Information about GB Non-native Species Risk Assessments

The Convention on Biological Diversity (CBD) emphasises the need for a precautionary approach towards non-native species where there is often a lack of firm scientific evidence. It also strongly promotes the use of good quality risk assessment to help underpin this approach. The GB risk analysis mechanism has been developed to help facilitate such an approach in Great Britain. It complies with the CBD and reflects standards used by other schemes such as the Intergovernmental Panel on Climate Change, European Plant Protection Organisation and European Food Safety Authority to ensure good practice.

Risk assessments, along with other information, are used to help support decision making in Great Britain. They do not in themselves determine government policy.

The Non-native Species Secretariat (NNSS) manages the risk analysis process on behalf of the GB Programme Board for Non-native Species. Risk assessments are carried out by independent experts from a range of organisations. As part of the risk analysis process risk assessments are:

- Completed using a consistent risk assessment template to ensure that the full range of issues recognised in international standards are addressed.
- Drafted by an independent expert on the species and peer reviewed by a different expert.
- Approved by an independent risk analysis panel (known as the Non-native Species Risk Analysis Panel or NNRAP) only when they are satisfied the assessment is fit-for-purpose.
- Approved for publication by the GB Programme Board for Non-native Species.
- Placed on the GB Non-native Species Secretariat (NNSS) website for a three month period of public comment.
- Finalised by the risk assessor to the satisfaction of the NNRAP.

To find out more about the risk analysis mechanism go to: www.nonnativespecies.org

Common misconceptions about risk assessments

To address a number of common misconceptions about non-native species risk assessments, the following points should be noted:

- Risk assessments consider only the risks posed by a species. They do not consider the practicalities, impacts or other issues relating to the management of the species. They therefore cannot on their own be used to determine what, if any, management response should be undertaken.
- Risk assessments are about negative impacts and are not meant to consider positive impacts that may also occur. The positive impacts would be considered as part of an overall policy decision.
- Risk assessments are advisory and therefore part of the suite of information on which policy decisions are based.
- Completed risk assessments are not final and absolute. Substantive new scientific evidence may prompt a re-evaluation of the risks and/or a change of policy.

Period for comment

Draft risk assessments are available for a period of three months from the date of posting on the NNSS website*. During this time stakeholders are invited to comment on the scientific evidence which underpins the assessments or provide information on other relevant evidence or research that may be available. Relevant comments are collated by the NNSS and sent to the risk assessor. The assessor reviews the comments and, if necessary, amends the risk assessment. The final risk assessment is then checked and approved by the NNRAP.

*risk assessments are posted online at: https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=51

comments should be emailed to nnss@fera.gsi.gov.uk

GB NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME

For more information visit: www.nonnativespecies.org

Name of Organism:	***Crangonyx pseudogracilis***
Objectives:	Assess the risks associated with this species in GB.
Version:	First published on the NNSS website: 03/09/13
Author:	Alison Dunn
Suggested citation:	Dunn, A. (2013). GB Non-native Organism Risk Assessment for *Crangonyx pseudogracilis*. www.nonnativespecies.org

Stage 1: Initiation

1 - What is the principal reason for performing the Risk Assessment? (Include any other reasons as comments)		Request from GB Non-Native Species Programme Board.
2 - What is the Risk Assessment Area?	GB	
3 - What is the name of the organism? **This will appear as a heading** (Other names used for the organism can be entered in the comments box)	*Crangonyx pseudogracilis*	*Crangonyx pseudogracilis* also previously referred to as *Eucrangonyx gracilis* and *Crangonyx gracilis*
4 - What is the status of any earlier Risk Assessment?	none exists	

Stage 2a: Organism Risk Assessment

6 - If you are sure that the organism clearly presents a risk, or that in any case a full Risk Assessment is required, you can omit this section and proceed directly to Section B.	Continue with Organism Screening	
7 - What is the taxonomic group of the organism?	Animalia, Arthropoda, Crustacea, Malacostraca, Peracarida, Amphipoda, Crangonyctidae, *Crangonyx pseudogracilis* Bousfield 1958	Earlier papers refer to the species as *Eucrangonyx gracilis* (Crawford 1937) and *Crangonyx gracilis* (Hynes 1955).
8 - What is the taxonomic status of the organism?	single taxonomic entity	Although *C. pseudogracilis* resembles the native freshwater *Gammarus pulex*, it can be distinguished by examination of the last three pereopods, each of which has a serrated posterior edge, and by the absence of dorsal urosomal spines (Holmes 1975). In addition (and a character which is more easily discerned in the field), *C. pseudogracilis* walks upright, whereas *G. pulex* swim on their sides (Gledhill et al 1993). A second species, *Crangonyx floridanus* is also invasive in Japan, although it has not been reported in GB. Although these species have a similar appearance, they can be distinguished by the presence of ventral spines on the outer ramus of uropod 2 in male *C. pseudogracilis*. These spines are absent in *C. floridanus*. This morphological differentiation is supported by sequence comparison of the small subunit ribosomal DNA (Slothouber Galbreath et al. 2004).
9 - If not a single taxonomic entity, please give details?		Not required
10 - Is the organism in its present range known to be invasive?	yes / possible (the organism is considered to be invasive)	*Crangonyx pseudogracilis* has spread rapidly across Western Europe since it was first detected in England in 1936 (Crawford 1937) and Holland in 1979 (Zhang and Holsinger 2003). There have been relatively few studies of the impact on native species and habitats. There is little evidence of harm to the invaded habitat or community.

12 - What is the current distribution status of the organism with respect to the Risk Assessment Area?	widely distributed	*C. pseudogracilis* was first reported in England in 1936 (Crawford 1937) and has spread extensively since then. It is now found in a range of locations in England, Scotland, Wales, Ireland and N. Ireland (Hynes 1955, Gledhill et al. 1993, Reynolds 1993, MacNeil et al 2009).
13 - Are there conditions present in the Risk Assessment Area that would enable the organism to survive and reproduce? Comment on any special conditions required by the species?	yes / possible	Breeding populations have been reported in numerous locations in GB. A study of one population in Wales (Hynes 1955) found no obvious annual life cycle, although breeding was greatest in Spring and Summer. The species is able to populate standing and running waters but is often excluded from areas of good water quality by native *Gammarus* species. Hence, *C. pseudogracilis* is often found in marginal habitats too extreme for native gammarids and can survive and reproduce at relatively high temperatures and low oxygen saturation conditions (Dick et al. 1998).
14 - Does the known geographical distribution of the organism include ecoclimatic zones comparable with those of the Risk Assessment Area or sufficiently similar for the organism to survive and thrive?	yes / possible	The native range of this species is N. America. The Netherlands, France and the UK (where numerous invasive populations are found) have similar ecoclimatic conditions - lentic and flowing freshwaters (but see 13), temperate climate.
15 - Could the organism establish under protected conditions (such as glasshouses, aquaculture facilities, terraria, zoological gardens) in the Risk Assessment Area?	yes / possible	High probability of establishment in garden ponds, and garden centres. For example, *C. pseudogracilis* has been reported in Ireland in tanks used to maintain fish and aquatic plants for commerical sale as well as in suburban ponds (McCarthy 1993).
16 - Has the organism established viable (reproducing) populations anywhere outside of its native range?	yes / possible	*C. pseudogracilis* originates from the East coast of America. Established breeding populations have been reported from a range of locations in England, Scotland, Ireland, N. Ireland, Wales, The Isle of Man, France and Holland (e.g. Pinkster et al 1992, Gledhill et al 1993; Dick et al. 1999, Slothouber Galbreath et al 2004, MacNeil et al 2009, Piscart et al 2010).
17 - Can the organism spread rapidly by natural means or by human assistance?	yes / possible	Spread can occur throughout river and canal systems (Pinkster and Platvoet 1983; Piscart et al 2010), via movement of aquatic plants (McCarthy 1993). Transportation by boats and on the plumage of birds (Swanson 1984) is also possible.
18 - Could the organism as such, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment Area?	yes / possible	
19 - If answers to questions in this section were 'yes' (even if some were only possibilities),	Necessary to proceed with full	Although there is little evidence of environmental or economic impacts, this invader has spread throughout the UK and mainland Europe since its introduction and so a full

then a full assessment is likely to be necessary. If some answers were 'no' then consider whether this negates the need for a full assessment or not. Please give an appraisal of whether it is necessary to proceed with a full assessment and briefly give the key reasons in the comment box.	assessment	assessment is advisable. The possibility of this species acting as host for parasites is high (eg see Slothouber Galbreath et al. 2004).

Stage 2b: Pathways

20 - How many pathways are relevant to the potential entry of this organism? For organisms which are already present in Great Britain, only complete the entry section for current active pathways of new entry.	moderate number	
21 - Please list relevant pathways through which the organism could enter (one per line). Give details about specific origins and end points of the pathways (where possible) in the comment box.	New entry to GB via shipping (ballast water, ships' hulls) Accidental introduction with pond plants Transport on migrating birds	Most likely source of new entry is Europe (from invasive populations in mainland Europe) via the routes listed. Transportation of new invasive propagules from the native N. American range is also possible via the routes listed. Introductions via shipping are likely to occur at ports/estuaries with subsequent movement upstream also via shipping. Introductions via pond plants have the potential to affect a wide range of habitats from managed wetlands to urban ponds. Transportation via birds has documented for other species of amphipod (Swanson 1984) and is another potential route.
22 - Please select the pathway:	New entry to GB via shipping (ballast water, ships' hulls)	
PATHWAY - SHIPPING (BALLAST WATER, SHIPS' HULLS)		
23 - How likely is it that the organism is strongly associated with the pathway at the point(s) of origin?	moderately likely Medium confidence	If *C pseudogracilis* populations occur in regions where there is shipping/boating activity then they may be taken up in ballast water (in freshwater ports) or attach to hulls (again, in freshwaters). For example, the species has been reported in the Loire (Piscart et al 2010) where there is commercial and recreational shipping.

24 - How likely is it that large numbers of the organism will travel along this pathway from the point(s) of origin?	moderately likely Medium confidence	Transport on hulls of boats is likely to involve a few animals. However, ballast may contain higher abundance, particularly within vegetation.
25 - How likely is the organism to survive during passage along the pathway?	moderately likely Medium confidence	*C. pseudogcracilis* may survive in vegetation on the hull of boats. It is also tolerant of low oxygen and high temperatures (Dick et al. 1998; MacNeil et al 2000) and so is adapted to survive transport in freshwater ballast. The organism is freshwater so is unlikely to survive translocation in sea water ballast/on the hull during sea passage.
26 - How likely is the organism to enter Great Britain undetected?	very likely High confidence	It is unlikely that this small photophobic crustacean would be detected unless through checks of shipping for invaders.
27 - How likely is the organism to multiply/increase in prevalence during transport /storage?	Unlikely High confidence	Mating may occur during transport via these routes, although it takes 60-85 days for young to reach maturity at 25 degrees C, and 80-106 days at 15 degrees (Hynes 1955). However, time from egg extrusion into the brood pouch to release of juveniles can be less than 10 days at temperatures over 20 degrees C (Sutcliffe & Carrick 1981) and a single large female can carry up to 98 embryos (J. Dick pers. comm.). This species shows active brood care which enhances its ability to breed in conditions of low dissolved oxygen and high temperatures such as may occur in ballast (Dick et al 1998).
28 - How likely is the organism to survive existing management practices within the pathway (answer N/A for intentional introductions)?	Unlikely Medium confidence	*C. pseudogracilis* is a freshwater species and is therefore unlikely to survive ballast exchange at sea.
29 - How likely is the organism to arrive during the months of the year most appropriate for establishment (if intentional introduction answer N/A)?	Likely High confidence	The species breeds all year round (Hynes 1955).
30 - How likely is the organism to be able to	very likely	Ballast exchange will release any *C. pseudogracilis* that were transported into a new habitat.

transfer from the pathway to a suitable habitat or host?	Medium confidence	
PATHWAY - ACCIDENTAL INTRODUCTION WITH POND PLANTS		
22 - Please select the pathway:	Accidental introduction with pond plants	
23 - How likely is it that the organism is strongly associated with the pathway at the point(s) of origin?	moderately likely High confidence	Widespread commercial movement of pond plants provides numerous opportunities for introduction of *C. pseudogracilis* and its subsequent movement around GB. The invader has been reported in holding tanks for commercially traded aquatic plants (McCarthy 1993).
24 - How likely is it that large numbers of the organism will travel along this pathway from the point(s) of origin?	moderately likely Very high confidence	Whilst only a few animals may be transported along with each plant, the wide trade and movement of aquatic plants provides multiple opportunities for spread. Females can carry up to 98 young in their brood pouch and hence propagule pressure with just a few adults could be high.
25 - How likely is the organism to survive during passage along the pathway?	very likely Very high confidence	The species shows broad tolerance to heat and low oxygen conditions and to pollution (Gledhill 1993; MacNeil et al 2000).
26 - How likely is the organism to enter Great Britain undetected?	very likely Very high confidence	*C. pseudogracilis* is a small amphipod that moves away from light and seeks out vegetation. Its appearance is similar to that of native amphipods, although it can be distinguished by its characteristic upright walking behaviour (native amphipods in freshwater swim on their sides). It is unlikely that this invader would be detected in a new habitat other than during invertebrate surveys or collections.

27 - How likely is the organism to multiply/increase in prevalence during transport /storage?	Likely High confidence	*C. pseudogracilis* breeds in the laboratory producing 8 broods per year (Hynes 1955) . It breeds in static water and shows active brood care (ventilation of embryos, removal of dead embryos) that enables it to breed under conditions of low oxygen (Dick et al 1998).
28 - How likely is the organism to survive existing management practices within the pathway (answer N/A for intentional introductions)?	very likely High confidence	*C. pseudogracilis* is likely to survive and breed in ponds and holding tanks.
29 - How likely is the organism to arrive during the months of the year most appropriate for establishment (if intentional introduction answer N/A)?	Likely High confidence	*C. pseudogracilis* can breed year round in GB, although breeding activity is higher in the summer. Domestic sales of pond plants are likely to be higher in spring/summer.
30 - How likely is the organism to be able to transfer from the pathway to a suitable habitat or host?	very likely High confidence	Planting of aquatic plants highly likely to allow transport of the invader to suitable habitats.
PATHWAY - TRANSPORT ON MIGRATING BIRDS		
22 - Please select the pathway:	Transport on migrating birds	
23 - How likely is it that the organism is strongly associated with the pathway at the point(s) of origin?	Unlikely Medium confidence	Transportation of amphipods via migrating birds has previously been documented (see review in Swanson 1984). *C. pseudogracilis* is eaten by waterfowl and there is a small possibility that individuals could become attached to the feathers and moved between habitats by the bird.
24 - How likely is it that large numbers of the organism will travel along this pathway from the point(s) of origin?	very unlikely High confidence	Small numbers of amphipods (1 to a few dozen, Swanson 1984) have been reported attached to the feathers of waterbirds. However, large numbers of water birds provide multiple opportunities for such transfer. Females can carry up to 98 young in their brood pouch and hence propagule pressure with just a few adults could be high.

25 - How likely is the organism to survive during passage along the pathway?	moderately likely High confidence	Live amphipods have been reported in the feathers of several species of water bird (Swanson 1984), although no data were given on rates of survival.
26 - How likely is the organism to enter Great Britain undetected?	very likely Very high confidence	The few reports of amphipods clinging to bird feathers come from examination of shot birds (Swanson 1984). Arrival on migrating birds is unlikely to be detected unless birds are examined at ringing, or shot.
27 - How likely is the organism to multiply/increase in prevalence during transport /storage?	very unlikely Very high confidence	Amphipods are highly unlikely to multiply during such transport. However, the transport of a single female that has developing embryos in the brood pouch could lead to the introduction of many juveniles- Hynes (1955) reported an average of 26 to 54 embryos per female (the largest brood recorded by Dick was 98 and by Hynes 109).
28 - How likely is the organism to survive existing management practices within the pathway (answer N/A for intentional introductions)?	N/A Very high confidence	No management practices in place.
29 - How likely is the organism to arrive during the months of the year most appropriate for establishment (if intentional introduction answer N/A)?	very unlikely High confidence	*C. pseudogracilis* has no clear annual breeding season. Breeding occurs year round but peaks in Spring/Summer (Hynes 1955).
30 - How likely is the organism to be able to transfer from the pathway to a suitable habitat or host?	very likely High confidence	Water birds are very likely to deliver any attached *C. psuedogracilis* to new suitable water bodies.
31 - Do other pathways need to be considered?	No	
32 - Please estimate the overall likelihood of entry into the Risk Assessment Area for this	very likely	

organism (please comment on the key issues that lead to this conclusion).	Very high confidence	

Establishment

33 - How likely is it that the organism will be able to establish in Great Britain based on the similarity between climatic conditions in Great Britain and the area of the organism's current distribution?	very likely Very high confidence	Climatic conditions in GB similar to native range. Numerous populations have already established in GB.
34 - How likely is it that the organism will be able to establish in Great Britain based on the similarity between other abiotic conditions in Great Britain and the area of current distribution to be similar?	very likely Very high confidence	There are numerous slow flowing and lentic freshwater habitats in GB that are similar to those in the native range (N. America) as well as to those in the invasive European range.
35 - How many species or suitable habitats vital for the survival, development and multiplication of the organism species are present in Great Britain? Please specify in the comment box the species or habitats.	very many Very high confidence	The species has been reported in lotic and lentic habitats ranging from suburban ponds to rivers and large lakes (eg.McCarthy 1993,Slothouber Galbreath et al. 2010, Piscart 2010); hence there are multiple suitable habitats.
36 - How widespread are the species or suitable habitats necessary for the survival, development and multiplication of the organism in Great Britain?	Widespread Very high confidence	Freshwater lakes, ponds, rivers and streams are all very common in GB.
37 - If the organism requires another species for critical stages in its life cycle then how likely is the organism to become associated with such species in Great Britain?	N/A Very high confidence	
38 - How likely is it that establishment will occur despite competition from existing species in Great Britain?	very likely Very high confidence	*G. pulex* is a larger stronger competitor and intraguild predator than the invader (MacNeil 2000) so is likely to exclude it from areas of habitat suitable for both species. However, *C. pseudogracilis* is typically found in shallow waters with low levels of oxygen; habitats where the native *G. pulex* does not occur.
39 - How likely is it that establishment will occur despite predators, parasites or pathogens already present in Great Britain?	very likely Very high confidence	

40 - How likely are management practices in Great Britain to favour establishment?	Unlikely Low confidence	
41 - How likely is the organism to establish despite existing management practices in Great Britain?	very likely High confidence	
42 - How likely is it that biological properties of the organism would allow it to survive eradication campaigns in Great Britain?	Likely High confidence	There are few possible mechanisms of eradication. Treatment of whole water courses with pyrethrin is one of the few viable methods. However it is highly likely that some animals would survive the drainage and treatment of an area. Furthermore, the species is already widely distributed and there are likely to be very many undetected populations, hence it would not be possible to eradicate all populations.
43 - Is establishment likely to be aided by the biological characteristics of the organism?	Likely High confidence	Although most freshwater gammarids are restricted to unpolluted waters, *Crangonyx pseudogracilis* can tolerate eutrophic and polluted waters and fluctuations in temperature and dissolved oxygen (Gledhill 1993). In the Netherlands, there is a correlation between the disappearance of *Gammarus* species as a result of pollution, and their replacement with *C. pseudogracilis* (Dick et al 1998). The ability to invade waters with low oxygen may result from brood care behaviour which has been shown to increase in response to higher temperatures and lower dissolved oxygen (Dick et al 1998).
44 - Is the organism's capacity to spread likely to aid establishment?	Unlikely Medium confidence	Accidental anthropogenic movement probably of greater impact than spread for example via swimming or drift.
45 - How likely is the adaptability of the organism to aid its establishment?	moderately likely Low confidence	Tolerance of pollution as described above may aid establishment.
46 - How likely is it that the organism could establish despite low genetic diversity in the founder population?	very likely High confidence	Invasive European populations of *C. pseudogracilis* were found to have experienced a reduction in post-invasion genetic diversity. Comparison of sequence (CoI mt DNA and ssu rDNA) variation revealed a strong reduction in variation in invasive populations when compared with populations from the native range (Slothouber Galbreath et al 2010). The study also concluded that a likely source population was from Lake Charles, Louisiana, with the

		invasive populations in the UK, France and the Netherlands representing a single haplotype from this region. Many other invasive species have experienced post-invasion genetic bottlenecks. Amongst amphipods, the invasive *Dikerogammarus haemobaphes* (Muller et al. 2002) and *Echinogammarus ishnus* (Cristescu et al 2004) have both undergone genetic bottlenecks, whilst there is no evidence for reduced genetic diversity in the invasive *D. villosus* (Wattier et al. 2007) and the patterns of genetic diversity vary in invasive populations of *G. tigrinus*, Kelly et al 2007). Based on observations from other invasive amphipods, and the spread of *C. pseudeogracilis* throughout W. Europe since its first detection in the UK in the 1930s, there is no evidence that the observed reduction in genetic diversity will limit it continued range expansion.
47 - How likely is the organism to be established in protected conditions (in which the environment is artificially maintained, such as wildlife parks, glasshouses, aquaculture facilities, terraria, zoological gardens) in Great Britain? (Note that home gardens are not considered protected conditions in this sense.)	very likely Very high confidence	Populations have been reported in the UK and Ireland in ponds and in tanks for holding aquatic plants (McCarthy 1993).
48 - Based on the history of invasion by this organism elsewhere, how likely is it to establish in Great Britain? (If possible, specify the instances of invasion in the comments box.)	very likely Very high confidence	The species has spread in GB since it was first recorded in London in 1936 (Crawford 1937). It has also established in the Netherlands (Zhang and Holsinger 2003) and France (Piscart et al 2010).
49 - If the organism does not establish, then how likely is it that transient populations will continue to occur?	very likely High confidence	Repeated introductions via the routes described are likely to lead to new or transient populations.
50 - Please estimate the overall likelihood of establishment (mention any key issues in the comment box)	very likely Very high confidence	Multiple opportunities for introduction and adaptation to local conditions mean that further populations are likely to establish in GB.

Spread

51 - How rapidly is the organism liable to spread in Great Britain by natural means?	Slowly High confidence	Spread by migrating birds has been reported for other amphipods (Swanson 1984) and may lead to introductions.
52 - How rapidly is the organism liable to spread in Great Britain by human assistance?	Moderately Very high confidence	Multiple opportunities for introduction with plants and through shipping.
53 - Within Great Britain, how difficult would it be to contain the organism?	very difficult High confidence	The species is already widespread (eg Hynes 1955, Gledhill et al 1993) and occurs in highly connected water bodies. Hence containment would be extremely difficult.
54 - Based on the answers to questions on the potential for establishment and spread in Great Britain, define the area endangered by the organism.	GB	*C pseudogracilis* is likely to continue to be moved around GB by accidental introductions and is likely to establish numerous populations. The impact on invaded habitats and communities is not likely to be great.
55 - Please estimate overall potential for spread (using the comment box to indicate any key issues).	Moderately Very high confidence	Anthropogenic introductions and movement of the species are likely to continue. Spread will also occur through connected water bodies.

Impacts

56 - How great is the economic loss caused by the organism within its existing geographic range, including the cost of any current management?	Minimal Medium confidence	There are currently no studies that indicate any economic losses as a result of the invader.
57 - How great a loss of production is the organism likely to cause in Great Britain? For example, how serious is the direct negative economic effect of the organism likely to be on crop yield and/or quality, livestock or fish health and production? (Describe the nature and extent of expected losses in the comment box.)	Minimal Medium confidence	There is no evidence of a loss of productivity as a result of the invader. Brown trout are more able to catch and consume *C. pseudogracilis* than other amphipod species (MacNeil et al 1999), so the introduction may in fact increase resource availability for commercially important fish.
58 - How great are the additional economic costs associated with managing this organism likely to be?	Minimal Low confidence	Minimal as little/no specific management occurs.
59 - How great a reduction in consumer demand is the organism likely to cause in the Risk Assessment Area?	Minimal High confidence	There are no studies that suggest the species will affect recreational or commercial activity in affected waters.
60 - How significant might the losses in export markets be due to the presence of the organism in the Risk Assessment Area?	Minimal High confidence	There are no studies that suggest the invader will have an economic effect on fish production or shipping.
61 - How important might other economic costs be resulting from introduction of the organism? (specify in the comment box)	no answer	
62 - How important is environmental harm caused by the organism within its existing geographic range under any current management regime?	Moderate Medium confidence	There are no reports of major impacts of this invader on the biodiversity or community structure of the native habitat. However, there have been no studies that explicitly tested for environmental damage. Amphipod Crustacea are keystone species in freshwater ecosystems. Through shredding, they process the primary basal energy resource in streams and canals. They provide key prey items for larger predators as well as preying on smaller invertebrates.

		In many locations, *C. pseudogracilis* is found in slow flowing, marginal habitats where it is not in direct competition with native amphipods, so the net outcome may be an increase in resource processing in the ecosystem. However, the invader may affect other detritivores through competition for resources. Again, there have been no direct tests of the impact of the invader on nutrient flow. There are also some (lotic and lentic) areas where the invader has been found to occur in sympatry with *G. pulex*. Studies show that *G. pulex* has a strong predatory impact on *C. pseudogracilis*, whereas the invader is a very weak intraguild predator (MacNeil et al 1999).
63 - How important is environmental harm likely to be in Great Britain taking into account any management interventions that might be implemented?	Minor Medium confidence	Impacts unlikely.
64 - How important is social, health or other harm (not directly included in economic and environmental categories) caused by the organism within its existing geographic range under any current management regime?	Minimal High confidence	No evidence of an effect on health or social wellbeing.
65 - How important is the social, health or other harm likely to be in Great Britain taking into account any management interventions that might be implemented?	Minimal Medium confidence	NA
66 - How important is it that genetic traits of the organism could be carried to native species, modifying their genetic nature and making their economic, environmental or social effects more serious?	Minimal Medium confidence	No reports of cross breeding with other amphipods (although no explicit tests). Cross breeding very unlikely as phylogenetically distant from native amphipods
67 - How important are the expected impacts of the organism despite any natural control by other organisms, such as predators, parasites or pathogens, that may already be present in Great Britain?	Minimal Medium confidence	Little impact predicted. Predation by trout and native amphipods may regulate *C. pseudogracilis* (MacNeil et al 2000).
68 - How difficult is it likely to be to control the organism in Great Britain?	very difficult Very high confidence	The organism is already very widespread and there are likely to be numerous undetected populations.

69 - How likely are control measures introduced for this new organism to disrupt existing biological or integrated systems used to control other organisms in Great Britain?	very unlikely Medium confidence	There are no control measures used.
70 - How likely is the organism to act as food, a host, a symbiont or a vector for other damaging organisms?	Unlikely Very high confidence	It is possible that *C. pseudogracilis* may act as an intermediate host for acanthocephalan parasites that affect commercially important fish. However, no evidence of acanthocephalan infection was found in a screen of invasive populations, although it is known to carry microsporidian parasites (Slothouber Galbreath 2004)
71 - Indicate any parts of Great Britain where economic, environmental and social impacts are particularly likely to occur (provide as much detail as possible).	NA	Little or no economic societal or environmental impact predicted in GB.
72 - Overall impact rating (please comment on the main reasons for this rating).	Minimal High confidence	There is little likelihood of economic environmental or societal impacts.

Conlusion

73 - Give an overall assessment of the risk, taking into account the likelihood of entry and establishment, the expected level of spread, and the potential impact.	Minimal High confidence	Although widespread and likely to spread further, there is little likelihood of economic or societal impacts and the environmental impact is likely to be low.

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