Department for Environment Food & Rural Affairs

Rapid Pest Risk Analysis (PRA) for:

Tetropium gracilicorne

July 2015

Stage 1: Initiation

1. What is the name of the pest?

Tetropium gracilicorne (Coleoptera: Cerambycidae) Reitter. Common name: fine-honed spruce borer (English)

Special notes on taxonomy

Tetropium gracilicorne is extremely similar morphologically to the European species *T. gabrieli* (Krehan & Holzschuh 1999), and though synonymy has been proposed Brustel *et al.* (2002) stated it did not comply with the rules set by the International Commission on Zoological Nomenclature. The two species have traditionally been separated by the absence of *T. gracilicorne* from the European parts of Russia where *Larix*, the preferred host, was not found (ML Danilevsky *pers. comm.* 1.4.2015). Larch is now planted in European Russian (for forestry purposes) and in section 5 the current status of *T. gracilicorne* in European Russia is detailed.

Similarity between the two species means references in literature to *T. gracilicorne* may refer to *T. gabrieli* and vice versa, and interceptions and outbreaks may be under-reported due to confusion with *T. gabrieli.*

2. What initiated this rapid PRA?

Information was found that *T. gracilicorne* is now present in European Russia, indicating the range of the pest is expanding and increasing the risk of spread into the EU. This PRA was initiated to help decide whether statutory action and regulation of the pest is justified, especially in light of the new distribution information.

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]?

The pest is not listed in the EC Plant Health Directive, but is included on the EPPO A2 list of pests recommended for regulation.

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

The distribution is summarised in Table 1. EPPO (2005a) lists *T. gracilicorne* as present with a limited distribution within Russia (Siberia and Transbaikalia) and the Far East. This is consistent with older texts, as mentioned in section one *T. gracilicorne* has previously been considered absent from European parts of Russia. Čerepanov (1990) describes the distribution of *T. gracilicorne* as "From the Ob' river basin, Altai to Pacific Ocean coast, including Siberia, Tuva, Sakhalin, and Kunashir; northern Mongolia, northern China, Korea and northern Japan (Hokkaido and Honshu)." It is not known if Korea refers to North or South, in the opinion of EPPO (2005a) it is probably present in North Korea, but the current status of the pest in North Korea according to EPPO is "Absent, unreliable record" (EPPO, 2015).

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000L0029:20100113:EN:PDF

[2] https://www.eppo.int/QUARANTINE/quarantine.htm

However the pest is now recorded as present in European parts of Russia. It is published within a checklist of Longicorn beetles of the Moscow region (where the author considered that *T. gracilicorne* = *T. gabrieli*) (Danilevsky 2005). The 2008 checklist of longhorn beetles in Russia lists *T. gracilicorne* as present in the centre of European Russia (Danilevsky 2008). Danilevsky (2015) reviewed the catalogue of Palaearctic Cerambycoidea by Löbl & Smetana published in 2010 and this also includes northern European Russia within the range of *T. gracilicorne*. The full distribution of *T. gracilicorne* in Russia has been described as from the Russian Far East to the Karelia Republic (Andrei Shamaev *pers. comm.* 26.02.2015). The status of the pest in the Karelia Republic is significant because this region borders with Finland, and the EU. A survey of pests at wood processing factories in the Karelia Republic in 1994 identified *T. gracilicorne* as a potential threat to the forests of this region, though stated it was not widespread in the area (Kulinich 2005). There is no evidence that *T. gracilicorne* is present in Finland, where *T. gabrieli* is also not listed as present (Danilevsky 2015).

Table 1: Distribution of *Tetropium gracilicorne* taken from EPPO (2005)

North America:	No records
Central America:	No records
South America:	No records
Europe:	Russia (European and Asian parts)
Africa:	No records
Asia:	China, Japan, Kazakhstan, Mongolia
Oceania:	No records

The distribution of the highly similar *T. gabrieli* is described western and central Europe, and present in Denmark but not the rest of Fennoscandia (Bílý & Mehl, 1989). The beetle is recorded in the UK (NBN, 2015), having been introduced sometime before 1907 (Crayshaw, 1907).

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

Tetropium gracilicorne is not established in the UK, nor has it been intercepted. However the morphologically similar *T. gabrieli* is widely found in the UK (NBN

2015). As a consequence if *T. gracilicorne* was also present in the UK, it would be very likely to be identified as *T. gabrieli*.

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?

There is some uncertainty over the host range of *T. gracilicorne*. EPPO (2005) lists species of *Abies* (fir), *Larix* (larch), *Picea* (spruce), and *Pinus* (pine) as major hosts, with a preference for *A. neohrolepis* (Manchurian fir), *L. gmelinii* (Dahurian larch), *L. sibirica* (Siberian larch), *Picea ajanensis, Pinus koraiensis* (Korean pine) *P. sibirica* (Siberian pine) and *P. sylvestris* (Scot's pine).

However, in Russia, the beetle is considered only to be a pest of larch (Andrey Shapovalov *pers. comm.* 01.04.2015; Mikhail Danilevsky *pers comm.* 01.04.2015). Additionally, surveys between 1939-1941 in deciduous forests in Trans-Baikal found *T. gracilicorne* only on larch (Čerepanov 1990), but it is possible alternative conifer hosts were not present. In the Canadian Exotic Forest Insect Guidebook, only larch is listed as a host (Kimoto *et al.* 2006).

The Russian and English and common names are "fine-horned spruce-borer", which implies that spruce is a major host. The species was given its common name in Russian by Plavilstschikov (1940), and though spruce was mentioned as the major host the text also stated that at the time nothing was known on its development and larvae were unknown (Mikhail Danilevsky *pers. comm.* 04.06.2015), thus "fine-horned spruce-borer" could be considered a misnomer. However some Russian textbooks do list spruce and pine as a host (after larch) (Dmitry Musolin *pers. comm.* 07.06.2015), so other conifers may act as minor hosts for *T. gracilicorne*, though there are few reports of impacts on species other than Larch. In this manner it is similar to the European species *T. gabrieli* which is occasionally found on pine, spruce and firs (Bílý & Mehl 1989).

Many conifer species are important to the UK. Various larch species, in particular European larch (*L. decidua*), Japanese Larch (*L. kaempferi*) and hybrid larch (*Larix x marschlinsii*) are grown for forestry purposes. Such forests are sometimes open to the public and used for reactional purposes. None of these species of larch are native to the UK, but larch has been grown here since the 17th century. Though Scot's pine is an important native UK species, the status of this as a host is uncertain.

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?

Timber (Non-Squared and Squared Wood)

Timber of larch, or other conifers if attacked by *T. gracilicorne*, could act as a pathway of entry for the pest. Females lay eggs in bark crevices and the larvae tunnel into the bark (Čerepanov 1990). Larvae will enter the sapwood (EPPO 2005a). As a consequence, most of the pest's lifecycle is highly cryptic, and would be difficult to detect during inspection.

Tetropium gracilicorne has previously been intercepted by Austria on Siberian larch timber (Krehan & Holzschuh 1999). At a 2002 meeting of the EPPO Panel on Quarantine Pests for Forestry it was noted that larvae were often found on Russian timber in Poland, even after debarking (EPPO 2005b). The pest was also found at wood processing plants in Karelia in Russia (Kulinich 2005).

Under EU regulations, wood of conifers that originates in Russia and Kazakhstan (and Turkey, though *T. gracilicorne* is not present there) must have an official statement that the wood comes from an area free of non-European *Monochamus* spp.*, Pissodes* spp. and Scolytinae, or are bark free and free from grub holes (larger than 3mm) caused by the genus *Monochamus* or has undergone appropriate heat treatments, fumigation or chemical pressure impregnation as listed in Council Directive 200/29/EC. These measures were also recommended by EPPO for coniferous wood originating from the known distribution of *T. gracilicorne,* as well as additional requirements to prevent infestation during transport (EPPO 2009) (see section 17).

It is likely that coniferous wood originating from Asian parts of Russia and Kazakhstan would not be able to meet the requirements for freedom from non-European species of *Monochamus, Pissodes* or Scolytinae, and as a consequence will have undergone processing or treatment as outlined in the directive. In section 12 common pests that attack larch in combination with *T.* gracilicorne are listed, including several Scolytinae, further supporting this conclusion. Many stages of the beetle's life cycle take place in the bark; however, since larvae can enter the sapwood, removal of bark may not be entirely effective at mitigating the risk of entry. This is because, as noted above, it has been intercepted by Poland even in debarked timber (EPPO 2005b). Heat treatment, fumigation and chemical impregnation – designed to eliminate the risk from other quarantine Coleoptera – is likely to be effective against *T. gracilicorne.* However, coniferous wood entering from European parts of Russia and Kazakhstan would not have to meet these requirements if they can state pest freedom from non-European species listed in the

directive. The pest is known to be present in at least low levels in European Russia, but the precise distribution within Kazakhstan is unknown.

Table 2: Import of coniferous wood in the rough from the known distribution of *T. gracilcorne*, excluding that of the species *Pinus sylvestris, Abies alba* and *Picea abies* into the UK and the EU (including UK) between 2010-2014. No import under this commodity code was recorded from Mongolia or Kazakhstan. The commodity code used was: *Coniferous wood in the rough, whether or not stripped of bark or sapwood, or roughly squared (excl. sawlogs; rough-cut wood for walking sticks, umbrellas, tool shafts and the like; wood in the form of railway sleepers; wood cut into boards or beams, etc.; wood treated with paint, stains, creosote or other preservatives; and spruce of the species "Picea abies Karst.", silver fir "Abies alba Mill." And pine of the species "Pinus sylvestris L.")*. This commodity code will include non-hosts. Data from Eurostat extracted 08.06.2015

Exporter	Importer	Year	Volume (100kg)
Russia	UK	2010	548
		2011	668
		2012	1500
		2013	-
		2014	6655
	EU	2010	61415
		2011	16839
		2012	5076
		2013	385547
		2014	777379
China	UK	2010	-
		2011	-
		2012	-
		2013	-
		2014	-
	EU	2010	1
		2011	48
		2012	6
		2013	-

		2014	1
Japan	UK	2010	-
		2011	-
		2012	-
		2013	-
		2014	-
	EU	2010	-
		2011	83
		2012	1
		2013	-
		2014	7

Table 2 contains data on import levels of coniferous wood into the UK and EU from the known range of the pest over the last 5 years. Since evidence from Russia indicates that *T. gracilicorne* only occurs in significant numbers on larch, the commodity code which excludes timber of *Pinus sylvestris, Abies alba* and *Picea abies* was used – though this commodity code will still include non-host species of *T. gracilicorne*. In 2014, al coniferous timber imported from Russia into the UK originated from Asian parts of Russia, and was inspected upon landing (Ian Brownlee *pers. comm.* 01.07.2015). Within the rest of Europe, it is not known what percentage of wood is imported from European areas compared to Asian areas of Russia.

Timber originating from the range of *T. gracilicorne* may be imported into another EU country, but eventually sold to the UK, which would be recorded as intra-EU trade. However there is still uncertainty over the risks that could be posed by import of these species, which may act as occasional hosts for *T. gracilicorne*.

Imports directly into the UK are relatively low under the commodity code for coniferous wood excluding *Pinus sylvestris, Abies alba* and *Picea abies* – the highest being 665.5 tonnes in 2014. In 2013 only about 5% of the total softwood imported into the UK originated from Russia (Forestry Commission 2014), and this will include non-host species. It should be noted that larch wood from Siberia is imported in large quantities into the EU as a whole, and in Austria methods have been developed to discriminate between European and Siberian larch origins as it was thought that importers may misdeclare the origin of larch wood to avoid the expense of phytosanitary inspection (Horacek *et al.* 2009).

Where larch wood is stored or seasoned outdoors, it will allow for adult emergence and transfer to suitable hosts. Entry of timber is rated as moderately likely, with low

confidence, as the pest does not appear to be widespread in European Russia and timber originating from Asian Russia is likely to be subject to phytosanitary measures, including inspection, which should reduce the risk of entry of the pest if applied correctly. However, if the distribution of the pest continues to expand, especially into Scandinavia from where the UK sources significant amounts of timber, the risk of entry on this pathway will increase. Confidence is low as it is uncertain how much timber may be imported into the rest of the EU before being exported to the UK.

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

Isolated Bark and Woodchips

Many of the life stages of *T. gracilicorne* take place in the bark, and thus isolated bark and wood chips may provide a pathway of entry for some life stages of *T. gracilicorne.* It is not clear, however, if *T. gracilicorne* eggs or larvae could complete their lifecycle in this commodity. Pupae are around 11 to 17 mm long and 3 to 5 mm wide (Čerepanov 1990). If they were to survive the wood chipping or debarking process, the adults could then emerge and transfer to new hosts. Direct UK imports of coniferous woodchips (which will include non-host species) from the current range of *T. gracilicorne* are very low. Between 2010 and 2014, imports were only from China, and totalled 2.8 tonnes (Eurostat data extracted 08.06.2015), and since distribution is limited in China, the woodchips may have originated from regions where *T. gracilicorne* does not occur. However it should be noted that there was a very large trade between the EU and Russia, with all years between 2010 and 2014 exceeding a million tonnes (Eurostat data extracted 08.06.2015) and some of this material may then have been sold on to the UK and recorded as intra-EU trade.

There are EU requirements on wood chips of conifers originating from Russia and Kazakhstan, as well as non-European countries where *Bursaphelenchus xylophilus* (pinewood nematode) is known to occur. These are the same as those for non-squared wood and so are likely to reduce the risk of entry of *T. gracilicorne* that originates from non-European areas if applied correctly.

Entry on this pathway is rated as very unlikely because of the low volume of trade directly into the UK, and the fact that the process of chipping wood or removing bark will reduce the number of viable life stages associated with the commodity. Confidence is medium, as it is uncertain how much host material of Russian origin may be imported to other EU countries before being sold on to the UK.

Isolated bark and woodchips	Very unlikely	✓	Unlikely		Moderately likely		Likely		Very likely	
Confidence	High Confidence		Medium Confidence	✓	Low Confidence					

Wood Packaging Material (WPM)

WPM that enters the EU from any 3rd country must be compliant with ISPM 15. Thus, all WPM originating from the range of *T. gracilicorne* should have been treated. ISPM15 is a standard that includes heat treatment or fumigation of wood designed to reduce the risk of entry of pests and diseases on this pathway. ISPM15 also limits the amount of bark, with a tolerance of small amount of bark of either less than 3cm in width (regardless of length) or greater than 3cm in width, with no piece of bark having a greater surface area than 50 cm^2 (IPPC 2011). Since many of the life stages of *T. gracilicorne* are in the bark, having WPM made largely of debarked wood also reduces the risk. However there are instances of non-compliance with ISPM15 (Haack & Brockerhoff 2011), and in these cases the risk will be higher.

Levels of WPM made from host material entering the UK from the current range of the pest are unknown. However, if ISPM 15 is correctly applied, entry on WPM is very unlikely with medium confidence, because of records of non-compliance with ISPM15 internationally.

Wood Packaging Material	Very unlikely	✓	Unlikely		Moderately likely		Likely		Very likely	
Confidence	High Confidence		Medium Confidence	✓	Low Confidence					

Plants for Planting

Plants of *Abies, Cedrus, Chamaecyparis, Juniperus, Larix, Picea, Pinus, Pseudotsuga* and *Tsuga* (other than fruits and seed) are prohibited from entering the EU from non-European countries by Annex III of Council Directive 2000/29/EC. As a consequence, *T. gracilicorne* could only enter on trees from the European part of its range. There is an EU derogation for bonsai of certain species from Korea and Japan, but there is no evidence that *T. gracilcorne* infests bonsai. There is also no evidence that *T. gracilicorne* is a pest in tree nurseries (whether for forestry or ornamental purposes). EPPO (2005a) states that “it attacks trees of different ages”, and the risk from planting material was considered high enough for EPPO to recommend phytosanitary measures that plants of host conifers should originate from areas known to be free from *T. gracilicorne* (EPPO 2005b). The import of host plants for planting (for forestry or ornamental purposes) from European parts of

Russia and Kazakhstan is likely to be very low. Trees would be subject to phytosanitary inspection, but parts of the pest's lifecycle are cryptic and it is unlikely to be detected in the egg and larval stage.

Entry on plants for planting is rated as very unlikely, with medium confidence, as import levels are unclear and it is also unknown how attractive the younger trees likely to be moved in trade are to *T. gracilicorne* attack.

Plants for Planting	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?

(*The likelihood rating should be based on the area of potential establishment, e.g. where hosts are present and the climate is suitable, within the UK/PRA area)*

No data have been published on the temperature requirements for *T. gracilicorne* development. The natural habitat of *T. gracilicorne* is described as within forests of foothills and mountainous regions up to an altitude of 2000-2100 metres (Čerepanov 1990, EPPO 2005a). It seems to be able to adapt to a variety of mountainous regions being found from the extreme north of Russia, including the Taimyr peninsula within the Artic (Pupavkin & Chernenko 1979), to Kazakhstan. Conifers (including larch, the preferred host) are planted widely in the UK, including in foothills and mountainous areas, and it seems likely that *T. gracilicorne* would be able to find areas where it could establish. A CLIMEX analysis indicated that parts of the UK, northern and central Europe, may be suitable for establishment of *T. gracilicorne* (Vanhanen et al. 2008). Establishment is rated as very likely, but with medium confidence since no data on temperature development requirements have been published.

Larch and other conifers are not usually grown under protection, so establishment under protection is very unlikely 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?

T. gracilicorne is a free living organism and no vector is required.

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

Beetles are capable of flight, being largely active in the summer months of June and July (Čerepanov 1990). No data on flight capacity have been published, though adults are described as moving quickly from tree to tree (Krehan & Holzschuh 1999). There is evidence that this pest has spread in European Russia, as described in section 5, though it is not certain if its arrival was natural spread or an accidental introduction. The rate of natural spread is rated as moderate, with low confidence due to a paucity of data.

The pest is known to be able to move in traded timber, and thus could spread quickly in wood moved between sites in the UK.

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?

There is low confidence associated with the reported impacts of *T. gracilicorne* in the current range, because the pest is very often present with other xylophagous species and thus the assessment of the impacts specifically caused by *T. gracilicorne* is very difficult (Čerepanov 1990, EPPO 2005b).

There are many reports of *T. gracilicorne* attacking already stressed trees. This is a feature of the fauna which invade after forest fires (a pryophile) (Goldammer &

Furyaev 2013, Müller *et al.* 2013, Troeva 2010). It also attacks Siberian larch defoliated by the lepidopteran pest *Dendrolimus sibiricus* (Siberian silkworm), along with several other species, and the cumulative effect of these attacks and the climate in the study area (Tuva) led to tree death within 2-3 years (Mamaev 1990). Cherepanov (1990) describes the biology of the pest as infesting “recently dead trees, those damaged by fire and Siberian silkworm (*Dendrolimus sibiricus* Tschetv.) or wind-felled and so forth”. There seem to be few reports of serious impacts in European parts of Russia (Andrey Shapovalov *pers. comm.* 01.04.2015), though death of conifers of an unspecified species was reported in the Moscow area to be caused by *T. gracilicorne* (Dmitry Musolin *pers. comm.* 07.06.2015).

Tetropium gracilicorne has been described as one of the most important pests of Siberian larch in the Taimyr Peninsula (within Artic Russia) (Pupavkin & Chernenko 1979). EPPO (2005a) also reports that apparently healthy trees can be infested, and that several attacks in consecutive years can kill trees or lead to a considerable loss of vigour and wood marketability. However, this statement was unreferenced, and reports elsewhere of *T. gracilicorne* acting as a primary pest solely responsible for the death of trees could not be found.

EPPO (2005a) references a significant number of studies in which *T. gracilicorne* may attack with other pests to lead to eventual tree death. Examples of stem pests attacking larch with *T. gracilicorne* published in the literature are *Ips subelongatus, Phaenops guttulata, Orthotomicus saturalis, Xylotrechus altaicus* and *Scolytus morawitzi* (Cherepanov 1990, EPPO 2005a, Goldammer & Furyaev 2013, Szujecki 2012, Troeva 2010). On larch in Trans-Baikal, Cherepanov (1990) noted that *T. gracilicorne* was the first species to attack stressed larch, followed by *X. altaicus.*

According to Goldammer & Furyaev (2013), after forest fires trees are initially attacked by *X. altaicus* and *S. morawitzi,* species highly tolerant of tree antibiosis (a protective response of trees where resin is secreted) which further weaken trees. This allows species such as *T. gracilicorne,* which is less tolerant of the antibiosis response, to attack. A list of pioneer pests after forest fires in Yakutia also does not include *T. gracilicorne*, and its attack of fire damaged trees is described as a “rare occurrence”. In contrast, Szujecki (2012) stated that *Tetropium gracilicorne* (with *P. guttulata*) is a key species in attacking fire stressed trees that may otherwise have recovered, because they are resistant to resin secretion, and this then allows further attacks by other species such as *I. subelongatus*.

Impacts of *T. gracilicorne* are rated as small, since it appears to be a secondary pest attacking already stressed trees and usually present with other pests. However, the accumulative effect of these species together causes significant impacts in killing trees that may otherwise have recovered, and there is some evidence that in certain situations *T. gracilicorne* is a pioneer species attacking stressed trees, which allows for further attacks by other stem pests and thus eventual death of the tree but contrasting reports exist that state the opposite.

This rating has low confidence due to conflicting reports concerning the impacts of *T. gracilicorne.* The fact other pests are often present, making it difficult to assess what specific role *T. gracilicorne* plays in the decline or death of trees, also decreases confidence. No specific reports of impacts on conifers other than larch could be found, despite some sources listing hosts such as pine and spruce.

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?

Within the UK, *T. gracilicorne* is most likely to attack already stressed larch trees.

Within its current range, *T. gracilicorne* is often mentioned as attacking trees after forest fires. Fires of forests in Siberia are common, with 10,000 to 30,000 recorded each year (Goldammer & Furyaev 2013). Though forest fires occur in the UK, they are much less frequent. However, in years with unusually high numbers of forest fires in larch forests, populations of *T. gracilicorne* may build up, and if this species is able to act as a pioneer when attacking stressed trees it could weaken them further, and may contribute to the mortality of trees that may otherwise have recovered.

With the exception of *O. suturalis,* the pests listed in section 12 as attacking trees in association with *T. gracilicorne* are all absent from the UK. This could help to limit the impacts of this pest. However, larch is still under pressure from other pests and diseases. The larch bark beetle *Ips cembrae* prefers stressed trees, and can attack and kill them in the north of Britain (Forest Research 2015) (*I. cembrae* is absent from Northern Ireland). *Phytophthora ramorum* is causing serious impacts and high mortality of Japanese larch in many parts of the UK (Forestry Commission 2015). Thus stressed stands of larch are present in the UK that may be vulnerable to attack from *T. gracilicorne*. However, it is worth noting that despite the pressure on larch from other pests and diseases, there have been no apparent increases in damage caused by the established *T. gabrieli*, which is also considered to be a secondary pest. No published reports of increased attacks by *I. cembrae* due to mortality of larch from *P. ramorum* could be found either.

Economic impacts are rated as small, with medium confidence. A lack of forest fires and absence of other key stem pests that attack larch in co-ordination with *T. gracilicorne* mean that confidence in this rating is higher than impacts in its current range. However, uncertainty remains over its ability to attack apparently healthy trees. Stressed trees may be killed more rapidly by *T. gracilicorne*, and wood

marketability reduced. There are natural enemies of *Tetropium* species present in the UK, such as the ichneumon wasp *Xorides brachylabis* which is strongly associated with *Tetropium* spp. (Kenis and Hilszanski 2004), and these could also act to help control populations of *T. gracilicorne* should it be introduced.

Larch is not native to the UK, having been introduced in the 17th century, but it is widely planted and will provide habitats and a source of food for other species. Environmental impacts are rated as very small, as only already stressed larch trees are expected to be killed or further weakened. Larch forests are usually planted as mono-cultures that are not significant sources of biodiversity. The confidence is low, as the suitability of important native tree species such as *Pinus sylvestris* as a host is uncertain, but it is likely other conifer species would only occasionally be attacked.

Plantations of larch for forestry purposes are also utilised as recreational areas. Infestations of *T. gracilicorne* may weaken trees, making them structurally unsafe, and will also hasten the death of already dying trees. Social impacts are rated as 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?

No records could be found of *T. gracilicorne* as a vector of plant pathogens. However other species of *Tetropium* are recorded as transmitting fungal pathogens (Jankowiak & Kolařík 2010), including *T. gabrieli* being associated with the blue-stain fungi *O. kryptum* (Kirisits 2004). Thus *T. gracilicorne* could be a vector of similar fungal species, but this has not been recorded in the literature used for this PRA.

15. What is the area endangered by the pest?

The endangered area is larch plantations across the PRA area, in particular those under stress from other pests or abiotic factors.

Stage 3: Pest Risk Management

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

Exclusion

The EPPO commodity specific phytosanitary measures for Coniferae (2009) recommend measures on conifer plants and products to mitigate the risk of entry of *T. gracilicorne*. For plants for planting of host conifers from countries where *T. gracilicorne* occurs, the recommended requirements are that plants originate from a pest free area and are harvested and imported outside the flight period of *T. gracilicorne,* or that they are produced in protected conditions. The same requirements are also recommended for cut branches of conifer hosts.

EPPO (2009) recommends that non-squared wood and squared wood (excluding WPM) of host conifers originating from countries where *T. gracilicorne* is known to occur, is either debarked and heat treated, or subject to chemical pressure impregnation treatment, or fumigated. Alternatively, wood can originate from a pest free area for *T. gracilicorne* and be transported either outside of the flight period for the beetle, or during it but not through any areas where the beetle is known to occur, or within closed transport to prevent infestation. It is also recommended that isolated bark originates from pest free areas for *T. gracilicorne*.

Correct implementation of ISPM15 will reduce the risk associated with WPM.

Increased surveys on coniferous timber, in particular larch originating from European parts of Russia and Kazakhstan, which currently has less stringent phytosanitary measures applied, could be considered. However many of the life stages of *T. gracilicorne* are cryptic and may be difficult to detected, especially on wood with bark intact.

Eradication and Containment

Because of the morphological similarity to the widespread UK species *T. gabrieli*, against which no statutory action is taken, eradication or containment in the wider

environment would be very difficult if not impossible to achieve, as there is no reliable way to distinguish the two species.

Non-statutory controls

The majority of reports concerning *T. gracilicorne* are related to impacts as a secondary pest. Thus good silviculture practises to keep forests healthy should reduce impacts by this pest. Any measures currently in place for *T. gabrieli* may also be effective for *T. gracilicorne*.

17. Summary and conclusions of the rapid PRA

This rapid PRA shows that *T. gracilicorne* is a species of uncertain taxonomy that largely attacks stressed larch in its native range, and whose impacts may be similar to those of the European species *T. gabrieli*.

Risk of entry

Entry is moderately likely on timber, which in the majority of cases will have been subjected to phytosanitary treatments which reduce the likelihood of association of *T. gracilicorne* with the commodity. Entry is very unlikely on WPM (though higher in instances of non-compliance), isolated bark and wood chips and plants for planting.

Risk of establishment

Very likely outdoors based on the pests current distribution in northern parts of Russia, with medium confidence as no specific data on temperature development requirements have been published.

Economic, environmental and social impact

Small in the current distribution, as it appears to be largely a secondary pest often present with other species. Economic and social impacts are potentially small for the UK, where many of the pests that attack in conjunction with *T. gracilicorne* in its native range are absent and forest fires, which provide *T. gracilicorne* with suitable hosts, are much less frequent than in the current range of the pest. Environmental impacts are rated as very small with low confidence due to uncertainty about host range.

Endangered area

Larch plantations within the PRA area, particularly those under stress from other factors.

Risk management options

Sourcing commodities from pest free areas for *T. gracilicorne*, or those that have been subject to appropriate phytosanitary treatments should mitigate the risk of entry. Because of an inability to separate *T. gracilicorne* from the widespread *T. gabrieli*, eradication and containment is unlikely, but good silviculture practises can reduce the impacts of the pest.

Key uncertainties and topics that would benefit from further investigation

This PRA is subject to three principal uncertainties. Firstly, there is the species status of *T. gracilicorne* and *T. gabrieli*, which are morphologically highly similar and may in fact be synomynous. Though there is some sequence data available for these species there has been no detailed molecular study to see if they can be separated on a genetic level. Molecular comparisons of *T. gabrieli* and *T. gracilicorne* species would help resolve the species status.

Another key uncertainty concerns the suitability of species of conifer other than larch as hosts for *T. gracilicorne*. It seems this pest will occasionally breed on other conifers; this is similar for the European pest *T. gabrieli*. When trapped on spruce and pine logs, larvae were produced, but Crawshay (1907) never observed any attack on these species in the wider environment. In Europe it has occasionally been recorded on pine, spruce and firs (Bílý & Mehl 1989).

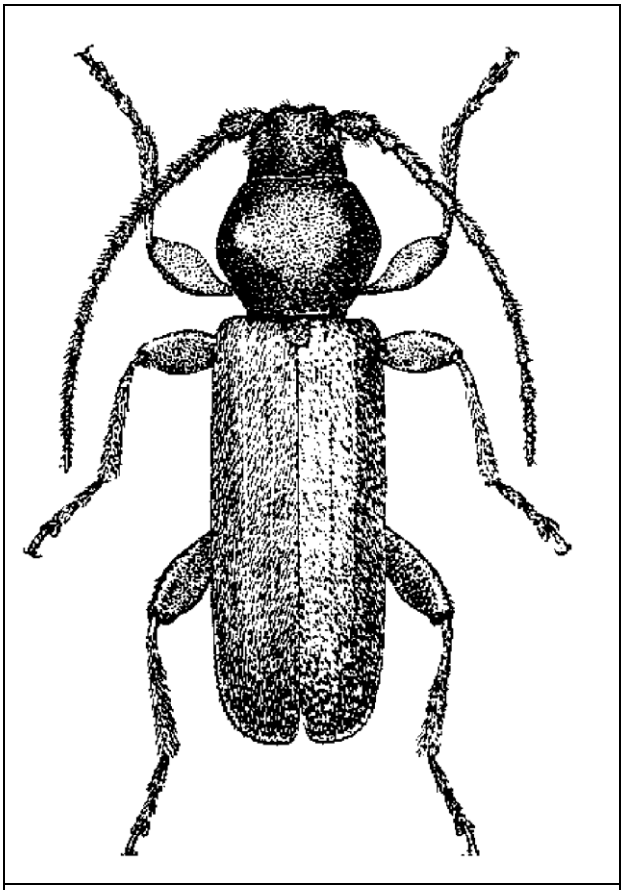
There is also some uncertainty over the impacts caused by *T. gracilicorne*, as it is often reported as present with other species and it is not clear if it can act as a primary pest or will only attack stressed or recently felled trees.

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.

A more detailed risk analysis is unlikely to provide additional information until the uncertainty concerning the species status of *T. gracilicorne* and *T. gabrieli* is resolved.

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

19. Images of the pest



An illustration of an adult *T. gracilicorne* (Čerepanov 1990)

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

At this time there is insufficient evidence to conclude that the naturalised UK species *T. gabrieli* is synomynous with *T. gracilicorne*. Until this is resolved, and because there is some evidence that *T. gracilicorne* in certain situations can be an important secondary pest, statutory action against findings on commodities such as timber may be appropriate. If *T. gracilicorne* were to become established in the wider environment, distinguishing reliably from *T. gabrieli* is not currently possible and thus statutory action against outbreaks in the wider environment may not be appropriate.

Yes Statutory action	✓	No Statutory action	

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