Department
for Environment
Food & Rural Affairs

Rapid Pest Risk Analysis (PRA) for:

Malacosoma parallela

December 2014

Stage 1: Initiation

1. What is the name of the pest?

Malacosoma parallela (Staudinger) (Lepidoptera, Lasiocampidae). Mountain ring silk moth.

Due to past confusion over the correct gender, the species name may be written in the masculine by some authors: *Malacosoma parallelum*. There is one recently described subspecies, *Malacosoma parallela iranica*, based on specimens from Iran (including the mountains along the Iran-Turkmenistan border) (Zolotuhin & Zahiri 2008). As this subspecies was described so recently, there is little information on it available, and its wider distribution is unknown. Therefore, this PRA considers *M. parallela* as a whole without distinguishing between the subspecies.

2. What initiated this rapid PRA?

Following the development of Phase I of the UK Pest Risk Register in summer and autumn 2013 (available at https://secure.fera.defra.gov.uk/phiw/riskRegister/), this species was identified as a priority to evaluate the EPPO (2001) PRA specifically for the UK, particularly with regard to assessing the pathways that pose a threat to the UK.

3. What is the PRA area?

The PRA area is the United Kingdom of Great Britain and Northern Ireland.

Stage 2: Risk Assessment

4. What is the pest's status in the EC Plant Health Directive (Council Directive 2000/29/EC[1]) and in the lists of EPPO[2]?

Malacosoma parallela is not listed in the EC Plant Health Directive, but it is recommended for regulation as a quarantine pest by EPPO, and is accordingly on the EPPO A2 list.

5. What is the pest's current geographical distribution?

This moth is found in western and central parts of Asia, usually at altitudes greater than 1600 m, though it has been recorded from a wide range of altitudes, between 130 and 3000 m (Zolotuhin & Didmanidze 2009). It is also found in the Caucasus in the southern part of European Russia. *Malacosoma parallela* is not present in any EU country.

Table 1: Distribution of *Malacosoma parallela*

North America:	No records
Central America:	No records
South America:	No records
Europe[3]:	Southern European Russia (Caucasus including Dagestan) and Georgia
Africa:	No records
Asia:	Found in the Asian part of Turkey, through Asia Minor and Central Asia, as far east as the north-west of China.
Oceania:	No records

Specific country records are as follows (listed approximately West to East):

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000L0029:20100113:EN:PDF
[2] https://www.eppo.int/QUARANTINE/quarantine.htm
[3] Europe as defined in the Plant Health (England) (Amendment) Order 2006: http://www.legislation.gov.uk/uksi/2006/2307/article/2/made

Turkey (Dubatolov 1999), where it has been recorded from the provinces of Ağri, Erzincan, Erzurum, Kars and Sivas (Koçak & Kemal 2006), which are all in the eastern (Asian) part of Turkey; European Russia (Caucasus including Dagestan) (Dubatolov & Zolotuhin 1992, Zolotuhin & Didmanidze 2009); Georgia (Didmanidze 2008, Dubatolov & Zolotuhin 1992); Armenia (Didmanidze 2008, Mirzoyan & Markaryan 1979); Iran (Mohammadian 2006, Zolotuhin & Zahiri 2008); Afghanistan (as *Malacosoma paralellum*) (Koçak & Kemal 2012); Turkmenistan, Uzbekistan, Kazakhstan, Kyrgyzstan (Dubatolov 1999); Tajikistan (Makhmadzieev 1989); China (Xinjiang Province) (Yang & Wang 1995, Yang *et al.* 2005). Additionally, there is apparently at least one record from Syria, but the source for this is unknown (both the CABI (2004) map and EPPO (2014) reference each other, but no original data source could be found).

The presence of this species in Azerbaijan (as reported by Didmanidze 2008, Dubatolov & Zolotuhin 1992) was declared to be invalid by the NPPO of Azerbaijan (EPPO 2014).

6. Is the pest established or transient, or suspected to be established/transient in the UK/PRA Area?

Malacosoma parallela has never been recorded in the UK, either as an interception or outbreak.

There are, however, two native species of *Malacosoma* present in the UK with which *M. parallela* could potentially be confused as all three species have broadly similar wing patterns, and all are intraspecifically quite variable in the shade of brownish colouration. *Malacosoma neustria* (lackey moth) is widespread in England and Wales, while *M. castrensis* (ground lackey) is restricted to the south of England. Both species are also present through much of Europe and central Asia.

7. What are the pest's natural and experimental host plants; of these, which are of economic and/or environmental importance in the UK/PRA area?

Malacosoma parallela is highly polyphagous on deciduous trees and shrubs. The species listed below are those that are either severely attacked and/or considered to be of greatest significance to the UK. More comprehensive host lists are given in the datasheet by EPPO (2005) and in Zolotuhin and Didmanidze (2009), from which much of the following information has been drawn.

High levels of damage are seen on *Quercus* spp. (as well as species of oak native to the moth's existing range, it also attacks *Q. robur* (English, or common oak)), *Prunus dulcis* (almond) and *Malus* spp. including *M. domestica* (orchard apple) (EPPO 2005). It is reported as a pest of the leaves of *Juglans* (walnut) in Central Asia by Ashimov (2010), and Yang *et al.* (2005) name *M. parallela* as one of nineteen serious pests of apricot in north-west China.

Other hosts commonly grown in the UK (either in gardens or the wider environment), and which have had significant damage recorded, include *Cydonia oblonga* (quince), *Prunus avium* (gean tree or wild cherry), *P. padus* (bird cherry) and *Pyrus communis* (pear) (EPPO 2005). Several species of *Cotoneaster*, *Crataegus* (hawthorns), *Rosa* (roses), *Salix* (willows) and *Sorbus* (rowan) are hosts (EPPO 2005), and, although none of the exact species listed are widespread in the UK, UK species in these genera could well be vulnerable given the polyphagous nature of the pest. Additionally, Zolotuhin and Didmanidze (2009) list host genera including *Fraxinus* (ash), *Lonicera* (honeysuckle), *Ribes* (currants) and *Vitis* (grapevines).

8. What pathways provide opportunities for the pest to enter and transfer to a suitable host and what is the likelihood of entering the UK/PRA area?

Plants for planting

Deciduous trees and shrubs are often moved in winter, when dormant. The overwintering life stage of *M. parallela* is eggs that the moth glues in a large cylindrical mass around twigs, this mass usually containing between 100 and 500 eggs (Sangov 2011). The egg mass is initially white, but darkens over time (Ashimov 2010). As these egg masses are relatively conspicuous, it seems likely that they would be detected during either pre- or post- entry inspections, though if the tree was very large this would be more difficult. As the species is univoltine, other immature life stages are only present for a relatively short period in spring and summer, and thus only hosts moved during this time could have larvae and pupae associated with them. Larvae live in communal silken nests until the penultimate or final instar (EPPO 2005), and even small nests will be very conspicuous. Final instar larvae (living singly) and pupae in cocoons could also be transported, but both are relatively large with lengths of more than 40 mm for the larvae and over 15 mm for the pupae (EPPO 2005). Pupae may be spun into cocoons in leaves (e.g., figure 3 in EPPO 2005), and thus may be the life stage least likely to be detected on this pathway, but the pupal period is very short, with a maximum observed duration of 16 days (Li 1989), and thus, with only one generation per year, there will only be a limited period in which pupae are present and could be associated with the plants. Currently, the UK imports very few live non-coniferous trees from the native range, with EUROSTAT only showing a small number of fruit or nut-bearing trees imported from China during the period 2004-2013 (data extracted October 2014). As *M. parallela* is only present in one region of China, the number of trees from this region will be lower still. Overall, larvae and pupae are also considered to be relatively easy to detect, unless the trees are semi-mature and too large to examine fully. Movement on this pathway is therefore considered unlikely, but this assessment is only made with medium confidence as, in Europe, this pest is present in the Caucasus, and trees from this area are not subject to the same levels of control and inspection as non-European trees.

Cut branches

Cut branches are considered to be a very unlikely pathway. This species is only known to feed on deciduous tree species, and cut branches from deciduous trees will not usually be transported while dormant and leafless. Therefore, there would seem to be only a limited opportunity for overwintering egg masses (the most cryptic life stage) to be moved on this pathway. For cut branches imported with leaves, the factors influencing detection for larval tents, large larvae and pupae will be similar to those covered under plants for planting. If any live larvae were able to enter the UK on cut branches, it is likely that they would need to find a new host to complete development. Pupae could probably complete development to adults on the imported foliage, but at least one male and female moth would need to emerge and find one another to mate, though it would then seem likely that the mated female could locate suitable hosts for egg-laying. EUROSTAT does not record any UK imports of foliage and cut branches from countries where *M. parallela* is present between 2004 and 2013 (data extracted October 2014). Overall, this pathway is considered to be very unlikely, with high confidence.

Bark (including wood with bark)

It is considered very unlikely that egg masses will be associated with bark and wood with bark, as the available literature indicates that the female moth lays eggs around thin twigs and not on thicker branches (e.g., Ashimov 2010, Il'insky 1962). Therefore, the likelihood of eggs being associated with this pathway is considered to be very low. Pupae in cocoons could be associated with bark, but since the pupal stage lasts less than two weeks on average (Li 1989), the pupae will only be present for a very short period in the year. Therefore, the likelihood of pupal association with bark (over the course of a year) is also considered to be very low. The UK does import some deciduous wood in the rough (i.e., relevant subcategories of the CN (customs) code 4403) from countries in the native range of this moth, including oak from China and other deciduous wood from both China and Russia (EUROSTAT, data extracted September 2014). Again, *M. parallela* is only present in parts of both China and Russia, and thus would only be associated with a subset of imports from these countries. The UK also imports wood stakes, split poles, etc. from China, Russia and a very small amount from Kyrgyzstan (EUROSTAT, data extracted September 2014). Only the wood of selected deciduous tree genera is covered by legislation and due to this pest’s wide host range, there is a possibility that the wood of unlisted hosts, imported as stakes, etc. could have bark, and thus there is a very small risk they could be carrying the pest. Overall, this pathway is considered very unlikely with medium confidence.

Natural spread

Though some species of *Malacosoma* are known to move long distances, e.g. adults of the North American species *M. disstria* have been shown to disperse in excess of 300 miles (Brown 1965), *M. parallela* is considered very unlikely (with high confidence) to reach the UK by natural spread from its current distribution, though data on how far this species is capable of spreading are lacking. However, if *M. parallela* were to spread into

western parts of Mediterranean Europe, there is a possibility that natural spread could provide a means of introduction to the UK.

Plants for planting	Very unlikely	☐	Unlikely	☑	Moderately likely	☐	Likely	☐	Very likely ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			

Cut branches	Very unlikely	☑	Unlikely	☐	Moderately likely	☐	Likely	☐	Very likely ☐
Confidence	High Confidence	☑	Medium Confidence	☐	Low Confidence	☐			

Bark and wood with bark	Very unlikely	☑	Unlikely	☐	Moderately likely	☐	Likely	☐	Very likely ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			

Natural spread	Very unlikely	☑	Unlikely	☐	Moderately likely	☐	Likely	☐	Very likely ☐
Confidence	High Confidence	☑	Medium Confidence	☐	Low Confidence	☐			

9. How likely is the pest to establish outdoors or under protection in the UK/PRA area?

Suitable tree hosts (e.g., oak, wild cherry) are found outdoors throughout most of the UK (BSBI 2014), and, given that this species is polyphagous, it seems probable that many other UK native broad-leafed trees could also be hosts. While the nests are relatively conspicuous, and thus outbreaks are more likely to be detected at an earlier stage, there is a potential for confusion with native nest-building species, including the closely related lackey moth (*M. neustria*). Experience with *Thaumetopoea processionea* (oak processionary moth) also suggests that isolated nests in mature trees can be surprisingly difficult to spot. However, nest-building Lepidoptera do have a relatively high public profile, especially on oak, and thus, on balance, an outbreak of *M. parallela* seems likely to be detected at an earlier stage than species that do not have nest-building larvae. Moths are

also attracted to light (CABI 2014), and with the wide network of amateur lepidopterists running light traps in the UK, it again seems likely that this species would be detected quickly.

Climate is likely to be more limiting, though no studies on development temperatures for this species could be found. The moth's native range has a continental climate, with much colder winters and hotter summers than are found in any part of the UK. Moreover, this species is usually found at high altitudes in its native range, most often above 1600 m, and up to 3000 m, though it has been reported as low as 130 m (Zolotuhin & Didmanidze 2009). Temperatures at these higher altitudes usually have more fluctuations: hotter in the day, but cooler at night. In mountainous regions, aspect and slope are also very important when considering what temperatures an insect is subject to (especially the less mobile immature stages). Climate data for these high-altitude regions are rather limited, and the two data sets found for the more mountainous regions are of unknown quality. The National Electronic Report (2000) briefly compares temperatures at two weather stations in Kyrgyzstan, lowland Osh (average July temperature approximately 25^{o}C), and mountainous Tyan-Shan (average July temperature approximately 5^{o}C), though the altitudes of neither weather station are given. The second set of data are again from Kyrgyzstan, from the mountain station of Naryn, altitude 2041 m: the average July temperature is 17.3^{o}C (Climatemps.com 2014). The average July temperatures for England (excluding regions such as the Pennines and the Lake District) are higher than this, as are the average July temperatures in parts of Wales, Northern Ireland and the central belt in Scotland (UK Met Office 1981-2010). However, due to the greater diurnal variation in temperatures in mountainous regions, mean temperatures from these areas (whether daily or monthly) are not particularly comparable with mean temperatures from lower elevations. In regions at different elevations, but with comparable mean temperatures, the montane insects will be able complete more development due to the higher daytime temperatures, compared to insects at lower elevations with less variation and cooler daytime temperatures.

In summary: (i) *M. parallela* is found at a wide range of altitudes which may indicate some flexibility in temperature or other climatic tolerance, but it is commonest at altitudes higher than those where its principal hosts occur in the UK, (ii) larvae live in webbed nests that have been shown to provide nest temperatures significantly above the ambient level in other nest-building species, e.g. the North American species *Malacosoma americanum* (Fitzgerald *et al.* 2012) and (iii) while the very limited climate data available from higher altitudes in its native range indicate average summer temperatures are broadly comparable with those found in the UK, daytime temperatures in mountainous regions are likely to be hotter than those experienced anywhere in the UK, thus the potential for larvae to complete their development in the UK is likely to be significantly less. Therefore, overall *M. parallela* is considered only moderately likely to be capable of establishing outdoors in the UK, but this judgement is made with medium confidence as it has been reported from altitudes as low as 130 m (Zolotuhin & Didmanidze 2009). There are many assumptions around this assessment, but the fact that it has not apparently spread into areas bordering its current distribution suggests that there is some factor (temperature or otherwise) limiting its range.

Suitable hosts are not commonly grown under glass and *M. parallela* has not been recorded in protected cultivation. However, given the wide host range, there is a possibility that it may be able to feed on woody ornamentals under protection, or in a botanical collection, though the conspicuous nests mean that any infestations are likely to be quickly detected and destroyed. It may also be that winter temperatures are too high in these situations for successful overwintering of this species (e.g. the eggs may hatch very early in the season), but this is unknown as there are no specific data on temperature requirements of this species. Overall, this pest is considered very unlikely to establish under protection, with high confidence.

Outdoors	Very unlikely	☐	Unlikely	☐	Moderately likely	☑	Likely	☐	Very likely ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			
Under Protection	Very unlikely	☑	Unlikely	☐	Moderately likely	☐	Likely	☐	Very likely ☐
Confidence	High Confidence	☑	Medium Confidence	☐	Low Confidence	☐			

10. If the pest needs a vector, is it present in the UK/PRA area?

No vector is required. This is a free-living organism.

11. How quickly could the pest spread in the UK/PRA area?

No data could be found on the dispersal potential of *M. parallela*, but other species of *Malacosoma* are capable, at least on occasion, of long distance flight. For example, the North American species *M. disstria* has been recorded travelling over 300 miles (with the aid of a weather system) (Brown 1965), and the same species was trapped in Newfoundland after travelling at least 150 miles from the nearest known population (Raske 1976). It should, however, be noted that Raske (1976) found only males while examining several thousand specimens of *M. disstria* from an approximately 50 mile migration in 1968, and if *M. parallela* was to show the same pattern of male biased migration, then the species would not be able to establish in the new distant areas, as adult males cannot found a new population. The judgement that *M. parallela* could spread naturally quickly is thus made with medium confidence as there are several uncertainties around the judgement.

Though egg masses are present on dormant trees (and most plant movement will take place during the period when the plant is dormant), these eggs are covered with a white secretion from the female (Il'insky 1962), though this darkens with age (Ashimov 2010). It is assumed that this colouration will make egg masses reasonably conspicuous, and

hence they are more likely to be detected before the plant is moved. Larvae (in webbed nests) and pupal cocoons should also be large enough to be detected reasonably easily. Overall, the potential for spread in trade is therefore thought to be at a moderate pace, with medium confidence, as there may be potential for confusion with the eggs of native species of *Malacosoma*.

Natural Spread	Very slowly	☐	Slowly	☐	Moderate pace	☐	Quickly	☑	Very quickly ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			

With trade	Very slowly	☐	Slowly	☐	Moderate pace	☑	Quickly	☐	Very quickly ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			

12. What is the pest's economic, environmental and social impact within its existing distribution?

Like many forest pests, populations are cyclical, which means that impacts can be very high in years when populations are large, and outbreaks can occur for two years in succession (CABI 2014). However, in years between outbreaks, impacts are much lower as the pest persists in the environment, but not in sufficient numbers to cause high levels of damage. Additionally, *M. parallela* often causes damage in association with other tree pests, commonly defoliating trees along with other Lepidoptera species (CABI 2014); the stressed trees may then succumb in following years to secondary pests such as bark beetles. The death of trees can have environmental impacts on the forest and surroundings, as well as economic losses due to tree damage. It seems likely that yields of fruit or nuts will be decreased if the tree suffers massive defoliation, but no specific reports could be found. There are also comparatively few sources where any damage caused by *M. parallela* is quantified. Sangov (2011) estimated that at altitudes of 1200-1500 m, up to 80% of almond trees in the Hissar mountains (Uzbekistan-Tajikistan) can be affected by *M. parallela*, though at 2300 m, less than 15% of trees were affected. Daricheva and Dubatolov (1990) noted that it can seriously harm fruit crops in Tajikistan and other central Asian countries. In the same region, Grechkin (1965) reports that up to 100% of wild fruit tree foliage can be damaged by *M. parallela* in combination with *Lymantria dispar* (gypsy moth). In China, Yang *et al.* (2005) lists *M. parallela* as one of the serious pests of apricot in Xinjiang, noting that it mainly attacks the leaves, and is not a fruit pest. *Quercus* is another host genus that can be badly affected, with *M. parallela* regarded as a dangerous oak pest in Armenia (CABI 2014). Overall, the damage in its native range is assessed as very large, particularly in some regions of Central Asia, and at vulnerable altitudes. However, impacts due to *M. parallela* alone are quite difficult to quantify and thus this assessment has a medium level of confidence.

Impacts	Very small	☐	Small	☐	Medium	☐	Large	☐	Very large ☑
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			

13. What is the pest's potential to cause economic, environmental and social impacts in the UK/PRA area?

CABI (2014) states that the main outbreaks occur between 1000 and 1800 m, where conditions are most favourable for the development of this pest, and the montane habitats occupied by this pest suggest that environmental conditions, particularly climate, will not allow damaging population densities causing major economic and environmental impacts to occur in the UK. The impacts are therefore assessed as small, with medium confidence, as potential interactions with other pests may increase impacts.

The nests are conspicuous and may be of concern to members of the public. However, these potential impacts are not considered to be significantly greater than those currently caused by native nest-building Lepidoptera larvae, some of which can build up to high populations in occasional years (Sterling & Parsons 2013). Moreover, the larvae of *M. parallela*, while conspicuously hairy, do not have specialised urticating setae and are much less likely to cause rashes and other health impacts than some other species present in the UK, such as brown-tail (*Euproctis chrysorrhoea*). Overall, the social impacts are also considered to be small, with medium confidence.

Economic Impacts	Very small	☐	Small	☑	Medium	☐	Large	☐	Very large ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			
Environ - mental Impacts	Very small	☐	Small	☑	Medium	☐	Large	☐	Very large ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			
Social Impacts	Very small	☐	Small	☑	Medium	☐	Large	☐	Very large ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			

14. What is the pest's potential as a vector of plant pathogens?

This species is not known to vector any plant pathogenic diseases.

15. What is the area endangered by the pest?

This polyphagous species is found most commonly at altitudes higher than its host plants occur in the UK. Such a montane species is therefore unlikely to find the conditions in the UK to be sufficiently suitable for damaging populations to occur. However, as it is unknown exactly which factors (climatic or otherwise) limit the distribution of this species, the assessments of establishment and potential damage in the UK both have a number of uncertainties which also affect this judgement.

Stage 3: Pest Risk Management

16. What are the risk management options for the UK/PRA area?

Exclusion: Currently there is no specific legislation aimed at excluding this pest. However, there are requirements associated with some of its hosts. Annex III A of Council Directive 2000/29/EU (the Plant Health Directive) prohibits the import of several host genera while they have leaves (namely *Quercus, Malus, Pyrus, Prunus, Crateagus, Cydonia* and *Rosa*) from non-European counties, therefore this prohibition does not apply to European Russia. Even though the eggs, which could be present on the dormant trees, are considered to be conspicuous on visual inspection, as the pest is unregulated it is unlikely detection of their present would prevent the export of the plants of either European or non-European origin. For some of the other hosts, there are requirements in Annex IV A I, but these are associated with other pests and are unlikely to mitigate the risk associated with *M. parallela*. Thus, there are currently no restrictions on the movement of plants which will fully mitigate the risk of introducing *M. parallela*. Exclusion of the pest from the UK would be preferable, but this would require the introduction of regulation specific to this pest and its hosts.

Eradication and containment: even with early detection (due to the conspicuous larval nests and the attraction of adults to light), either option could be difficult. This moth is considered moderately likely to establish in the wider environment, and the adults have at least the potential to be highly mobile. With the additional factor of many tree species being potential hosts, it seems probable that controlling any outbreak of *M. parallela* would be very challenging: control of oak processionary moth in the wider environment has proved challenging, and this species has a much narrower host range than *M. parallela*.

Non-statutory controls: In the native range, control methods include mechanical pruning and destruction of affected branches (Sangov 2011). Shcherbakova and Ovcharov (1979) demonstrated that the susceptibility of *M. parallela* to two strains of *Bacillus thuringiensis* varied, depending on factors including the foodplant and the age of the larvae, while Mirzoyan and Markaryan (1979) found virus preparations were more effective than bacterial insecticides. As the larvae spend parts of the day sheltering inside their nests, where they will be at least partially protected from contact treatments, timings of

applications would need to be considered carefully in order to match the larval activity outside the nest. Some control is likely to be provided by the application of insecticides to control other pests such as codling moth (*Cydia pomonella*), although the degree of control would be determined by the lifecycle of the pest in the UK.

17. Summary and conclusions of the rapid PRA

This rapid PRA shows:

Malacosoma parallela is a moth with nest-building larvae, which feeds on a wide range of deciduous trees and shrubs, and can cause significant defoliation. The species is native to western and central Asia and a very small part of south-east Europe, is usually found in mountainous regions, and is most common at heights over about 1600 m.

Risk of entry

Entry is considered to be unlikely on plants for planting, as all life stages (including the egg masses) are reasonably conspicuous, and very low volumes are imported from this moth's current range. This judgement is made with medium confidence. Entry on the other three pathways is considered very unlikely: on bark (including wood with bark), the confidence is medium, while for both cut branches and natural spread, the confidence is high.

Risk of establishment

Malacosoma parallela is considered moderately likely to establish outdoors in the UK, with medium confidence. It is a montane pest, most common at high altitudes in its native range, and these regions will have much hotter days (and cooler nights) compared to lower elevations, though average temperatures may be broadly comparable. Thus, at higher altitudes, insects have the potential to develop rapidly in the daytime heat: the UK is likely to have much cooler daytime temperatures allowing less development. This is considered to reduce the likelihood of establishment, as larvae may not receive sufficient warmth. Suitable hosts are found throughout the UK.

Establishment in protected cultivation is considered very unlikely, with high confidence. Suitable hosts are not commonly grown under protection, and there is a possibility that winter temperatures would be too high. However, given the polyphagous nature of the species, it is possible that some woody plants gown under protection may be suitable hosts, though due to the highly conspicuous larval nest, any infestation would probably be rapidly noticed and destroyed.

Economic, environmental and social impact

In its native range it can be a serious pest of trees, though damage appears to vary with altitude. Like many forest pests, damage appears to be cyclical and often occurs in tandem with other species, though there are very few reports of quantifiable damage attributable to this species alone. The overall assessment is that, in susceptible areas and

in outbreak years, it causes very large impacts, this judgement made with medium confidence.

In the UK, potential economic, environmental and social impacts are all considered to be small, these judgements all made with medium confidence. The uncertainty arises over the suitability of UK climate for damaging population levels to build up. Social impacts are due to larval nests and hairy larvae potentially causing some concern among members of the public, though the larval hairs of this species are not especially irritating.

Endangered area

As this is a montane species, it seems unlikely that any area of the UK is suitable for damaging populations of this pest to develop, though suitable hosts are widespread in the UK.

Risk management options

Continued exclusion is one option, but would require new regulation specific to this pest, as the current legislation does not fully mitigate the risk of introduction. Eradication and control would be difficult, as this pest would be present in the wider environment, has a very wide host range, and the adults are potentially highly mobile.

Various control options are used against this pest in its native range, including physical measures (pruning and destruction of infested branches) and strains of *Bacillus thuringiensis*. Some control of *M. parallela* may be provided by insecticide applications against native pests, though this would depend on the lifecycle in the UK.

Key uncertainties and topics that would benefit from further investigation

The major area of uncertainty is the suitability of the UK climate for large populations of this pest to be able to develop. Specifically, the assumption has been made that the daytime temperatures in the UK are likely to be too low to enable larvae to complete their development. However, no temperature data are available, and it may be that other factors contribute to limiting the distribution of this species. It is also unclear if it would be capable of building up to population levels sufficient to cause damage in any part of the UK.

18. Is there a need for a detailed PRA or for a more detailed analysis of particular sections of the PRA? If yes, select the PRA area (UK or EU) and the PRA scheme (UK or EPPO) to be used.

[For completion by the Plant Health Risk Group] (put a tick in the box)

No	✓				
Yes		PRA area: UK or EU		PRA scheme: UK or EPPO	

19. Images of the pest

Images of all life stages of *M. parallela* can be found in the datasheet published by EPPO (2005), available through http://www.eppo.int/QUARANTINE/listA2.htm.

20. Given the information assembled within the time scale required, is statutory action considered appropriate / justified?

[*For completion by the Plant Health Risk Group*] *(put a tick in the box)*

Yes Statutory action	✓	No Statutory action	

References

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