and Japan (Stadie & Fiebig 2014), areas where climatic conditions are similar to Australia. Therefore, <i>C. elinguarina</i> has the potential to establish and spread in Australia.	Australia 2019c). Larval damage on ornamental host plants may reduce value and marketability. Therefore, <i>C. elinguarina</i> has the potential to cause negative economic consequences in Australia.	
<i>Cyligramma latona</i> (Cramer, 1775) [Erebidae]	Widespread across Africa and the Middle East, including Angola, Botswana, The Democratic Republic of Congo, Egypt, Ethiopia, Gambia, Ghana, Kenya, Malawi, Mozambique, South Africa, Uganda and Zimbabwe (De Prins & De Prins 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Yes. <i>Cyligramma latona</i> larvae are polyphagous, known to feed on <i>Acacia</i> spp., in addition to <i>Entada abyssinica</i> and <i>Malus pumila</i> (Robinson et al. 2019). For the exception of <i>Entada abyssinica</i> , these plant species are widespread in Australia (APNI 2020). The species is present in areas of Africa and the Middle East (De Prins & De Prins 2018), where climatic conditions are similar to parts of Australia. Therefore, <i>C. latona</i> has the potential to establish and spread in Australia.	Yes. <i>Cyligramma latona</i> larvae are polyphagous, known to feed on <i>Acacia</i> spp., in addition to <i>Entada abyssinica</i> and <i>Malus pumila</i> (Robinson et al. 2019). Both, <i>Acacia</i> spp. and <i>Malus pumila</i> are endemic and economically important plants to Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>C. latona</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p><i>Danaus chrysippus</i> subsp. <i>dorippus</i> (Klug, 1845)</p> <p>Synonym: <i>Danaus (Anosia) chrysippus ssp. dorippus</i> (Klug, 1845), <i>Danaus dorippus</i> (Klug, 1845)</p> <p>[Nymphalidae]</p> <p>African monarch</p>	Kenya, Ethiopia, Malawi, Uganda, South Africa, Tanzania, Sri Lanka, Iran, Pakistan, India, Singapore and Indonesia (Braby et al. 2015; GBIF Secretariat 2017; Williams 2019b).	No record found (ABRS 2020; Braby et al. 2015).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	<p>Yes. <i>Danaus chrysippus</i> subsp. <i>dorippus</i> is polyphagous on host plants in the Asclepiadaceae (milkweed) family which are present in Australia (Herbison-Evans & Crossley 2019; Williams 2019b). <i>Danaus chrysippus</i> subsp. <i>dorippus</i> is distributed in Asia and the Afrotropical regions (Braby et al. 2015; Williams 2019b) where climatic conditions are similar to Australia. Previously, other <i>Danaus</i> spp. have been introduced and established in Australia (Herbison-Evans & Crossley 2019). Therefore, <i>Danaus chrysippus</i> subsp. <i>dorippus</i> has the potential to establish and spread in Australia.</p>	<p>Yes. <i>Danaus chrysippus</i> subsp. <i>dorippus</i> larvae feed on foliage of plants in the family Asclepiadaceae (Herbison-Evans & Crossley 2019; Williams 2019b), which are commonly found in Australia (APNI 2020). Therefore, <i>Danaus chrysippus</i> subsp. <i>dorippus</i> has the potential to cause negative environmental consequences in Australia.</p>	Yes
<p><i>Darna pallivitta</i> (Moore, 1877)</p> <p>Synonym: <i>Darna (Oxyplax) pallivitta</i></p>	Taiwan and USA (GBIF Secretariat 2017), China, Thailand, Malaysia, Indonesia (Chun et al. 2005) and Japan (Molet 2016).	<p>No record found (ABRS 2020; Plant Health Australia 2020).</p> <p>Declared pest, prohibited entry into WA</p>	<i>Darna pallivitta</i> is associated with <i>Cordyline</i> and <i>Dracaena</i> spp. foliage (Molet 2016).	<p>Yes. <i>Darna pallivitta</i> is a highly polyphagous, generalist pest of over 50 host plant species, including <i>Macadamia</i>, <i>Cocos niceifera</i>, <i>Coffea</i></p>	<p>Yes. <i>Darna pallivitta</i> larval feeding causes significant leaf damage due to defoliation and skeletisation; defoliation of an entire potted plant</p>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Moore, 1877; <i>Oxyplax pallivitta</i> (Moore, 1877)</p> <p>[Limaecodidae]</p> <p>Stinging nettle caterpillar</p>		(Government of Western Australia 2020).		<p><i>arabica</i>, <i>Cordyline terminalis</i>, <i>Dracaena</i>, <i>Ficus</i>, <i>Iris</i> and <i>Musa</i> spp. (Molet 2016), which are all present in Australia (APNI 2020). The species is distributed throughout South-East Asia and has invaded, established and spread in Hawaii (Molet 2016), areas where climatic conditions are similar to Australia. Therefore, <i>D. pallivitta</i> has the potential to establish and spread in Australia.</p>	<p>can occur rapidly within a few days (Molet 2016; Nagamine & Epstein 2007). This behaviour particularly affects the nursery and ornamental industries (Chun et al. 2005). Due to its generalist polyphagous nature, <i>D. pallivitta</i> may threaten endemic Australian plant species. <i>D. pallivitta</i> is also a human health pest; its stinging spines release an irritant which cause local pain, itching and swelling if handled incorrectly (Chun et al. 2005). Therefore, <i>D. pallivitta</i> has the potential to cause negative economic, environmental and human health consequences in Australia.</p>	
<p><i>Deanolis sublimbalis</i> Snellen, 1899</p> <p>Synonym: <i>Deanolis albizonalis</i> (Hampson, 1903)</p> <p>[Crambidae]</p>	<p>India, Indonesia, Nepal, Philippines, Thailand, Vietnam (CABI 2020a) and Papua New Guinea (QDAF 2018c; Royer 2008).</p>	<p>Present, Qld (Cape York Peninsula and Torres Strait Islands), however it is under official control within the Far Northern Biosecurity Zones (QDAF 2018c).</p>	<p>Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).</p>	<p>Yes. Previously assessed by the department (Biosecurity Australia 2008a; DAWR 2015a). <i>Deanolis sublimbalis</i> is present in Australia (Queensland), but is under official control</p>	<p>Yes. Previously assessed by the department (Biosecurity Australia 2008a; DAWR 2015a). <i>Deanolis sublimbalis</i> is a major pest on mango in regions of India. In tropical parts of Asia, it</p>	<p>Yes</p>

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Red-banded mango caterpillar		Declared pest, prohibited entry into WA (Government of Western Australia 2020), notifiable pest for Northern Territory (DPIR 2018a).		(Biosecurity Australia 2008a). The pest may be spread over short distances by natural dispersal of adults, and over longer distances in infested fruit and, perhaps, by wind (Jackson 2017). Therefore, <i>D. sublimbalis</i> has the potential to establish and spread in Australia	has also caused commercial losses in the order of 10%-55% in mango crops (Biosecurity Australia 2008a; Jackson 2017). Therefore, <i>D. sublimbalis</i> has the potential to cause negative economic consequences in Australia.	
<i>Duponchelia fovealis</i> Zeller, 1847 [Crambidae] European pepper moth	USA, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, UK (CABI 2020a; Karsholt & Nieukerken 2019), Egypt, Kenya, Madagascar, Saudi Arabia, South Africa and United Arab Emirates (De Prins & De Prins 2018).	No record found (ABRS 2020; CABI 2020a; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Duponchelia fovealis</i> is associated with <i>Eustoma</i> spp. (Plant Health Australia 2020).	Yes. <i>Duponchelia fovealis</i> is highly polyphagous and has a wide host range including 35 plant species within 38 families, including <i>Zea</i> , <i>Capsicum</i> , <i>Fragaria</i> and <i>Poinsettia</i> spp. (Brambila & Stocks 2010; Paes et al. 2018) which are found throughout Australia. <i>D. fovealis</i> is distributed in the Middle East, Europe and Africa (Paes et al. 2018), where climatic conditions are similar to Australia. Therefore, <i>D. fovealis</i> has the potential to establish and spread in Australia.	Yes. <i>Duponchelia fovealis</i> larvae tunnel into stems and fruit, causing withering and dry crown damage to all plant parts of host plants (Brambila & Stocks 2010; CABI 2020a). Due to its highly polyphagous nature, <i>D. fovealis</i> may also threaten endemic Australian plant species. Therefore, <i>D. fovealis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Earias vittella</i> (Fabricius, 1794) [Nolidae] Spotted bollworm	Afghanistan, Cambodia, China, India, Indonesia, Iran, Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam, Fiji, Papua New Guinea, Tonga (CABI 2020a), Saudi Arabia, United Arab Emirates (De Prins & De Prins 2018) and UK (Kimber 2019).	Present, NSW, NT, Qld, WA and Vic. (ABRS 2020; CSIRO 2018; Government of Western Australia 2020; Herbison-Evans & Crossley 2019). Note: ABRS states taxon is under review and the record is a draft.	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Assessment not required	Assessment not required	No
<i>Ectropis crepuscularia</i> (Denis & Schiffermüller, 1775) [Geometridae] Saddle-backed looper	Belgium, France, Italy, Portugal, Spain, Switzerland, the Netherlands, UK (Karsholt & Nieukerken 2019), USA (Lotts & Naberhaus 2018), Korea (Choi & An 2010), Japan and China (Skou 1986).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Ectropis crepuscularia</i> is associated with <i>Rosa</i> spp. (OGTR 2006; PHA 2016a)).	Yes. <i>Ectropis crepuscularia</i> is highly polyphagous and known to attack host species from over 20 plant families (Robinson et al. 2019), which are present in Australia (APNI 2020). It is present in the Palearctic region where climatic conditions are similar to regions in Australia. Therefore, <i>E. crepuscularia</i> has the potential to establish and spread in Australia.	Yes. <i>Ectropis crepuscularia</i> is highly polyphagous, known to attack host species from over 20 plant families (Robinson et al. 2019), including many landscape and forestry plant species which are present in Australia (APNI 2020). This species is a known forestry pest, with heavy infestations known to cause severe defoliation and sometimes plant death (Holsten et al. 2008). Therefore, <i>E. crepuscularia</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Australia.	
<i>Elasmopalpus lignosella</i> (Zeller, 1848) Synonym: <i>Elasmopalpus lignosellus</i> (Zeller, 1848) [Pyralidae] Lesser corn stalk borer	Mexico, USA, Panama, Argentina, Chile, Colombia and Peru (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Elasmopalpus lignosella</i> is polyphagous and known to attack host plant species from over 20 plant families including Leguminosae, Gramineae and Rosaceae families (Robinson et al. 2019), which are distributed throughout Australia (APNI 2020). The species is distributed in South, Central and North America, and Vietnam where climatic conditions are similar to regions in Australia. Therefore, <i>E. lignosella</i> has the potential to establish and spread in Australia.	Yes. <i>Elasmopalpus lignosella</i> is a pest of many weed species and agricultural crops such as corn, peanuts, bean, peas, wheat, oats, cotton, sugarcane and forest trees (Sandhu et al. 2010), plants naturalised or of economic importance in Australia (Ash et al. 2014; Horticulture Innovation Australia 2019c). Therefore, <i>E. lignosella</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Ephesttia elutella</i> (Hübner, 1796) [Pyralidae] Tobacco moth	Afghanistan, China, Iran, Israel, Japan, Republic of Korea, Lebanon, Nepal, Pakistan, Philippines, Saudi Arabia, Taiwan, Egypt, Morocco, Zimbabwe, USA, Argentina, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, UK,	Present, ACT, NSW, Qld, SA, Tas. and Vic. (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Present in WA, but also a declared pest, prohibited entry (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	and New Zealand (CABI 2020a) and South Africa (De Prins & De Prins 2018).					
<i>Epichoristodes acerbella</i> (Walker, 1864) [Tortricidae] South African carnation tortrix	Kenya (letter from KEPHIS on 29/01/2018), Madagascar, South Africa, France, Italy, Spain (CABI 2020a), Switzerland (Karsholt & Nieukerken 2019), Zimbabwe (De Prins & De Prins 2018) and UK (Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Epichoristodes acerbella</i> is associated with flowers and foliage of <i>Chrysanthemum</i> , <i>Dianthus</i> and <i>Rosa</i> spp. (Gilligan & Epstein 2014; OGTR 2006; PHA 2016a). Species also intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Epichoristodes acerbella</i> is polyphagous and known hosts include <i>Dianthus</i> , <i>Rosa</i> , <i>Chrysanthemum</i> , <i>Lucerne</i> , <i>Fragaria</i> spp. and stone fruits (Gilligan & Epstein 2014; PHA 2016a). <i>E. acerbella</i> is a known invasive species distributed in Europe and Africa (Bell et al. 2015; CABI 2020a; Karsholt & Nieukerken 2019), where climatic conditions are similar to regions in Australia. Therefore, <i>E. acerbella</i> has the potential to establish and spread in Australia.	Yes. <i>Epichoristodes acerbella</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). Larvae feed on leaves and mine tunnels in the stem damaging the plant (Bell et al. 2015). In carnations, larvae infest flowers and buds, and weave petals together with silk before feeding on central parts (Meijerman & Ulenberg 2016), thus reducing flower quality. Therefore, <i>E. acerbella</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Epiphryne verriculata</i> (Felder & Rogenhofer, 1875) Synonym: <i>Venusia verriculata</i> Feld.	New Zealand (GBIF Secretariat 2017).	No record found (ABRS 2020; CSIRO 2018; Plant Health Australia 2020).	<i>Epiphryne verriculata</i> is associated with <i>Cordyline</i> spp. leaves (Guthrie 2008; Martin 2018a).	Yes. <i>Epiphryne verriculata</i> is a pest of <i>Cordyline</i> spp. (Guthrie 2008; Martin 2018a) which are present in Australia (APNI 2020).	Yes. <i>Epiphryne verriculata</i> is known to feed on various <i>Cordyline</i> spp. which are grown commercially or present naturally in the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Geometridae] Cabbage tree moth				The species is endemic to New Zealand where it lives in various habitats (Guthrie 2008; Martin 2018a). Due to the availability of suitable habitats and climatic conditions, <i>E. verriculata</i> has the potential to establish and spread in Australia.	Australian environment (APNI 2020; Thomas & Gollnow 2013). Larvae make their way into unopened leaves in the crown and feed on the surfaces or edges of leaves which cause long brown scarring, holes and notches along the foliage (Guthrie 2008; Martin 2018a), thus reducing plant quality. Therefore, <i>E. verriculata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Epitoxis albicincta</i> Hampson, 1903 [Erebidae]	Kenya, Uganda, Congo and Tanzania (De Prins & De Prins 2018).	No record found (ABRS 2020; CSIRO 2018; Plant Health Australia 2020).	<i>Epitoxis albicincta</i> is associated with <i>Dianthus</i> spp. foliage (OGTR 2006).	Yes. <i>Epitoxis albicincta</i> is polyphagous, known to attack <i>Dianthus caryophyllus</i> and <i>Cynodon dactylon</i> (Robinson et al. 2019) which are present in Australia (APNI 2020; Thomas & Gollnow 2013). The species is distributed in East Africa (De Prins & De Prins 2018) where climatic conditions are similar to regions in Australia. Therefore, <i>E. albicincta</i> has the	Yes. <i>Epitoxis albicincta</i> is known to feed on <i>Dianthus caryophyllus</i> and <i>Cynodon dactylon</i> (Robinson et al. 2019) which are commercially grown or distributed naturally throughout Australia (APNI 2020; Thomas & Gollnow 2013). Therefore, <i>E. albicincta</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Erannis defoliaria</i> (Clerck, 1759) [Geometridae] Mottled umber	Belgium, France, Iceland, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), UK (Kimber 2019) and Japan (Discover Life 2019; Robinson et al. 2019).	No record found (ABRS 2020; CSIRO 2018; Plant Health Australia 2020).	<i>Erannis defoliaria</i> is associated with foliage of <i>Dianthus</i> and <i>Rosa</i> spp. (OGTR 2006; PHA 2016a).	potential to establish and spread in Australia. Yes. <i>Erannis defoliaria</i> is polyphagous on host species from 11 plant families, including <i>Quercus</i> , <i>Vaccinium</i> , <i>Fagus</i> , <i>Populus</i> , <i>Malus</i> , <i>Prunus</i> and <i>Rosa</i> spp. (Mannai et al. 2015; Robinson et al. 2019) which are distributed throughout Australia (APNI 2020). The species occurs in Europe, North America and Japan where climatic conditions are similar to regions in Australia. Therefore, <i>E. defoliaria</i> has the potential to establish and spread in Australia.	Yes. <i>Erannis defoliaria</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). Young larvae consume buds and foliage of their hosts and sew leaves together with silk, where they remain when not feeding (FAO 2007). Older larvae cause severe defoliation over a long period of time, leading to growth loss, tree mortality and die-back (FAO 2007). Therefore, <i>Erannis defoliaria</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Eublemma rufimixta</i> (Hampson, 1918) [Noctuidae] Owlet moth	Malawi (De Prins & De Prins 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Eublemma rufimixta</i> is associated with <i>Dracaena</i> spp. (MPI 2016; Robinson et al. 2019).	Yes. <i>Eublemma rufimixta</i> is known to feed on <i>Dracaena</i> spp. (Robinson et al. 2019) which is distributed throughout Australia (APNI 2020). The species is distributed in East Africa (De Prins &	Yes. <i>Eublemma rufimixta</i> is known to feed on <i>Dracaena</i> spp. (Cock, Congdon & Collins 2015), which are grown commercially or commonly present in Australia (APNI 2020;	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				De Prins 2018) where similar climatic conditions exist in parts of Australia. Therefore, <i>E. rufimixta</i> has the potential to establish and spread in Australia.	Thomas & Gollnow 2013). Therefore, <i>E. rufimixta</i> has the potential for negative economic and environmental consequences in Australia.	
<i>Euproctis chrysorrhoea</i> Linnaeus, 1758 Synonym: <i>Porthesia chrysorrhoea</i> Linnaeus, 1758 [Erebidae] Brown-tail moth	Afghanistan, China, Iran, Israel, Morocco, USA, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, Papua New Guinea (CABI 2020a), USA (Lotts & Naberhaus 2018), UK (Kimber 2019) and India (Discover Life 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Euproctis chrysorrhoea</i> has a wide host range including roses (PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2010b). Additionally, <i>Euproctis chrysorrhoea</i> is highly polyphagous, attacking trees and shrubs from 26 genera from 13 different plant families (Frago et al. 2010; Robinson et al. 2019), which are distributed throughout Australia (APNI 2020). <i>E. chrysorrhoea</i> is invasive and has established in countries where climatic conditions are similar to Australia. Therefore, <i>E. chrysorrhoea</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2010b). <i>Euproctis chrysorrhoea</i> is a highly polyphagous forest pest (Frago et al. 2010). The larvae are gregarious foliage feeders of woody shrubs and trees (Marques et al. 2014). Larval hairs also cause allergic reactions (DAFF 2013d). Therefore, <i>E. chrysorrhoea</i> has the potential to cause negative economic, environmental and human health consequences	Yes
<i>Euproctis taiwana</i> Shiraki, 1913 Synonym: <i>Euproctis taiwana</i> Sliv. 1913	Japan, Taiwan (CABI 2020a) and Republic of Korea (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Euproctis taiwana</i> is associated with gladiolus, <i>Lilium</i> and <i>Rosa</i> spp. (DAFF 2013d; PHA 2016a).	Yes. Previously assessed by the department (DAFF 2013d). <i>Euproctis taiwana</i> feeds on the foliage of gladiolus and	Yes. Previously assessed by the department (DAFF 2013d). <i>Euproctis taiwana</i> feeds on several hosts and can affect	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Erebidae] Tussock moth				lily plants (Liu 1998), the leaves of soybean (Talekar, Lee & Suharsono 1988), grapevine (Chang 1988) and of rose in Taiwan (Biosecurity Australia 2008a), plants which are distributed throughout Australia (APNI 2020). <i>E. taiwana</i> has established in countries where climatic conditions are similar to Australia. Therefore, <i>E. taiwana</i> has the potential to establish and spread in Australia.	commercial crops through feeding on foliage, including flowers, fruit trees, vegetables and cereals. Larval hairs also cause allergic reactions (DAFF 2013d). Therefore, <i>E. taiwana</i> has the potential to cause negative economic, environmental and human health consequences.	
<i>Graphania steropastis</i> (Meyrick, 1918) Synonym: <i>Tmetolophota steropastis</i> Meyrick, 1887 [Noctuidae] Flax notcher Moth	New Zealand (Beccaloni et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Graphania steropastis</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Graphania steropastis</i> is a pest of <i>Cordyline</i> and <i>Phormium</i> spp. (Guthrie 2008), which are present throughout Australia (APNI 2020). The species is found inhabiting the surrounds of swamp areas in New Zealand (Guthrie 2008), where climatic conditions are similar to regions in Australia. Therefore <i>G. steropastis</i> has the potential to establish and spread in Australia.	Yes. <i>Graphania steropastis</i> is known to feed on various <i>Cordyline</i> and <i>Phormium</i> spp. which are grown commercially or present naturally in the Australian environment (APNI 2020; Thomas & Gollnow 2013). The larvae chew notches along the edges of foliage (Guthrie 2008). <i>Graphania steropastis</i> is part of the Noctuidae, an important plant pest family due to the voracious appetites of	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					most larvae for foliage (CSIRO 2010). Therefore, <i>G. steropastis</i> has the potential to cause negative environmental and economic consequences in Australia.	
<i>Gymnoscelis rufifasciata</i> (Haworth, 1809) [Geometridae]	Israel, Egypt (CABI 2020a), Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands and UK (GBIF Secretariat 2017; Karsholt & Nieukerken 2019; Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Gymnoscelis rufifasciata</i> is associated with a wide range of hosts including <i>Dianthus</i> and <i>Rosa</i> spp. (OGTR 2006; PHA 2016a).	Yes. <i>Gymnoscelis rufifasciata</i> is a polyphagous pest of over 40 plant hosts, including <i>Sorghum</i> , <i>Zea</i> , <i>Vitis</i> , <i>Citrus</i> , <i>Olea</i> , <i>Dianthus</i> and <i>Rosa</i> spp. (Kacar & Ozdemir 2015; OGTR 2006; PHA 2016a), which are present in Australia (APNI 2020). <i>G. rufifasciata</i> is distributed in the Mediterranean region, parts of Europe, North Africa and temperate regions in Asia (Kacar & Ozdemir 2015), suggesting similar climatic conditions in Australia would be suitable for the pest. Therefore, <i>G. rufifasciata</i> has the potential to establish and spread in Australia.	Yes. <i>Gymnoscelis rufifasciata</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). Larvae damage fruit and flowers by pupating and feeding on flowers, buds and fruit of olives, leading to the drying and 'spilling' of the fruit (Kacar & Ozdemir 2015). They damage the reproductive organs in flower buds and migrate to new hosts once consumed (Kacar & Ozdemir 2015). Adult moths oviposit in buds, flowers and immature fruit, so once hatched, the larvae tunnel within the host plant, resulting in the creation of an entrance hole and bloom	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					drying (Kacar & Ozdemir 2015). Therefore, <i>G. rufifasciata</i> has the potential to cause negative environmental and economic consequences.	
<i>Hadena bicruris</i> (Hufnagel, 1766) [Noctuidae] Lychnis moth	Belgium, France, Italy, Portugal, Germany, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019) and UK (Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hadena bicruris</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. <i>Hadena bicruris</i> is oligophagous on the plant family Caryophyllaceae, including <i>Dianthus</i> spp. (Robinson et al. 2019) which are present throughout Australia (APNI 2020). The species is distributed throughout Europe (Karsholt & Nieukerken 2019) where climatic conditions are similar to regions in Australia. Therefore, <i>H. bicruris</i> has the potential to establish and spread in Australia.	Yes. <i>Hadena bicruris</i> is a pest of carnations which are economically important and naturalised plants in Australia (Flowers Australia 2019). Larvae tunnel within the seed capsule, where the entrance hole will become larger over time, and mature larvae move from one emptied seed capsule to another and begin consuming the bud from the top down (Elzinga, Biere & Harvey 2002), which potentially reduces flower quality and yield. Therefore, <i>H. bicruris</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Hadena compta</i> (Denis & Schiffermüller, 1775) [Noctuidae]	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019) and UK (Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hadena compta</i> is associated with <i>Dianthus caryophyllus</i> foliage (OGTR 2006).	Yes. <i>Hadena compta</i> is oligophagous on the host plant family Caryophyllaceae, including <i>Dianthus</i> spp. (Robinson et al. 2019) which are present throughout Australia (APNI 2020). The species is distributed throughout Europe (Karsholt & Nieukerken 2019) where climatic conditions are similar to regions in Australia. Therefore, <i>H. compta</i> has the potential to establish and spread in Australia.	Yes. <i>Hadena compta</i> is a pest of carnations which are economically and environmentally important ornamental plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). Young larvae tunnel into the ovary of the bud, feeding on the young ovules, and once consumed, the larvae move onto other flowers (Erhardt 1988). Older larvae feed on young fruits, flower ovaries and seeds, resulting in the damage of seed set (Erhardt 1988) and reduced marketability of flowers. Therefore, <i>H. compta</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Helicoverpa armigera</i> (Hübner, 1827) [Noctuidae] Cotton bollworm	Kenya (Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), South Africa, India, Japan, Pakistan, New Zealand (Herbison-Evans &	Present, widespread (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	<i>Helicoverpa armigera</i> is associated with <i>Lilium</i> and <i>Dianthus</i> spp. (DAFF 2013d; OGTR 2006). Species intercepted at Australian points of entry	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Crossley 2019), Afghanistan, Cambodia, China, Indonesia, Iran, Israel, Republic of Korea, Lebanon, Malaysia, Nepal, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, United Arab Emirates, Vietnam, Egypt, Madagascar, Malawi, Mauritius, Morocco, Tanzania, Uganda, Zimbabwe, USA, Argentina, France, Greece, Italy, Portugal, Spain, Switzerland, American Samoa, Fiji, Kiribati, Marshall Islands, New Caledonia, Papua New Guinea, Tonga, Vanuatu (CABI 2020a), Belgium (Karsholt & Nieukerken 2019) and UK (Kimber 2019).		on cut flower and foliage consignments (unpublished data).			
<i>Helicoverpa assulta</i> Guenée, 1852 [Noctuidae] Oriental tobacco budworm	Kenya, Malawi, South Africa, Tanzania, Uganda, Zimbabwe, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam, American Samoa, Fiji,	Present, NSW, NT, Qld and WA (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments and confirmed by DNA sequencing (unpublished).	Assessment not required.	Assessment not required.	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	New Caledonia, Papua New Guinea, Samoa and Vanuatu (EPPO 2015b).					
<i>Helicoverpa punctigera</i> (Wallengren, 1860) [Noctuidae] Native budworm	New Zealand (CABI 2020a; Government of Western Australia 2020).	Present, widespread (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Helicoverpa zea</i> Boddie, 1850 [Noctuidae] American cotton bollworm	Widespread in North and South America, including Mexico, USA, Panama, Argentina, Chile, Colombia, Ecuador, Peru and China (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Helicoverpa zea</i> has a wide host range including <i>Dianthus</i> , <i>Chrysanthemum</i> , <i>Gerbera</i> and <i>Gladiolus</i> (OGTR 2006; PHA 2016a). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Yes. <i>Helicoverpa zea</i> is a highly polyphagous, feeding on over 100 plant species including <i>Allium</i> , <i>Amaranthus</i> , <i>Dianthus</i> , <i>Chrysanthemum</i> and <i>Gladiolus</i> spp., and other important agricultural crops (Capinera 2017a; Plant Health Australia 2009), many of which are distributed throughout Australia (APNI 2020). The species is distributed throughout the Americas in tropical and subtropical climates, and survives in cold regions during the warmer months (Plant Health Australia 2009). Similar climatic conditions exist in Australian regions and other <i>Helicoverpa</i> spp. are	Yes. <i>Helicoverpa zea</i> is highly polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). <i>H. zea</i> larvae are prevalent on foliage and flowers, tunnelling within the flower buds and excavating the interior (Mau & Martin Kessing 1991b). Serious and costly damage is caused by this pest due to the larvae feeding on reproductive structures and growing points of high value crops such as corn cobs, sorghum heads and cotton bolls (Mau & Martin Kessing 1991b; Plant Health Australia 2009). Therefore, <i>H. zea</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				already present in Australia. Therefore, <i>H. zea</i> has the potential to establish and spread in Australia.	has the potential to cause negative economic consequences in Australia.	
<i>Heliothis incarnata</i> (Freyer, 1838) Synonym: <i>Chazaria incarnata</i> (Freyer, 1838) [Noctuidae]	Greece, Italy, Portugal, Spain (de Jong et al. 2014), Iran (Rabieh 2018) and Israel (Kravchenko et al. 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Heliothis incarnata</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. <i>Heliothis incarnata</i> is a pest of <i>Dianthus caryophyllus</i> (Robinson et al. 2019) which are present in Australia (APNI 2020). The species is distributed in southern Europe and similar climatic conditions exist in Australian regions, therefore, <i>H. incarnata</i> has the potential to establish and spread in Australia.	Yes. <i>Heliothis incarnata</i> is a pest of carnations which are naturalised and economically important plants in Australia (Horticulture Innovation Australia 2019c). <i>Heliothis</i> larvae feed on flowers and fruit of their host plants, resulting in crop losses (Matov, Zahiri & Holloway 2008). Therefore, <i>H. incarnata</i> has the potential to cause negative environmental and economic impacts within Australia.	Yes
<i>Heliothis maritima</i> Graslin, 1855 [Noctuidae] Shoulder-striped clover	Japan, Republic of Korea (CABI 2020a), Belgium, France, Greece, Italy, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019) and UK (Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Heliothis maritima</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. <i>Heliothis maritima</i> is polyphagous on hosts species from 13 plant families (Matov, Zahiri & Holloway 2008), including <i>Dianthus</i> , <i>Calluna</i> , <i>Erica</i> , <i>Medicago</i> , <i>Melilotus</i> , <i>Spergula</i> and <i>Spergularia</i> spp. (Robinson et al. 2019), all present throughout Australia (APNI 2020).	Yes. <i>Heliothis maritima</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). <i>Heliothis</i> larvae feed on flowers, fruit and seeds of their host plants, resulting in crop losses (Matov, Zahiri & Holloway 2008).	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				The species is distributed in Europe and north Asia and similar climatic conditions exist in Australian regions. Therefore, <i>H. maritima</i> has the potential to establish and spread in Australia.	Therefore, <i>H. maritima</i> has the potential to cause negative environmental and economic impact within Australia.	
<i>Hemithea aestivaria</i> (Hübner, 1789) [Geometridae] Common emerald moth	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), UK (Kimber 2019), USA (Lotts & Naberhaus 2018), Republic of Korea and Japan (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hemithea aestivaria</i> has a wide host range including <i>Rosa</i> spp. (PHA 2016).	Yes. <i>Hemithea aestivaria</i> is highly polyphagous, feeding on plant species from over 19 plant families, including <i>Viburnum</i> , <i>Salix</i> , <i>Rosa</i> , and <i>Hypericum</i> spp. (Robinson et al. 2019), which are present in Australia (APNI 2020). The species is present in the Palearctic region (Bolte & Munroe 1979) where climatic conditions are similar to regions in Australia. Therefore, <i>H. aestivaria</i> has the potential to establish and spread in Australia.	Yes. <i>Hemithea aestivaria</i> is highly polyphagous and attacks economically important plants of Australia such as <i>Viburnum</i> , <i>Salix</i> , <i>Rosa</i> and mandarins (Horticulture Innovation Australia 2019c). On unshu mandarin fruit, larvae feed on leaves and pupate within woven leaves of the host plant (MAFF 2003). The larvae of <i>H. aestivaria</i> are known to attack cedar and other shrub and hardwood species resulting in defoliation (Duncan 2007). Therefore, <i>H. aestivaria</i> has the potential to cause negative economic and environmental	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Australia.	
<i>Hendecasis duplifascialis</i> (Hampson, 1891) [Crambidae] Jasmine budworm	West Africa, India, Sri Lanka (Beccaloni et al. 2018), Taiwan (GBIF Secretariat 2017), Japan, Philippines, Thailand (Gilligan & Passoa 2014) and China (Gong, Lu & Fan 2007).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Yes. <i>Hendecasis duplifascialis</i> is a pest of <i>Jasminum</i> spp. (Gilligan & Passoa 2014), <i>Dianthus</i> , <i>Gardenia</i> and <i>Plumeria</i> spp. (Robinson et al. 2019), all of which are present in Australia (APNI 2020). The species is distributed in Asia where climatic conditions are similar to regions in Australia. Therefore, <i>H. duplifascialis</i> has the potential to establish and spread in Australia.	Yes. <i>Hendecasis duplifascialis</i> larvae bore holes in flower buds and feed on the inner flower structures, eventually making their way through all adjacent buds, and creating a web-like pattern in severe infestations (Plantwise 2019; Suganthi, Chandraeskan & Regupathy 2006). This species is associated with carnations, gardenia and jasmine which are important ornamental and naturalised plants in Australia (Flowers Australia 2019). Therefore, <i>H. duplifascialis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Homona magnanima</i> Diakonoff, 1948 [Tortricidae]	China, Japan, Taiwan (CABI 2020a; Li et al. 2005; Li et al. 2013) and Republic of Korea (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Homona magnanima</i> is associated with foliage of <i>Rosa</i> spp. (PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2009c). Hosts include apple, pear, stone fruit,	Yes. Previously assessed by the department (Biosecurity Australia 2009c). <i>Homona magnanima</i> plant hosts	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Oriental tea tortrix		Declared pest, prohibited entry into WA (Government of Western Australia 2020).		persimmons, tea and roses (CABI 2020a). Adults are capable long-range fliers (Shirai & Kosugi 1997). Polyphagy, high fecundity, preadaptation to temperatures found in Australia, readily available hosts, including eucalyptus, and strong, directional flight ability suggest <i>Homona magnanima</i> has the potential to establish and spread (Biosecurity Australia 2009c).	include <i>Eucalyptus</i> spp., and other commercial crops such as pome and stone fruits, citrus fruits, grapes, tea, coffee, cereals and cotton (Carter 1984; Meijerman & Ulenberg 2000). <i>H. magnanima</i> is an economically important pest known to cause severe damage to plant foliage, often leading to defoliation and crop loss (Takaji 1976). Therefore, <i>H. magnanima</i> , has potential to cause a negative economic and environmental consequences in Australia.	
<i>Hypercompe indecisa</i> (Walker, 1855) [Erebidae]	Brazil, Uruguay, Argentina, Paraguay and Bolivia (Drechsel & Garcia 2016; GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Hypercompe indecisa</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Hypercompe indecisa</i> is highly polyphagous on over 20 plant hosts, including <i>Citrus</i> , <i>Cucurbita</i> , <i>Datura</i> , <i>Diospyros</i> , <i>Leucanthemum</i> , <i>Persea</i> , <i>Pisum</i> , <i>Prunus</i> , <i>Ricinus</i> , <i>Rosa</i> , <i>Senecio</i> , <i>Spiraea</i> , <i>Zea mays</i> , <i>Lycopersicon</i> , <i>Fragaria</i> , and <i>Solanum</i> spp. (Robinson et al. 2019) which are present throughout Australia	Yes. <i>Hypercompe indecisa</i> is associated with citrus, cucurbits, <i>Prunus</i> , <i>Rosa</i> , <i>Zea mays</i> , <i>Fragaria</i> and <i>Solanum</i> spp. (Robinson et al. 2019) which are economically important plants in Australia (Flowers Australia 2019; Horticulture Innovation Australia 2019c). Larvae feed on foliage and seedlings of hosts (Dapoto et al. 2010; Nava	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				(APNI 2020). The species is present in countries from Southern Brazil to Bolivia (Drechsel & Garcia 2016), where climatic conditions are similar to Australian regions, therefore, <i>H. indecisa</i> has the potential to establish and spread in Australia.	et al. 2008), resulting in reduced marketability and yield. Therefore, <i>H. indecisa</i> has the potential to cause negative economic consequences in Australia.	
<i>Izatha austera</i> (Meyrick, 1884) [Oecophoridae]	New Zealand (Beccaloni et al. 2018; GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Izatha austera</i> is associated with <i>Cordyline</i> spp. (Hoare 2010).	Yes. <i>Izatha austera</i> is polyphagous, known to feed on <i>Cordyline</i> spp. (Hoare 2010) which are present in Australia (APNI 2020). The species is present throughout New Zealand (Hoare 2010) where climatic conditions are similar to regions in Australia. Therefore, <i>I. austera</i> has the potential to establish and spread in Australia.	Yes. <i>Izatha austera</i> larvae tunnel into soft woody stems of <i>Cordyline</i> spp. (Hoare 2010) which are important plants found throughout Australia. Therefore, <i>I. austera</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Junonia oenone</i> Linnaeus, 1764 [Nymphalidae]	Sub-Saharan Africa including Ethiopia, Uganda, Tanzania, Malawi, Zimbabwe, South Africa, southern Arabia and Madagascar (Williams 2019c).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Junonia oenone</i> host plants include <i>Asystasia gangetica</i> , <i>Brillantaisia lamium</i> , <i>Hypoestes</i> , <i>Isoglossa</i> , <i>Justicia</i> and <i>Ruellia</i> spp. (Hoskins 2019; Williams 2019c). All host plants are present in Australia	Yes. <i>Junonia oenone</i> butterflies are often seen feeding from flowers in gardens (Williams 2019c). However, butterfly larvae cause the most damage through feeding on their host plants (Hoskins 2019). <i>J.</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				(APNI 2020) and climatic conditions in the African countries that <i>J. oenone</i> is currently distributed are similar to parts of Australia. Therefore, <i>J. oenone</i> has the potential to establish and spread in Australia.	<i>oenone</i> host plants species include <i>Asystasia gangetica</i> , <i>Brillantaisia lamium</i> , <i>Hypoestes</i> , <i>Isoglossa</i> , <i>Justicia</i> and <i>Ruellia</i> spp. (Hoskins 2019; Williams 2019c) many of which are in Australia, including the endangered native species <i>Isoglossa eranthemoides</i> (APNI 2020). Therefore, <i>J. oenone</i> has the potential to cause negative environmental consequences in Australia.	
<i>Lacanobia oleracea</i> (Linnaeus, 1758) [Noctuidae] Bright-line brown eye moth	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands, (Karsholt & Nieukerken 2019), Israel and UK (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Lacanobia oleracea</i> is associated with <i>Chrysanthemum</i> and <i>Dianthus</i> spp. (DAFF 2003; OGTR 2006)	Yes. Previously assessed by the department (DAFF 2003). <i>Lacanobia oleracea</i> has environmental tolerances and a wide host range. Fecundity data suggests population numbers can increase rapidly under suitable conditions. Adults are good flyers and would spread readily within Australia (DAFF 2003). The species is present in countries across Europe (Karsholt	Yes. Previously assessed by the department (DAFF 2003). <i>Lacanobia oleracea</i> larvae primarily feed on leaves, with late instar larvae may also feed internally on fruit (DAFF 2003). <i>Lacanobia oleracea</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). Therefore, <i>L. oleracea</i> has the potential to cause negative economic and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				& Nieukerken 2019), where climatic conditions are similar to Australian regions. Therefore, <i>L. oleracea</i> has the potential to establish and spread in Australia.	environmental consequences in Australia.	
<i>Lacanobia suasa</i> (Denis & Schiffermüller, 1775) [Noctuidae]	Belgium, France, Greece, Italy, Spain, Switzerland, the Netherlands and UK (Karsholt & Nieukerken 2019; Kimber 2019).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lacanobia suasa</i> is associated with <i>Dianthus</i> spp. (OGTR 2006).	Yes. <i>Lacanobia suasa</i> is polyphagous on plant hosts across 16 different families and numerous plant genera including <i>Pinus</i> , <i>Dianthus</i> , <i>Malus</i> , <i>Prunus</i> and <i>Rubus</i> spp. (Robinson et al. 2019), which are present throughout Australia (APNI 2020). The species is distributed throughout Europe (Karsholt & Nieukerken 2019; Kimber 2019) where climatic conditions are similar to regions in Australia. Therefore, <i>L. suasa</i> has the potential to establish and spread in Australia.	Yes. <i>Lacanobia suasa</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). <i>Lacanobia</i> spp. feed primarily on foliage (Wilsterman et al. 2016). This pest is a member of the Noctuidae, an important plant pest family due to the voracious appetites of most larvae for foliage (CSIRO 2010). Therefore, <i>L. suasa</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Lacipa florida</i> (Swinhoe, 1903) [Erebidae]	Kenya, South Africa, Tanzania, Uganda and Zimbabwe (De Prins & De Prins 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lacipa florida</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. <i>Lacipa florida</i> is polyphagous, with hosts including <i>Dianthus caryophyllus</i> , <i>Gloriosa</i> and <i>Gossypium</i> spp. (Robinson et al. 2019), which are present throughout	Yes. <i>Lacipa florida</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). Most Lepidoptera are	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Australia (APNI 2020). The species is distributed from eastern to southern Africa (De Prins & De Prins 2018) where climatic conditions are similar to parts of Australia. Therefore, <i>L. florida</i> has the potential to establish and spread in Australia.	plant-feeders as larvae and nectar-feeder as adults, and function as herbivores, pollinators, and prey, as well as being one of the most damaging groups of agricultural pests (Regier et al. 2009). Therefore, <i>L. florida</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Lacipa quadripunctata</i> (Dewitz, 1881) [Erebidae]	Widespread in Africa including, Malawi, South Africa, Ghana, Zambia, Tanzania, Democratic Republic of the Congo and Zimbabwe (De Prins & De Prins 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lacipa quadripunctata</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006).	Yes. <i>Lacipa quadripunctata</i> is polyphagous with known hosts including <i>Dianthus caryophyllus</i> , <i>Gloriosa</i> , <i>Gossypium</i> , <i>Hibiscus</i> , <i>Eleusine</i> and <i>Urena</i> spp. (Robinson et al. 2019), which are present in Australia (APNI 2020). This species is distributed in western to southern Africa (De Prins & De Prins 2018) where climatic conditions are similar to parts of Australia. Therefore, <i>L. quadripunctata</i> has the potential to establish and spread in Australia.	Yes. <i>Lacipa quadripunctata</i> is known to damage carnations (OGTR 2006) which are grown commercially and are present throughout Australia (Flowers Australia 2019; Thompson & Nelson 2003). Most Lepidoptera are plant-feeders as larvae and nectar-feeders as adults, and function as herbivores, pollinators, and prey and are one of the most damaging groups of agricultural pests (Regier et al. 2009). Therefore, <i>L. quadripunctata</i> has the	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					potential to cause negative economic and environmental consequences in Australia.	
<i>Lampides boeticus</i> (Linnaeus, 1767) [Lycaenidae] Long-tailed pea-blue butterfly	Kenya (Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Afghanistan, China, India, Indonesia, Iran, Israel, Japan, Republic of Korea, Lebanon, Malaysia, Nepal, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, Egypt, Malawi, Fiji, Madagascar, Mauritius, USA, Morocco, South Africa, New Caledonia, Tanzania, France, Uganda, Belgium, Greece, Italy, Zimbabwe, Portugal, Spain, Switzerland, UK, New Zealand, Kiribati, Marshall Islands, Papua New Guinea, Vanuatu (CABI 2020a) and the Netherlands (Karsholt & Nieukerken 2019).	Present, widespread (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	<i>Lampides boeticus</i> is associated with <i>Lilium</i> spp. cut flowers (DAFF 2013d). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished data).	Assessment not required	Assessment not required	No
<i>Leucoptera malifoliella</i> Costa, 1836	China, Iran, Belgium, France, Italy, the Netherlands, Portugal,	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Leucoptera malifoliella</i> is associated with <i>Rosa</i> spp. (Molet 2015).	Yes. <i>Leucoptera malifoliella</i> is oligophagous on the plant	Yes. <i>Leucoptera malifoliella</i> is a pest of Rosaceae plant species,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Synonym: <i>Elachista malifoliella</i> Costa, 1836</p> <p>[Lyonetiidae]</p> <p>Apple leaf miner</p>	Spain, Switzerland, UK (CABI 2020a) and Greece (Karsholt & Nieukerken 2019).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).		<p>family Rosaceae, including <i>Cydonia</i>, <i>Malus</i>, <i>Pyrus</i>, <i>Prunus</i>, <i>Rosa</i> and <i>Betula</i> spp. (Molet 2015; Robinson et al. 2019). which are present throughout Australia (APNI 2020). Australia has climatic conditions similar to the current geographical distribution. Therefore, <i>L. malifoliella</i> has the potential establish and spread in Australia.</p>	<p>including <i>Cydonia</i>, <i>Malus</i>, <i>Pyrus</i>, <i>Prunus</i>, <i>Rosa</i> and <i>Betula</i> (Molet 2015; Robinson et al. 2019) many plants which are naturalised or of economic importance in Australia (APNI 2020). <i>L. malifoliella</i> larvae mine through foliage, causing premature leaf fall, resulting in yield reduction, delayed shoot growth and reduction in fruit weight, quality and yield (MAF Biosecurity New Zealand 2009; Ovsyannikova & Grichanov 2009b). Repeated heavy defoliation can weaken the trees (Molet 2015) suggesting trees would need to be replaced to keep up fruit production. Therefore, <i>L. malifoliella</i> has the potential to cause negative economic and environmental consequences in Australia.</p>	
<i>Lozotaenia forsterana</i> (Fabricius, 1781)	Belgium, France, Italy, Spain, Switzerland, the Netherlands (Karsholt &	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lozotaenia forsterana</i> is associated with <i>Rosa</i> spp.	Yes. <i>Lozotaenia forsterana</i> is polyphagous, attacking	Yes. <i>Lozotaenia forsterana</i> is known to attack <i>Fragaria</i> , <i>Rubus</i> ,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Tortricidae]	Nieukerken 2019) and UK (Kimber 2019).		(Ali et al. 2016; PHA 2016a).	host plants from the families Pinaceae, Vacciniaceae, Caprifoliaceae, Rosaceae and Saxifragaceae, including <i>Rubus</i> , <i>Fragaria</i> , <i>Prunus</i> and <i>Hedera</i> spp. (Meijerman & Ulenberg 2016; Vernon 1971), which are all present in Australia (APNI 2020). The species is present in Europe where climatic conditions are similar to regions in Australia. Therefore <i>L. forsterana</i> has the potential to establish and spread in Australia.	<i>Prunus</i> and <i>Hedera</i> spp. (Meijerman & Ulenberg 2016; Vernon 1971), which are economically important in Australia. In heavy infestations, larvae can cause severe defoliation (Meijerman & Ulenberg 2016; Vernon 1971). Therefore, <i>L. forsterana</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Lymantria obfuscata</i> (Walker, 1865) Synonym: <i>Lymantria obfuscata</i> Walker, 1865 [Erebidae] Indian gypsy moth	Afghanistan, India, Nepal and Pakistan (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Lymantria obfuscata</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Lymantria obfuscata</i> is polyphagous and a pest of <i>Juglans</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Malus</i> , <i>Salix</i> and <i>Populus</i> spp. (Fuester et al. 2002; PHA 2016a; Robinson et al. 2019), which are all present in Australia (APNI 2020). This species has high dispersal power and ability to find hosts at low population densities (Fuester et al. 2002). <i>L. obfuscata</i> is established in temperate regions of	Yes. <i>Lymantria obfuscata</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). <i>L. obfuscata</i> larvae are able to defoliate trees completely, and feeding behaviour results in reduced fruit formations and fruit loss (Sharma, Pandey & Shankar 2012). Willow and poplar trees are also affected.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				the countries in Asia (Sharma, Pandey & Shankar 2012), suggesting similar climatic conditions in Australia would be suitable. Therefore, <i>L. obfuscata</i> has the potential to establish and spread in Australia.	Therefore, <i>L. obfuscata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Mamestra brassicae</i> (Linnaeus, 1758) [Noctuidae] Cabbage moth	China, India, Iran, Japan, Republic of Korea, Lebanon, Pakistan, Taiwan, Belgium, France, Italy, the Netherlands, Portugal, Spain, Switzerland, UK (CABI 2020a) and Greece (Karsholt & Nieukerken 2019).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Mamestra brassicae</i> is associated with <i>Chrysanthemum</i> , <i>Dianthus</i> and <i>Rosa</i> spp. (OGTR 2006; PHA 2016a).	Yes. Previously assessed by the department (DAFF 2003). <i>Mamestra brassicae</i> has a wide host range and most hosts are present within Australia. Adults are good flyers (Ovsyannikova & Grichanov 2009a). The species is present in Europe and Asia (CABI 2020a), where climatic conditions are similar to regions in Australia. Therefore, <i>M. brassicae</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (DAFF 2003). <i>Mamestra brassicae</i> is a polyphagous pest of many plants which are naturalised or of economic importance in Australia (APNI 2020). <i>M. brassicae</i> larvae feed on foliage, while later instars bore into fruits often leading to damage strawberry and grapes crops (DAFF 2013f; DAWR 2016a; Voigt 1974). Therefore, <i>M. brassicae</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Metarctia tricolorana</i> (Wichgraf, 1922) Synonym: <i>Automolis tricolorana</i> (Wichgraf, 1922) [Arctiidae]	Uganda (De Prins & De Prins 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Metarctia tricolorana</i> host range is unknown, however, other <i>Metarctia</i> species are known to feed on host species from the Asteraceae (Compositae), Ulmaceae, Poaceae (Gramineae) and Convolvulaceae plant families (Robinson et al. 2019), plant families which are well represented in Australia (APNI 2020). <i>M. tricolorana</i> is distributed in Uganda (De Prins & De Prins 2018) where climatic conditions are similar to Australia. Therefore, <i>M. tricolorana</i> has the potential to establish and spread in Australia.	Yes. <i>Metarctia tricolorana</i> biology and host plants are unknown, however other <i>Metarctia</i> species attack important crops such as sweet potatoes (Robinson et al. 2019). Therefore <i>M. tricolorana</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Mythimna separata</i> (Walker, 1865) Synonym: <i>Mythimna (Pseudaletia) separata</i> (Walker, 1865) [Noctuidae] Northern armyworm	Afghanistan, Cambodia, China, India, Indonesia, Republic of Korea, Malaysia, Nepal, Pakistan, Sri Lanka, Taiwan, Thailand, Vietnam, Fiji, New Caledonia, New Zealand, Papua New Guinea, Tonga and Vanuatu (CABI 2020a),	Present, NSW, NT, Qld, SA, Vic. and WA (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Negeta chlorocrota</i> Hampson, 1907 Synonym: <i>Urbona chlorocrota</i> (Hampson, 1907) [Nolidae] Tuft moth	India, Indonesia (CABI 2020a), Sri Lanka and Malaysia (Holloway 2003).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Negeta chlorocrota</i> is associated with <i>Dendrobium</i> and <i>Phalaenopsis</i> spp. (PHA 2016a)	Yes. <i>Negeta chlorocrota</i> is known to attack <i>Phalaenopsis</i> , <i>Dendrobium</i> , and <i>Arachnis</i> spp. (Robinson et al. 2019) which are present in Australia (APNI 2020). The species is distributed in India and South-East Asia where climatic conditions are similar to regions in Australia. Therefore, <i>N. chlorocrota</i> has the potential to establish and spread in Australia.	Yes. <i>Negeta chlorocrota</i> feeds on <i>Phalaenopsis</i> , <i>Dendrobium</i> and <i>Arachnis</i> spp. (Robinson et al. 2019), important ornamental species in Australia (Horticulture Innovation Australia 2019c; Thomas & Gollnow 2013). Larvae feed on young foliage, flower buds and flowers, causing leaves to fall (Purwanto & Semiarti 2009). Therefore, <i>N. chlorocrota</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Nadata gibbosa</i> Smith, 1797 [Notodontidae] White-dotted prominent moth	USA (Lotts & Naberhaus 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Nadata gibbosa</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Nadata gibbosa</i> is a generalist pest, feeding on host species from plant families Salicaceae, Rosaceae and Fagaceae (Ganong, Dussourd & Swanson 2012; Robinson et al. 2019), which are all present in Australia (APNI 2020). <i>N. gibbosa</i> is from the Nearctic region where climatic conditions are similar to Australia. Therefore, <i>N. gibbosa</i> has	Yes. <i>Nadata gibbosa</i> is known to feed on <i>Prunus</i> , <i>Quercus</i> , and <i>Rosa</i> spp. (Robinson et al. 2019), economically important and naturalised species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>N. gibbosa</i> has the potential to cause negative economic consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Nemapogon granella</i> (Linnaeus, 1758) [Tineidae] European grain moth	USA, UK (Herbison-Evans & Crossley 2019), Belgium, Greece, Italy, Portugal, Spain, the Netherlands, Switzerland, France, (GBIF Secretariat 2017; Karsholt & Nieukerken 2019), South Africa (De Prins & De Prins 2018), Republic of Korea, China and Japan (Lee et al. 2018).	Present, ACT, NSW and Vic. (ABRS 2020; CSIRO 2018; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	the potential to establish and spread in Australia. Yes. <i>Nemapogon granella</i> is polyphagous, feeding on rotting wood and stored products, such as flour and dried fruit (Osada 2016). The species is distributed in Asia, Europe, North America, and parts of Australia, and it is likely that similar climatic conditions exist in parts of Western Australia. The availability of hosts and suitable climatic conditions in Western Australia suggests <i>N. granella</i> has the potential to establish and spread in Western Australia.	Yes. <i>Nemapogon granella</i> is a stored product pest and has the potential to cause negative economic consequences in Western Australia.	Yes (WA)
<i>Noctua pronuba</i> (Linnaeus, 1758) [Noctuidae]	Morocco, USA, France, Iceland, Switzerland, UK (CABI 2020a), Egypt, Saudi Arabia, United Arab Emirates (De Prins & De Prins 2018), Belgium, Greece, Italy, Portugal, Spain, the Netherlands (Discover Life 2019; Karsholt & Nieukerken 2019) and Iran	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Noctua pronuba</i> is associated with <i>Dianthus</i> and <i>Chrysanthemum</i> spp. (OGTR 2006; PHA 2016a).	Yes. <i>Noctua pronuba</i> is known to attack host plant species from 14 different families, including <i>Vitis</i> , <i>Solanum</i> , <i>Dianthus</i> , <i>Brassica</i> , <i>Dahlia</i> , <i>Gladiolus</i> , <i>Primula</i> , <i>Ribes</i> , <i>Viola</i> , <i>Fragaria</i> and <i>Chrysanthemum</i> spp. (CABI 2020a; Copley & Cannings 2005; Robinson	Yes. <i>Noctua pronuba</i> larvae feed on foliage, crowns, stems, roots, flower buds and flowers (Copley & Cannings 2005; Difonzo & Russell 2010) of economically important plants in Australia such as <i>Vitis</i> , <i>Dianthus</i> , <i>Fragaria</i> , <i>Chrysanthemum</i> , <i>Solanum</i> ,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	(Esfandiari, Mossadegh & Shishehbor 2011).			et al. 2019), which are present in Australia (APNI 2020). <i>N. pronuba</i> also feed on numerous weed species and invade homes and garages (Copley & Cannings 2005; Difonzo & Russell 2010). The species is distributed throughout Europe and North America, where climatic conditions are similar to regions in Australia. The adults are migratory, strong fliers and can endure cold winters (Copley & Cannings 2005), aiding in spread once established. Therefore, <i>N. pronuba</i> has the potential to establish and spread in Australia.	<i>Brassica</i> and <i>Ribes</i> spp. (CABI 2020a; Copley & Cannings 2005; Horticulture Innovation Australia 2019c; Robinson et al. 2019). Infestations and damage can become severe, similar to armyworms (Bechinski, Smith & Merickel 2009; Difonzo & Russell 2010). Therefore, <i>N. pronuba</i> has the potential to cause negative economic and environmental impact in Australia.	
<i>Olene inclusa</i> (Walker, 1857) [Lymantriidae]	Borneo, Indonesia, India, Philippines, Myanmar and Sri Lanka (Kaleka 2012; Sakai et al. 2001; Smetacek & Smetacek 2011)	No record found (ABRS 2020; Plant Health Australia 2020)	Species intercepted at Australia points of entry on cut flowers and foliage consignments (unpublished).	<i>Olene inclusa</i> is polyphagous, known to feed on species of <i>Rosa</i> , <i>Citrus</i> , <i>Pelargonium</i> , <i>Theobroma</i> , <i>Musa</i> , <i>Ficus</i> , <i>Averrhoa</i> , <i>Durio</i> , <i>Acacia</i> and <i>Eugenia</i> (Kaleka 2012; Sakai et al. 2001; Smetacek & Smetacek 2011), many plant species of which are present throughout	<i>Olene inclusa</i> larvae feed on foliage of numerous plant species including <i>Rosa</i> , <i>Citrus</i> , <i>Pelargonium</i> , <i>Theobroma</i> , <i>Musa</i> , <i>Ficus</i> , <i>Averrhoa</i> , <i>Durio</i> , <i>Acacia</i> and <i>Eugenia</i> (Kaleka 2012; Sakai et al. 2001; Smetacek & Smetacek 2011), which are naturalised or commercially grown	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Australia (APNI 2020). <i>Olene inclusa</i> is distributed throughout the South-East Asia, which has similar tropical climatic conditions to parts of Australia. Therefore, <i>O. inclusa</i> has the potential to establish and spread in Australia.	plants in Australia (APNI 2020). Therefore, <i>O. inclusa</i> has the potential to cause negative environmental and economic consequences in Australia.	
<i>Omiodes diemenalis</i> (Guenée, 1854) [Pyrilidae] Soybean leaf folder	Cambodia, China, India, Indonesia, Malaysia, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, South Africa, American Samoa, Fiji, New Caledonia, Papua New Guinea, Tonga and Vanuatu (CABI 2020a).	Present, Qld, NSW, NT and WA (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Operophtera brumata</i> Linnaeus, 1758 [Geometridae] European winter moth	Iran, Japan, USA, Belgium, France, Greece, Italy, the Netherlands, Spain, Switzerland, UK (CABI 2020a), Iceland, Portugal (Karsholt & Nieuwerkerken 2019) and Republic of Korea (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Operophtera brumata</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Operophtera brumata</i> is highly polyphagous, known to feed on host plant species from 15 different families, including <i>Cydonia</i> , <i>Malus</i> , <i>Pyrus</i> , <i>Prunus</i> , <i>Punica</i> , <i>Ribes</i> , <i>Rubus</i> , <i>Vitis</i> , <i>Acer</i> , <i>Betula</i> , <i>Fagus</i> , <i>Populus</i> , <i>Quercus</i> , <i>Rhododendron</i> , <i>Rosa</i> and <i>Ulmus</i> spp. (Ovsyannikova & Grichanov 2009c;	Yes. <i>Operophtera brumata</i> is known to feed on <i>Cydonia</i> , <i>Malus</i> , <i>Pyrus</i> , <i>Prunus</i> , <i>Punica</i> , <i>Ribes</i> , <i>Rubus</i> , <i>Vitis</i> , <i>Acer</i> , <i>Betula</i> , <i>Fagus</i> , <i>Populus</i> , <i>Quercus</i> , <i>Rhododendron</i> , <i>Rosa</i> and <i>Ulmus</i> spp. (Ovsyannikova & Grichanov 2009c; Robinson et al. 2019), economically important and naturalised species in Australia (APNI 2020;	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Robinson et al. 2019), which are present throughout Australia (APNI 2020). <i>O. brumata</i> is considered an invasive species since its accidental introduction in North America and establishment in woodlands (Kimberling, Miler & Penrose 1986). <i>O. brumata</i> has established in regions with similar climatic conditions to Australia. Therefore, <i>O. brumata</i> has the potential to establish and spread in Australia.	Horticulture Innovation Australia 2019c). <i>O. brumata</i> larval infestations result in defoliation of host plants (Childs, Swanson & Elkinton 2007; INRA 2019; Kikuzawa, Asai & Higashiura 1979; Kimberling, Miler & Penrose 1986; Ovsyannikova & Grichanov 2009c). Consecutive years of defoliation has caused branch or whole tree mortality in Canada (Childs, Swanson & Elkinton 2007). Therefore, <i>O. brumata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Opogona omoscopia</i> (Meyrick 1893) [Tineidae] Detritius moth	Ethiopia, South Africa, Madagascar, Mauritius (De Prins & De Prins 2018), USA (Lotts & Naberhaus 2018), UK (Kimber 2019), New Zealand, France and the Netherlands (GBIF Secretariat 2017).	Present, widespread (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	<i>Opogona omoscopia</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p><i>Opogona sacchari</i> (Bojer, 1856)</p> <p>[Tineidae]</p> <p>Banana Moth</p>	<p>China, Israel, Japan, Madagascar, Mauritius, Morocco, South Africa, USA, Peru, Brazil, Venezuela, Italy, the Netherlands, Portugal, Spain, Switzerland (CABI 2020a) and France (Karsholt & Nieukerken 2019).</p>	<p>No record found (ABRS 2020; Plant Health Australia 2020).</p> <p>Declared pest, prohibited entry into WA (Government of Western Australia 2020).</p>	<p><i>Opogona sacchari</i> is associated with foliage of <i>Dracaena</i> and <i>Cordyline</i> spp. (MPI 2016).</p>	<p>Yes. <i>Opogona sacchari</i> is distributed throughout humid tropical and subtropical climates (EPPO 2006b). Known hosts include over 87 plant species within 28 families, including <i>Chrysaliidocarpus</i>, <i>Cordyline</i>, <i>Dracaena</i>, <i>Gladiolus</i>, <i>Hippeastrum</i>, <i>Orchidaceae</i>, <i>Philodendron</i>, <i>Salix</i>, <i>Tulipa</i> and <i>Pandanus</i> spp. (van der Gaag et al. 2013). This species has established in regions with similar climatic conditions to Australia. Therefore, <i>O. sacchari</i> has the potential to establish and spread in Australia.</p>	<p>Yes. <i>Opogona sacchari</i> is known to feed on <i>Chrysaliidocarpus</i>, <i>Cordyline</i>, <i>Dracaena</i>, <i>Gladiolus</i>, <i>Hippeastrum</i>, <i>Orchidaceae</i>, <i>Philodendron</i>, <i>Salix</i>, <i>Tulipa</i> and <i>Pandanus</i> spp. (van der Gaag et al. 2013), economically important and naturalised species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>O. sacchari</i> larvae are extremely mobile, causing damage to foliage, flowers and seedlings, resulting in the stripping of the plant, collapse and wilting (EPPO 2006b). <i>O. sacchari</i> is recorded to tunnel within and hollow out woody and fleshy stems as well as feed on roots and dead foliage of <i>Dracaena</i> and <i>Yucca</i> spp., where the larvae live within the cortex and pith, resulting in soft tissues (EPPO 2006b; van der Gaag et al. 2013).</p>	<p>Yes</p>

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					Therefore, <i>O. sacchari</i> has the potential to cause negative economic consequences in Australia.	
<i>Orgyia postica</i> (Walker, 1855) Synonym: <i>Orgyia posticus</i> [Erebidae] Cocoa tussock moth	China, India, Indonesia, Japan, Malaysia, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam and Papua New Guinea (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Orgyia postica</i> has a wide host range including <i>Rosa</i> , Orchid, and <i>Lilium</i> spp. (Biosecurity Australia 2010c; DAFF 2013d; PHA 2016a).	Yes. Previously assessed by the department (Biosecurity Australia 2006d, 2011d; DAFF 2013d). <i>Orgyia postica</i> has a wide host range including <i>Rosa</i> , Orchid, <i>Lilium</i> spp., mangoes, eucalyptus and tropical fruits (Biosecurity Australia 2010c; DAFF 2013d; PHA 2016a), plants which are present throughout Australia (APNI 2020). <i>O. postica</i> is established across Asia, areas with a wide range of climatic conditions. Therefore <i>O. postica</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2006d, 2011d; DAFF 2013d). <i>Orgyia postica</i> is highly polyphagous pest recorded on many economically important crops and endemic plants of Australia. This includes <i>Eucalyptus</i> in Japan (Nasu et al. 2004), tropical fruit in Southern China (Biosecurity Australia 2006d; Zhu & Zhang 2004), mangoes in India (Gupta & Singh 1986) and grapes, roses and cereal pulses in Taiwan (Chang 1988; Su 1987; Wang 1982). Therefore, <i>O. postica</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Ostrinia nubilalis</i> (Hübner 1796) [Crambidae] European maize borer	China, India, Indonesia, Iran, Israel, Lebanon, Egypt, Morocco, USA, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, UK (CABI 2020a), Republic of Korea and Malaysia (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020), NT (DPIR 2018a), and Vic. (DEDJTR 2017).	<i>Ostrinia nubilalis</i> is associated with <i>Alcea</i> , <i>Aster</i> , <i>Chrysanthemum</i> , <i>Cosmos</i> , <i>Dahlia</i> , <i>Gladiolus</i> and <i>Helianthus</i> spp. (PHA 2016a; Robinson et al. 2019).	Yes. <i>Ostrinia nubilalis</i> is highly polyphagous, reported to establish on over 200 host plants (Bourguet et al. 2000; Hudon & LeRoux 1986), including <i>Zea</i> , <i>Sorghum</i> , <i>Solanum</i> , <i>Malus</i> , <i>Fragaria</i> , <i>Capsicum</i> , <i>Brassicae</i> , <i>Alcea</i> , <i>Aster</i> , <i>Chrysanthemum</i> , <i>Cosmos</i> , <i>Dahlia</i> , <i>Gladiolus</i> and <i>Helianthus</i> spp. (Capinera 2000; Robinson et al. 2019), many plants which are present throughout Australia (APNI 2020). The species is distributed throughout Asia, Europe and North America, regions with similar climatic conditions to Australia. Therefore <i>O. nubilalis</i> has the potential to establish and spread in Australia.	Yes. <i>Ostrinia nubilalis</i> feeds on corn, oats, peanut, barley, wheat, peas, dahlia, apple, peach, raspberry, eggplant, capsicum, tomato, potato, cotton, millet, gladiolus, and chrysanthemums (Hudon & LeRoux 1986; PHA 2016a; Robinson et al. 2019), all economically important plants in Australia (Horticulture Innovation Australia 2019c). In North America <i>O. nubilalis</i> is a significant pest of corn, with damage and pest control costs exceeding US\$1 billion per annum (Qureshi et al. 2005). Therefore, <i>O. nubilalis</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Orvasca subnotata</i> (Walker, 1865) Synonym: <i>Euproctis subnotata</i> Walker, 1865, <i>Porthesia subnotata</i> Walker, 1865	India, Malaysia (CABI 2020a), China, Taiwan, India, Pakistan, Sri Lanka, Malaysia, Singapore, and Indonesia (Wang, Wang & Fan 2011).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Orvasca subnotata</i> is polyphagous and feeds on host plants from 13 families, including <i>Acacia</i> , <i>Mangifera</i> , <i>Solanum</i> , <i>Sorghum</i> , <i>Zea</i> , <i>Citrus</i> , <i>Litchi</i> , <i>Nephelium</i> , and	Yes. <i>Orvasca subnotata</i> is known to attack <i>Dalbergia</i> spp., acacia, mango, potato, sorghum, maize, citrus trees, lychee and rambutan (Holloway 1999; Robinson et al.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Erebidae]				<i>Cycas</i> spp. (Holloway 1999; Robinson et al. 2019), which are present in Australia (APNI 2020). The species is distributed throughout Asia, where climatic conditions are similar to parts of Australia. Therefore, <i>O. subnotata</i> has the potential to establish and spread in Australia.	2019), which are important plant species in Australia (AgriFutures 2017; Horticulture Innovation Australia 2019c). Larvae feed on foliage and cause severe defoliation in <i>Dalbergia</i> spp. in China (Zhou et al. 2015). This species may also become a pest in lowland forests (Holloway 1999). Therefore, <i>O. subnotata</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Pandemis cerasana</i> (Hübner, 1786) [Tortricidae] Cherry brown tortrix	China, Italy, UK (CABI 2020a), Belgium, France, Greece, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), India (Robinson et al. 2019) and USA (Lotts & Naberhaus 2018).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020) and Vic. (DEDJTR 2017).	<i>Pandemis cerasana</i> is associated with flowers and foliage of <i>Rosa</i> spp. (PHA 2016a; Ziarkiewicz & Kozłowska 1973).	Yes. <i>Pandemis cerasana</i> is polyphagous and known to feed on host plants from 15 families including <i>Acer</i> , <i>Betula</i> , <i>Malus</i> , <i>Picea</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Quercus</i> , <i>Rhododendron</i> , <i>Ribes</i> , <i>Rosa</i> , <i>Tilia</i> , <i>Ulmus</i> and <i>Vaccinium</i> spp. (PHA 2016a; Robinson et al. 2019), many plant species which are present in Australia (APNI 2020). The species is distributed	Yes. <i>Pandemis cerasana</i> is a high priority pest for the Australian cherry industry (PHA 2018). This species is also associated with <i>Prunus</i> spp., apple, pear, roses, and blueberries which are economically important in Australia (Horticulture Innovation Australia 2019c). Larvae feed on shoots, flowers, foliage, recently formed fruit and skin on fruits	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				in Europe, USA and Asia where climatic conditions are similar to parts of Australia. Therefore, <i>P. cerasana</i> has the potential to establish and spread in Australia.	that are in contact with leaves (INRA 2019; MAF Biosecurity New Zealand 2009; Tiso et al. 1992). Therefore, <i>P. cerasana</i> has the potential to cause negative economic consequences in Australia.	
<i>Papaipema nebris</i> (Guenée, 1852) [Noctuidae] Common stalk borer	Canada and USA (CABI 2020a).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Yes. <i>Papaipema nebris</i> is associated with <i>Chrysanthemum</i> , <i>Rosa</i> , <i>Gladiolus</i> , <i>Helianthus</i> , <i>Iris</i> and <i>Dianthus</i> spp. (OGTR 2006; Robinson et al. 2019).	Yes. <i>Papaipema nebris</i> is highly polyphagous and has a wide host range. There are almost 200 known plant hosts (Capinera 2001) from 29 plant families, including <i>Aster</i> , <i>Brassica</i> , <i>Capsicum</i> , <i>Chrysanthemum</i> , <i>Dahlia</i> , <i>Delphinium</i> , <i>Dianthus</i> , <i>Fragaria</i> , <i>Gladiolus</i> , <i>Helianthus</i> , <i>Iris</i> , <i>Lilium</i> , <i>Malus</i> , <i>Pisum</i> , <i>Poa</i> , <i>Prunus</i> , <i>Ribes</i> , <i>Rosa</i> , <i>Rubus</i> , <i>Solanum</i> , <i>Sorghum</i> , <i>Vitis</i> , <i>Zea</i> and <i>Zinnia</i> spp. (Robinson et al. 2019). <i>P. nebris</i> is distributed throughout North America where climatic conditions are similar to parts of Australia. Therefore, <i>P. nebris</i> has the potential to establish and spread in Australia.	Yes. <i>Papaipema nebris</i> is highly polyphagous and has a wide host range. There are almost 200 known plant hosts (Capinera 2001), many of these plants are economically important and or naturalised in Australia (APNI 2020; Robinson et al. 2019). Young <i>Papaipema nebris</i> larvae initially mine leaves or grass stems. As they grow they relocate to larger plants to bore into stems near the surface and below the ground (Capinera 2001). In corn, larvae bore into the stem or whorl, causing hollowed cobs and death (Capinera 2001), which results in significant damages and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					reduced yield. <i>Papaipema nebris</i> also feeds on soft woody tissues of woody plants (Capinera 2001). Therefore, <i>P. nebris</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Parapoynx diminutalis</i> Snellen 1880 [Crambidae] Hydrilla leaf-cutter moth	India, Philippines, Thailand, USA, Panama (CABI 2020a), Egypt, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, South Africa, Tanzania, Uganda, Zimbabwe (De Prins & De Prins 2018), Singapore, Taiwan, the Netherlands (GBIF Secretariat 2017) and Britain (Karsholt & Nieukerken 2019).	Present, NSW, NT, Qld and WA (ABRS 2020; Herbison-Evans & Crossley 2019).	<i>Parapoynx diminutalis</i> is associated with <i>Jasminium</i> spp. (Robinson et al. 2019).	Assessment not required	Assessment not required	No
<i>Peridroma saucia</i> (Hübner, 1808) [Noctuidae] Pearly underwing moth	China, Israel, Japan, Republic of Korea, Sri Lanka, Taiwan, Morocco, Mexico, USA, Argentina, Chile, Colombia, Ecuador, Peru, Belgium, France, Greece, Iceland, Italy, the Netherlands, Portugal, Spain, Switzerland, UK (CABI 2020a), Pakistan (GBIF Secretariat 2017),	No record found (ABRS 2020; Plant Health Australia 2020). Declared and notifiable pest, prohibited entry into WA (Government of Western Australia 2020), Vic. (DEDJTR 2017) and Qld. (Office of the Queensland	<i>Peridroma saucia</i> is associated with foliage of <i>Chrysanthemum</i> and <i>Dianthus</i> spp. (OGTR 2006; PHA 2016a). Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Peridroma saucia</i> is highly polyphagous with over 121 host plants from 39 plant families (Choi et al. 2009; Robinson et al. 2019) including vegetable, cereal, ornamental, fruit, forage crops, and non-crop plants (Mau & Martin Kessing 2007; Simonet et	Yes. <i>Peridroma saucia</i> is highly polyphagous with over 121 host plants from 39 plant families (Choi et al. 2009; Robinson et al. 2019), many of these plants are economically important and or naturalised in Australia (APNI 2020; Robinson et al. 2019). <i>Peridroma</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Saudi Arabia, South Africa, United Arab Emirates (De Prins & De Prins 2018) and Nepal (Discover Life 2019).	Parliamentary Counsel 2016).		al. 1981; Walker 2011). Additionally, <i>P. saucia</i> has high reproductive potential and migratory habits aiding spread (Choi et al. 2009). The species is widely distributed throughout the globe (CABI 2020a; De Prins & De Prins 2018), in regions where climatic conditions are similar to Australia. Therefore, <i>P. saucia</i> has the potential to establish and spread in Australia.	<i>saucia</i> larvae are generalist feeders that damage seedlings, bark, buds, foliage, flowers, and fruit (MAF Biosecurity New Zealand 2009; Mau & Martin Kessing 2007). In some cases, foliage and bud feeding are severe enough to cease development of grape bunches (MAF Biosecurity New Zealand 2009). <i>P. saucia</i> is regarded as a high priority pest for Australia (PHA 2018). Therefore, <i>P. saucia</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Phalera bucephala</i> (Linnaeus, 1758) [Notodontidae] Buff-tip moth	Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), UK and Kenya (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Phalera bucephala</i> is associated with <i>Rosa</i> spp. (PHA 2016a)	Yes. <i>Phalera bucephala</i> is polyphagous, commonly found on host plants from 10 families, including <i>Fagus</i> , <i>Betula</i> , <i>Ulmus</i> , <i>Prunus</i> , <i>Tilia</i> , <i>Quercus</i> , <i>Salix</i> , <i>Rosa</i> , <i>Castanea</i> and <i>Viburnum</i> spp. (Alford 2012; Robinson et al. 2019), all present in Australia (APNI 2020).	Yes. <i>Phalera bucephala</i> is known to feed on <i>Fagus</i> , <i>Betula</i> , <i>Ulmus</i> , <i>Prunus</i> , <i>Tilia</i> , <i>Quercus</i> , <i>Salix</i> , <i>Rosa</i> , <i>Castanea</i> and <i>Viburnum</i> spp. (Alford 2012; Robinson et al. 2019), economically important and naturalised species in Australia (APNI 2020; Horticulture Innovation	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				The species is widely distributed in Europe, where climatic conditions are similar to regions in Australia. Therefore, <i>P. bucephala</i> has the potential to establish and spread in Australia.	Australia 2019c). Young <i>P. bucephala</i> larvae feed on the lower epidermis of leaves, while older larvae eat whole leaves (Alford 2012). This behaviour defoliates shoots and branches which can be detrimental to younger trees and shrubs (Alford 2012). Therefore, <i>P. bucephala</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Phlogophora meticulosa</i> (Linnaeus, 1758) [Noctuidae] Angle-shades moth	Belgium, France, Greece, Iceland, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), UK, India (Discover Life 2019) and USA (Lotts & Naberhaus 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished). It is associated with <i>Alcea</i> , <i>Iris</i> , <i>Chrysanthemum</i> , <i>Geranium</i> , <i>Viola</i> , <i>Primula</i> , <i>Dahlia</i> and <i>Pelargonium</i> (Alford 2012; Robinson et al. 2019).	Yes. <i>Phlogophora meticulosa</i> is polyphagous, feeding on over 23 host species within 12 plant families (Robinson et al. 2019), including chrysanthemum, geranium, iris, dahlias and hollyhock (Alford 2012). The species is present in Europe and the USA where they are common in herbaceous greenhouses (Alford 2012), temperatures and conditions which are	Yes. <i>Phlogophora meticulosa</i> is a pest of chrysanthemum, geranium, iris, dahlias and hollyhock (Alford 2012), economically important and naturalised species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>P. meticulosa</i> larvae feed on foliage and causing a 'windowing effect' (Alford 2012). Older larvae eat whole leaves, flower buds, growing points, and	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				similar to regions in Australia. Therefore, <i>P. meticulosa</i> has the potential to establish and spread in Australia.	blossom trusses, ultimately causing some degree of defoliation (Alford 2012), thus reducing the value and marketability of ornamentals. Therefore, <i>P. meticulosa</i> has the potential to cause negative economic consequences in Australia.	
<i>Pirdana hyela</i> (Hewitson 1867) [Hesperiidae]	Malaysia, India, Indonesia, Thailand (Discover Life 2019) and Philippines (de Jong & Treadaway 1993).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pirdana hyela</i> is associated with <i>Dracaena</i> and <i>Cordyline</i> spp. (Cock, Congdon & Collins 2015; Guthrie 2008; Robinson et al. 2019).	Yes. <i>Pirdana hyela</i> is polyphagous and known to feed on host species from 3 families, including <i>Dracaena</i> and <i>Cordyline</i> spp. (Robinson et al. 2019) which are present in Australia (APNI 2020). The species is distributed throughout South-East Asia, areas with similar climatic conditions to Australia. Therefore, <i>P. hyela</i> has the potential to establish and spread in Australia.	Yes. <i>Pirdana hyela</i> is a pest of <i>Dracaena</i> and <i>Cordyline</i> spp. (Robinson et al. 2019), economically important ornamental and naturalised plant species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>Pirdana hyela</i> feeding damage reduces marketability of host plants. Therefore, <i>P. hyela</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Planotortrix excessana</i> (Walker, 1863)	New Zealand (CABI 2020a) and Hawaii (Gilligan & Epstein 2014).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Planotortrix excessana</i> is associated with <i>Chrysanthemum</i> , <i>Fuchsia</i> , <i>Rosa</i> , and <i>Camellia</i> spp.	Yes. Previously assessed by the department (Biosecurity Australia 2003a, 2006b, a, 2011c).	Yes. Previously assessed by the department (Biosecurity Australia 2003a, 2006b, a, 2011c).	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<p>Synonym: <i>Planotortrix excessana</i> type B Foster <i>et al.</i></p> <p>[Tortricidae]</p> <p>Green-headed leafroller</p>		Declared pest, prohibited entry into WA (Government of Western Australia 2020).	(Gilligan & Epstein 2014; Robinson <i>et al.</i> 2019).	<i>Planotortrix. excessana</i> has a wide host range, including apple, pear, grapes, citrus, stone fruit, kiwifruit, walnut, lupin, ivy, camellia, laurel, hebe, polyanthus, coprosma, and conifers (Biosecurity Australia 2006b; McLaren <i>et al.</i> 1999), which are present in Australia (APNI 2020). <i>P. excessana</i> is distributed in New Zealand and Hawaii, areas with similar climatic conditions to Australia. Therefore, <i>P. excessana</i> has the potential to establish and spread in Australia.	<i>Planotortrix excessana</i> is a naturally polyphagous orchard pest in New Zealand (Biosecurity Australia 2006a; Dugdale 1990; Wearing <i>et al.</i> 1991). Feeding on immature fruit may result in a gumming response or predispose fruit to fungal infection (Biosecurity Australia 2006b; McLaren <i>et al.</i> 1999). Therefore, <i>P. excessana</i> has the potential to cause negative economic consequences in Australia.	
<p><i>Platynota stultana</i></p> <p>Walsingham, 1884</p> <p>[Tortricidae]</p> <p>Rose leaf roller</p>	Mexico, USA (CABI 2020a) and Spain (EPPO 2020; Groenen & Baixeras 2013).	<p>No record found (ABRS 2020; Plant Health Australia 2020).</p> <p>Declared pest, prohibited entry into WA (Government of Western Australia 2020) and Vic. (DEDJTR 2017).</p>	<i>Platynota stultana</i> is associated with leaves and flowers of <i>Chrysanthemum</i> , <i>Dianthus</i> and <i>Rosa</i> spp. (OGTR 2006; PHA 2016a).	<p>Yes. Previously assessed by the department (Biosecurity Australia 2010b; DAWR 2016e).</p> <p><i>Platynota stultana</i> is polyphagous feeding on many common fruit, vegetable and fibre crops as well as <i>Eucalyptus</i> spp. and clover (CABI 2014), which are present in Australia (APNI 2020). <i>P. stultana</i> is distributed in parts of Europe and</p>	<p>Yes. Previously assessed by the department (Biosecurity Australia 2010b; DAWR 2016e).</p> <p><i>Platynota stultana</i> is a polyphagous pest feeding on many common fruit, vegetable and fibre crops as well as <i>Eucalyptus</i> spp. and clover (CABI 2014), many of which are economically important and or naturalised plant species in Australia (APNI</p>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				America, areas with similar climatic conditions to Australia. Therefore, <i>P. stultana</i> has the potential to establish and spread in Australia (Bentley 2016; Bentley, Day & Rice 2009; Biosecurity Australia 2010b; CABI 2007).	2020; Horticulture Innovation Australia 2019c). <i>Platynota stultana</i> is an important pest on many plant crops in Australia (Bentley 2016; Bentley, Day & Rice 2009; Biosecurity Australia 2010b; CABI 2007). The feeding habits of this species also allow secondary rots to infect grape bunches due to direct feeding damage on berries (Bentley & Coviello 2012; CABI 2014; DAWR 2016e). Therefore, <i>P. stultana</i> has the potential to cause negative economic consequences in Australia.	
<i>Plodia interpunctella</i> (Hübner, 1813) [Pyralidae] Indian meal moth	China, India, Iran, Israel, Japan, Republic of Korea, Vietnam, Egypt, Ethiopia, Malawi, Morocco, South Africa, Zimbabwe, USA, Chile, France, Greece, Italy, Portugal, Spain, Switzerland and UK (CABI 2020a).	Present widespread (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Present in WA, but also a declared pest, prohibited entry (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Plutella xylostella</i> (Linnaeus 1758) [Plutellidae] Diamondback moth	Afghanistan, Cambodia, China, India, Indonesia, Iran, Israel, Japan, Republic of Korea, Lebanon, Malaysia, Nepal, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam, Egypt, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Morocco, South Africa, Tanzania, Uganda, Zimbabwe, Mexico, USA, British Virgin Islands, Argentina, Chile, Colombia, Peru, Belgium, France, Greece, Iceland, Italy, the Netherlands, Portugal, Spain, Switzerland, UK, Fiji, New Caledonia, New Zealand, Papua New Guinea and Tonga (CABI 2020a).	Present, widespread (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Prothinodes grammocosma</i> (Meyrick, 1888) [Tineidae]	New Zealand (Beccaloni et al. 2018; Guthrie 2008).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Prothinodes grammocosma</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Prothinodes grammocosma</i> is oligophagous, known to feed on dead leaves of <i>Cordyline</i> spp. (Guthrie 2008) which is present in Australia (APNI 2020). The species is endemic to New Zealand, where	No. <i>Prothinodes grammocosma</i> has only been reported on dead leaves of <i>Cordyline</i> , <i>Freycinetia</i> spp. and astelias in New Zealand (Guthrie 2008). There is no evidence it could cause significant	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				climatic conditions are similar to Australia. Therefore, <i>P. grammocosma</i> has the potential for establishment and spread in Australia.	economic or environmental consequences in Australia.	
<i>Prothinodes lutata</i> Meyrick, 1914 [Tineidae]	New Zealand (Beccaloni et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Prothinodes lutata</i> is associated with <i>Cordyline</i> spp. (Guthrie 2008).	Yes. <i>Prothinodes lutata</i> is oligophagous, known to feed on dead leaves of <i>Cordyline</i> spp. (Guthrie 2008) which is present in Australia (APNI 2020). <i>P. lutata</i> is present in New Zealand, where climatic conditions are similar to Australia. Therefore, <i>P. lutata</i> has the potential for establishment and spread in Australia.	No. <i>Prothinodes lutata</i> was reported from <i>Cordyline</i> dead leaves and nikau palm (Guthrie 2008). It is suspected but unconfirmed that <i>P. lutata</i> is associated with long-leaved arboreal monocots (Guthrie 2008). There is no evidence it could cause significant economic or environmental consequences in Australia.	No
<i>Ptilodon capucina</i> (Linnaeus, 1758) [Notodontidae] Coxcomb prominent	Belgium, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), France, UK and Republic of Korea (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Ptilodon capucina</i> is associated with <i>Rosa</i> spp. (PHA 2016a)	Yes. <i>Ptilodon capucina</i> is polyphagous and feeds on hosts species within seven plant families, including <i>Acer</i> , <i>Betula</i> , <i>Malus</i> , <i>Populus</i> , <i>Prunus</i> , <i>Quercus</i> , <i>Rosa</i> , <i>Salix</i> , <i>Tilia</i> and <i>Ulmus</i> spp. (Robinson et al. 2019), many plants which are present in Australia (APNI 2020). <i>P. capucina</i> is	Yes. <i>Ptilodon capucina</i> are polyphagous feeding on range of deciduous tree species including fruiting trees species, <i>Malus</i> and <i>Prunus</i> , and forestry tree species trees, poplar, willow, elms, birch and maple (Oxbrough et al. 2012; Robinson et al. 2019), economically important	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				geographically distributed in Europe and Asia, regions with similar climatic conditions to Australia. Therefore, <i>P. capucina</i> has the potential to establish and spread in Australia.	and naturalised plant species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>P. capucina</i> has the potential to cause negative environmental and economic consequences in Australia.	
<i>Pyrrharctia isabella</i> (Smith 1797) [Erebidae] Isabella tiger moth	USA (Lotts & Naberhaus 2018) and Mexico (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Pyrrharctia isabella</i> is associated with <i>Dianthus</i> spp. (OGTR 2006).	Yes. <i>Pyrrharctia isabella</i> is polyphagous on over 90 host species from 50 plant families (Capinera 2001). These include <i>Aster</i> , <i>Betula</i> , <i>Dianthus</i> , <i>Fragaria</i> , <i>Gossypium</i> , <i>Helianthus</i> , <i>Prunus</i> , <i>Ribes</i> , <i>Rubus</i> , <i>Ulmus</i> , <i>Vitis</i> and <i>Zea</i> spp. (Robinson et al. 2019), which are present throughout Australia (APNI 2020). The species is distributed throughout North America (Capinera 2001) where climatic conditions are similar to regions in Australia. Therefore, <i>P. isabella</i> has the potential to establish and spread in Australia.	Yes. <i>Pyrrharctia isabella</i> larvae feed on the underside of foliage, causing skeletonisation, while mature larvae chew sporadic holes in leaves (Capinera 2001), which would reduce value and marketability of ornamentals. Host plants include economically important and naturalised plant species in Australia (APNI 2020; Horticulture Innovation Australia 2019c), including cotton, strawberry, sunflowers, maize, grape, carnation, <i>Prunus</i> , <i>Ribes</i> and <i>Rubus</i> spp. (Horticulture Innovation Australia 2019c; Robinson et al.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					2019). Therefore, <i>P. isabella</i> has the potential to cause negative economic consequences in Australia.	
<i>Sabera dobboe</i> (Plötz, 1885) Synonym: <i>Pamphila dobboe</i> [Hesperiidae] Yellow-streaked swift	Indonesia and Papua New Guinea (ABRS 2020).	Present, Qld, (ABRS 2020; Herbison-Evans & Crossley 2019).	<i>Sabera dobboe</i> is associated with <i>Cordyline</i> spp. (Herbison-Evans & Crossley 2019).	Assessment not required	Assessment not required	No
<i>Saturnia pavonia</i> (Linnaeus, 1758) [Saturniidae] Small emperor moth	Morocco, Belgium, France, Greece, Italy, the Netherlands, Spain, Switzerland, UK (CABI 2020a), Portugal (Karsholt & Nieuwerkerken 2019) and Turkey (Kaygin, Yildiz & Avci 2009).	No record found (ABRS 2020; Plant Health Australia 2020)	<i>Saturnia pavonia</i> is associated with <i>Rosa</i> spp. (PHA 2016a).	Yes. <i>Saturnia pavonia</i> is polyphagous, feeding on host species from 18 plant families, including <i>Rubus</i> , <i>Prunus</i> , <i>Quercus</i> , <i>Betula</i> , <i>Salix</i> , <i>Malus</i> , <i>Vaccinium</i> , <i>Fragaria</i> , <i>Rosa</i> and <i>Ulmus</i> spp. (Pittaway 2018; Robinson et al. 2019), which are present throughout Australia (APNI 2020). The species is highly adaptable in shrub-strewn grasslands, heaths, woodland margins and hedgerows (Pittaway 2018). <i>S. pavonia</i> is widely distributed throughout the Palearctic region	Yes. <i>Saturnia pavonia</i> is a pest of <i>Rubus</i> , <i>Prunus</i> , <i>Quercus</i> , <i>Betula</i> , <i>Salix</i> , <i>Malus</i> , <i>Vaccinium</i> , <i>Fragaria</i> , <i>Rosa</i> and <i>Ulmus</i> spp. (Pittaway 2018; Robinson et al. 2019), economically important ornamental and naturalised plant species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>S. pavonia</i> larvae feed on vegetative stages and foliage of apple, strawberry, rose, <i>Rubus</i> and <i>Prunus</i> spp. (CABI 2020a). In outbreaks, <i>S. pavonia</i> is able to	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				(Pittaway 2018) where climatic conditions are similar to regions in Australia. Therefore, <i>S. pavonia</i> has the potential to establish and spread in Australia.	rapidly defoliate trees (Bertucci 1983), causing a reduction in fruit yield (CABI 2020a). Therefore, <i>S. pavonia</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Sideridis rivularis</i> (Fabricius, 1775) Synonym: <i>Hadena rivularis</i> (Fabricius, 1775) [Noctuidae] Campion moth	Belgium, France, Italy, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), UK (Kimber 2019), Republic of Korea (Byun et al. 2009) and Turkey (Kaygin, Yildiz & Avci 2009).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Sideridis rivularis</i> is associated with <i>Dianthus</i> spp. (OGTR 2006).	Yes. <i>Sideridis rivularis</i> feeds on plant species from the family Caryophyllaceae, including <i>Dianthus</i> , <i>Silene</i> and <i>Lychnis</i> spp. (Robinson et al. 2019; Vegliante & Zilli 2007). <i>S. rivularis</i> is widely distributed across the Palaearctic region (Vegliante & Zilli 2007) where climatic conditions are similar to regions in Australia. Therefore, with the availability of host plants and suitable climatic conditions, <i>S. rivularis</i> has the potential to establish and spread across Australia.	Yes. <i>Sideridis rivularis</i> is a pest of <i>Dianthus</i> , <i>Silene</i> and <i>Lychnis</i> spp. (Robinson et al. 2019; Vegliante & Zilli 2007), economically important ornamental and naturalised plant species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Young <i>Sideridis rivularis</i> larvae feed on developing seeds internally (Kimber 2019), older larvae feed on foliage, then adults oviposit on flowers and flower buds (Vegliante & Zilli 2007; Wagner 2016). The feeding habits of this species in-turn reduce plant health and quality of flowers and foliage. Therefore, <i>S. rivularis</i> has	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					the potential to cause negative economic and environmental consequences in Australia.	
<i>Sitotroga cerealella</i> (Olivier, 1789) [Gelechiidae] Angoumois grain moth	Ethiopia (letter from MANR on 06/03/2018), China, India, Indonesia, Israel, Japan, Lebanon, Malaysia, Pakistan, Philippines, Saudi Arabia, Sri Lanka, Taiwan, Thailand, Egypt, Kenya, Malawi, South Africa, Tanzania, Zimbabwe, Mexico, USA, Argentina, Colombia, Greece, Italy, the Netherlands, Spain and Switzerland (CABI 2020a).	Present, ACT, NSW, NT, SA, Tas., Qld, Vic. and WA (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Present in WA, but also a declared pest prohibited entry (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Spodoptera cosmioides</i> Walker 1858 [Noctuidae] Armyworm	Brazil (EPPO 2015b; Montezano et al. 2018).	No record found (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020)	Species intercepted at Australian points of entry on cut flower and foliage consignments and identified with DNA (unpublished).	Yes. <i>Spodoptera cosmioides</i> is polyphagous, known to attack over 24 plant species (Cabezas et al. 2013), including <i>Ananas</i> , <i>Gossypium</i> , <i>Solanum</i> , <i>Allium</i> , <i>Eucalyptus</i> and <i>Capsicum</i> spp. (Bavaresco et al. 2002; EPPO 2015b) which are all present in Australia (APNI 2020). The species is present in Brazil (EPPO 2015b;	Yes. <i>S. cosmioides</i> is a pest of many plants including <i>Ananas</i> , <i>Gossypium</i> , <i>Solanum</i> , <i>Allium</i> , <i>Eucalyptus</i> and <i>Capsicum</i> spp. (Bavaresco et al. 2002; EPPO 2015b), endemic, economically important and naturalised plant species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>S. cosmioides</i> is an	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Montezano et al. 2018), where climatic conditions are similar to regions in Australia. Therefore <i>S. cosmioides</i> has the potential to establish and spread in Australia.	agriculturally important plant pest in Brazil (Montezano et al. 2018). All <i>Spodoptera</i> species have similar biology; adults oviposit on leaves, larvae feed on leaves, fruits, stems, flowers, flower bud and cotton bolls, and pupate in soils (dos Santos et al. 2010; EPPO 2015b) Therefore, <i>S. cosmioides</i> has the potential to cause negative economic consequences in Australia.	
<i>Spodoptera eridania</i> (Stoll, 1781) [Noctuidae] Southern armyworm moth	Mexico, USA, Panama, Argentina, Chile, Colombia, Ecuador and Peru (CABI 2020a).	No record found (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Spodoptera eridania</i> is associated with <i>Dianthus caryophyllus</i> (OGTR 2006; PHA 2016a), <i>Chrysanthemum</i> , <i>Gerbera</i> , <i>Hibiscus</i> , <i>Helianthus</i> and <i>Rosa</i> spp. (CABI 2020a; Robinson et al. 2019).	Yes. <i>Spodoptera eridania</i> is highly polyphagous, known to attack over 200 species (CABI 2020a) from over 30 plant families, including <i>Allium</i> , <i>Brassica</i> , <i>Capsicum</i> , <i>Citrus</i> , <i>Cucurbit</i> , <i>Dianthus</i> , <i>Eucalyptus</i> , <i>Chrysanthemum</i> , <i>Glycine</i> , <i>Rubus</i> , <i>Gerbera</i> , <i>Gossypium</i> , <i>Helianthus</i> , <i>Hibiscus</i> , <i>Ipomoea</i> , <i>Phaseolus</i> , <i>Rosa</i> , <i>Solanum</i> , <i>Vaccinium</i> and <i>Zinnia</i> spp. (CABI 2020a; Robinson et al. 2019), all present in	Yes. <i>Spodoptera eridania</i> is a polyphagous pest of many plants including <i>Allium</i> , <i>Brassica</i> , <i>Capsicum</i> , <i>Citrus</i> , <i>Cucurbit</i> , <i>Dianthus</i> , <i>Eucalyptus</i> , <i>Chrysanthemum</i> , <i>Glycine</i> , <i>Rubus</i> , <i>Gerbera</i> , <i>Gossypium</i> , <i>Helianthus</i> , <i>Hibiscus</i> , <i>Ipomoea</i> , <i>Phaseolus</i> , <i>Rosa</i> , <i>Solanum</i> , <i>Vaccinium</i> and <i>Zinnia</i> spp. (CABI 2020a; Robinson et al. 2019), endemic, economically important and naturalised plant species in Australia (APNI	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
				Australia (APNI 2020). <i>S. eridania</i> occurs in the American tropics (Capinera 2014), where climatic conditions are similar to regions in Australia. Therefore, <i>S. eridania</i> has the potential to establish and spread within Australia.	2020; Horticulture Innovation Australia 2019c). <i>Spodoptera eridania</i> larvae are defoliators; young larvae skeletonise leaves and mature larvae can bore into fruit (Capinera 2014). If foliage is absent, larvae will eat apical portions of branches and bore into stems or attack tubers near the soil surface (Capinera 2014). Due to defoliating behaviours and population densities, <i>S. eridania</i> is known to cause economic losses in some crop species (Favetti, Butnariu & Foerster 2015). Therefore, <i>S. eridania</i> has the potential to cause negative economic consequences in Australia.	
<i>Spodoptera exigua</i> (Hübner, 1808) [Noctuidae] Beet armyworm	Kenya (Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Afghanistan, Cambodia, China, India, Indonesia, Iran, Israel, Japan,	Present, widespread (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Republic of Korea, Lebanon, Malaysia, Pakistan, Philippines, Saudia Arabia, Sri Lanka, Taiwan, Thailand, Vietnam, Egypt, Madagascar, Malawi, Morocco, South Africa, Tanzania, Zimbabwe, Mexico, USA, Belgium, France, Greece, Italy, the Netherlands, Portugal, Spain and UK (CABI 2020a).					
<i>Spodoptera frugiperda</i> Smith & Abbot, 1797 [Noctuidae] Fall armyworm	Kenya (under official control) (Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), India (ICAR-NBAIR 2018), Sri Lanka, Thailand, Indonesia, Madagascar, Malawi, South Africa, Tanzania, Uganda, Zimbabwe, Mexico, USA, British Virgin Islands, Panama, Argentina, Chile, Colombia, Ecuador and Peru (CABI 2020a).	Present, NSW, Qld, NT and WA (IPPC 2020, unpublished data).	<i>Spodoptera frugiperda</i> is associated with <i>Dianthus</i> and <i>Chrysanthemum</i> spp. (PHA 2016a). Species has also been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Spodoptera littoralis</i> (Boisduval, 1833) [Noctuidae]	Kenya (letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018),	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Spodoptera littoralis</i> is associated with foliage of <i>Chrysanthemum</i> , <i>Helianthus</i> , <i>Gerbera</i> ,	Yes. <i>Spodoptera littoralis</i> has a host range belonging to over 40 families (CABI & EPPO	Yes. <i>Spodoptera littoralis</i> is a high priority pest of cut flowers and foliage in Australia (PHA 2018).	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Cotton leafworm	Japan, Pakistan, Indonesia (Ali et al. 2016), Iran, Israel, Lebanon, Saudi Arabia, United Arab Emirates, Egypt, Madagascar, Malawi, Mauritius, Morocco, South Africa, Tanzania, Uganda, Zimbabwe, Greece, Italy, Portugal, Spain (CABI 2020a), France, Switzerland (Karsholt & Nieukerken 2019), UK (Kimber 2019) and the Netherlands (GBIF Secretariat 2017).	Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Dianthus</i> , <i>Rosa</i> and <i>Lisianthus</i> spp. (PHA 2016a). Species has also been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	1997; PHA 2016a), including <i>Allium</i> , <i>Amaranthus</i> , <i>Brassica</i> , <i>Camellia</i> , <i>Capsicum</i> , <i>Citrus</i> , <i>Chrysanthemum</i> , <i>Musa</i> , <i>Dianthus</i> , <i>Eucalyptus</i> , <i>Fragaria</i> , <i>Gerbera</i> , <i>Gossypium</i> , <i>Prunus</i> , <i>Zea</i> , <i>Helianthus</i> , <i>Hibiscus</i> , <i>Rosa</i> , <i>Vitis</i> , <i>Quercus</i> and <i>Solanum</i> spp. (CABI 2020a). Many of these plant species are grown throughout Australia (APNI 2020). <i>S. littoralis</i> is a tropical to sub-tropical species (Alford 2012), distributed in regions with similar climates to Australia (CABI 2020a). Therefore, <i>S. littoralis</i> has the potential to establish and spread in Australia.	This species feeds on foliage, causing defoliation, and attacks flowers, flower buds, fruiting points and stems of many economically important crops such as citrus, capsicum, carnation, sunflower, cotton, <i>Brassica</i> and <i>Solanum</i> spp. (Alford 2012; CABI & EPPO 1997). Larvae are also known to bore into fruit, rendering produce unsuitable for consumption (CABI & EPPO 1997). Therefore <i>S. littoralis</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Spodoptera litura</i> (Fabricius, 1775) [Noctuidae] Tropical armyworm	Afghanistan, Cambodia, China, India, Indonesia, Iran, Japan, Republic of Korea, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam, USA, France, Portugal, UK, America Samoa, Fiji, Kiribati,	Present, ACT, NSW, NT, Qld, Tas., Vic. and WA (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Marshall Islands, New Caledonia, New Zealand, Papua New Guinea, Pitcairn Island, Tonga and Vanuatu (CABI 2020a).					
<i>Spodoptera ornithogalli</i> (Guenée, 1852) Synonym: <i>Spodoptera marima</i> (Schaus, 1904) [Noctuidae] Yellow striped armyworm	North, Central and South America, including USA, Mexico (EPPO 2015b), Colombia, Ecuador and Peru (Brito et al. 2018).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Spodoptera ornithogalli</i> is a highly polyphagous pest, recorded on over 209 plant species (Brito et al. 2018), including <i>Allium</i> , <i>Aster</i> , <i>Brassica</i> , <i>Dahlia</i> , <i>Capsicum</i> , <i>Citrus</i> , <i>Musa</i> , <i>Hibiscus</i> , <i>Gladiolus</i> , <i>Gossypium</i> , <i>Helianthus</i> , <i>Lactuca</i> , <i>Phaseolus</i> , <i>Prunus</i> , <i>Rosa</i> , <i>Rubus</i> , <i>Solanum</i> , <i>Viola</i> and <i>Zea</i> spp. (Capinera 2017d; Robinson et al. 2019), which are present in Australia (APNI 2020). The species is distributed throughout North, South and Central America (Capinera 2017d; EPPO 2015b), areas with similar climatic conditions to Australia. Therefore, <i>S. ornithogalli</i> has the potential to establish and spread in Australia.	Yes. <i>Spodoptera ornithogalli</i> is a highly polyphagous pest, recorded on over 209 plant species (Brito et al. 2018). In addition, <i>S. ornithogalli</i> is considered a major pest of tomatoes in North America (EPPO 2015b). Larvae are small, gregarious feeders, stripping and skeletonising foliage as they disperse (Capinera 2017d). Larvae also feed on fruit and buds (Capinera 2017d; EPPO 2015b), thus reducing marketability of fruits, vegetables and ornamentals. Therefore, <i>S. ornithogalli</i> has the potential for negative economic consequences.	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Spoladea recurvalis</i> (Fabricius, 1775) Synonym: <i>Hymenia recurvalis</i> (Fabricius, 1775) [Crambidae] Hawaiian beet worm	Cosmopolitan. Cambodia, China, India, Indonesia, Iran, Israel, Japan, Republic of Korea, Lebanon, Malaysia, Nepal, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam, Egypt, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, South Africa, Tanzania, Uganda, USA, Zimbabwe, Panama, Chile, Colombia, Peru, UK, Fiji, American Samoa, New Caledonia, New Zealand, Tonga, Vanuatu (CABI 2020a), France, Portugal, Spain, the Netherlands (Karsholt & Nieukerken 2019), Mexico (GBIF Secretariat 2017) and United Arab Emirates (De Prins & De Prins 2018).	Present, ACT, NSW, NT, Qld, SA, Tas., Vic. and WA (ABRS 2020; Government of Western Australia 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Assessment not required	Assessment not required	No
<i>Syricoris lacunana</i> ([Denis & Schiffermüller], 1775) Synonym: <i>Tortrix lacunana</i> (Denis & Schiffermüller, 1775), <i>Celypha lacunana</i> (Denis & Schiffermüller, 1775), <i>Olethreutes lacunana</i>	UK (Kimber 2019), Belgium, France, Greece, Italy, Portugal, Spain, Switzerland, the Netherlands (Karsholt & Nieukerken 2019), USA, Iceland, China and Japan (Bland, Hancock & Razowski 2014).	No record found (ABRS 2020; Plant Health Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished). <i>S. lacunana</i> is associated with <i>Chrysanthemum</i> spp. (Bland, Hancock & Razowski 2014).	Yes. <i>Syricoris lacunana</i> is polyphagous, known hosts include <i>Betula</i> , <i>Fagus</i> , <i>Fragaria</i> , <i>Hibiscus</i> , <i>Chrysanthemum</i> , <i>Rubus</i> , <i>Salix</i> and <i>Ranunculus</i> spp. (Bland, Hancock & Razowski 2014; Hitchcox, LaGasa & Petersen-	Yes. <i>Syricoris lacunana</i> is a pest of chrysanthemum, strawberry, and <i>Rubus</i> spp. (Bland, Hancock & Razowski 2014; Hitchcox, LaGasa & Petersen-Morgan 2014) which are economically important in Australia (Horticulture	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
Dennis & Schiffermuller, 1775 [Tortricidae] Dark strawberry tortrix				Morgan 2014), all of which are present in Australia (APNI 2020). <i>S. lacunana</i> is present in areas of Europe, China and Japan (Bland, Hancock & Razowski 2014; Hitchcox, LaGasa & Petersen-Morgan 2014), areas with similar climatic conditions to Australia. Therefore, <i>S. lacunana</i> has the potential to establish and spread in Australia.	Innovation Australia 2019c). Larvae feed on flowers and foliage (Bland, Hancock & Razowski 2014). Feeding behaviour would reduce the quality and marketability of ornamentals affected. Therefore, <i>S. lacunana</i> has the potential to cause negative economic consequences in Australia.	
<i>Teia anartoides</i> Walker, 1855 Synonym: <i>Orgyia anartoides</i> (Walker, 1855) [Erebidae] Painted apple moth	Australia (PaDIL 2020).	Present, ACT, NSW, NT, Qld, SA, Tas. and Vic. (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	Species intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Teia anartoides</i> is an Australian native which is present in eastern Australia, on a wide range of host plants such as <i>Dahlia</i> , <i>Rosa</i> , <i>Musa</i> , <i>Passiflora</i> , <i>Pinus</i> and <i>Acacia</i> spp. (ABRS 2020; Herbison-Evans & Crossley 2019; Plant Health Australia 2020). Therefore, <i>T. anartoides</i> has the potential to establish and spread in Western Australia.	Yes. In Australia, <i>Teia anartoides</i> is a sporadic pest of forestry and horticulture (CABI 2020b). Larvae cause occasional severe defoliation of <i>Pinus radiata</i> in New South Wales and Victoria (Brown & Wylie 1990). In New Zealand, before eradication, some native trees in New Zealand were heavily defoliated (CABI 2020b). Therefore, <i>T. anartoides</i> has the potential to cause negative economic	Yes (WA)

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
					consequences in Western Australia.	
<i>Thaumatotibia leucotreta</i> (Meyrick, 1913)	Widespread in Africa (Gilligan & Epstein 2014)	No record found (ABRS 2020; Plant Health Australia 2020).	Species has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. Previously assessed by the department (Biosecurity Australia 2002b). <i>Thaumatotibia leucotreta</i> larvae attack ears of maize, cotton bolls, citrus fruit, avocado fruit, macadamia nuts, mango fruit and leaves, acorn nuts, and pineapple fruit (Biosecurity Australia 2002b), all of which are present in Australia (APNI 2020). <i>Thaumatotibia leucotreta</i> is widespread in Africa and similar temperatures and conditions occur in Australia. Therefore, <i>T. leucotreta</i> has the potential to establish and spread in Australia.	Yes. Previously assessed by the department (Biosecurity Australia 2002b). <i>Thaumatotibia leucotreta</i> is a polyphagous pest of maize, citrus, avocado, macadamia, mango, acorn and pineapple (Biosecurity Australia 2002b), which are economically important plants in Australia (Horticulture Innovation Australia 2019c). In Africa and Israel this species has become a serious pest of citrus, cotton and macadamia (Wysoki 1986). Currently, <i>T. leucotreta</i> is considered a high priority pest of the cotton, grains, pineapple, stone fruit and summer fruit industries of Australia (Plant Health Australia 2005). Therefore, <i>T. leucotreta</i> has the potential to cause negative economic consequences in Australia.	Yes
<i>Cryptophlebia leucotreta</i> Meyrick, 1913 [Tortricidae]	Letter from KEPHIS on 29/01/2018), Ethiopia (letter from MANR on 06/03/2018), Israel, Madagascar, Malawi, Mauritius, South Africa, Tanzania, Uganda and Zimbabwe (CABI 2020a).	Declared pest, prohibited entry into WA (Government of Western Australia 2020) and Qld (Office of the Queensland Parliamentary Counsel 2016).				

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Tortrix dinota</i> Meyrick, 1918 Synonym: <i>Choristoneura dinota</i> (Meyrick, 1918) [Tortricidae] Tea tortrix	Ethiopia, Kenya, Malawi, South Africa, Tanzania, Uganda and Zimbabwe (De Prins & De Prins 2018).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020)	Species has been intercepted at Australian points of entry on cut flower and foliage consignments (unpublished).	Yes. <i>Tortrix dinota</i> , is polyphagous and known hosts include <i>Camellia</i> , <i>Citrus</i> , <i>Coffea</i> , <i>Eucalyptus</i> , <i>Gossypium</i> and <i>Macadamia</i> spp. (Evans 1968; Robinson et al. 2019), all of which are present in Australia (APNI 2020). This species is distributed in the Afrotropical regions (De Prins & De Prins 2018; Evans 1968), where climatic conditions are similar to Australia. Therefore, <i>T. dinota</i> has the potential to establish and spread in Australia.	Yes. <i>Tortrix dinota</i> is known to attack citrus, cotton, macadamia and eucalyptus which are commercial or naturalised plants in Australia (APNI 2020; Horticulture Innovation Australia 2019c). <i>Tortrix dinota</i> larvae tie together leaves with silk to form a shelter, then skeletonise the upper surface of the lower of two leaves, and also bore into the tip of young 'suckers' (Evans 1968). In Malawi, <i>T. dinota</i> is a defoliator and causes damage to major tropical crops (Hill 2008). Therefore, <i>T. dinota</i> has the potential to cause negative economic or environmental consequences in Australia.	Yes
<i>Trichoplusia ni</i> (Hübner, 1802) [Noctuidae] Ni moth	Kenya (Letter from KEPHIS on 29/01/2018), Afghanistan, Cambodia, China, India, Indonesia, Iran, Israel, Japan, Republic of Korea, Lebanon, Malaysia,	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western	<i>Trichoplusia ni</i> is associated with Baby's Breath, <i>Chrysanthemum</i> , <i>Helianthus</i> and <i>Dianthus</i> spp. (OGTR 2006; PHA 2016a).	Yes. <i>Trichoplusia ni</i> is polyphagous, known to feed on <i>Brassica</i> , <i>Chenopodium</i> , <i>Chrysanthemum</i> , <i>Dianthus</i> , <i>Geranium</i> , <i>Gossypium</i> , <i>Helianthus</i> ,	Yes. <i>Trichoplusia ni</i> is an agricultural pest, feeding on a wide variety of crops including broccoli, cabbage, sweet peas, chrysanthemums, carnations, watermelon,	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	Pakistan, Saudi Arabia, Taiwan, Thailand, Egypt, Ethiopia, Madagascar, Morocco, South Africa, Tanzania, Mexico, USA, Argentina, Chile, Colombia, France, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland (CABI 2020a), Vietnam (CABI 2020a; Moir & Szito 2018; Nguyen et al. 2016), Belgium, (Karsholt & Nieukerken 2019) and UK (Kimber 2019).	Australia 2020) and NT (DPIR 2018a).		<i>Lactuca</i> , <i>Malus</i> , <i>Pisum</i> , <i>Solanum</i> , and <i>Zea</i> spp. (Robinson et al. 2019), which are all present in Australia (APNI 2020). Adults are highly dispersive, with a flight range of approximately 200 km (Capinera 2011), aiding in natural dispersal and spread. <i>T. ni</i> is distributed throughout the Nearctic region (OGTR 2006). Australia has similar climatic conditions to the geographical distribution areas. Therefore, <i>T. ni</i> has the potential to establish and spread in Australia.	turnip, cucumber, lettuce, beans, potato, spinach, tomato, cotton, and some agricultural weeds (Capinera 2011; Gentry 1965), all are present throughout Australia as naturalised or economically important plants (APNI 2020; Horticulture Innovation Australia 2019c). The species is considered a pest for the Australia cotton and grains industries (Plant Health Australia 2005, 2015). Young larvae feed on the underside of the leaf surface causing ‘windows’, while older instar larvae chew large holes within the foliage, away from leaf margins (Capinera 2011). <i>T. ni</i> have also been recorded boring into developing cabbage heads (Capinera 2011). <i>T. ni</i> can eat three times their weight in plant matter daily (Capinera 2011). Therefore, <i>T. ni</i> has the potential to cause	

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
<i>Vanessa canace</i> (Kinnaeus, 1763) Synonym: <i>Kaniska canace</i> (Linnaeus, 1763); <i>Nymphalis canace</i> Linnaeus [Nymphalidae] Blue admiral	India (CABI 2020a), Taiwan, Republic of Korea (GBIF Secretariat 2017), Japan (Wahlberg & Nylin 2003), Pakistan, Nepal and Sri Lanka (Mehra, Kirti & Sidhu 2018).	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Vanessa canace</i> is associated with the order Liliales including <i>Smilax</i> , <i>Tricyrtus</i> , <i>Streptopus</i> and <i>Lilium</i> spp. (DAFF 2013d; PHA 2016a).	Yes. Previously assessed by the department (DAFF 2013d). <i>Vanessa canace</i> host plants include <i>Smilax</i> , <i>Tricyrtus</i> , <i>Streptopus</i> and <i>Lilium</i> spp. (DAFF 2013d), which are present in Australia (APNI 2012). Australia has similar climatic conditions to current geographical distribution areas. Therefore, <i>V. canace</i> has the potential to establish and spread in Australia.	negative economic consequences in Australia. Yes. Previously assessed by the department (DAFF 2013d). <i>Vanessa canace</i> is a polyphagous pest with plant hosts including <i>Smilax</i> , <i>Tricyrtus</i> , <i>Streptopus</i> and <i>Lilium</i> spp. (DAFF 2013d), both <i>Lilium</i> and <i>Smilax</i> spp. are endemic, economically important and naturalised plant species in Australia (APNI 2020; Horticulture Innovation Australia 2019c). Therefore, <i>Vanessa canace</i> has the potential to cause negative economic and environmental consequences in Australia.	Yes
<i>Xestia c-nigrum</i> (Linnaeus, 1758) Synonym: <i>Xestia (Megasema) c-nigrum</i> (Linnaeus, 1758) [Noctuidae] Spotted cutworm	Afghanistan, China, India, Japan, Republic of Korea, Pakistan, Morocco, Mexico, USA, Belgium, France, Greece, Iceland, Italy, the Netherlands, Portugal, Spain, Switzerland, UK (CABI	No record found (ABRS 2020; Plant Health Australia 2020). Declared pest, prohibited entry into WA (Government of Western Australia 2020).	<i>Xestia c-nigrum</i> is associated with <i>Chrysanthemum</i> , <i>Helianthus</i> and <i>Lucerne</i> spp. (PHA 2016a).	Yes. <i>Xestia c-nigrum</i> is polyphagous, known to attack over 75 plant species within over 35 families including <i>Allium</i> , <i>Brassica</i> , <i>Chrysanthemum</i> , <i>Citrus</i> , <i>Fragaria</i> , <i>Gossypium</i> , <i>Helianthus</i> , <i>Malus</i> , <i>Phaseolus</i> , <i>Prunus</i> ,	Yes. <i>Xestia c-nigrum</i> is highly polyphagous with no definitive host specificity (Hill 2008). This species is a major pest of field crops, vegetable, grasses and deciduous fruit trees in Japan (Oku 1984). <i>X. c-</i>	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
	2020a) and Iran (Rabieh 2018).			<i>Pyrus, Ribes, Rosa, Rubus, Solanum, Vaccinium, Viola, Vitis</i> and <i>Zea</i> spp. (CABI 2020a; Robinson et al. 2019), which are present in Australia (APNI 2020). <i>X. c-nigrum</i> is distributed throughout Europe, Asia, North Africa and North America (Hill 2008), where climatic conditions are similar to regions in Australia. Therefore, <i>X. c-nigrum</i> has the potential to establish and spread in Australia.	<i>nigrum</i> is a gregarious feeder, eating all plant parts, including buds and fruit which results in direct damage and reduced yield (Capinera 2001). Feeding on foliage causes defoliation and destruction of young plants or seedlings (Capinera 2001; Hill 2008). Additionally, <i>X. c-nigrum</i> also feeds on roots in the soil (Hill 2008). <i>X. c-nigrum</i> is considered a threat to Australian cut flower, grains, cherry and viticulture industries (PHA 2016a; Plant Health Australia 2005, 2011, 2013). Therefore, <i>X. c-nigrum</i> has the potential to cause negative economic and environmental consequences in Australia.	
<i>Xylena formosa</i> Butler, 1878 Synonym: <i>Xylena plumbeopaca</i> Hreblay & Ronkay 2000	Japan, China, Taiwan (Murakami, Tsuda & Kusigemati 2000) and Republic of Korea (GBIF Secretariat 2017).	No record found (ABRS 2020; Plant Health Australia 2020).	<i>Xylena formosa</i> is associated with <i>Lilium</i> spp. (DAFF 2013d; PHA 2016a).	Yes. Previously assessed by the department (DAFF 2013d). <i>Xylena formosa</i> is a generalist plant pest, feeding on flowers commonly found in Japan,	Yes. Previously assessed by the department (DAFF 2013d). <i>Xylena formosa</i> is considered a minor pest of <i>Lilium</i> spp., though <i>X. formosa</i> has been	Yes

Pest	Geographical distribution	Present within Australia	Potential to be on pathway	Potential for establishment and spread	Potential for economic consequences	Quarantine pest/Regulated article
[Noctuidae]				China, and Taiwan (Murakami, Tsuda & Kusigemati 2000). The species is distributed throughout Asia (Murakami, Tsuda & Kusigemati 2000), where climatic conditions are similar to regions in Australia. Therefore, <i>X. formosa</i> has the potential to establish and spread in Australia.	recorded as feeding on sap of <i>Citrus</i> spp. and other fruit trees (Biosecurity Australia 2009c). Therefore, <i>X. formosa</i> has potential for negative economic consequences in parts of Australia.	

Appendix G: Regulatory status of Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera

This appendix contains a summary of all quarantine and regulated article species of Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera assessed in Part 2 of this PRA. Column three (Quarantine pest/Regulated article) includes the determination of the species' regulatory status. The full pest categorisation assessment, and scientific references used in these determinations, is provided in Appendix F.

Pest species intercepted at the Australian border on cut flowers and foliage pathway between January 2000 to December 2020

* *Liriomyza huidobrensis* remains a quarantine pest for Australia pending decisions by Australian States and Territories regarding official control status.

Pest	Present within Australia	Quarantine pest/Regulated article
Coleoptera (beetles)		
<i>Adoretus sinicus</i> [Scarabaeidae]	No	Quarantine pest
<i>Adoretus versutus</i> [Scarabaeidae] ##	No	Quarantine pest
<i>Agrilus cuprescens</i> [Buprestidae]	No	Quarantine pest
<i>Agriotes lineatus</i> [Elateridae]	No	Quarantine pest
<i>Aulacophora nigripennis</i> [Chrysomelidae]	No	Quarantine pest
<i>Chrysomela vigintipunctata</i> [Chrysomelidae] ##	No	Quarantine pest
<i>Diaprepes abbreviatus</i> [Curculionidae]	No	Quarantine pest
<i>Diaxenes phalaenopsidis</i> [Cerambycidae]	No	Quarantine pest
<i>Elytroteinus subtruncatus</i> [Curculionidae]	No	Quarantine pest
<i>Euchionellus zanzibaricus</i> [Latridiidae]	No	Quarantine pest
<i>Eucossonus comptus</i> [Curculionidae]	No	Quarantine pest
<i>Eucossonus setiger</i> [Curculionidae]	No	Quarantine pest
<i>Euphoria sepulcralis</i> [Scarabaeidae]	No	Quarantine pest
<i>Eutassa comata</i> [Curculionidae]	No	Quarantine pest
<i>Exophthalmus jekelianus</i> [Curculionidae]	No	Quarantine pest
<i>Glycyphana malayensis</i> [Scarabaeidae] ##	No	Quarantine pest
<i>Gonocephalum simplex</i> [Tenebrionidae] ##	No	Quarantine pest
<i>Harmonia axyridis</i> [Coccinellidae] ##	No	Quarantine pest
<i>Homalorynchites hungaricus</i> [Attelabidae]	No	Quarantine pest
<i>Lema pectoralis</i> [Chrysomelidae]	No	Quarantine pest
<i>Lilioceris formosana</i> [Chrysomelidae]	No	Quarantine pest
<i>Lilioceris lili</i> [Chrysomelidae]	No	Quarantine pest
<i>Lilioceris merdigera</i> [Chrysomelidae]	No	Quarantine pest
<i>Loberus depressus</i> [Erotylidae]	No	Quarantine pest
<i>Luperomorpha xanthodera</i> [Chrysomelidae]	No	Quarantine pest
<i>Macroductylus subspinosus</i> [Scarabaeidae]	No	Quarantine pest
<i>Macroscytalus parvicornis</i> [Curculionidae]	No	Quarantine pest

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Meligethes aeneus</i> [Nitidulidae]	No	Quarantine pest
<i>Melolontha melolontha</i> [Scarabaeidae]	No	Quarantine pest
<i>Merhynchites bicolor</i> [Attelabidae]	No	Quarantine pest
<i>Micropodabrus cochleata</i> [Cantharidae]	No	Quarantine pest
<i>Monanus concinnulus</i> [Silvanidae] ##	No	Quarantine pest
<i>Nematocerus castaneipennis</i> [Curculionidae]	No	Quarantine pest
<i>Novitas dispar</i> [Curculionidae]	No	Quarantine pest
<i>Omophoita cyanipennis</i> [Chrysomelidae]	No	Quarantine pest
<i>Orchidophilus peregrinator</i> [Curculionidae]	No	Quarantine pest
<i>Orchidophilus ran</i> [Curculionidae]	No	Quarantine pest
<i>Oryctes monoceros</i> [Scarabaeidae]	No	Quarantine pest
<i>Oxythyrea cinctella</i> [Scarabaeidae]	No	Quarantine pest
<i>Oxythyrea funesta</i> [Scarabaeidae] ##	No	Quarantine pest
<i>Pachnaeus litus</i> [Curculionidae]	No	Quarantine pest
<i>Phytoecia rufiventris</i> [Cerambycidae]	No	Quarantine pest
<i>Polydrusus formosus</i> [Curculionidae] ##	No	Quarantine pest
<i>Proterhinus vestitus</i> [Belidae]	No	Quarantine pest
<i>Psammoecus simoni</i> [Silvanidae]	No	Quarantine pest
<i>Psammoecus trimaculatus</i> [Silvanidae]	No	Quarantine pest
<i>Psilocnaeia asteliae</i> [Cerambycidae]	No	Quarantine pest
<i>Psilocnaeia nana</i> [Cerambycidae]	No	Quarantine pest
<i>Ptilodactyla exotica</i> [Ptilodactylidae]	No	Quarantine pest
<i>Sangariola punctatostrata</i> [Chrysomelidae]	No	Quarantine pest
<i>Scyphophorus acupunctatus</i> [Curculionidae]	No	Quarantine pest
<i>Sinoxylon conigerum</i> [Bostrichidae]	No	Quarantine pest
<i>Systates pollinosus</i> [Curculionidae]	No	Quarantine pest
<i>Tropinota hirta</i> [Scarabaeidae]	No	Quarantine pest
<i>Xyleborus malgasicus</i> [Curculionidae]	No	Quarantine pest
<i>Xyleborus rugatus</i> [Curculionidae]	No	Quarantine pest
<i>Xylopsocus capucinus</i> [Bostrichidae]	No	Quarantine pest
<i>Xylosandrus compactus</i> [Scolytidae]	No	Quarantine pest
<i>Carpophilus obsoletus</i> [Nitidulidae] ##	Yes	Quarantine pest (WA)
<i>Cryptolestes pusillus</i> [Laemophloeidae] ##	Yes	Quarantine pest (WA)
<i>Epuraea luteola</i> [Nitidulidae]	Yes	Quarantine pest (WA)
<i>Litargus balteatus</i> [Mycetophagidae] ##	Yes	Quarantine pest (WA)
<i>Omonadus floralis</i> [Anthicidae]	Yes	Quarantine pest (WA)
<i>Orchidophilus aterrimus</i> [Curculionidae]	Yes	Quarantine pest (WA and NT)
<i>Oryzaephilus surinamensis</i> [Silvanidae] ##	Yes	Quarantine pest (WA)
<i>Plesispa reichei</i> [Chrysomelidae] ##	Yes	Quarantine pest (WA)
<i>Rhyzopertha dominica</i> [Bostrichidae] ##	Yes	Quarantine pest (WA)
<i>Sitophilus oryzae</i> [Curculionidae] ##	Yes	Quarantine pest (WA)
<i>Xyleborus affinis</i> [Curculionidae]	Yes	Quarantine pest (WA)

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Xyleborus perforans</i> [Curculionidae] ##	Yes	Quarantine pest (WA)
<i>Xylosandrus crassiusculus</i> [Scolytidae]	Yes	Quarantine pest (WA)
<i>Diabrotica speciosa</i> [Chrysomelidae]	No	Quarantine pest & potential regulated article
<i>Phyllotreta striolata</i> [Chrysomelidae] ##	No	Quarantine pest & potential regulated article
<i>Popillia japonica</i> [Scarabaeidae]	No	Quarantine pest & potential regulated article
<i>Carpophilus hemipterus</i> [Nitidulidae] ##	Yes	Potential regulated article
<i>Urophorus humeralis</i> [Nitidulidae]	Yes	Potential regulated article
<i>Xyleborus ferrugineus</i> [Curculionidae]	Yes	Potential regulated article
Diptera (flies)		
<i>Acidia cognata</i> [Tephritidae]	No	Quarantine pest
<i>Amauromyza chenopodivora</i> [Agromyzidae]	No	Quarantine pest
<i>Amauromyza flavifrons</i> [Agromyzidae]	No	Quarantine pest
<i>Amauromyza labiatarum</i> [Agromyzidae]	No	Quarantine pest
<i>Amauromyza maculosa</i> [Agromyzidae]	No	Quarantine pest
<i>Bradysia tillicola</i> [Sciaridae]	No	Quarantine pest
<i>Cerodontha incisa</i> [Agromyzidae]	No	Quarantine pest
<i>Cerodontha lateralis</i> [Agromyzidae]	No	Quarantine pest
<i>Chromatomyia horticola</i> [Agromyzidae] ##	No	Quarantine pest
<i>Contarinia maculipennis</i> [Cecidomyiidae] ##	No	Quarantine pest
<i>Contarinia quinquenotata</i> [Cecidomyiidae]	No	Quarantine pest
<i>Dasineura rhodophaga</i> [Cecidomyiidae]	No	Quarantine pest
<i>Liriomyza bryoniae</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza cepae</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza chinensis</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza congesta</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza cyclaminis</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza huidobrensis</i> [Agromyzidae] ##	Yes (limited distribution *)	Quarantine pest
<i>Liriomyza phryne</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza ptarmicae</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza sativae</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza soror</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza strigata</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza taraxaci</i> [Agromyzidae]	No	Quarantine pest
<i>Liriomyza trifolii</i> [Agromyzidae]	No	Quarantine pest
<i>Melanagromyza pubescens</i> [Agromyzidae]	No	Quarantine pest
<i>Ophiomyia cunctata</i> [Agromyzidae]	No	Quarantine pest
<i>Phytomyza dianthicola</i> [Agromyzidae]	No	Quarantine pest
<i>Phytoliriomyza dorsata</i> [Agromyzidae]	No	Quarantine pest
<i>Phytomyza aquilegiae</i> [Agromyzidae]	No	Quarantine pest
<i>Phytomyza fallaciosa</i> [Agromyzidae]	No	Quarantine pest

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Phytomyza gymnostoma</i> [Agromyzidae]	No	Quarantine pest
<i>Phytomyza ilicis</i> [Agromyzidae]	No	Quarantine pest
<i>Phytomyza lappae</i> [Agromyzidae]	No	Quarantine pest
<i>Phytomyza rufipes</i> [Agromyzidae]	No	Quarantine pest
<i>Pseudonapomyza atra</i> [Agromyzidae]	No	Quarantine pest
<i>Scaptomyza graminum</i> [Drosophilidae]	No	Quarantine pest
<i>Trypeta zoe</i> [Tephritidae]	No	Quarantine pest
Hemiptera (bugs) excluding aphids		
<i>Acanthococcus asteliae</i> [Eriococcidae]	No	Quarantine pest
<i>Acanthococcus setulosus</i> [Eriococcidae]	No	Quarantine pest
<i>Agonoscelis versicoloratus</i> ## [Pentatomidae]	No	Quarantine pest
<i>Aleurodicus dugesii</i> [Aleyrodidae]	No	Quarantine pest
<i>Andaspis mackieana</i> [Diaspididae]	No	Quarantine pest
<i>Anzaspis neocordylinidis</i> [Diaspididae]	No	Quarantine pest
<i>Aonidiella lauretorum</i> [Diaspididae]	No	Quarantine pest
<i>Aonidiella tinerfensis</i> [Diaspididae]	No	Quarantine pest
<i>Aonidomytilus albus</i> [Diaspididae]	No	Quarantine pest
<i>Aphenochiton pubens</i> [Coccidae]	No	Quarantine pest
<i>Bagrada hilaris</i> ## [Pentatomidae]	No	Quarantine pest
<i>Balanococcus cordylinidis</i> [Pseudococcidae]	No	Quarantine pest
<i>Bemisia cordylinidis</i> [Aleyrodidae]	No	Quarantine pest
<i>Bipuncticoris triplex</i> [Miridae]	No	Quarantine pest
<i>Chionaspis tangana</i> [Diaspididae]	No	Quarantine pest
<i>Chrysomphalus diversicolor</i> [Diaspididae]	No	Quarantine pest
<i>Collaria oleosa</i> [Miridae]	No	Quarantine pest
<i>Crypticerya multicastrices</i> [Monophlebidae]	No	Quarantine pest
<i>Dalpada oculata</i> [Pentatomidae]##	No	Quarantine pest
<i>Dysmicoccus lepelleyi</i> [Pseudococcidae]	No	Quarantine pest
<i>Dysmicoccus neobrevipes</i> [Pseudococcidae]	No	Quarantine pest
<i>Dysmicoccus nesophilus</i> [Pseudococcidae]	No	Quarantine pest
<i>Edwardsiana rosae</i> [Cicadellidae]	No	Quarantine pest
<i>Empoasca kraemeri</i> [Cicadellidae]	No	Quarantine pest
<i>Empoasca pteridis</i> [Cicadellidae]##	No	Quarantine pest
<i>Empoasca stevensi</i> [Cicadellidae]	No	Quarantine pest
<i>Erthesina fullo</i> [Pentatomidae]	No	Quarantine pest
<i>Esbenia major</i> [Acanthosomatidae]	No	Quarantine pest
<i>Ferrisia dasyllirii</i> [Pseudococcidae]	No	Quarantine pest
<i>Gonocerus insidiator</i> [Coreidae]##	No	Quarantine pest
<i>Hauptidia maroccana</i> [Cicadellidae]	No	Quarantine pest
<i>Hemiberlesia diffinis</i> [Diaspididae]	No	Quarantine pest
<i>Heterogaster urticae</i> [Heterogastridae]##	No	Quarantine pest

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Hypogeococcus pungens</i> [Pseudococcidae]	No	Quarantine pest
<i>Kallitaxila sinica</i> [Tropiduchidae] ##	No	Quarantine pest
<i>Labidaspis myersi</i> [Diaspididae]	No	Quarantine pest
<i>Lecanodiaspis dendrobii</i> [Coccidae]	No	Quarantine pest
<i>Lepidosaphes chinensis</i> [Diaspididae]	No	Quarantine pest
<i>Lepidosaphes cornuta</i> [Diaspididae]	No	Quarantine pest
<i>Lepidosaphes laterochitinsa</i> [Diaspididae]	No	Quarantine pest
<i>Lepidosaphes orsomi</i> [Diaspididae]	No	Quarantine pest
<i>Leptoglossus occidentalis</i> [Coreidae] ##	No	Quarantine pest
<i>Leptoglossus phyllopus</i> [Coreidae]	No	Quarantine pest
<i>Leucaspis gigas</i> [Diaspididae]	No	Quarantine pest
<i>Leucaspis morrisi</i> [Diaspididae]	No	Quarantine pest
<i>Lopholeucaspis cockerelli</i> [Diaspididae]	No	Quarantine pest
<i>Loxa viridis</i> [Pentatomidae]	No	Quarantine pest
<i>Lygus lineolaris</i> [Miridae]	No	Quarantine pest
<i>Lygus pratensis</i> [Miridae] ##	No	Quarantine pest
<i>Megacopta cribraria</i> [Plataspididae] ##	No	Quarantine pest
<i>Melacoryphus lateralis</i> [Lygaeidae]	No	Quarantine pest
<i>Melanaspis corticosa</i> [Diaspididae]	No	Quarantine pest
<i>Melanaspis elaeagni</i> [Diaspididae]	No	Quarantine pest
<i>Melanaspis nigropunctata</i> [Diaspididae]	No	Quarantine pest
<i>Melanopleurus bistrangularis</i> [Lygaeidae]	No	Quarantine pest
<i>Metcalfa pruinosa</i> [Flatidae]	No	Quarantine pest
<i>Murgantia histrionica</i> [Pentatomidae]	No	Quarantine pest
<i>Mycetaspis personata</i> [Diaspididae]	No	Quarantine pest
<i>Mycetaspis sphaerioides</i> [Diaspididae]	No	Quarantine pest
<i>Neoselenaspidus silvaticus</i> [Diaspididae]	No	Quarantine pest
<i>Nipaecoccus nipae</i> [Pseudococcidae]	No	Quarantine pest
<i>Nysius huttoni</i> [Lygaeidae]	No	Quarantine pest
<i>Nysius plebeius</i> [Lygaeidae] ##	No	Quarantine pest
<i>Nysius senecionis</i> subsp. [Lygaeidae]	No	Quarantine pest
<i>Oceanaspidiotus spinosus</i> [Diaspididae]	No	Quarantine pest
<i>Ochrinnus carnosulus</i> [Lygaeidae]	No	Quarantine pest
<i>Opuntiaspis carinata</i> [Diaspididae]	No	Quarantine pest
<i>Ovaticoccus agavium</i> [Eriococcidae]	No	Quarantine pest
<i>Oxycarenus hyalinipennis</i> [Oxycarenidae] ##	No	Quarantine pest
<i>Oxycarenus multiformis</i> [Oxycarenidae] ##	No	Quarantine pest
<i>Oxycarenus zimbabwei</i> [Oxycarenidae] ##	No	Quarantine pest
<i>Pangaeus bilineatus</i> [Cydidae]	No	Quarantine pest
<i>Paracoccus glaucus</i> [Pseudococcidae]	No	Quarantine pest
<i>Paracoccus interceptus</i> [Pseudococcidae]	No	Quarantine pest
<i>Paracoccus marginatus</i> [Pseudococcidae]	No	Quarantine pest

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Parlatoria mytilaspiformis</i> [Diaspididae]	No	Quarantine pest
<i>Phenacoccus avenae</i> [Pseudococcidae]	No	Quarantine pest
<i>Phenacoccus madeirensis</i> [Pseudococcidae] ##	No	Quarantine pest
<i>Phloeococcus cordylinidis</i> [Eriococcidae]	No	Quarantine pest
<i>Pinnaspis dracaenae</i> [Diaspididae]	No	Quarantine pest
<i>Pinnaspis theae</i> [Diaspididae]	No	Quarantine pest
<i>Pinnaspis yamamotoi</i> [Diaspididae]	No	Quarantine pest
<i>Planococcus lilacinus</i> [Pseudococcidae]	Yes (Under official control)	Quarantine pest
<i>Poliaspis floccosa</i> [Diaspididae]	No	Quarantine pest
<i>Pseudischnaspis bowreyi</i> [Diaspididae]	No	Quarantine pest
<i>Pseudococcus baliteus</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudococcus comstocki</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudococcus floriger</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudococcus jackbeardsleyi</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudococcus landoi</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudococcus maritimus</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudococcus orchidicola</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudococcus philippinicus</i> [Pseudococcidae]	No	Quarantine pest
<i>Pseudoparlatoria parlatorioides</i> [Diaspididae]	No	Quarantine pest
<i>Selenaspis antsingyi</i> [Diaspididae]	No	Quarantine pest
<i>Selenaspis articulatus</i> [Diaspididae]	No	Quarantine pest
<i>Selenaspis littoralis</i> [Diaspididae]	No	Quarantine pest
<i>Sophonia orientalis</i> [Cicadellidae]	No	Quarantine pest
<i>Spanioneura fonscolombii</i> [Psyllidae] ##	No	Quarantine pest
<i>Symeria pyriformis</i> [Diaspididae]	No	Quarantine pest
<i>Veterna natalensis</i> [Pentatomidae]	No	Quarantine pest
<i>Veterna sanguineirostris</i> [Pentatomidae]	No	Quarantine pest
<i>Ceroplastes floridensis</i> [Coccidae]	Yes	Quarantine pest (WA)
<i>Ceroplastes stellifer</i> [Coccidae]	Yes	Quarantine pest (WA)
<i>Chrysomphalus dictyospermi</i> [Diaspididae] ##	Yes	Quarantine pest (WA)
<i>Diaspis boisduvalii</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Eucalymnatus tessellatus</i> [Coccidae]	Yes	Quarantine pest (WA)
<i>Fiorinia fiorinae</i> [Diaspididae] ##	Yes	Quarantine pest (WA)
<i>Furcaspis biformis</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Hemiberlesia cyanophylli</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Hemiberlesia palmarum</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Howardia biclavis</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Insignorthesia insignis</i> [Ortheziidae]	Yes	Quarantine pest (WA)
<i>Ischnaspis longirostris</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Kilifia acuminata</i> [Coccidae]	Yes	Quarantine pest (WA)
<i>Lepidosaphes beckii</i> [Diaspididae]	Yes	Quarantine pest (NT)

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Lepidosaphes pinnaeformis</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Parlatoria blanchardi</i> [Diaspididae] ##	Yes	Quarantine pest (SA)
<i>Parlatoria pergandii</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Phenacoccus solenopsis</i> [Pseudococcidae] ##	Yes	Quarantine pest (WA)
<i>Pinnaspis aspidistrae</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Planococcus mali</i> [Pseudococcidae]	Yes	Quarantine pest (WA)
<i>Planococcus minor</i> [Pseudococcidae] ##	Yes	Quarantine pest (WA)
<i>Protopulvinaria pyriformis</i> [Coccidae]	Yes	Quarantine pest (Qld, SA, NSW, Vic.)
<i>Pseudaonidia trilobitiformis</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Pseudaulacaspis cockerelli</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Pseudaulacaspis pentagona</i> [Diaspididae]	Yes	Quarantine pest (WA)
<i>Pseudococcus calceolariae</i> [Pseudococcidae]	Yes	Quarantine pest (WA)
<i>Pulvinaria floccifera</i> [Coccidae]	Yes	Quarantine pest (WA)
<i>Taylorilygus apicalis</i> [Miridae] ##	Yes	Quarantine pest (WA)
<i>Thaumastocoris peregrinus</i> [Thaumastocoridae] ##	Yes	Quarantine pest (WA)
<i>Aleurodicus dispersus</i> [Aleyrodidae]	Yes	Quarantine pest (WA, Vic., NSW, NT and Tas.) & potential regulated article
<i>Bemisia tabaci</i> species complex [Aleyrodidae]	Yes	Quarantine pest (Tas., WA) & potential regulated article
<i>Berecynthus hastator</i> [Pentatomidae]	No	Quarantine pest & potential regulated article
<i>Caldwellioliola reservata</i> [Cicadellidae]	No	Quarantine pest & potential regulated article
<i>Cicadella viridis</i> [Cicadellidae]	No	Quarantine pest & potential regulated article
<i>Halyomorpha halys</i> [Pentatomidae]	No	Quarantine pest & potential regulated article
<i>Homalodisca vitripennis</i> [Cicadellidae]	No	Quarantine pest & potential regulated article
<i>Oncometopia clarior</i> [Cicadellidae]	No	Quarantine pest & potential regulated article
<i>Philaenus spumarius</i> [Aphrophoridae] ##	No	Quarantine pest & potential regulated article
<i>Metadelphax propinqua</i> [Delphacidae] ##	Yes	Potential regulated article
Hymenoptera (wasps, bees and ants)		
<i>Allantus cinctus</i> [Tenthredinidae]	No	Quarantine pest
<i>Arge ochropus</i> [Argidae]	No	Quarantine pest
<i>Arge xanthogaster</i> [Argidae]	No	Quarantine pest
<i>Cladius difformis</i> [Tenthredinidae]	No	Quarantine pest
<i>Diplolepis rosae</i> [Cynipidae]	No	Quarantine pest
<i>Endelomyia aethiops</i> [Tenthredinidae]	No	Quarantine pest
<i>Hartigia bicincta</i> [Cepidae]	No	Quarantine pest
<i>Hartigia cressoni</i> [Cepidae]	No	Quarantine pest
<i>Hartigia mexicana</i> [Cepidae]	No	Quarantine pest
<i>Megastigmus aculeatus</i> [Torymidae]	No	Quarantine pest

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Plagiolepis pygmaea</i> [Formicidae] ##	No	Quarantine pest
<i>Solenopsis geminata</i> [Formicidae]	Yes (under eradication)	Quarantine pest
<i>Anoplolepis gracilipes</i> [Formicidae] ##	Yes (Under eradication)	Quarantine pest (WA, Qld and NSW)
Lepidoptera (moths and butterflies)		
<i>Acleris bergmanniana</i> [Tortricidae]	No	Quarantine pest
<i>Acrolepiopsis incertella</i> [Acrolepiidae]	No	Quarantine pest
<i>Acronicta psi</i> [Noctuidae]	No	Quarantine pest
<i>Adoxophyes orana</i> [Tortricidae]	No	Quarantine pest
<i>Agrochola lychnidis</i> [Noctuidae]	No	Quarantine pest
<i>Agrotis segetum</i> [Noctuidae]	No	Quarantine pest
<i>Aloa lactinea</i> [Erebidae]	No	Quarantine pest
<i>Alysia purdii</i> [Noctuidae]	No	Quarantine pest
<i>Amerila carneola</i> [Erebidae]	No	Quarantine pest
<i>Amorbia emigratella</i> [Tortricidae]	No	Quarantine pest
<i>Amphipyra pyramidea</i> [Noctuidae]	No	Quarantine pest
<i>Amphipyra tragopoginis</i> [Noctuidae]	No	Quarantine pest
<i>Aphomia sabella</i> [Pyralidae] ##	No	Quarantine pest
<i>Archips micaceana</i> [Tortricidae]	No	Quarantine pest
<i>Archips rosana</i> [Tortricidae]	No	Quarantine pest
<i>Argyrotaenia franciscana</i> [Tortricidae]	No	Quarantine pest
<i>Artitropa comus</i> [Hesperiidae]	No	Quarantine pest
<i>Astrogenes chrysograptus</i> [Tineidae]	No	Quarantine pest
<i>Astrogenes insignita</i> [Tineidae]	No	Quarantine pest
<i>Autographa gamma</i> [Noctuidae] ##	No	Quarantine pest
<i>Cacoecimorpha pronubana</i> [Tortricidae]	No	Quarantine pest
<i>Catamacta lotinana</i> [Tortricidae]	No	Quarantine pest
<i>Chliaria othona</i> [Lycaenidae]	No	Quarantine pest
<i>Choristoneura orae</i> [Tortricidae] ##	No	Quarantine pest
<i>Choristoneura rosaceana</i> [Tortricidae]	No	Quarantine pest
<i>Chrysodeixis chalcites</i> [Noctuidae]	No	Quarantine pest
<i>Chrysodeixis includens</i> [Noctuidae]	No	Quarantine pest
<i>Clepsis spectrana</i> [Tortricidae] ##	No	Quarantine pest
<i>Cnaemidophorus rhododactyla</i> [Pterophoridae]	No	Quarantine pest
<i>Cochylis caulocatax</i> [Tortricidae]	No	Quarantine pest
<i>Coleophora dianthi</i> [Coleophoridae]	No	Quarantine pest
<i>Coleophora gryphipennella</i> [Coleophoridae]	No	Quarantine pest
<i>Coleophora potentillae</i> [Coleophoridae]	No	Quarantine pest
<i>Coleophora rosacella</i> [Coleophoridae]	No	Quarantine pest
<i>Coleophora rosaefoliella</i> [Coleophoridae]	No	Quarantine pest
<i>Copitarsia corruda</i> [Noctuidae] ##	No	Quarantine pest
<i>Copitarsia decolora</i> [Noctuidae] ##	No	Quarantine pest

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Copitarsia incommoda</i> [Noctuidae]	No	Quarantine pest
<i>Crocallis elinguaris</i> [Geometridae]	No	Quarantine pest
<i>Cyligramma latona</i> [Erebidae] ##	No	Quarantine pest
<i>Danaus chrysippus</i> subsp. <i>dorippus</i> [Nymphalidae] ##	No	Quarantine pest
<i>Darna pallivitta</i> [Limaecodidae]	No	Quarantine pest
<i>Deanolis sublimbalis</i> [Crambidae]	Yes (Under official control)	Quarantine pest
<i>Duponchelia fovealis</i> [Crambidae]	No	Quarantine pest
<i>Ectropis crepuscularia</i> [Geometridae]	No	Quarantine pest
<i>Elasmopalpus lignosella</i> [Pyralidae]	No	Quarantine pest
<i>Epichoristodes acerbella</i> [Tortricidae]	No	Quarantine pest
<i>Epiphryne verriculata</i> [Geometridae]	No	Quarantine pest
<i>Epitoxis albicincta</i> [Erebidae]	No	Quarantine pest
<i>Erannis defoliaria</i> [Geometridae]	No	Quarantine pest
<i>Eublemma rufimixta</i> [Noctuidae]	No	Quarantine pest
<i>Euproctis chrysorrhoea</i> [Erebidae]	No	Quarantine pest
<i>Euproctis taiwana</i> [Erebidae]	No	Quarantine pest
<i>Graphania steropastis</i> [Noctuidae]	No	Quarantine pest
<i>Gymnoscelis rufifasciata</i> [Geometridae]	No	Quarantine pest
<i>Hadena bicruris</i> [Noctuidae]	No	Quarantine pest
<i>Hadena compta</i> [Noctuidae]	No	Quarantine pest
<i>Helicoverpa zea</i> [Noctuidae] ##	No	Quarantine pest
<i>Heliothis incarnata</i> [Noctuidae]	No	Quarantine pest
<i>Heliothis maritima</i> [Noctuidae]	No	Quarantine pest
<i>Hemithea aestivaria</i> [Geometridae]	No	Quarantine pest
<i>Hendecasis duplifascialis</i> [Crambidae] ##	No	Quarantine pest
<i>Homona magnanima</i> [Tortricidae]	No	Quarantine pest
<i>Hypercompe indecisa</i> [Erebidae]	No	Quarantine pest
<i>Izatha austera</i> [Oecophoridae]	No	Quarantine pest
<i>Junonia oenone</i> [Nymphalidae] ##	No	Quarantine pest
<i>Lacanobia oleracea</i> [Noctuidae] ##	No	Quarantine pest
<i>Lacanobia suasa</i> [Noctuidae]	No	Quarantine pest
<i>Lacipa florida</i> [Erebidae]	No	Quarantine pest
<i>Lacipa quadripunctata</i> [Erebidae]	No	Quarantine pest
<i>Leucoptera malifoliella</i> [Lyonetiidae]	No	Quarantine pest
<i>Lozotaenia forsterana</i> [Tortricidae]	No	Quarantine pest
<i>Lymantria obfuscata</i> [Erebidae]	No	Quarantine pest
<i>Mamestra brassicae</i> [Noctuidae]	No	Quarantine pest
<i>Metarctia tricolorana</i> [Arctiidae] ##	No	Quarantine pest
<i>Nadata gibbosa</i> [Notodontidae]	No	Quarantine pest
<i>Negeta chlorocrota</i> [Nolidae]	No	Quarantine pest
<i>Noctua pronuba</i> [Noctuidae]	No	Quarantine pest

Pest	Present within Australia	Quarantine pest/Regulated article
<i>Olene inclusa</i> [Lymantriidae] ##	No	Quarantine pest
<i>Operophtera brumata</i> [Geometridae]	No	Quarantine pest
<i>Opogona sacchari</i> [Tineidae]	No	Quarantine pest
<i>Orgyia postica</i> [Erebidae]	No	Quarantine pest
<i>Orvasca subnotata</i> [Erebidae] ##	No	Quarantine pest
<i>Ostrinia nubilalis</i> [Crambidae]	No	Quarantine pest
<i>Pandemis cerasana</i> [Tortricidae]	No	Quarantine pest
<i>Papaipema nebris</i> [Noctuidae]	No	Quarantine pest
<i>Peridroma saucia</i> [Noctuidae] ##	No	Quarantine pest
<i>Phalera bucephala</i> [Notodontidae]	No	Quarantine pest
<i>Phlogophora meticulosa</i> [Noctuidae] ##	No	Quarantine pest
<i>Pirdana hyela</i> [Hesperiidae]	No	Quarantine pest
<i>Planotortrix excessana</i> [Tortricidae]	No	Quarantine pest
<i>Platynota stultana</i> [Tortricidae]	No	Quarantine pest
<i>Ptilodon capucina</i> [Notodontidae]	No	Quarantine pest
<i>Pyrrharctia isabella</i> [Erebidae]	No	Quarantine pest
<i>Saturnia pavonia</i> [Saturniidae]	No	Quarantine pest
<i>Sideridis rivularis</i> [Noctuidae]	No	Quarantine pest
<i>Spodoptera cosmioidea</i> [Noctuidae] ##	No	Quarantine pest
<i>Spodoptera eridania</i> [Noctuidae]	No	Quarantine pest
<i>Spodoptera littoralis</i> [Noctuidae] ##	No	Quarantine pest
<i>Spodoptera ornithogalli</i> [Noctuidae]	No	Quarantine pest
<i>Syricoris lacunana</i> [Tortricidae] ##	No	Quarantine pest
<i>Thaumatotibia leucotreta</i> [Tortricidae] ##	No	Quarantine pest
<i>Tortrix dinota</i> [Tortricidae] ##	No	Quarantine pest
<i>Trichoplusia ni</i> [Noctuidae]	No	Quarantine pest
<i>Vanessa canace</i> [Nymphalidae]	No	Quarantine pest
<i>Xestia c-nigrum</i> [Noctuidae]	No	Quarantine pest
<i>Xylena formosa</i> [Noctuidae]	No	Quarantine pest
<i>Aglossa caprealis</i> [Pyralidae] ##	Yes	Quarantine pest (WA)
<i>Nemapogon granella</i> [Tineidae]	Yes	Quarantine pest (WA)
<i>Teia anartoides</i> [Erebidae] ##	Yes	Quarantine pest (WA)

Appendix H: Issues raised in stakeholder comments

Written submissions were received from 18 stakeholders in response to the Draft PRA. These submissions contained comments of a technical nature relating to the PRA, in addition to comments that were non-technical and related to aspects of the cut flower and foliage trade and departmental operations.

The department has considered all submissions of a technical nature and, after consideration and further review of literature, has made several changes to the risk analysis. This Appendix summarises the key technical comments received during consultation on the Draft PRA, and the department's responses.

Additional information on other issues commonly raised by stakeholders, which are outside the scope of this technical report, is available on the department's website.

Comment 1: Concerns were raised about inspection practices and pest identification by trading partners prior to export, and by the department at the Australian border.

The department places reliance on the processes and practices of National Plant Protection Organisations (NPPOs) in inspecting consignments of cut flowers and foliage for freedom from pests and certification prior to export. For the information of NPPOs, guidance about these procedures is provided in Section 7.2.6 of this document. The inspection procedures outlined are familiar to trading partners as they are consistent with International Standards for Phytosanitary Measures (ISPMs) 23: *Guidelines for inspection* (FAO 2005) and ISPM 31: *Methodologies for sampling of consignments* (FAO 2016f).

To assist trading partners in meeting Australian requirements, the department has offered and delivered targeted training in inspection techniques and hosted trading partner government and industry participant visits to see Australian processes onshore.

Regarding the identification of pests by trading partners, Part 1 and Part 2 of this PRA provide a comprehensive list of pests of biosecurity concern to Australia for the cut flower and foliage pathway. This provides NPPOs and producers with an extensive resource to enable management of pests offshore. In addition, all pest interception data are reported by the department on a regular basis to importers and NPPOs. When pests are not able to be identified to species level due to diagnostic restrictions the most accurate information is still provided.

The department then verifies each consignment of cut flowers and foliage arriving at the Australian border. For each cut flower and foliage consignment that arrives at the Australian border, the department undertakes a series of actions to verify the consignment is free from biosecurity risk prior to release. This includes securing the consignment, reviewing phytosanitary documentation, inspecting the consignment, and applying remedial treatment (if required). If pests or contaminants are detected, the department requires action to be taken on the whole consignment. These activities are explained in further detail in Chapter 7 of this PRA and in the department's responses to non-technical comments, Comment 6 (available from agriculture.gov.au/biosecurity/risk-analysis/plant/cut-flowers#pest-risk-analysis-for-cut-flower-and-foliage-imports--part-2).

Pests found on imported cut flowers and foliage are identified to species level, where possible, to allow the department to determine if biosecurity measures need to be applied to mitigate risk. It is not always possible to identify pests to species level, for several reasons. These reasons include the condition of the pest found, the pest taxa, the sex, and life stage. In addition, given the significant volume of trade and the perishable nature of cut flowers and foliage, at times complex diagnostics are unable to be performed. Therefore, more often the pest is identified to genus or family level. In these circumstances, phytosanitary action is taken because live pests within that level of taxon are known to be of biosecurity concern to Australia, or could not be identified to a taxonomic level sufficient to exclude the possibility of their being a pest of biosecurity concern.

The department continues to improve the understanding of pest species on the cut flower and foliage pathway through additional initiatives. One such initiative (discussed in Section 4.2.1) was research which found that the species of *Tetranychus* mites arriving on cut flowers and foliage from Colombia, Ecuador and Kenya were not pests of biosecurity concern for Australia. This has led to a direct reduction to the resources needed to identify these non-biosecurity risks and facilitates the faster clearance of compliant consignments.

Comment 2.1: Concerns were raised about the efficacy of methyl bromide treatments offshore and onshore to mitigate biosecurity risk.

Methyl bromide is a broad-spectrum biocide that has been used as a fumigant for many years in production systems and as a treatment to manage pests since the 1930s (Bond 1989; Thompson 1966). Methyl bromide has been registered for use in Australia since 1945 (APVMA 2007) and has been widely used worldwide for quarantine purposes during this time. For example, Australia has been fumigating nursery stock and bulbs using methyl bromide since 1948.

Methyl bromide is used effectively on a range of plant products such as fresh and dried fruits, fresh and dried vegetables, roots, bulbs, nursery stock, nuts and timber (Bond 1989; Fields & White 2002; Hertel & Kielhorn 1995). Methyl bromide has several excellent properties as a fumigant such as a low boiling point, high vapour pressure and is known to penetrate quickly and deeply into materials (Bond 1989; Fields & White 2002; Hertel & Kielhorn 1995; Lembright 1990; Martin 2003; Thompson 1966).

Methyl bromide fumigation is effective at killing a broad range of organisms including insects, mites and ticks, snails and slugs, fungi, nematodes, weed seeds and is toxic to mammals (Bond 1989; Fields & White 2002; Hertel & Kielhorn 1995; NPIC 2000; Thompson 1966; USDA 2015). Methyl bromide is extensively used in quarantine applications by many countries for a wide range of pests at schedules of 24–48 grams m³ for 2 hours at 5–30°C (Fields & White 2002). Methyl bromide fumigation schedules can also be expressed as a concentration by time (CxT) product. Effective fumigation treatments can be achieved with methyl bromide by varying the dose and times to achieve the same CxT product (Bond 1989) as long as the dose available remains above 2 grams m³ (Thompson 1966). As explained in table 7.2 of this PRA, Australia only accepts methyl bromide treatments for cut flowers and foliage of ≥ 32 grams m³ at temperature ≥ 10°C.

For countries that employ methyl bromide treatment prior to export there are treatment specifications that need to be followed to ensure the efficacy of phytosanitary treatments, as outlined in the PRA. In brief, approved treatments must be applied as specified for cut flowers and foliage, and consignments must be inspected to verify freedom of live pests following treatment and prior to export, and certified via issuance of phytosanitary certificate by the NPPO. Further

details are provided in Chapter 7 of this PRA. In addition, the department conducts on-arrival inspection of each consignment, and for consignments treated offshore with methyl bromide, this on-arrival inspection forms part of the department's verification that the fumigation has been efficacious.

Several of our major trading partners have also signed onto the Australian Fumigation Accreditation Scheme (AFAS). AFAS is a management and registration system run by overseas government agencies to ensure continued compliance of fumigators with the treatment requirements. Fumigation companies accredited through the scheme receive specialised training, support and regular audits to demonstrate capacity and knowledge to perform effective fumigation treatments. This system assists fumigators to maintain a high standard of fumigation performance and compliance with departmental requirements. More information regarding AFAS is available from agriculture.gov.au/import/before/prepare/treatment-outside-australia/afas.

In Australia the department has an approval and auditing process to ensure that providers of phytosanitary treatments meet the department's requirements. Providers of methyl bromide fumigation are required to meet the specification of a class 4.6 fumigation approved arrangement (AA) (see agriculture.gov.au/import/arrival/arrangements/general-policies for more information). Some key aspects of this regulation include that the department must be satisfied that the applicant has the capability, training and facilities to carry out the fumigation, and the applicant must pass regular audits conducted by the department.

In cases where consignments found to be non-complaint on arrival are fumigated with methyl bromide the department undertakes a program of verification post-fumigation to verify efficacy of the treatment, so that quarantine pest species do not enter Australia.

Comment 2.2: A stakeholder was concerned that methyl bromide fumigation may not be an effective phytosanitary measure due to the establishment of resistant insect populations.

Resistance of cut flower and foliage pests to fumigants used for biosecurity purposes is unlikely due to the low exposure rates of the insect populations to fumigants like methyl bromide. Insect resistance to treatments is developed through overuse and continual exposure of specific insect populations to the same chemical type (Manners 2015). This is observed with mites such as *Tetranychus urticae* that have developed resistance to insecticides like etoxazole (Herron et al. 2018). While there are several cases of insects developing resistant to methyl bromide this is primarily observed in stored grain pests, such as *Tribolium castaneum* and *Sitophilus granarius* (Michigan State University 2019). Exposure of insects inhabiting cut flowers and foliage to methyl bromide is limited to phytosanitary treatments only. Therefore, the likelihood that insects found on cut flowers will develop methyl bromide resistance is exceedingly low.

Comment 2.3: A stakeholder commented that the requirements as outlined in Section 7.1.3 of the PRA regarding pre-export methyl bromide fumigation fail to meet Australia's IPPC obligations of minimal impact and transparency.

Methyl bromide fumigation is one of the three pre-export pest risk management measures available for the importation of cut flowers and foliage from all countries. Australia also allows import under an NPPO approved systems approach or NPPO approved alternative pre-export disinfestation treatment. Through providing multiple alternatives of treatment for the import of

cut flowers and foliage, Australia meets its IPPC obligations of applying phytosanitary treatments of minimal impact, and that represent the least restrictive measures available for this pathway.

As mentioned above in comment 2.1, methyl bromide fumigation has been used for over 80 years to manage arthropod pests through fumigation of soil, grain, and many more plant and plant products including cut flowers and foliage. However, for some flower types methyl bromide fumigation can affect the vase quality of cut flowers and foliage (Zhang et al. 2012). Methyl bromide fumigation at different rates and using different flower types, can produce different quality results (OEPP-EPPO 2009; Zhang et al. 2012). The department acknowledges the effect that methyl bromide fumigation may have on some flower species and thus allows alternative pest management options for the export of cut flowers and foliage to Australia.

Comment 3: Concerns were raised about the use of a group PRA process for the Pest Risk Analysis for cut flower and foliage imports, saying this is not supported by the International Standards for Phytosanitary Measures and is not specific enough to apply risk ratings.

The department has established precedent for using the Group PRA method for the purpose of risk analysis and developing policy with the publication of several group PRAs, including the *Final group pest risk analysis for thrips and orthotospoviruses on fresh fruit, vegetable, cut-flower and foliage imports*, the *Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports* and *Draft group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports*. As with the Pest Risk Analysis for cut flower and foliage imports, each Group PRA has a clearly defined scope in relation to the pests being grouped and the import pathways under consideration.

Undertaking and utilising PRAs on groups of pests that share common biological characteristics provides significant opportunities to improve effectiveness and consistency of commodity-based PRAs in which those pests are also assessed, and to maintain a high level of biosecurity protection against new and emerging risks. Through the Agricultural Competitiveness White Paper, the group approach to PRA was initiated by the department to take advantage of these opportunities and assist with activities aimed at reforming and modernising Australia's biosecurity system. It is a building block that can be used to review existing trade pathways or be applied to prospective pathways for which a specific PRA is required.

As outlined in Part 1 and Part 2 of the PRA (Appendix E) the department has ensured that it has acted consistently with Australia's international obligations in undertaking the PRA for cut flowers and foliage imports. This method is consistent with the principles of the International Standards for Phytosanitary Measures (ISPMs), including ISPM 2: Framework for Pest Risk Analysis (FAO 2019a) and ISPM 11: Pest Risk Analysis for Quarantine Pests (FAO 2019c), and the requirements of the SPS Agreement (WTO 1995a).

The International Plant Protection Convention (IPPC) defines PRA as 'the process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it' (FAO 2019b). A pest is 'any species, strain or biotype of plant, animal, or pathogenic agent injurious to plants or plant products' (FAO 2019b).

The International Standard for Phytosanitary Measures Number 2: Framework for pest risk analysis (FAO 2019a) states that ‘Specific organisms may ... be analysed individually, or in groups where individual species share common biological characteristics.’ This is the basis for the Group PRA, in which organisms are grouped if they share common biological characteristics, and as a result also have similar likelihoods of entry, establishment and spread and comparable consequences—thus posing a similar level of biosecurity risk.

The department recognises there may be exceptional circumstances where risk(s) posed by specific pests differ significantly from those of the other members of the group. If technically justified, a specific risk assessment would be undertaken where such exceptions exist.

Comment 4: Questions were raised as to when and how the biosecurity risks of pathogens will be addressed by the department. In addition, concerns about vectors of pathogens of biosecurity concern were also raised.

The department is considering undertaking a formal risk assessment on pathogens potentially associated with the cut flower and foliage import pathway, which would form Part 3 of the cut flower and foliage PRA.

Vectors of some pathogens of biosecurity concern have been identified in Part 1 and Part 2 of the PRA. These include numerous thrips, aphid, beetle and hemipteran species which have been classified either as regulated articles or potential regulated articles due to their ability to vector or transmit another quarantine pest (see Appendix F of Part 1 and Part 2 of the PRA). As described in the updated glossary of the PRA, a regulated article is defined as:

Any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harbouring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved (FAO 2019).

A species identified by the department as a potential regulated article is a pest that has been assessed through a pest categorisation process (and its quarantine status determined), but for which the organisms it is capable of spreading have not yet been assessed. In many instances there is sufficient scientific evidence to support their regulation at the border due to the associated biosecurity risk.

In this PRA, insects that can vector pathogens of biosecurity concern, regardless of the insect’s presence or absence in Australia, are classified as regulated or potential regulated articles and will be managed appropriately at the border. An example is the regulation of the *Bemisia tabaci* (Silverleaf whitefly) species complex in Australia. *Bemisia tabaci* is defined as a regional quarantine pest for Australia as specific biotypes of *Bemisia tabaci* are absent from WA and Tasmania. Secondly, *Bemisia tabaci* is a well-known vector of plant viruses and thus has been assessed through the PRA as a potential regulated article. In a situation where live specimens of *Bemisia tabaci* were to be identified on a consignment of cut flowers or foliage the consignment would need to undergo remedial action.

Comment 5.1: Concerns were raised about the control of non-quarantine pests at the Australian border.

The department is not able to regulate non-quarantine pests on cut flower and foliage imports, even if we do not want more of these pests in Australia. As a member of the World Trade Organization (WTO) and a signatory to the IPPC, Australia can only regulate pests at the border if a pest has:

- been identified to be a quarantine pest for Australia, and/or
- been identified as a regulated non-quarantine pest, and/or
- been identified as a regulated article, and/or
- been identified to be a contaminating pest that is of biosecurity concern of Australia.

Definitions of each of these categories are supplied in the Glossary of this PRA.

The phytosanitary measures that the department applies to all imported plants and plant products are governed by the guidelines of the SPS Agreement from the WTO and International Standards for Phytosanitary Measures (ISPMs) from the IPPC. Key principles of these guidelines that prevent Australia, and other signatories to the IPPC, from regulating non-quarantine pests are outlined in ISPM 1, *Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade*. As an example, the Principle of Necessity, section 1.2, ISPM 1 states:

Contracting parties may apply phytosanitary measures only where such measures are necessary to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests. In this regard, the IPPC provides that: “Contracting parties shall not, under their phytosanitary legislation, take any of the measures specified in ... unless such measures are made necessary by phytosanitary considerations ...” (Article VII.2(a)). Article VI.1(b) states that “Contracting parties may require phytosanitary measures for quarantine pests and regulated non-quarantine pests, provided that such measures are ...limited to what is necessary to protect plant health...”. Article VI.2 states that “Contracting parties shall not require phytosanitary measures for non-regulated pests.”

In accordance with these obligations, Australia cannot apply phytosanitary measures to non-quarantine species. This principle is also applied by trading partners in relation to the export of Australian goods overseas.

Comment 5.2: Concerns were raised about the control of pesticide resistant pests at the Australian border.

As discussed in Part 1 of this PRA’s responses to stakeholder comments, regarding insecticide resistant populations of *Tetranychus urticae* and *Myzus persicae*, the department determined that there was insufficient evidence to regulate pesticide resistance in these species at that time. The department was at the time, and still is unable to define exotic pesticide resistant biotypes of these two species as quarantine pests. For the department to regulate pests it needs to have technical justification, and this is a requirement for WTO members.

Although pesticide resistant biotypes of certain pest species may exist around the world, the department is required to differentiate them from the existing pest populations in Australia, proving their absence and thus meeting the definition of a quarantine pest. While pesticide

resistance is more significant in some countries, pesticide resistance has also been found in over 65 insect species in Australia (Michigan State University 2019).

The department can research specific instances of resistance if information is provided about the species and resistance of concern.

Comment 6: Concerns were raised about transparency and reporting of pest interception data.

The department used historical pest interception data to support the analysis conducted in the PRA. The continual publication and full disclosure of pest interception data of trading partner countries and Australian importers is not part of the pest risk analysis process, and its use is considered carefully because of commercial trading partner sensitivities.

The cut flower and foliage PRA was the first time the department had conducted a review of an historic import pathway, and as such, the department had access to a large amount of data about these imports. The department has used data in several ways throughout this PRA. The analysis of historical pest interception data was conducted as evidence for the need to strengthen import conditions and undertake the PRA. The historical interception data has also provided an overview of the types of pests found on this pathway and formed a large part of the source data for the presence of particular species on the pathway. The publication of these data sets demonstrates that the measures are having the desired effect of reducing pest interceptions at Australia's border, and confirms that the measures are suitable to reduce biosecurity risk on this pathway.

Interception data are also used as a snapshot in time to provide valuable information about the risks on the pathway. The use and sharing of this information is dependent on the data available, the sensitivities that may be associated with each individual pathway, and the wider trade and political environment at the time. As such, the types of data disclosed will vary between risk analysis publications.

The department does not intend to continue regular publication of pest interception data with respect to this pathway, noting that to do so may contravene relevant privacy provisions in legislation. The department will, however, continue to report pest interception data to its trading partner countries and Australian importers.

Comment 7: Concerns were raised about the efficacy, verification, and approval of pre-export treatments.

All pre-export approved treatments including methyl bromide fumigation, NPPO-approved alternative treatments and devitalisation are managed and verified by the NPPO of the exporting country. It is a requirement of the NPPO to meet our specifications, in addition to providing the appropriate phytosanitary certification that verifies the treatment. These are outlined in detail within the PRA Chapter 7 Pest Risk Management.

Any stand-alone pre-export treatment used as an alternative to methyl bromide must be approved by the exporting country's NPPO prior to use. The effectiveness of the pre-export treatment will be verified by the exporting country's NPPO at pre-export inspection and by the department at the on-arrival inspection. Where the department considers the treatment is not mitigating pest risks as intended, the department will request regulatory action by the exporting country's NPPO.

This may include investigation of treatment facilities and providers and implementation of corrective actions as required. Ongoing high rates of pest interception will result in suspension of a treatment facility or even removal of the treatment option. There are currently no stand-alone NPPO approved treatments in operation. If and when they are used, the department will monitor efficacy and respond to any evidence that the treatment is not working.

Australia's phytosanitary measures are designed to reduce the biosecurity risk of consignments to meet our appropriate level of protection, prior to entry into Australia. This is outlined in the PRA, section 7.2.7.

Regardless of the import pathway used, on arrival in Australia the department will:

- assess documentation to verify that the consignment is as described on the Phytosanitary Certificate, that required phytosanitary actions have been undertaken, and that product security has been maintained.
- complete an inspection of each consignment to verify that the biosecurity status meets Australia's import conditions.

Comment 8: Stakeholders made comments about the devitalisation treatment of cut flowers and foliage including:

- **Support for the use of devitalisation to mitigate pathogen risk**
- **Questions about devitalisation treatments**
- **Concerns about the effectiveness and ongoing verification of treatment.**

Some flower and foliage species may be propagated from stem material, and if successfully propagated, this plant material could introduce exotic pathogens into Australia. Therefore, the current policy of the department is that all propagatable cut flowers and foliage must be devitalised before they are imported into Australia. There are 14 groups of plants that require devitalisation via glyphosate treatment prior to import into Australia including roses, carnations and chrysanthemums (the full list is provided on BICON, available from bicon.agriculture.gov.au/BiconWeb4.0). Trading partners that export these species are required to follow the department's treatment guidelines to ensure that the arriving cut flowers and foliage entering Australia are non-propagatable. The cut flower devitalisation treatment guide is available on the department website (agriculture.gov.au/import/goods/plant-products/cut-flowers-foliage/treatment-guide). Glyphosate is the only herbicide approved by the department and Australian Pesticides and Veterinary Medicines Authority (APVMA) for the devitalisation of imported cut flowers and foliage, and the treatment must be applied prior to release from biosecurity control. The APVMA does not regulate the offshore use of glyphosate.

Trading partners have oversight of the devitalisation process when applied pre-export—providing the department with assurance of the methods and treatment rates applied via the phytosanitary certificate. The guide provides information about the department's cut flower devitalisation requirements for devitalisation treatment providers and NPPOs. To ensure the efficacy of all treatments the guidelines advise that:

- Flower stems are be cut within two hours of treatment

- Flowers that have been stored in cool rooms are brought to room temperature before the treatment
- Treatments are performed at to 18° to 21°C within a room with adequate air flow
- Packaging around flowers is removed, or adjusted
- stems are immersed in the dipping solution for at least 20 minutes
- Solutions are made fresh, used within specific timeframes and kept clean
- The concentration of solutions used in the devitalisation process (0.9g/L to 5.4 g/L, depending on flower species) are consistent with rates applied for treatment of weeds in farming and gardening practices.

The department obtains assurance that devitalisation has been undertaken on each consignment via phytosanitary certificates and undertakes a range of activities including in-country visits and verification activities to ensure devitalisation activities are being effectively applied.

The use of glyphosate in Australia as a treatment to devitalise propagatable cut flowers has been assessed and permitted through APVMA permit PER86711. Key factors and inclusions of PER86711 are:

- critical use comments and safety directions including the use of Personal Protective Equipment by workers applying the treatment.
- consideration of the application of the chemical and end use of the commodity. The end use is for decorative purposes and not for human or animal consumption.
- evaluation of the potential risk of handling treated cut flowers in relation to the use of glyphosate.
- appropriate permit safety directions to mitigate risks associated with preparing and using the product. These same safety directions should be followed when handling the cut flowers immediately after treatment until the treated areas are dry.

Imported cut flowers and foliage are imported for decorative purposes, and not for the end use of propagation. The department has discouraged Australian industry stakeholders from attempting to propagate imported cut flowers and foliage, as this creates a heightened biosecurity risk. Knowingly attempting to propagate imported cut flowers and foliage contravenes biosecurity legislation, specifically the *Biosecurity (Prohibited and Conditionally Non-prohibited Goods) Determination 2016*. As an Australian Government regulator, the department carries the responsibility for monitoring compliance with import and export legislation and will take action to address non-compliance and enforce laws where this is required.

Managing Australia's biosecurity is important and the department promotes a shared responsibility with clients, stakeholders and the general public who can all play their part in protecting Australia. Understanding legal obligations and proactively seeking to comply with Australian laws is the simplest way for Australian residents to help protect Australia's unique environment, agricultural industries, and animal and plant health.

The Department of Agriculture, Water and the Environment 'Redline' is a free call service for people to confidentially report information about suspected breaches of Australian biosecurity, meat or food inspection laws. Breaches of Australian biosecurity laws include illegal importation, providing fraudulent or misleading documentation, and bypassing directions given by the

department. More information is available from agriculture.gov.au/biosecurity/legislation/compliance/redline.

Comment 9: Several stakeholders raised concerns that the management of biosecurity risks on the cut flower and foliage pathway is inconsistent with other pathways, such as imported nursery stock.

The department, in accordance with the SPS agreement and ISPMs, manages pathways relative to the biosecurity risks which they pose. The processes of a risk assessment are outlined in the PRA Appendix E. Every pathway is different, and while they may share elements such as commonalities of pests, biosecurity risks can vary due to the pest association with the commodity and other factors of the particular biosecurity pathway.

For example, the imported nursery stock and cut flower and foliage pathways can share some common pests. However, the differences in the pathways, and the intended end-uses of the commodities, influence the levels of biosecurity risk, and in turn determine the types of phytosanitary measures that are necessary to manage those risks.

Nursery stock is specifically imported into Australia for the purpose of propagation and planting in Australia. Australia's import conditions for nursery stock vary depending on the plant species, country of origin and form of material imported. With the exception of tissue cultured plants*, all imported nursery stock requires mandatory treatment to manage arthropod risks, and a period of post-entry quarantine for pest and disease monitoring. Some species of plant material must be accompanied by additional certification to provide assurance that the material is free from certain pests or are required to undergo mandatory active testing using molecular methods such as polymerase chain reaction (PCR) for various pathogens, in addition to other disease screening methods. Once released from quarantine, nursery stock material is grown in the Australian environment. This creates a situation in which pests on the imported plant material can have direct contact with other suitable hosts within potentially compatible environments, which increases their likelihood of establishment in Australia. In contrast, cut flowers and foliage are imported for decorative purposes, have a short shelf life, and are used in situations including homes, offices and outdoor events. In these situations, any pests remaining on the pathway have a reduced or transient exposure to other plants and compatible environments. Therefore, the likelihoods associated with entry, establishment and spread of pests on or from cut flowers and foliage are different from those of pests associated with nursery stock.

The differences in pathway components justify different approaches to the application of phytosanitary measures.

*Nursery stock imported as tissue culture (except high-risk plant species) generally do not require a period of post-entry quarantine as the pathway reduces the likelihood of entry of pests and pathogens, but cultures must be inspected on arrival to verify compliance with all import conditions. All import conditions are provided on BICON, available at bicon.agriculture.gov.au/BiconWeb4.0.

Other issues

The department has made a number of changes to the report following consideration of stakeholder comments on the draft report and subsequent review of the literature. These include:

- amendments to the pest categorisation table (Appendix F) to recognise the regional pest status of one species for the state of Western Australia (the species was elevated from non-quarantine pest to quarantine pest status). Amendments were also made to the global distribution of some species, on advice and provision of evidence from NPPOs.
- consideration of departmental pest interception data from January 2020 to December 2020 for the pest categorisation table, and the addition of one species, *Olene inclusa* Walker, 1856 (Lymantriidae), a quarantine pest for Australia.
- redrafting the text of Chapter 5 to focus on pest interception rates of consignments, and moving the previous Chapter 5 text to an appendix for reference (Appendix I).
- updating of Appendix B, Table I: Interceptions of contaminant pests on cut flowers and foliage, to include interception statistics of gastropods (snails and slugs) from 2020-2019.
- minor corrections, rewording and editorial changes for consistency, clarity and web-accessibility.

Appendix I: Copy of Chapter 5 - Changing patterns of activity and risk from Draft Pest Risk Analysis for Cut Flower and Foliage Imports—Part 2

The following section is reproduced in full from Chapter 5 of the *Draft Pest Risk Analysis for Cut Flower and Foliage Imports—Part 2*, published on 22 May 2020.

Cut flowers and foliage are traded globally, and trade patterns have changed over time. In an historic trade pathway such as fresh cut flowers and foliage to Australia, changes in trade patterns create changes to biosecurity risk, as different countries have different arthropod pest profiles. The changes to the biosecurity risk form the basis for Australia's initiation of this PRA.

This chapter updates the analysis presented in Chapter 5 of Part 1 of this PRA (Department of Agriculture 2019b). It considers the continuing changes in the patterns of global cut flower and foliage trade as they relate to Australia, and as an indicator of changes in biosecurity risk. An analysis of current tariff code data is presented to update the information presented in Part 1 of this PRA on increases in volume of exports to Australia, the changes in countries of origin of these exports and the changes in types of flowers. This chapter also presents an updated analysis of the department's arthropod detection data to determine the changes in pest groups intercepted on consignments of imported cut flowers and foliage following the implementation of the revised import conditions for cut flower and foliage consignments on 1 March 2018.

Tariff code data on imports of cut flowers and foliage were sourced from the Department of Home Affairs' Integrated Cargo System (ICS) (Department of Home Affairs 2018) under two tariff codes—0603.1: cut flowers and flower buds of a kind suitable for bouquets or for ornamental purposes (fresh), and 0604.1: foliage, branches and other parts of plants without flowers or flower buds (fresh).

These data were prepared to exclude any records associated with dried flowers and foliage, or non-flower and foliage species. ICS data enabled analyses of trends in numbers and types of consignments, as well as of countries of origin. For the purposes of this assessment, a consignment is defined as one entry against the relevant fresh cut flower tariff code as recorded in ICS. Consignment units have been used as a volume determiner in this instance, as there is no standardised method for recording volumes of imports in ICS (weights, carton numbers and stem numbers are all commonly used).

In addition to ICS data, the department records detections from consignments, known as 'interceptions'. Each interception denotes one type of arthropod found at the border (all pests of biosecurity concern are managed before release, and different species found on one consignment are recorded as separate interceptions), and one interception can record multiple instances of that species being found on one consignment. The ISPM No.5 *Glossary of phytosanitary terms* (FAO 2019b) defines the interception of a pest as 'the detection of a pest during inspection or testing of an imported consignment'. This is distinct from the definition of an incursion, which is defined as 'an isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future'.

The department's interception data enabled analyses of the proportion of consignments detected with live arthropod pests, the countries of origin of those consignments, and also the types of pests found.

Importations by consignment, country and flower type

Global cut flower and foliage trade

International trade is largely organised by region, with Asian Pacific countries being the main suppliers to Japan and Hong Kong; African, Middle Eastern, and other European countries being the principal suppliers to Europe, and Colombia and Ecuador the principal suppliers to the USA (International Trade Centre 2019).

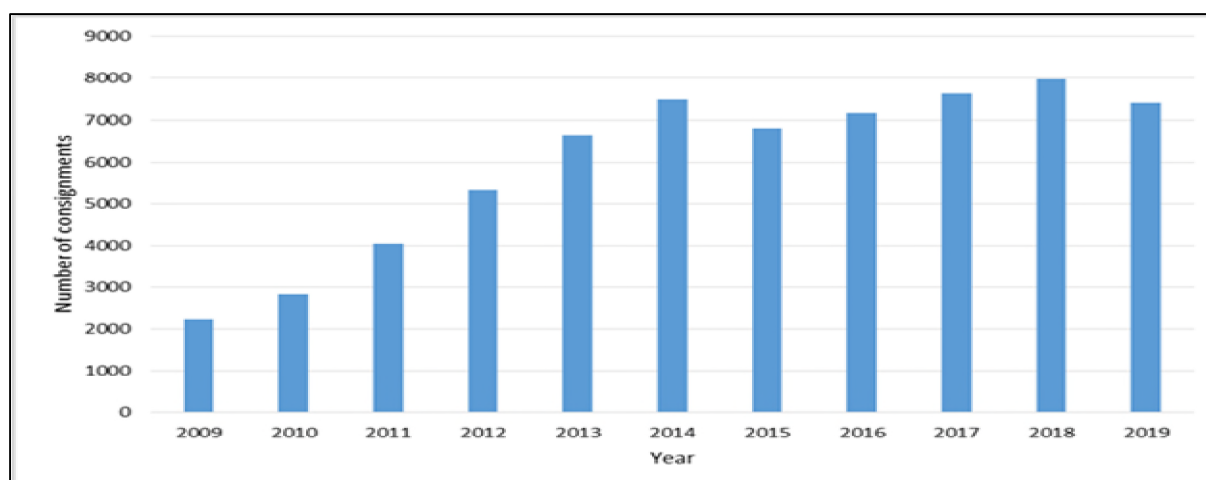
According to Rabobank's World Floriculture Map (van Rijswijk 2016), the source of cut flowers and foliage in the market is continuing to change. Traditionally the major market player, the Netherlands' share of global cut flower exports declined from 50% in 2005 to 43% in 2015. Colombia, Kenya, Ecuador and Ethiopia have increased their global market shares, collectively accounting for 25% in 2005 and 44% of the market in 2015. In 2015, the world's five largest cut flower exporting countries were the Netherlands (holding 43% of the market share), Colombia (15%), Kenya (11%), and Ecuador and Ethiopia (9% each). For the same period, the largest importing countries were the USA (17% of the market share), Germany (15%), the United Kingdom (14%), the Netherlands (11%) and the Russian Federation (7%).

The volume of fresh cut flowers and foliage traded globally almost doubled from 2001 to 2015 (van Rijswijk 2016). The cut flower trade is also changing, with key production areas becoming centred away from points of demand. Production has moved from countries that have traditionally been consumers and growers, such as the Netherlands, to relatively new producing countries such as Colombia, Ecuador, Kenya and Ethiopia (International Trade Centre 2019).

Consignment numbers

Cut flower and foliage imports to Australia have substantially increased since 2009 (Figure 3). In the eleven-year period from 2009 to 2019, the number of cut flower consignments arriving in Australia increased more than threefold, from 2,231 consignments in 2009 to 7,415 consignments in 2019. The highest number recorded to date was 7,977 consignments in 2018.

Figure 3 Number of consignments arriving in Australia per year: 2009 to 2019

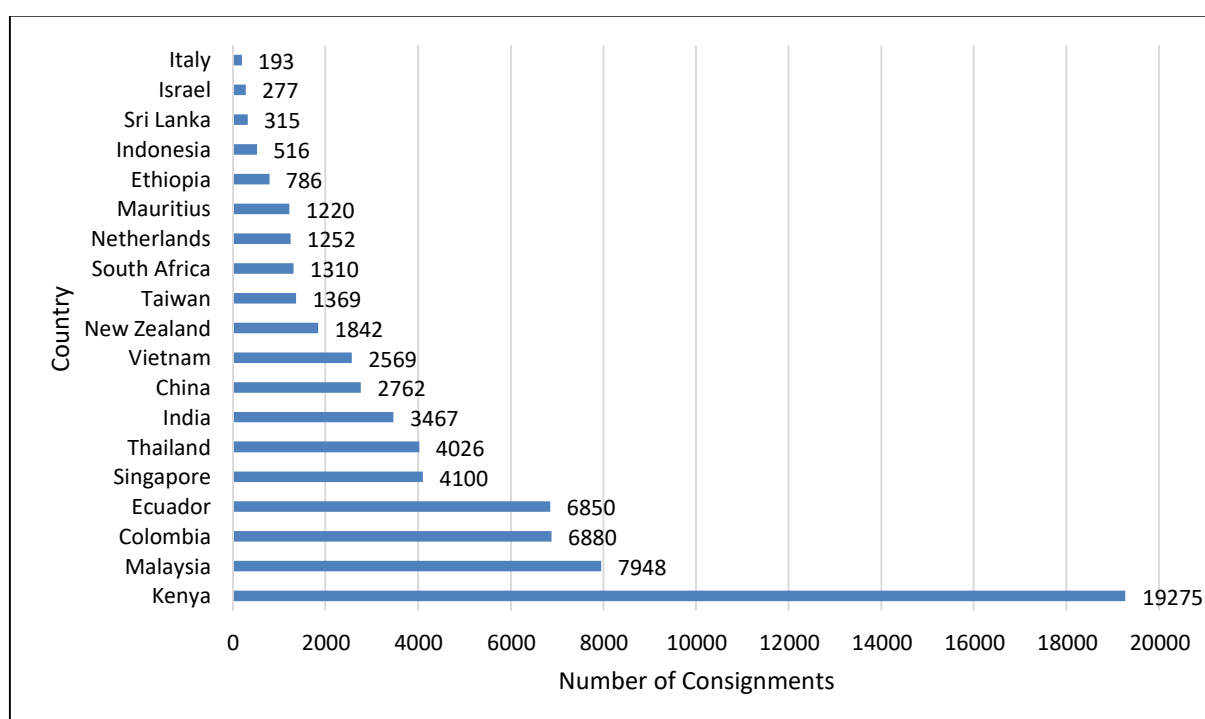


Source: ICS data for tariff codes 0603.1 and 0604.2 for 1 January 2009 to 31 December 2019.

Countries of origin and consignment numbers

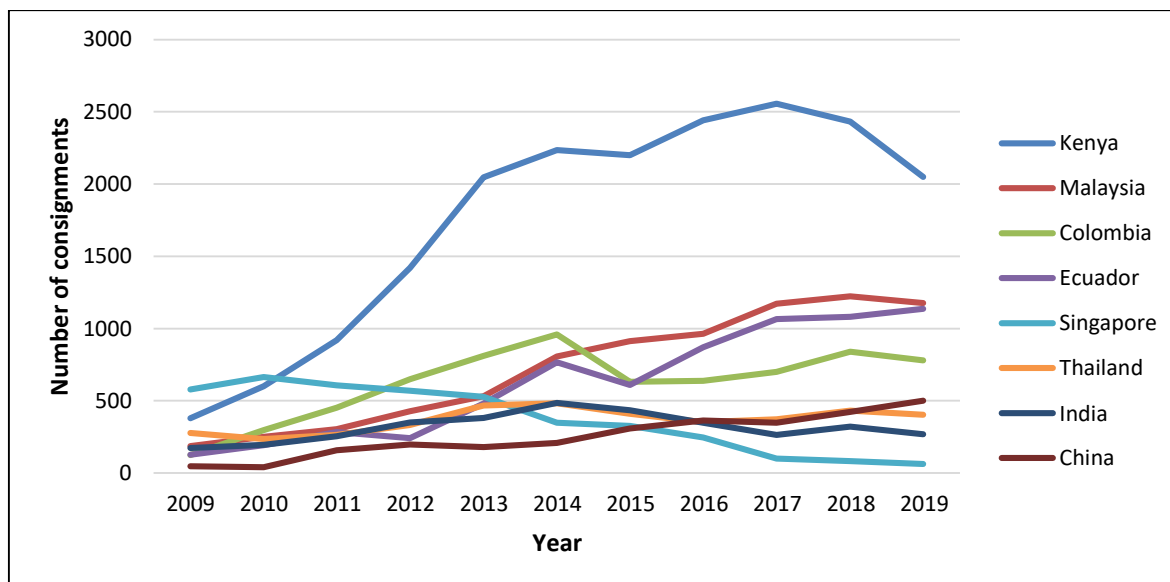
Nineteen countries or economies contributed the majority of cut flower and foliage imports into Australia from 2009 to 2019. These 19 countries or economies are, in order of volume, Kenya, Malaysia, Colombia, Ecuador, Singapore, Thailand, India, China, Vietnam, New Zealand, Taiwan, South Africa, the Netherlands, Mauritius, Ethiopia, Indonesia, Sri Lanka, Israel, and Italy. Kenya is the largest exporter of cut flowers and foliage to Australia, and Kenya's exports (19,275 consignments) are more than two times greater than the next largest exporter for that period (Malaysia, with 7,948 consignments). Figure 4 gives a breakdown of the total number of consignments imported from the top 19 exporting countries from 1 January 2009 to 31 December 2019.

Figure 4 Total number of consignments imported from the top 19 exporting countries or economies: 2009 to 2019



Source: ICS data for tariff codes 0603.1 and 0604.2 for 1 January 2009 to 31 December 2019.

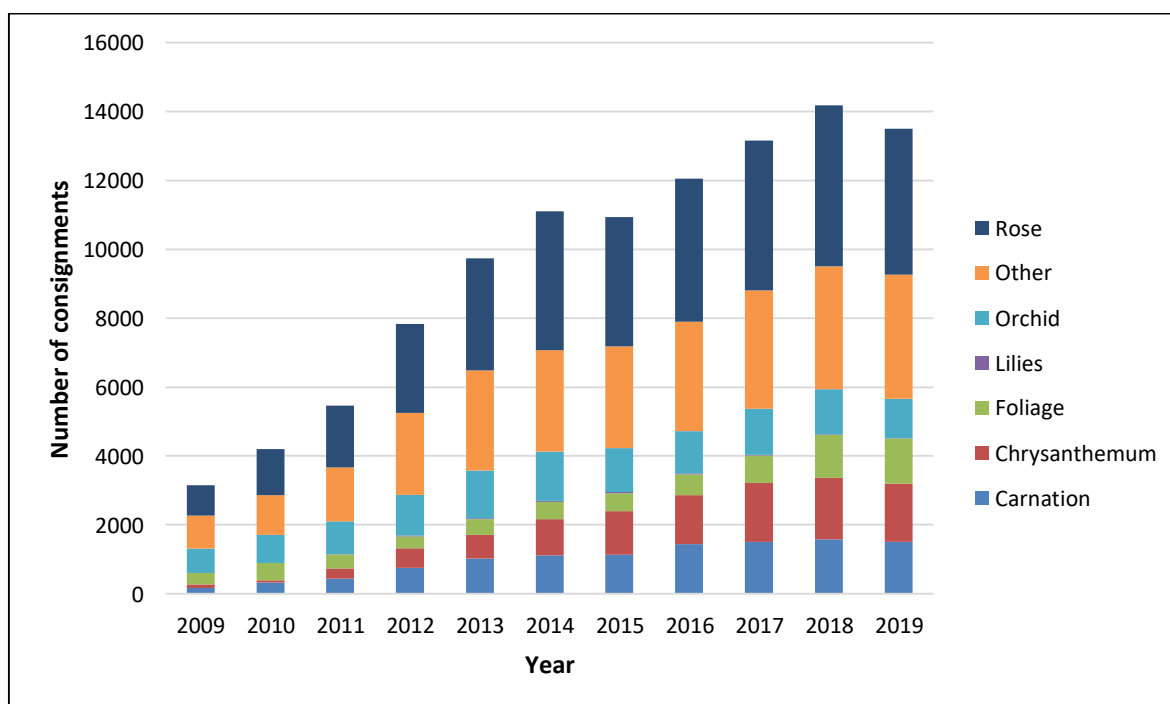
Numbers of consignments from each country also show trends, both increasing and decreasing. Figure 5 illustrates these trends for the eight countries with the largest exports to Australia between 2009 and 2019. Of these eight countries, imports from Kenya show exceptional growth (from 379 consignments in 2009 to 2,431 consignments in 2018), but also a recent numerical reduction (from 2,431 consignment in 2018 to 2,049 consignments in 2019). Three other countries have shown strong growth in consignment numbers, namely Malaysia (186 in 2009 to 1,175 in 2019), Colombia (123 in 2009 to 780 in 2019) and Ecuador (126 in 2009 to 1,136 in 2019). The number of consignments from Singapore has declined (from 579 consignments in 2009 to 61 consignments in 2019).

Figure 5 Trend in import quantities for the eight largest exporters to Australia: 2009 to 2019

Source: ICS data for tariff codes 0603.1 and 0604.2 for 1 January 2009 to 31 December 2019.

Flower types imported

Figure 6 illustrates the number of consignments recorded against the most common cut flower and foliage import groups (carnation, chrysanthemum, foliage, lilies, orchid, 'other' and roses) from 1 January 2009 to 31 December 2019. These groups are based on the tariff codes used to record the imports.

Figure 6 Number of consignments recorded against cut flower and foliage groups

Source: ICS data for tariff codes 0603.1 and 0604.2 for 1 January 2009 to 31 December 2019.

Note: A new tariff code for lilies was introduced in 2012. Prior to this lilies would have been recorded as 'other flowers'. The lily tariff code is for recording *Lilium* spp., but is often used for other flower types. The data presented in this figure have been corrected so that only *Lilium* sp. consignments are represented.

Consistent with the findings in the equivalent analysis conducted for Part 1 of this PRA, roses are proportionally the most frequently imported cut flower type followed by the 'other' group. The 'other' flower group contains flowers such as *Gypsophila*, *Anthurium* and *Limonium*, mixed consignments, or consignments that are not further identified by flower type. Since the implementation of the revised import conditions there has been very little change in the proportions of the types of cut flowers and foliage being imported into Australia.

It is important to note that the lily tariff code is intended to be used for flowers in the genus *Lilium* (Department of Home Affairs 2018), however this tariff is most commonly used by importers to record consignments of *Alstromeria* (lily of the Inca) and *Zantedeschia* (calla lily). These species are not from the *Lilium* genus and so, for the purposes of this analysis, any consignments of these species under the lily tariff were assigned to the 'other flowers' group. This issue was not identified in the Part 1 data analysis.

Arthropod interceptions by commodity, country and flower type

To complement the analyses conducted for Part 1 of this PRA, the department has expanded its analyses of the interception data and arthropod pest groups associated with cut flowers and foliage. Over the period from 1 January 2000 to 28 February 2018, more than 38,000 interceptions of live arthropods were recorded, with 63% being identified to at least genus level, and 37% being identified to species level. Over the period since the implementation of the revised import conditions (1 March 2018 to 31 December 2019) more than 15,500 interceptions of live arthropods have been recorded, with 72% being identified to at least genus level and 37% being identified to species level.

Although the percentage of identifications to genus level has increased since the implementation of the revised import conditions, the percentage of identifications to the species level has remained the same. It is important to note that higher rates of species-level identification are often not possible if the life stage and/or sex of the organism being examined cannot be fully determined, or if the sample is in poor condition. In addition, given the significant volume of trade in cut flowers and the quarantine pest containment risk associated with some pest groups, it is often not feasible to rear sufficient numbers of specimens to adult stages to allow identification. In instances where species-level identification has not been possible, phytosanitary action was taken because a live pest was either exotic to Australia, or could not be identified to a taxonomic level sufficient to exclude the possibility of it being a pest of biosecurity concern.

The analyses of importation data for arrivals of cut flowers and foliage into Australia, and of historic interception rates have highlighted important considerations of relevance to regulating the biosecurity risk posed by this pathway. It has also highlighted how the revised import conditions have had a positive compliance impact on interception rates in some cases, whilst also identifying pathways that continue to be non-compliant. These findings have led to further revisions in import conditions, including the introduction of import permits for highly non-compliant high-volume pathways on 1 September 2019.

Historic top ten exporting countries and proportions of arthropod interceptions

For readability and completeness, the following section is reproduced from the equivalent section in Part 1 of this PRA (Section 5.2.1 of that document).

Flowers exported from different countries have different interception rates. Table 0.1 shows the top 10 countries exporting to Australia (by number of consignments shipped) and the number of instances of live arthropods intercepted, prior to the revised import conditions being implemented on 1 March 2018. These figures do not record non-compliance.

Table 0.1 Top ten exporting countries and rate of historic live arthropod interceptions

Exporting country	2007 to 2017		2017 only	
	Number of consignments	Interception rate	Number of consignments	Interception rate
Kenya	15,602	40%	2,555	82%
Malaysia	5,797	8%	1,172	18%
Colombia	5,493	21%	699	78%
Singapore (a)	5,265	4%	97	5%
Ecuador	4,871	19%	1,066	47%
Thailand	3,813	10%	373	24%
India	3,174	23%	262	81%
China	2,150	26%	349	81%
Vietnam	1,886	22%	309	54%
New Zealand	1,657	5%	162	15%
The Netherlands (b)	1,008	34%	243	52%
Total	49,708	24%	7,190	59%

Source: ICS data for tariff codes 0603.1 and 0604.2 and departmental interception data.

Note: (a). Singapore is in the top ten countries by number of consignments for 2007–2017 but not in 2017. (b) The Netherlands was not a top ten country by number of consignments in 2007–2017.

Imported consignments from some countries have had notably higher historic interception rates of live arthropods than have other countries. Compared to the 2007–2017 average, interception rates for the 2017 calendar year show increases in the percentage interception rates for all countries. Multiple factors may have contributed to this increase, including a change in the types of flowers in each consignment, as well as an increase in the number of specimens being submitted for identification and therefore recorded in the department's systems. It is important to note that interception rates recorded in earlier years could have been understated, as post-2015 the department had a heightened appreciation of the associated risk after release of the Interim Inspector-General of Biosecurity's report on cut flower imports (Interim Inspector-General of Biosecurity 2015). Accordingly, the 2017 average figures are likely to be a more accurate indication of the approach rate of live arthropods from these sources, and are also relevant in estimating the likelihood that arthropod pests will be associated with this import pathway.

Flower type and proportion of interceptions

As identified in Part 1 of this PRA, different flower types also appear to be correlated with different proportions of interceptions. Part 1 of this PRA showed the average proportion of interceptions for each main flower type individually from 2007 to 2017 (Table 5.2 of that document), with roses having the highest rate of interceptions (45%) and lilies having the lowest (2%).

Part 1 of this PRA provided a more detailed breakdown of interceptions by major flower and foliage type in the form of a 'heatmap'. The department's analysis used ICS and departmental interception data representing the five year time period from 1 January 2015 to 28 February 2019 for the top 19 countries or economies (as mentioned in Section 0) exporting cut flowers and foliage to Australia. Data were prepared by standardising the goods description field in ICS for

each consignment, or for each line of each consignment where more than one type of goods were recorded per consignment.

Further in-depth analysis has been conducted into the relationship between pest type and flower type, including an analysis of the pest families of greater biosecurity concern represented in Part 2 of this PRA. Figure 7 and Figure 8 present the percentage interception rates of a selection of major cut flower and foliage pest families within the Part 2 pest groups that have been recorded on cut flower imports. Figure 7 is an analysis of the 22 months prior to the revised import conditions being implemented, whilst Figure 8 is an analysis of the 22 months after. These heatmaps show the interception rate of individual pest families on each flower type on a scale of 1 to 100% (being represented by a colour scale from pale blue through to dark red respectively). Interception rates of 0% are represented in white. The figures also present the total unique count of each flower or foliage type arriving, where more than 10 consignments of that type were recorded for the time period. The total unique arthropod detections for each family are also presented—that is, where at least one interception of that family occurred, as distinct from the absolute count of pest load per consignment.

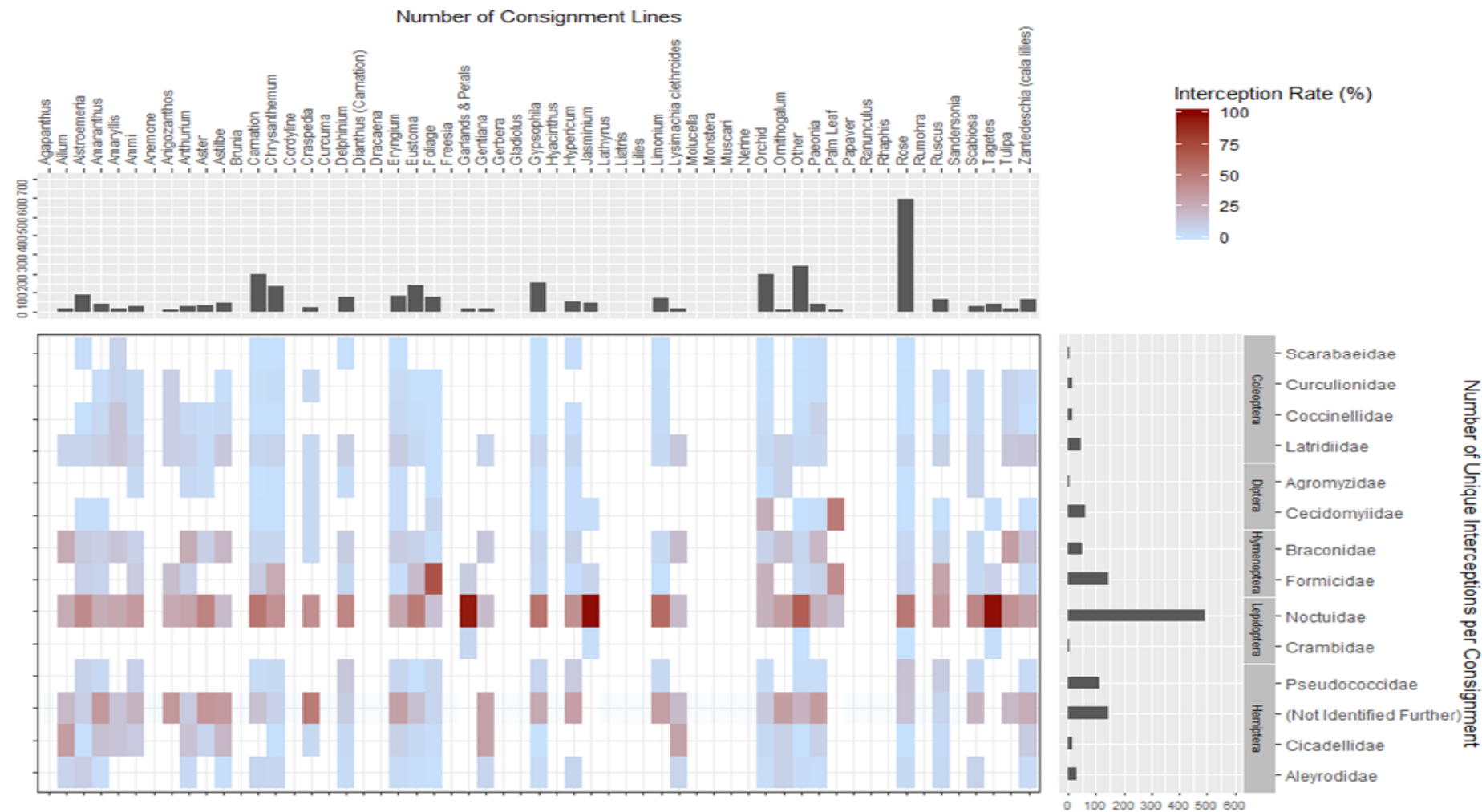
In comparing these two heatmaps (Figure 7 and Figure 8) it can be seen that the revised import conditions have reduced the number of Part 2 pest interceptions. There has also been a reduction in the number of flower types being found with interceptions of Part 2 pests (from 34 flower types to 21 flower types). The Noctuidae family still have the highest interception rate of all the major Part 2 pest families, with noctuid pests found on all the flower types that showed interceptions of the major Part 2 pests.

A similar analysis was conducted to compare the main orders intercepted on the cut flower pathway with the types of flowers on which they were intercepted. This analysis was conducted for the 22 month period prior to the implementation of the revised import conditions (Figure 9) and again for the 22 months after (Figure 10). The right-hand bar graph shows the total number of unique occurrences of each arthropod Order. The reference to Acari relates to all mites, excluding the Suborder Ixodida (ticks) which is separately listed.

In comparing these two heatmaps (Figure 9 and Figure 10) it can be seen that the revised import conditions have reduced the number of arthropod Orders being intercepted (from 23 to 20) as well as the number of flower types they are being intercepted on (from 53 to 44). Part 1 pests (thrips, mites and aphids) are still the predominant pests being intercepted on cut flowers and foliage, however a noticeable drop in the interception rate of thrips and aphids can be seen. The order Acari (excluding Ixodida), is the only Order that has not shown a reduction in interception rate.

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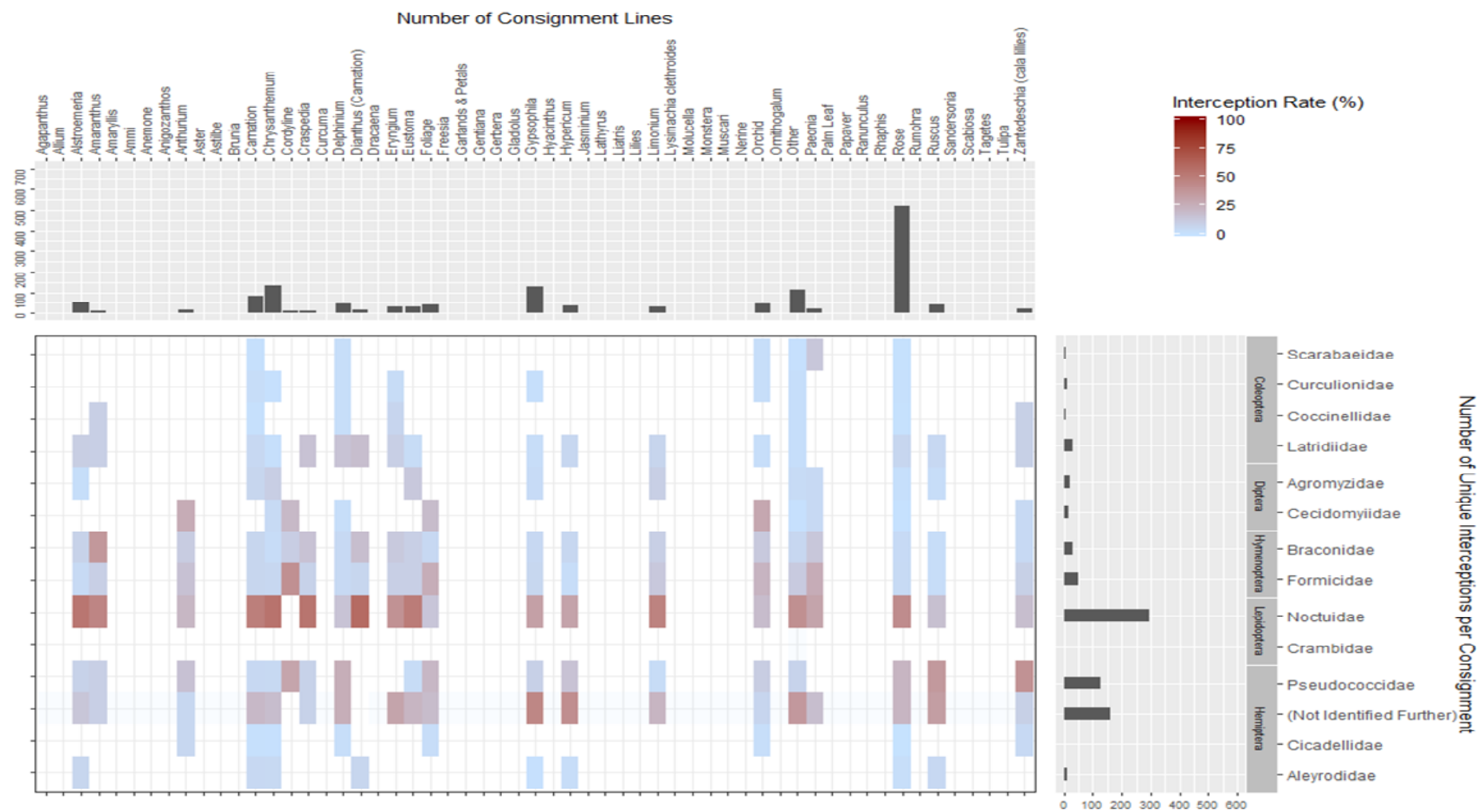
Figure 7 Heatmap of a selection of major Part 2 cut flower and foliage pest families (1 May 2016 to 28 February 2018)



Source: Tariff code data from the Integrated Cargo System (ICS) and departmental interception data.

Note: The upper bar graph shows the number of consignment lines of goods by flower or foliage type. 'Other' denotes consignments that contained more than one flower and/or foliage type and 'Foliage' denotes where no further descriptor for foliage type was recorded.

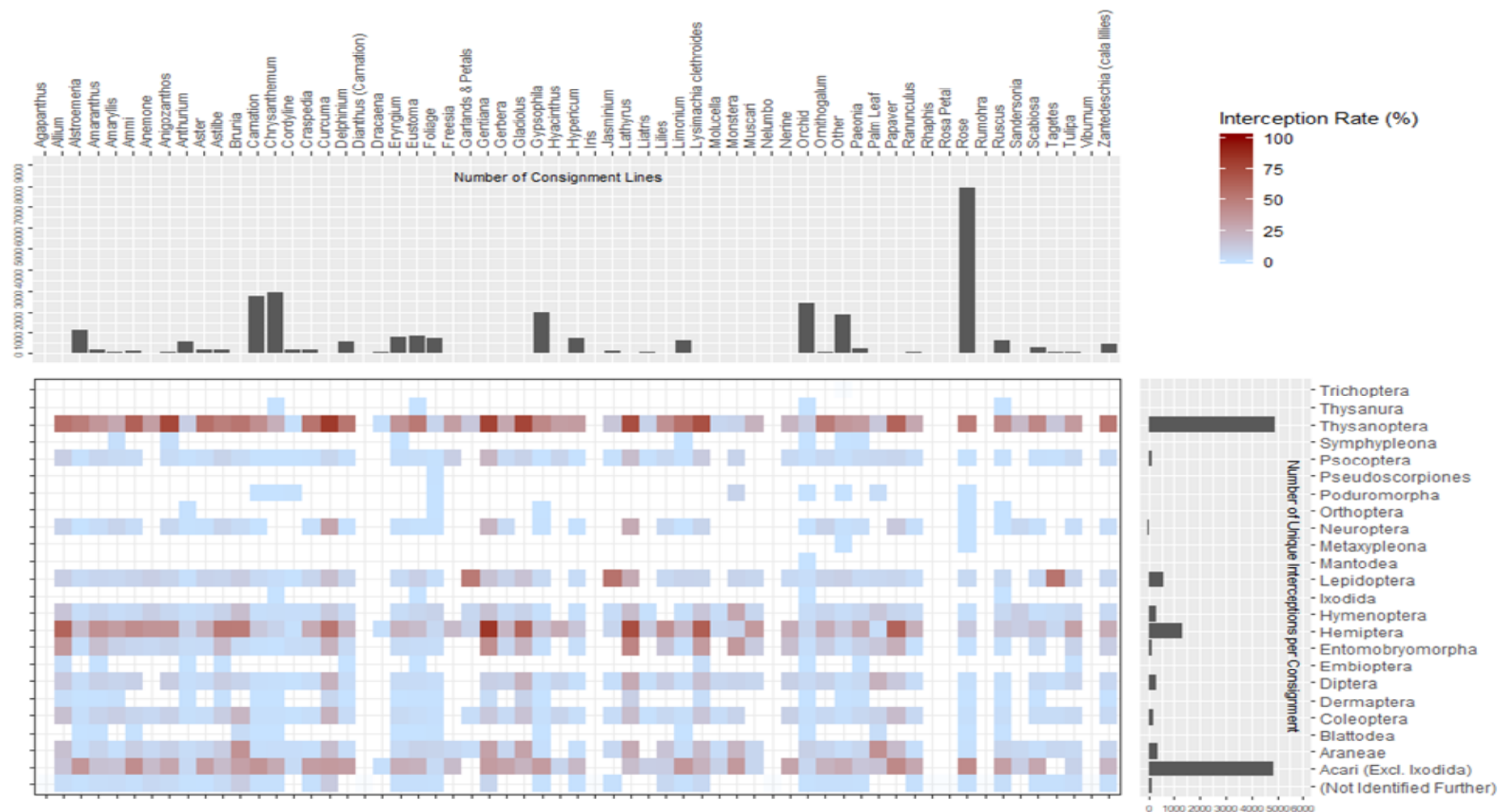
Figure 8 Heatmap of a selection of major Part 2 cut flower and foliage pest families (1 March 2018 to 31 December 2019)



Source: Tariff code data from the Integrated Cargo System (ICS) and departmental interception data.

Note: The upper bar graph shows the number of consignment lines of goods by flower or foliage type. 'Other' denotes consignments that contained more than one flower and/or foliage type and 'Foliage' denotes where no further descriptor for foliage type was recorded.

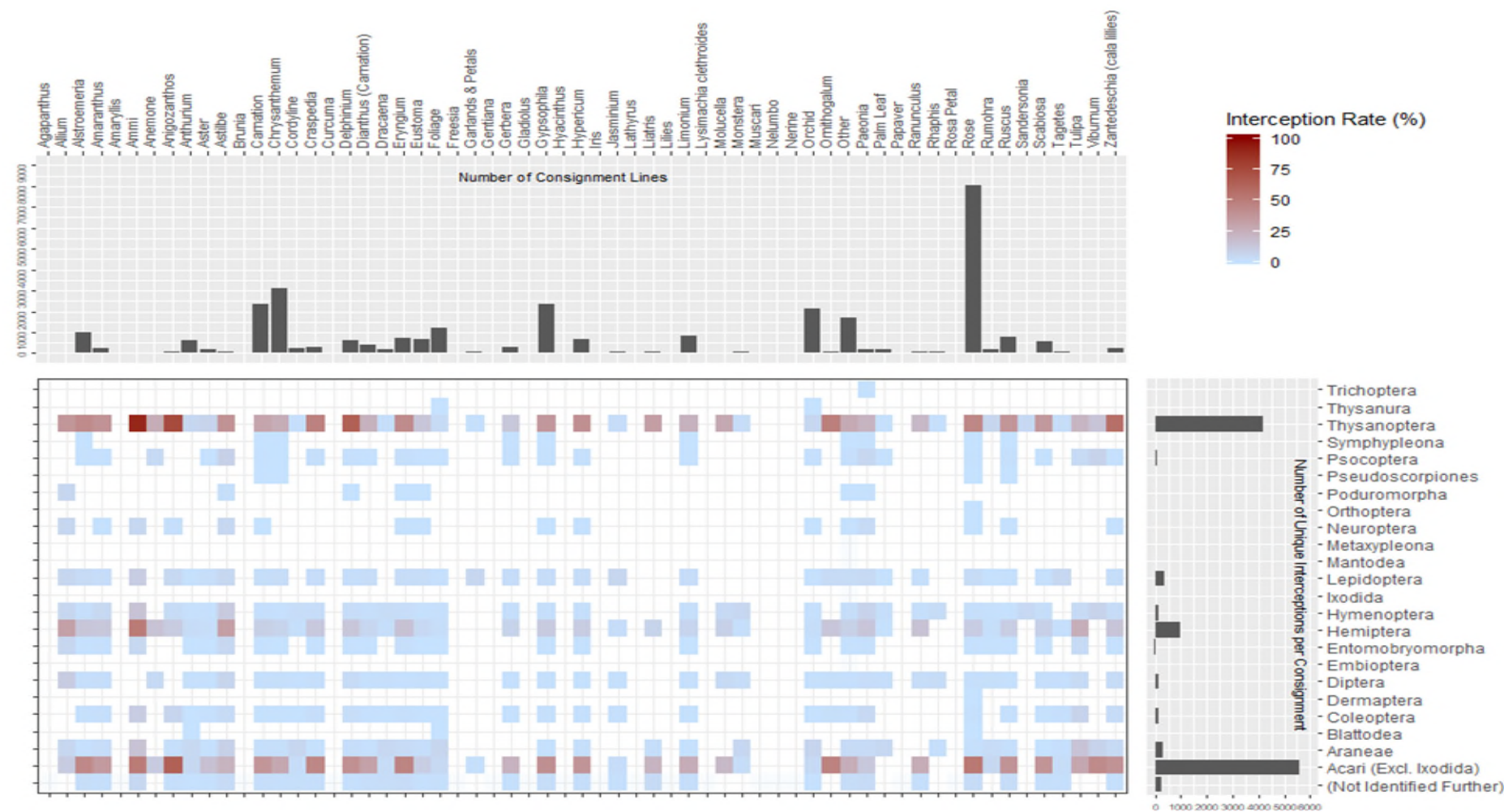
Figure 9 Heatmap of arthropod interceptions recorded against cut flower/foilage type and arthropod groups (1 May 2016 to 28 February 2018)



Source: Tariff code data from the Integrated Cargo System (ICS) and departmental interception data.

Note: The upper bar graph shows the number of consignment lines of goods by flower or foliage type. 'Other' denotes consignments that contained more than one flower and/or foliage type and 'Foliage' denotes where no further descriptor for foliage type was recorded.

Figure 10 Heatmap of arthropod interceptions recorded against cut flower/foilage type and arthropod groups (1 March 2018 to 31 December 2019)



Source: Tariff code data from the Integrated Cargo System (ICS) and departmental interception data.

Note: The upper bar graph shows the number of consignment lines of goods by flower or foliage type. 'Other' denotes consignments that contained more than one flower and/or foliage type and 'Foliage' denotes where no further descriptor for foliage type was recorded.

Types of arthropods intercepted

The analysis of arthropod interceptions conducted in Part 1 of this PRA (for the period 1 January 2000 to 28 February 2018) found that insects were the dominant Class of arthropods recorded. Part 1 also provided a taxonomic breakdown of the three most frequently intercepted groups of arthropods on cut flowers and foliage—thrips, mites and aphids.

Further analysis has been conducted following the implementation of the revised import conditions in order to identify any changes to the trends identified in Part 1 of this PRA, and to assess the interception data for Part 2 pests (Table 0.2).

The data summarised in Table 0.2 are for the time period 1 March 2018 to 31 December 2019, and provide the percentages of all Classes and Orders of arthropods intercepted as a proportion of all interception events. The dataset discussed in Appendix D contains a breakdown to the species level, and provides the percentage of all species intercepted as a proportion of all interception events.

Since the introduction of the revised import conditions, insects continue to be the dominant Class of arthropods intercepted, being 53.5% of all interceptions on the cut flower and foliage pathway. The thrips and aphids also continue to be the most frequently intercepted groups of insects, being 39.7% and 4.6% respectively. The number of interception events of the Class Arachnida has increased, from 30% of all interception events reported in Part 1 of this PRA, to 46% of all interception events in this period, and with the three mite taxa (Trombidiformes, Mesostigmata and Sarcoptiformes) making up 42.3% of the total.

In comparison, the Orders representing the insect taxa being assessed in Part 2 of this PRA are present in a smaller number of interception events, being 0.8% for Coleoptera, 1.1% for Diptera, 2.9% for non-aphid Hemiptera, 1.0% for Hymenoptera, and 2.2% for Lepidoptera.

Table 0.2 Arthropod interceptions (identified to Class and Order)

Class/Order/Family	Percentage of all interception events (a)
Insecta (insects)	53.44%
Thysanoptera (thrips)	39.72%
Hemiptera (true bugs)	7.46%
Aphididae (aphids)	4.61%
Other than Aphididae	2.85%
Lepidoptera (butterflies/moths)	2.20%
Hymenoptera (ants/wasps/bees)	1.04%
Diptera (flies)	1.07%
Coleoptera (beetles)	0.84%
Psocoptera (booklice)	0.63%
(Not identified further)	0.28%
Neuroptera (lacewings)	0.14%
Dermaptera (earwigs)	0.01%
Blattodea (cockroaches)	0.02%
Orthoptera (crickets)	0.01%
Thysanura (silverfish)	0.02%
Embiopoda (web spinners)	0.00%
Mantodea (praying mantis)	0.00%
Odonata (dragonflies)	0.00%
Trichoptera (caddis flies)	0.01%
Arachnida (spiders, scorpions and mites)	45.88%
Trombidiformes (mites)	33.75%
Mesostigmata (mites)	7.80%
Araneae (spiders)	2.29%
Sarcoptiformes (mites)	0.81%
(Not identified further)	1.22%
Pseudoscorpiones (false scorpions)	0.01%
Ixodida (ticks)	0.00%
Collembola (springtails)	0.67%
Entomobryomorpha	0.33%
(Not identified further)	0.30%
Poduromorpha	0.03%
Symphyleona	0.01%
Metaxyleona	0.00%
Chilopoda (centipedes)	0.01%
(Not identified further)	0.01%

Source: Departmental interception data.

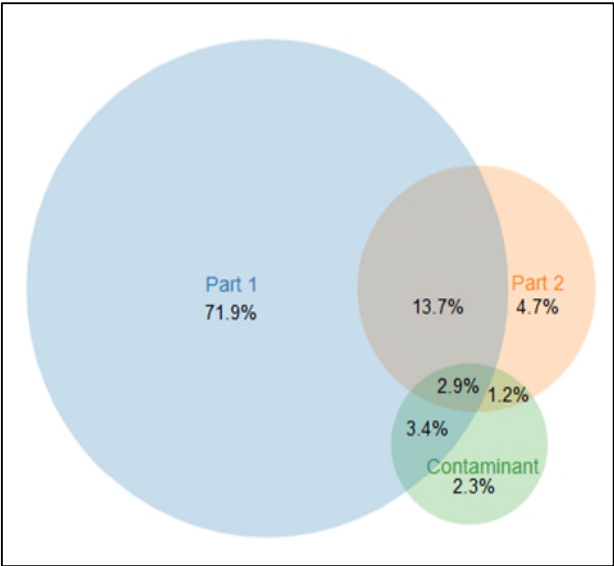
Note: Percentages have been rounded and do not total 100%. (a). Calculated on the basis of interception events recorded by Australia in the 22 months after the implementation of the revised import conditions (1 March 2018 to 31 December 2019).

8.1.1 Analysis of interceptions based on pest type

As identified in Part 1 of this PRA, thrips, mites and aphids (‘Part 1 pests’) are the three most frequently intercepted groups of arthropods on cut flowers and foliage. Further analysis has now been conducted to identify the frequency of interception of Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera (‘Part 2 pests’) as well as all other intercepted pests (classed as contaminants for this pathway, and discussed in more detail in Appendix B). Note that the data presented in this section are for all interception events, and do not reflect non-compliance. For example, these interception data do not reflect the change in quarantine status for *Tetranychus* mites for Colombia, Ecuador and Kenya from 1 September 2019 (as discussed in Section 4.2.1). Non-compliance results are discussed in Section 5.4.

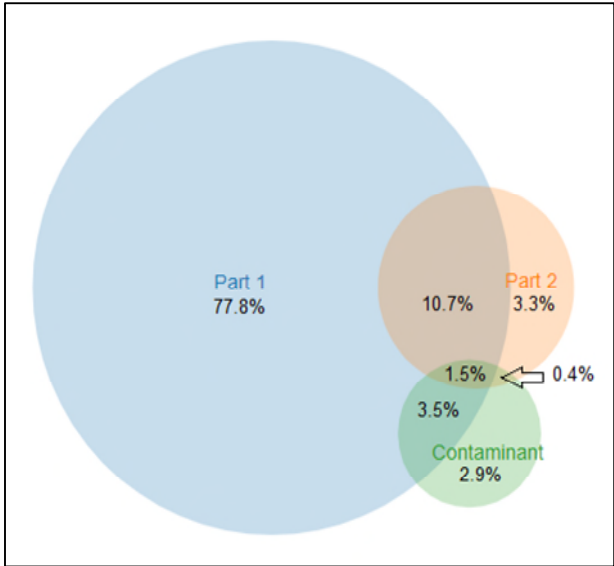
Figure 9 shows the percentage of Part 1, Part 2 and contaminant pests within all consignments that had interceptions, for the 22 months prior to the revised import conditions being implemented, whilst Figure 12 shows the same analysis for the 22 months after the revised import conditions were implemented.

Figure 11 Percentage breakdown of pests for all consignments with interceptions: 1 May 2016 to 28 February 2018



Source: Departmental interception data.

Figure 12 Percentage breakdown of pests for all consignments with interceptions: 1 March 2018 to 31 December 2019



Source: Departmental interception data.

Note: Percentages have been rounded and do not total 100%.

In both analyses, it is evident that there are far fewer consignments in which only Part 2 or contaminant pests are intercepted, and a far greater percentage of consignments that have Part 1 pests intercepted. Prior to the introduction of the revised import conditions (Figure 11), 91.9% of all consignments found to have interceptions contained at least one Part 1 pest, 22.4% contained at least one Part 2 pest, and 9.7% contained at least one contaminant.

Since the implementation of the revised import conditions (Figure 12) there has been a shift in the pest percentages being seen within consignments with interceptions. Figure 10 shows a decrease in consignments with interceptions containing Part 2 pests (22.4% to 15.8%) and contaminants (9.7% to 8.4%), leading to a relative increase in the percentage of consignments with interceptions of Part 1 pests only (91.9% to 93.5%). This decrease in Part 2 and contaminant pests could be attributed to an increased awareness of NPPO's during pre-export inspection of cut flowers and foliage, along with the larger comparative physical sizes of Part 2 pests and contaminants in comparison with smaller sized mites, thrips and aphids.

Non-compliance with revised import conditions, post 1 March 2018

As identified in Section 0, imported consignments from some countries had notably higher historic interception rates of live arthropods than other countries. Table 0.1 in that section compares the 2007–2017 average interception rates with the 2017 calendar year interception rate, which showed that interception rates were increasing for all countries. This was attributed to a change in the types of flowers in each consignment, as well as an increase in the number of specimens being submitted for identification and therefore recorded in the department's systems.

The department has continued to conduct verification and inspection processes on arriving consignments of cut flowers and foliage, and has reported instances of non-compliance to exporting countries and Australian importers. Also, the implementation of import permits for highly non-compliant and high-volume countries commenced on 1 September 2019, as did the change in quarantine status, from quarantine to non-quarantine, for *Tetranychus* mites from Colombia, Ecuador and Kenya (see Section 4.2.1 for more detail). The following section is an analysis of the department's records of non-compliance with import conditions. The data presented in this section have been de-identified due to trade sensitivities.

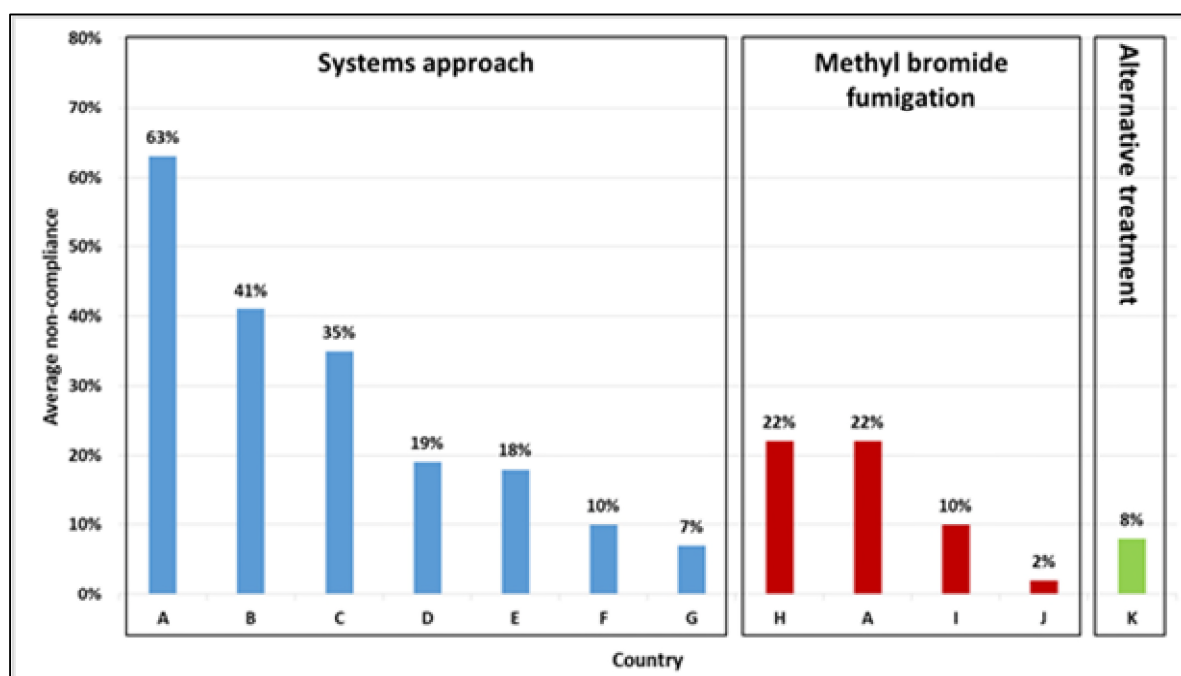
8.1.2 Revised import conditions and compliance

Since 1 March 2018, revised import conditions have specified that countries must use one of three arthropod pest management options for exporting cut flowers and foliage to Australia: an NPPO-approved systems approach, pre-export methyl bromide fumigation, or an NPPO-approved alternative pre-export disinfestation treatment. As a response to countries that were not able to reduce their live pest interception rate with these pre-shipment measures, import permits were implemented on 1 September 2019.

From 1 September 2019, importers intending to source flowers and foliage from Colombia, Ecuador and Kenya were required to obtain an import permit prior to importing. An import permit is not itself a pest management option, and importers needed to provide details of the supply chain management system to be used. Some importers elected to use a combination of pest management options for each permit, for example, a permit could encompass flowers produced under a systems approach with the addition of end-point fumigation.

In order to assess the effectiveness of these different approaches, the following analysis differentiates between different treatment options. Figure 13 presents data for the five month period during which the first import permits were in effect, from 1 September 2019 to 31 January 2020. The figure shows the average rate of non-compliance of consignments arriving from 14 countries. Currently, most countries are certifying exports to Australia under the systems approach option. Import permits are not specifically identified in this figure, as the permits are a regulatory, rather than a phytosanitary, measure.

Figure 13 Consignment non-compliance by import measure: September 2019 to January 2020



Source: Departmental interception data.

Note: Each bar represents one country. Country A is represented twice, as consignments were certified under two measures—the systems approach and methyl bromide fumigation.

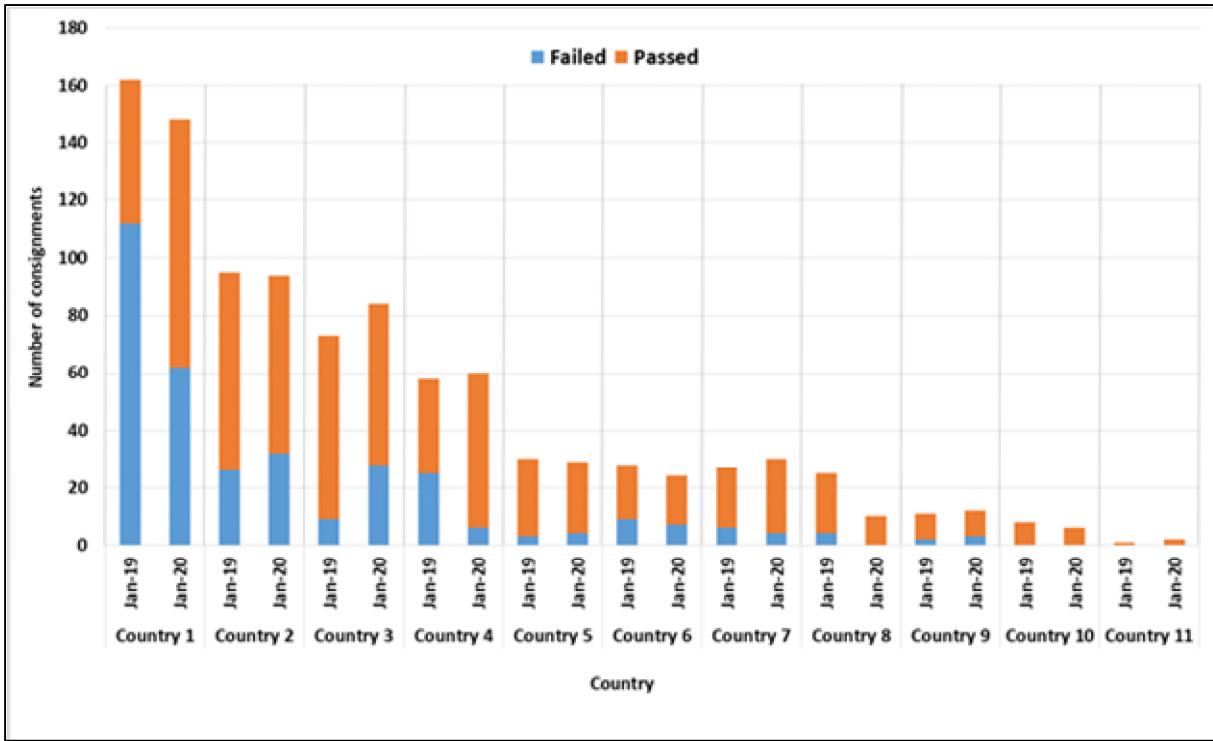
In comparison with the historic interception rates presented in Table 0.1, these data show that the revised import conditions have resulted in an overall decrease in the rates of arrival of live pests. In comparison with the analysis of interception data presented in Part 1 of this PRA (Figure 6 of that document, detailing data from March 2018 to April 2019, and using the data from the same 11 countries), these data show additional improvements in the non-compliance percentage rates. This trend has continued in recent months.

Similar to the findings in Part 1 of this PRA, Figure 13 shows that some treatment types have a better compliance rate than others (particularly methyl bromide), but that some countries continue to have greater success using the systems approach option than do others. The data in Figure 13 also show that the measures, if implemented correctly, can reduce the approach rate of those pests.

Another important consideration in determining the department's approach to non-compliance is the volume (as differentiated from the percentage) of non-compliant consignments from each country. Figure 14 presents data for 11 countries, for the months of January 2019 and January 2020. These data represent the numbers of consignments that were non-compliant due to interceptions of live arthropod pests, and also show the number of compliant consignments. The

same month, one year apart, has been shown in order to provide a direct comparison and to take into account any seasonal effect on pest load.

Figure 14 Consignment non-compliance by country: January 2019 and January 2020



Source: Departmental non-compliance data.

Figure 12 shows that the revised import measures have had a varying effect on non-compliance volumes. Several countries, notably country 1 and country 4, had a decrease in non-compliant consignments. For the same period, results for some other countries have not improved, examples being country 2 and country 3.

In addition, Figure 12 also shows the marked differences in volumes of consignments across trading partners. The department has already introduced an additional regulatory tool, in the form of import permits, applicable to countries that exhibited high non-compliance and high export volumes. As the volume of non-compliant consignments increases, the likelihood of entry of pests of biosecurity concern also increases. This is an important factor in the department’s determination of implementing import permits, as an additional regulatory tool, for countries that exhibited high non-compliance percentages and high volumes of trade.

All arriving consignments are subject to border procedures, and if live arthropods of biosecurity concern are detected, the consignment is either fumigated (where appropriate) prior to release, or exported or destroyed. The department continues to verify incoming consignments, monitor compliance rates, and report these to trading partners and importers. Where non-compliance results have not improved, or become worse, and the trade volume is high, the department is in discussion about further steps that can be made to improve compliance.

The actions being taken by the department in response to continued high levels of non-compliance are discussed in Section 7.1.1.

Chapter conclusion

The patterns of global cut flower and foliage trade as they relate to Australia have changed. In the recent past, changes have encompassed a combination of increased import volumes, different countries of origin, and a high arrival rate of live arthropods in Australia. All of these factors contribute to a change in biosecurity risk associated with this importation pathway, and have led to the department's decision to revise import conditions and conduct this PRA. Analysis of departmental interception data confirms the association of arthropods with the cut flower and foliage pathway, and also identifies the prevalence of different pest groups arriving with the commodity.

The analysis of interception data after 1 September 2019 is also important, because it shows that the revised import conditions are having an intended effect in some instances, that is, reducing the arrival rate of live pests of biosecurity concern on this pathway. The implementation of import permits has continued to reduce the arrival rate of these pests, and the department will continue to liaise with trading partners to maintain this improvement.

Glossary

Term or abbreviation	Definition
Additional declaration	A statement that is required by an importing country to be entered on a Phytosanitary Certificate and which provides specific additional information on a consignment in relation to regulated pests or regulated articles (FAO 2019b).
Approach rate	Proportion of units that are not compliant with import conditions.
Appropriate level of protection (ALOP)	The level of protection deemed appropriate by the Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory (WTO 1995b).
Appropriate level of protection (ALOP) for Australia	The <i>Biosecurity Act 2015</i> defines the appropriate level of protection (or ALOP) for Australia as a high level of sanitary and phytosanitary protection aimed at reducing biosecurity risks to very low, but not to zero.
Arboreal	Organism that lives in trees.
Area	An officially defined country, part of a country or all or parts of several countries (FAO 2019b).
Arthropod	The largest phylum of animals, including the insects, arachnids and crustaceans.
Asexual reproduction	The development of new individual from a single cell or group of cells in the absence of meiosis.
Australian territory	Australian territory as referenced in the <i>Biosecurity Act 2015</i> refers to Australia, Christmas Island and Cocos (Keeling) Islands.
Biological control agents (BCAs)	A biological control agent is an organism, such as an insect or plant disease, that is used to control a pest species. Before a biological control agent is released into the Australian environment, it must be established, via risk analysis, that the risk associated with its release, including host specificity, achieves the appropriate level of protection (ALOP) for Australia.
Biosecurity	The prevention of the entry, establishment or spread of unwanted pests and infectious disease agents to protect human, animal or plant health or life, and the environment.
Biosecurity measures	The <i>Biosecurity Act 2015</i> defines biosecurity measures as measures to manage any of the following: biosecurity risk, the risk of contagion of a listed human disease, the risk of listed human diseases entering, emerging, establishing themselves or spreading in Australian territory, and biosecurity emergencies and human biosecurity emergencies.
Biosecurity import risk analysis (BIRA)	The <i>Biosecurity Act 2015</i> defines a BIRA as an evaluation of the level of biosecurity risk associated with particular goods, or a particular class of goods, that may be imported, or proposed to be imported, into Australian territory, including, if necessary, the identification of conditions that must be met to manage the level of biosecurity risk associated with the goods, or the class of goods, to a level that achieves the ALOP for Australia. The risk analysis process is regulated under legislation.
Biosecurity risk	The <i>Biosecurity Act 2015</i> refers to biosecurity risk as the likelihood of a disease or pest entering, establishing or spreading in Australian territory, and the potential for the disease or pest causing harm to human, animal or plant health, the environment, economic or community activities.
Bulbils	A tiny secondary bulb that forms in the angle between a leaf and stem or in place of flowers on certain plants.

Term or abbreviation	Definition
Consignment	A quantity of plants, plant products or other articles being moved from one country to another and covered, when required, by a single Phytosanitary Certificate (a consignment may be composed of one or more commodities or lots) (FAO 2019b).
Contaminating pest	A pest that is carried by a commodity, packaging, conveyance or container, or present in a storage place and that, in the case of plants and plant products, does not infest them (FAO 2019b).
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO 2019b).
Corrective action plan	Documented plan of phytosanitary actions to be implemented in an area officially delimited for phytosanitary purposes if a pest is detected or a tolerance level is exceeded or in the case of faulty implementation of officially established procedures (FAO 2019b).
Cut flowers and branches	Fresh parts of plants intended for decorative use and not for planting (FAO 2019b).
Devitalisation	A procedure rendering plants or plant products incapable of germination, growth or further reproduction (FAO 2019b).
Diapause	Period of suspended development/growth occurring in some insects, in which metabolism is decreased.
Endangered area	An area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss (FAO 2019b).
Endemic	Belonging to, native to, or prevalent in a particular geography, area or environment.
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO 2019b).
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO 2019b).
Fresh	Living; not dried, deep-frozen or otherwise conserved (FAO 2019b).
Fumigation	A method of pest control that completely fills an area with gaseous pesticides to suffocate or poison the pests within.
Fungivore	An animal that gets its energy from eating fungi.
Genus	A taxonomic category ranking below a family and above a species and generally consisting of a group of species exhibiting similar characteristics. In taxonomic nomenclature the genus name is used, either alone or followed by a Latin adjective or epithet, to form the name of a species.
Goods	The <i>Biosecurity Act 2015</i> defines goods as an animal, a plant (whether moveable or not), a sample or specimen of a disease agent, a pest, mail or any other article, substance or thing (including, but not limited to, any kind of moveable property).
Herbivore	An animal that gets its energy from eating plants.
Host	An organism that harbours a parasite, mutual partner, or commensal partner, typically providing nourishment and shelter.
Host range	Species capable, under natural conditions, of sustaining a specific pest or other organism (FAO 2019b).
Import permit	Official document authorising importation of a commodity in accordance with specified phytosanitary import requirements (FAO 2019b).

Term or abbreviation	Definition
Incursion	An isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future (FAO 2019b).
Infection	The internal ‘endophytic’ colonisation of a plant, or plant organ, and is generally associated with the development of disease symptoms as the integrity of cells and/or biological processes are disrupted.
Infestation (of a commodity)	Presence in a commodity of a living pest of the plant or plant product concerned. Infestation includes infection (FAO 2019b).
Inspection	Official visual examination of plants, plant products or other regulated articles to determine if pests are present or to determine compliance with phytosanitary regulations (FAO 2019b).
Intended use	Declared purpose for which plants, plant products, or other regulated articles are imported, produced or used (FAO 2019b).
Interception (of a pest)	The detection of a pest during inspection or testing of an imported consignment (FAO 2019b).
International Plant Protection Convention (IPPC)	The IPPC is an international plant health agreement, established in 1952, that aims to protect cultivated and wild plants by preventing the introduction and spread of pests. The IPPC provides an international framework for plant protection that includes developing International Standards for Phytosanitary Measures (ISPMs) for safeguarding plant resources.
International Standard for Phytosanitary Measures (ISPM)	An international standard adopted by the Conference of the Food and Agriculture Organization, the Interim Commission on Phytosanitary Measures or the Commission on Phytosanitary Measures, established under the IPPC (FAO 2019b).
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO 2019b).
Larva	A juvenile form of animal with indirect development, undergoing metamorphosis (for example, insects or amphibians).
Lot	A number of units of a single commodity, identifiable by its homogeneity of composition, origin et cetera, forming part of a consignment (FAO 2019b).
National Plant Protection Organization (NPPO)	Official service established by a government to discharge the functions specified by the IPPC (FAO 2019b).
Natural enemy	An organism which lives at the expense of another organism in its area of origin and which may help to limit the population of that organism. This includes parasitoids, parasites, predators, phytophagous organisms and pathogens (FAO 2019b).
Non-regulated risk analysis	Refers to the process for conducting a risk analysis that is not regulated under legislation (Biosecurity import risk analysis guidelines 2016).
Obligate predator	An animal that can only survive by eating other animals.
Official control	The active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests (FAO 2019b).
Parasite	An organism which lives on or in a larger organism, feeding upon it (FAO 2019b).
Parasitoid	An insect parasitic only in its immature stages, killing its host in the process of its development, and free living as an adult (FAO 2019b).
Parthenogenetic	A form of asexual reproduction where offspring are produced without fertilization.
Pathogen	A biological agent that can cause disease to its host.

Term or abbreviation	Definition
Pathway	Any means that allows the entry or spread of a pest (FAO 2019b).
Pest	Any species, strain or biotype of plant, animal, or pathogenic agent injurious to plants or plant products (FAO 2019b).
Pest categorisation	The process for determining whether a pest has or has not the characteristics of a quarantine pest or those of a regulated non-quarantine pest (FAO 2019b).
Pest free area (PFA)	An area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained (FAO 2019b).
Pest free place of production	Place of production in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained for a defined period (FAO 2019b).
Pest free production site	A production site in which a specific pest is absent, as demonstrated by scientific evidence, and in which, where appropriate, this condition is being officially maintained for a defined period (FAO 2019b).
Pest risk analysis (PRA)	The process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it (FAO 2019b).
Pest risk assessment (for quarantine pests)	Evaluation of the probability of the introduction and spread of a pest and of the magnitude of the associated potential economic consequences (FAO 2019b).
Pest risk assessment (for regulated non-quarantine pests)	Evaluation of the probability that a pest in plants for planting affects the intended use of those plants with an economically unacceptable impact (FAO 2019b).
Pest of biosecurity concern (for Australia)	Pests of biosecurity concern (for Australia) include quarantine pests, regulated articles, potential regulated articles and contaminating pests.
Pest risk management (for quarantine pests)	Evaluation and selection of options to reduce the risk of introduction and spread of a pest (FAO 2019b).
Pest risk management (for regulated non-quarantine pests)	Evaluation and selection of options to reduce the risk that a pest in plants for planting causes an economically unacceptable impact on the intended use of those plants (FAO 2019b).
Pest status (in an area)	Presence or absence, at the present time, of a pest in an area, including where appropriate its distribution, as officially determined using expert judgement on the basis of current and historical pest records and other information (FAO 2019b).
Petal	A unit of the corolla or inner floral envelope of a flower, usually coloured and more or less showy.
Phytosanitary	Phytosanitary relates to the health of plants.
Phytosanitary Certificate	An official paper document or its official electronic equivalent, consistent with the model of certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements (FAO 2019b).
Phytosanitary certification	Use of phytosanitary procedures leading to the issue of a Phytosanitary Certificate (FAO 2019b).
Phytosanitary measure	Any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO 2019b). In this risk analysis the term 'phytosanitary measure' and 'risk management measure' may be used interchangeably.

Term or abbreviation	Definition
Phytosanitary procedure	Any official method for implementing phytosanitary measures including the performance of inspections, tests, surveillance or treatments in connection with regulated pest (FAO 2019b).
Phytosanitary regulation	Official rule to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests, including establishment of procedures for phytosanitary certification (FAO 2019b).
Polyphagous	Feeding on a relatively large number of hosts from different plant family and/or genera.
Potential regulated article	A pest which has not undergone a formal risk assessment to confirm the regulatory status of the pests that it can vector. However, there is significant scientific evidence to support its regulation at the border due to the associated biosecurity risk.
PRA area	Area in relation to which a pest risk analysis is conducted (FAO 2019b).
Predator	A natural enemy that preys and feeds on other animal organisms, more than one of which are killed during its lifetime (FAO 2019b).
Production site	In this report, a production site is a continuous planting of cut flowers and foliage treated as a single unit for pest management purposes. If a production area is subdivided into one or more units for pest management purposes, then each unit is a production site. If the production area is not subdivided, then the area is also the production site.
Propagatable	Plants that can be propagated.
Phytophagous	Plant-feeding.
Pupa	An inactive life stage that only occurs in insects that undergo complete metamorphosis, for example moths and butterflies (Lepidoptera), beetles (Coleoptera) and bees, wasps and ants (Hymenoptera).
Quarantine	Official confinement of regulated articles, pests or beneficial organisms for inspection, testing, treatment, observation or research (FAO 2019b).
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO 2019b).
Regulated article	Any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harbouring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved (FAO 2019b).
Regulated non-quarantine pest	A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (FAO 2019b).
Regulated pest	A quarantine pest or a regulated non-quarantine pest (FAO 2019b).
Restricted risk	Restricted risk is the risk estimate when risk management measures are applied.
Risk analysis	Refers to the technical or scientific process for assessing the level of biosecurity risk associated with the goods, or the class of goods, and if necessary, the identification of conditions that must be met to manage the level of biosecurity risk associated with the goods, or class of goods to a level that achieves the ALOP for Australia.
Risk management measure	Are conditions that must be met to manage the level of biosecurity risk associated with the goods or the class of goods, to a level that achieves the ALOP for

Term or abbreviation	Definition
	Australia. In this risk analysis, the term ‘risk management measure’ and ‘phytosanitary measure’ may be used interchangeably.
Saprophyte	An organism deriving its nourishment from dead organic matter.
Spread (of a pest)	Expansion of the geographical distribution of a pest within an area (FAO 2019b).
SPS Agreement	WTO Agreement on the Application of Sanitary and Phytosanitary Measures.
Stakeholders	Government agencies, individuals, community or industry groups or organizations, whether in Australia or overseas, including the proponent/applicant for a specific proposal, who have an interest in the policy issues.
Stylet	Modified insect mouthparts for piercing.
Surveillance	An official process which collects and records data on pest occurrence or absence by surveying, monitoring or other procedures (FAO 2019b).
Systems approach(es)	A pest risk management option that integrates different measures, at least two of which act independently, with cumulative effect (FAO 2019b).
Taxon/taxa	Unit used in the science of biological classification.
The department	The Australian Government Department of Agriculture, Water and the Environment.
Trash	Soil, splinters, twigs, leaves and other plant material, other than fruit as defined in the scope of this risk analysis. For example, stem and leaf material, seeds, soil, animal matter/parts or other extraneous material.
Treatment	Official procedure for the killing, inactivation or removal of pests, or for rendering pests infertile or for devitalisation (FAO 2019b).
Unrestricted risk	Unrestricted risk estimates apply in the absence of risk management measures.
Vector	An organism that does not cause disease itself, but which causes infection by conveying pathogens from one host to another.
Verification visit	Visit to verify production system.
Viable	Alive, able to germinate or capable of growth.

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