RISK ASSESSMENT SUMMARY SHEET

Updated: September 2015

American Skunk Cabbage (*Lysichiton americanus*)

- Herbaceous plant from North America, widely available in horticulture trade.
- In the wild in GB, found in wet woodland, swamp, bog woodland but still localised; also in gardens, ditches and parks
- Can spread rapidly downstream through catchments.
- Potentially significant impacts on rare and important wet woodland habitats.

History in GB

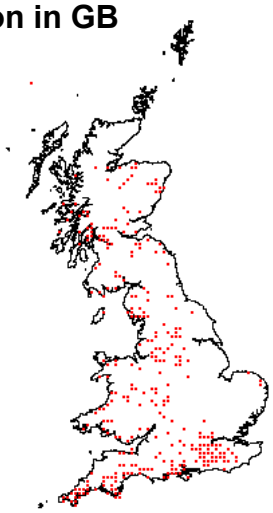
First recorded in the wild in GB about 1950. Now found in 250 10 km squares, widespread but very localised throughout England (mainly in the west), Scotland (east and west, absent from far north) and Wales.

Native distribution

Native to the pacific north-west of North America.

Source: United States Department of Agriculture 2013

Distribution in GB



Source: NBN 2014

Impacts

Environmental (major)

- Causes significant problems in wet woodlands—a rare and threatened habitat in GB.
- Alters habitat structure and causes displacement and local extinction of important bryophytes and other plants such as rare sedges, violets and orchids.
- May cause declines in some invertebrates.
- Recent (2013) study has shown significant impacts in the New Forest, where it outcompetes native flora.

Economic (minimal)

Social (minimal)

Introduction pathway

Ornamental plant trade (likely) - sold in many garden centres, online etc. with estimated 10-20,000 plants sold annually.

Spread pathways

Natural (intermediate) - can spread rapidly through catchments mainly via seeds transported by water. Spread between catchments likely to be slow.

Human (intermediate) - sometimes deliberately planted close to vulnerable wet woodland habitats.

Summary

	Risk	Confidence
Entry	VERY LIKELY	HIGH
Establishment	VERY LIKELY	HIGH
Spread	INTERMEDIATE	HIGH
Impacts	MAJOR	HIGH
Conclusion	HIGH	HIGH

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@apha.gsi.gov.uk

GB NON-NATIVE ORGANISM RISK ASSESSMENT SCHEME

For more information visit: www.nonnativespecies.org

Name of Organism	***Lysichiton americanus - American Skunk Cabbage***	
Objectives:	Assess the risks associated with this species in GB	
Version:	Final (April 2016) - Original draft May 2011, revised January 2012, revised May 2012, revised July 2013, signed off by NNRAP June 2012, approved by GB Programme Board March 2015, published on NNSS website September 2015.	
Author:	Jonathan Newman and Manuel Angel Duenas (CEH)	

N	QUESTION	RESPONSE	COMMENT
1	What is the reason for performing the Risk Assessment?		Assess the risks associated with this species in GB
2	What is the Risk Assessment area?	GB	*Lysichiton americanus* is intentionally introduced into the UK as an ornamental plant. It is reported to reduce biodiversity in the PRA area. It is spreading in the UK region by human assistance (planting) and naturally.
3	Does a relevant earlier Risk Assessment exist?	YES (Go to 4)	http://www.eppo.org/MEETINGS/2009_meetings/ewg_lysichiton_americanus.htm and comment thereon in http://www.efsa.europa.eu/en/efsajournal/doc/539.pdf
4	If there is an earlier Risk Assessment is it still entirely valid, or only partly valid?	PARTLY VALID OR NOT VALID (Go to 5)	Not selective for UK
	Stage 2: Organism Risk Assessment **SECTION A: Organism Screening**		
5	Identify the Organism. Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?	YES (Give the full name & Go to 7)	*Lysichiton americanus* , Hulten & St. John, American Skunk Cabbage, Yellow Skunk Cabbage Synonyms are *Lysichitum americanum, Lysichiton americanum* (http://www.nobanis.org/files/factsheets/Lysichiton%20americanus.pdf) The further variant genus spelling in citations of Alberternst; B.; Nawrath; S. (2002): *Lysichtion americanus* Hulten & St. John Neu in Kontinental-Europa is a misprint in http://www.eppo.org/QUARANTINE/Pest_Risk_Analysis/PRAdocs_plants/05-11898%20NEW%20PRA%20LSYAM.doc According to http://www.plants.usda.gov/java/nameSearch?keywordquery=Lysichiton+americanus&mode=sciname , *Lysichiton camtschatcensis* auct. non (L.) Schott is also a synonym for *L. americanus* . This is incorrect. *Lysichiton camtschatcensis* auct. non (L.) Schott is a different species, is smaller and has white flowers
6	If not a single taxonomic entity, can it be redefined?		
7	Is the organism in its present range known to be invasive, i.e. to threaten species, habitats or ecosystems?	YES (Go to 9)	In its introduced range, *L. americanus* can cause major problems in wetlands and displaces native flora through competition and possibly also fauna by habitat modification. The displacement and local extinction of rare species of mosses (like Aulacomnium palustre and different Sphagnum-species) and higher plants (Carex echinata, Viola palustris, and Orchid-species) have been shown (König & Nawrath 1992, Alberternst & Nawrath 2002). In Germany, invasive behaviour is restricted to acidic wet woodland habitats (EPPO 2006) and it is likely to be restricted to this habitat in the RAA. More recent work by Sanderson (2013) in the New Forest on the south coast of the UK has shown
8	Does the organism have intrinsic attributes that indicate that it could be invasive, i.e. threaten species, habitats or ecosystems?		*L. americanus* can grow in many different environments (acid, neutral or basic soils, in shade or full light), has a high reproductive potential (prolific seed production, reproduction is possible by fragmented stems/rhizomes) and is highly mobile locally (moving long distances by water, soil, attachment to machinery). Seeds can remain viable in soil for at least six years, possibly longer (Alberternst, pers. comm.). In Germany, invasive behaviour is restricted to bog woodland habitats (EPPO 2006) and it is likely to be restricted to this habitat in the RAA, although alluvial forests in the RAA are also probably at risk 9sanderson (2013)
9	Does the organism occur outside effective containment in the Risk Assessment area?	YES (Go to 10)	The species is present in 249 ten Km grid squares as of 23/5/2012) (NBN gateway) Publications relative to the presence in the RAA include Preston *et al* . 2002, Doyle & Duckett 1985, O'Malley 1996 and Clement & Foster 1994,
10	Is the organism widely distributed in the Risk Assessment area?	YES & Future conditions/management procedures/policies are being considered (Go to 19)	*L. americanus* was introduced into U.K. for cultivation in 1901 and was known in the wild by 1950. The distribution records in the NBN Gateway (accessed 23/5/2012 http://data.nbn.org.uk/gridMap/gridMap.jsp?allDs=1&srchSpKey=NHMSYS0000460540) indicate there are 249 ten Km squares where L. americanus is present. The first modern occurrence is recorded as 1950 from Ordnance Survey Grid Square SU83.

11	Does at least one species (for herbivores, predators and parasites) or suitable habitat vital for the survival, development and multiplication of the organism occur in the Risk Assessment area, in the open, in protected conditions or both?	YES (Go to 12)	Suitable habitats are swamps, swamp woods and bog woodlands (see Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora). It can grow along streams and riverbanks, lakesides, ponds, in boggy and other low wet areas. In Germany, invasive behaviour is restricted to acidic wet woodland habitats (EPPO) and it is likely to be restricted to this habitat in the RAA.
12	Does the organism require another species for critical stages in its life cycle such as growth (e.g. root symbionts), reproduction (e.g. pollinators; egg incubators), spread (e.g. seed dispersers) and transmission, (e.g. vectors)?	NO (Go to 14)	No, this species is an ornamental plant sold for ornamental purposes.
13	Is the other critical species identified in question 12 (or a similar species that may provide a similar function) present in the Risk Assessment area or likely to be introduced? If in doubt, then a separate assessment of the probability of introduction of this species may be needed.		
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 (Go to 16)	Already established in the PRA area.
15	Could the organism establish under protected conditions (e.g. glasshouses, aquaculture facilities, terraria, zoological gardens) in the Risk Assessment area?	YES (Go to 16)	The species is widely cultivated , grown in nurseries and sold through garden centres, specialist nurseries and online. See Google, e.g. 207 results in shopping category for Skunk Cabbage accessed 23/5/2012 and four sites in shopping category for Lysichiton americanus, accessed 23/5/2012. It is reasonable to assume that it survives in cultivation.
16	Has the organism entered and established viable (reproducing) populations in new areas outside its original range, either as a direct or indirect result of man's activities?	YES (Go to 17)	Present in Ireland, Great Britain (Preston et al. 2002, Doyle & Duckett 1985, O'Malley 1996, Clement & Foster 1994), Norway (Per Arvid Åsen pers. comm.), Sweden: (Larson 2003; Lenfors & Nilsson 1987; Lind 1988; Arne Anderberg, Naturhistoriska Riksmuseet Stockholm, pers. comm.), Germany (Korneck & Krause 1990, König & Nawrath 1992, Alberternst & Nawrath 2002, Fischer & Schausten 1994, Fuchs *et al* . 2003), Switzerland (see http://www.be.ch/cgi-bin/frameset.exe?http://www.vol.be.ch/lanat/natur/neo.html), Denmark (but not known to be invasive there, E. Nordbo, pers. comm.), The Netherlands (K. Peeters-van der Meijden, pers. comm.).
17	Can the organism spread rapidly by natural means or by human assistance?	YES (Go to 18)	Spreads by seed when established, and is cultivated by rhizome fragment propagation. The level of rhizome fragment reproduction in natural populations is unknown, but remains a possibility along side fast flowing streams, assuming suitable habitat exists downstream. Rhizome fragmentation is likely to perpetuate the species in systems managed by mechanical means. Seed transport by birds may account for upstream dispersal in some New Forest sites (Sanderson, 2013).
18	Could the organism as such, or acting as a vector, cause economic, environmental or social harm in the Risk Assessment area?	YES OR UNCERTAIN (Go to 19)	Indirectly harmful to plants, not widely distributed in the PRA area. Suitable habitats and ecoclimatic conditions occur in the PRA area. There is a high risk of establishment and spread of *L. americanus* in swamps, swamp woods, bog woodlands; the plant can threaten biodiversity. Establishment in garden situations is certain, but spread to the wider environment is dependent on suitable wet woodland habitat. Deliberate planting in ornamental situations does not often lead to invasive behaviour in a garden situation, where original plantings often remain discrete. Invasive behaviour is likely to be limited suitable wet woodland habitats.
19	This organism could present a risk to the Risk Assessment area and a detailed risk assessment is appropriate.	Detailed Risk Assessment Appropriate GO TO SECTION B	Yes. The programme board has asked for a full risk assessment to be completed.
20	This organism is not likely to be a harmful non-native organism in the Risk Assessment area and the assessment can stop.		

B	SECTION B: Detailed assessment of an organism's probability of entry, establishment and spread and the magnitude of the economic, environmental and social consequences			
	Probability of Entry	**RESPONSE**	**UNCERTAINTY**	**COMMENT**
1.1	List the pathways that the organism could be carried on. How many relevant pathways can the organism be carried on?	few - 1	LOW - 0	Plants for planting are the main pathway for *L. americanus* . It is grown in many botanical gardens and more and more favoured by gardeners as a plant for ponds and other wet places, because of its striking inflorescences and robustness. The Royal Horticultural Society Floral Committee (GB) awarded *L. americanus* an Award of Garden Merit: 'Over the years the plants have seeded themselves freely and now make a fantastic display covering the full length of the stream and beyond.' Pathways of secondary release may be soil and water containing viable seeds. The plant is widely available through the internet, with 206 hits when entering skunk cabbage into Google in the shopping category (accessed 23/5/2012)
1.2	Choose one pathway from the list of pathways selected in 1.1 to begin the pathway assessments.			Trade
1.3	How likely is the organism to be associated with the pathway at origin?	very likely - 4	LOW - 0	Although It is not a common species at aquatic garden centres as it is large and may therefore be purchased reasonably often It is favoured because it is tolerant of shade. It may be listed in catalogues and available at specialist aquatic nurseries. The RHS plant finder lists 37 suppliers of this species at 26/01/2012
1.4	Is the concentration of the organism on the pathway at origin likely to be high?	moderately likely - 2	LOW - 0	No
1.5	How likely is the organism to survive existing cultivation or commercial practices?	very likely - 4	LOW - 0	Very likely, deliberately propagated
1.6	How likely is the organism to survive or remain undetected by existing measures?	very unlikely - 0	LOW - 0	It is a large plant, and very obvious in the environment.
1.7	How likely is the organism to survive during transport /storage?	very likely - 4	LOW - 0	No obvious reason for decline in viability in transit.
1.8	How likely is the organism to multiply/increase in prevalence during transport /storage?	unlikely - 1	LOW - 0	Long growing time, may set seed if transported especially during late summer to early autumn.
1.9	What is the volume of movement along the pathway?	moderate - 2	LOW - 0	This is impossible to find out. Although because it is listed as a species with an RHS Award of Garden Merit it is likely that it is regularly traded. Suppliers were unwilling to supply actual numbers of plants sold when contacted. I assume from this that at least some plants were sold. One supplier who wished to remain anonymous said that they grew about 1000 plants a year which were all sold. There are 37 suppliers of *L. americanus* listed on the RHS plant finder website, so a rough calculation would estimate that approximately 10,000 to 20,000 plants are sold annually.
1.10	How frequent is movement along the pathway?	occasionally - 2	MEDIUM -1	Plants will be purchased on a seasonal basis, so I would anticipate the highest volume into spring and summer, with little in the autumn and winter.
1.11	How widely could the organism be distributed throughout the Risk Assessment area?	very widely - 4	MEDIUM -1	Wide distribution network of garden centres, mail order and internet suppliers, encouraged by RHS AGM http://apps.rhs.org.uk/agm/Award3.asp?ID=42177, and global access through Google to internet suppliers.
1.12	How likely is the organism to arrive during the months of the year most appropriate for establishment ?	very likely - 4	MEDIUM -1	The organism will be on show for sale during this period.
1.13	How likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) or other material with which the organism is associated to aid transfer to a suitable habitat?	unlikely - 1	LOW - 0	This species needs to be deliberately planted in an ornamental situation. It establishes from the entry route into natural habitats
1.14	How likely is the organism to be able to transfer from the pathway to a suitable habitat?	moderately likely - 2	HIGH -2	Seed formation and flow into connected watercourses will aid distribution (König & Nawrath,1992)

	Probability of Establishment	RESPONSE	UNCERTAINTY	COMMENT
1.15	How similar are the climatic conditions that would affect establishment in the Risk Assessment area and in the area of current distribution?	very similar - 4	LOW - 0	EPPO (2006) states L. americanus is typically associated with climates Cf, Dfb and Dfc in Köppen's classification, i.e. cool to hot summer, very cold to cool winter, wet year round. L. americanus is hardy at least to zone 7 (−15°C), and possibly colder. It is associated with the vegetation zones: temperate deciduous forests, mixed conifer forests, taiga forests, forest tundra (EPPO, 2004). Areas particularly at risk are areas having an Atlantic influence (the UK, Ireland). A climatic prediction with the software CLIMEX has been performed and highlights that Northern and Western Europe are the most at risk.
1.16	How similar are other abiotic factors that would affect establishment in the Risk Assessment area and in the area of present distribution?	very similar - 4	LOW - 0	Wetlands including wet woodlands, lakeside, raised bogs, swamps, riverbanks, pond margins, in permanently wet soils, in alluvial forests, moorlands and wet meadows (Vanderhoeven, et al. 2007; Doyle & Duckett, 1985; Alberternst &Nawrath, 2002).
1.17	How many species (for herbivores, predators and parasites) or suitable habitats vital for the survival, development and multiplication of the organism species are present in the Risk Assessment area? Specify the species or habitats and indicate the number.	many - 3	MEDIUM -1	Pollinators are required for successful reproduction: beetles, flies, midges. These are abundant in the PRA area. Suitable habitat exists in the form of acidic wet woodland areas, and garden plantings.
1.18	How widespread are the species (for herbivores, predators and parasites) or suitable habitats vital for the survival, development and multiplication of the organism in the Risk Assessment area?	frequent - 3	LOW - 0	The widespread presence of suitable habitats throughout the RAA would not be limiting to survival, development or multiplication of the organism in the RAA
1.19	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 the risk assessment area?	N/A	LOW - 0	N/A
1.20	How likely is it that establishment will not be prevented by competition from existing species in the Risk Assessment area?	very likely - 4	LOW - 0	*L. americanus* is a large plant and is often deliberately planted, avoiding any competition factors. The species is already established
1.21	How likely is it that establishment will not be prevented by natural enemies already present in the Risk Assessment area?	very likely - 4	LOW - 0	There are no known natural enemies and the species is already established.
1.22	If there are differences in man's management of the environment/habitat in the Risk Assessment area from that in the area of present distribution, are they likely to aid establishment? (specify)	unlikely - 1	LOW - 0	Deliberate planting in gardens will aid dispersal and establishment. The species is only managed on a limited basis in certain locations Ornamental plantings are not normally managed.
1.23	How likely is it that existing control or husbandry measures will fail to prevent establishment of the organism?	very likely - 4	LOW - 0	The species is already established. Deliberately planted, so unlikely that control of planted species will occur. The species is susceptible to treatment with glyphosate formulations currently approved for use near water. Access for application of herbicides in wet woodland environments can be difficult, resulting in poor or inadequate control.
1.24	How often has the organism been recorded in protected conditions, e.g. glasshouses, elsewhere?	frequent - 3	LOW - 0	Often recorded in large garden environments rather than in natural situations
1.25	How likely is the reproductive strategy of the organism and duration of its life cycle to aid establishment?	very likely - 4	LOW - 0	Seed dispersal and production are very effective. Rhizome fragments are used for propagation in the horticultural trade, although this method is unlikely in natural situations as the species is deep rooted, and rhizomes do not tend to fragment naturally. Some fragmentation may occur alongside fast flowing streams and after mechanical management techniques have been applied (Alberternst and Nawrath 2002)
1.26	How likely is it that the organism's capacity to spread will aid establishment?	very likely - 4	LOW - 0	Seed production aids dispersal and establishment is favoured in suitable habitats. (Alberternst and Nawrath 2002) See 1.25
1.27	How adaptable is the organism?	slightly adaptable - 1	MEDIUM -1	Unknown, observed growing in deep shade, wet woodland and damp grassland. (Alberternst and Nawrath 2002)
1.28	How likely is it that low genetic diversity in the founder population of the organism will not prevent establishment?	very likely - 4	LOW - 0	Seed production will increase and / or maintain genetic diversity. The founder population size is not known, the viability of seeds is evidence of successful sexual reproduction. Limited founder population size may have limited the ability to adapt to habitats other than wet woodland and care should be taken if new hybrids are introduced by the trade that may adapt better to drier / more alkaline habitats. (Alberternst and Nawrath 2002)
1.29	How often has the organism entered and established in new areas outside its original range as a result of man's activities?	moderate number - 2	MEDIUM -1	Unknown, but probably spread as a result of escape from cultivation in most cases.
1.30	How likely is it that the organism could survive eradication campaigns in the Risk Assessment area?	moderately likely - 2	MEDIUM -1	Successful eradication techniques are available. The herbicides glyphosate and 2,4-D amine provide rapid control. (EPPO, 2006, Newman pers comm.) Plants in cultivation will not normally be treated and would survive an eradication campaign for escaped populations, resulting in perpetuation of the founder populations.
1.31	Even if permanent establishment of the organism is unlikely, how likely is it that transient populations will be maintained in the Risk Assessment area through natural migration or entry through man's activities (including intentional release into the outdoor environment)?	very likely - 4	MEDIUM -1	Repeated introduction and escapes from cultivation will continue.

	Spread	RESPONSE	UNCERTAINTY	COMMENT
2.1	How rapidly is the organism liable to spread in the Risk Assessment area by natural means?	intermediate - 2	MEDIUM -1	The species is capable of very rapid spread within suitable habitats due to seed dispersal means in suitable habitat, e.g. along streams. The presence in wet woodland does not encourage spread between habitats, and so occurrences are usually sporadic and stochastic. (Alberternst and Nawrath 2002)
2.2	How rapidly is the organism liable to spread in the Risk Assessment area by human assistance?	intermediate - 2	LOW - 0	The continued supply through trade and growth in cultivated situations will maintain a continuous inoculum through garden populations and will continue to provide the main means of dispersal. L. americanus is a large plant as is often restricted to large gardens where the scale of the species can be appreciated.
2.3	How difficult would it be to contain the organism within the Risk Assessment area?	with some difficulty - 2	MEDIUM -1	An enforceable restriction of trade in this species would achieve limitation of spread within the area, combined with an eradication program.
2.4	Based on the answers to questions on the potential for establishment and spread define the area endangered by the organism.			Wet Alluvial Forest and Bog Woodlands.(Klingenstein & Alberternst, 2010)

	Impacts	RESPONSE	UNCERTAINTY	COMMENT
2.5	How important is economic loss caused by the organism within its existing geographic range?	minor - 1	LOW - 0	Economic loss does not appear to be important.
2.6	Considering the ecological conditions in the Risk Assessment area, how serious is the direct negative economic effect of the organism, e.g. on crop yield and/or quality, livestock health and production, likely to be? (describe) in the Risk Assessment area, how serious is the direct negative economic effect of the organism, e.g. on crop yield and/or quality, likely to be?	minor - 1	LOW - 0	Economic loss does not appear to be important.
2.7	How great a loss in producer profits is the organism likely to cause due to changes in production costs, yields, etc., in the Risk Assessment area?	minimal - 0	LOW - 0	N/A
2.8	How great a reduction in consumer demand is the organism likely to cause in the Risk Assessment area?	minimal - 0	LOW - 0	N/A
2.9	How likely is the presence of the organism in the Risk Assessment area to cause losses in export markets?	very unlikely - 0	LOW - 0	N/A
2.10	How important would other economic costs resulting from introduction be? (specify)	minor - 1	LOW - 0	The costs of control are minor.
2.11	How important is environmental harm caused by the organism within its existing geographic range?	major - 3	LOW - 0	Sanderson (2013) indicates that significant loss and degradation of native biodiversity, habitat structure and ancient indicator species occur in invaded wet woodland sites in the New Forest. In other introduced ranges, L. americanus can cause major problems in wetlands and displaces native flora through competition and possibly also fauna by habitat modification. The displacement and local extinction of rare species of mosses (like Aulacomnium palustre and different Sphagnum-species) and higher plants (Carex echinata, Viola palustris, and Orchid-species) have been shown (König & Nawrath 1992, Alberternst & Nawrath 2002). In Germany, invasive behaviour is restricted to wet woodland habitats (EPPO 2006).
2.12	How important is environmental harm likely to be in the Risk Assessment area?	major - 3	MEDIUM -1	Sanderson (2013) indicates that significant loss and degradation of native biodiversity, habitat structure and ancient indicator species occur in invaded wet woodland sites in the New Forest. *Lysichiton americanus* may sometimes reduce native bryophyte biodiversity. It is one of the few alien plant species in Europe that is naturalised in swamp woods and bog woodlands, although this is not the case in UK sites (Sanderson, 2013). After some years its huge leaves build a dense layer excluding light from native species which usually are not adapted to deep shade because native swamp woods tend to be predominantly dappled shade. Moreover, swamp woods and associated wetlands often contain many endangered species of national red lists. The displacement and local extinction of rare species of mosses (like *Aulacomnium palustre* and different *Sphagnum* species) and vascular plants (*Carex echinata* , *Viola palustris* , and Orchid-species) have been shown (Nawrath & König 1992, Alberternst & Nawrath 2002). Invertebrates associated with wet woodland may also suffer declines in abundance due the presence of this species (Action plan for Wet Woodland - http://www.ukbap.org.uk/UKPlans.aspx?id=4).
2.13	How important is social and other harm caused by the organism within its existing geographic range?	minor - 1	LOW - 0	The degree to which social harm is caused by the presence of this species is unknown and cannot be assessed.
2.14	How important is the social harm likely to be in the Risk Assessment area?	minor - 1	LOW - 0	The relative scarcity of this species in natural habitats limits the social impact of this species at the moment. A significant increase in distribution would be required to have a moderate impact
2.15	How likely is it that genetic traits can be carried to native species, modifying their genetic nature and making their economic, environmental or social effects more serious?	very unlikely - 0	MEDIUM -1	There is unlikely to be any hybridisation between this species and native species in the RAA
2.16	How probable is it that natural enemies, already present in the Risk Assessment area, will have no affect on populations of the organism if introduced?	very likely - 4	LOW - 0	The leathery leaves of this species are not often consumed by herbivores. No known fungal pathogens occur
2.17	How easily can the organism be controlled?	with some difficulty - 2	LOW - 0	Glyphosate gives good control of *L. americanus* , . Targeting of *L americanus* is easy because of its large leaf size, but access can be difficult for herbicide application equipment.
2.18	How likely are control measures to disrupt existing biological or integrated systems for control of other organisms?			N/A
2.19	How likely is the organism to act as food, a host, a symbiont or a vector for other damaging organisms?			N/A
2.20	Highlight those parts of the endangered area where economic, environmental and social impacts are most likely to occur		LOW - 0	Wet Alluvial Forests and Bog Woodlands

Summarise Entry	very likely - 4	LOW - 0	Already present
Summarise Establishment	very likely - 4	LOW - 0	Already established in the PRA area.
Summarise Spread	intermediate - 2	LOW - 0	likely in suitable habitats and mediated by increased availability through internet sources.
Summarise Impacts	major - 3	LOW - 0	
For pathway/policy risk assessment Assess the potential for establishment and economic/environmental/social impacts of another organism or stop			Since *L. americanus* are introduced intentionally as an ornamental plant, it is very popular and is for sale in many garden centres in several EPPO Member Countries as well as via the internet. The probability of an introduction to areas of the EPPO region where it is currently not present is high or even very high. If the plant has been intentionally introduced, the probability of short distance spread is very high, spread occurs by transport of seeds with running water and probably animals as well as by human activity. Spread by seeds is slow but effective. Human activity is principal vector for long distance spread.
Conclusion of the risk assessment	HIGH -2	LOW - 0	The risk of this species will only increase due to continued sales and recommendations by gardening experts. This is likely to bring the species into contact with a higher number of suitable habitats on a more frequent basis, increasing the risk of spread and establishment. Although impacts are relatively minor at most sites, the impact of higher numbers and increased distribution may increase the impact at especially vulnerable sites. The very recent evidence of significant loss of rare and nationally important indicator species as a consequence of the presence of L. americanus makes this species one of serious concern.
Conclusions on Uncertainty		LOW - 0	The defined impacts in defined habitats make uncertainty for this species low. The major unknown is the actual distribution of this species in the RAA. To date we have very little idea of the location of most of the garden populations of this species.
Should risk management options be considered?	YES (Go to Risk Management)		The species is controlled by application of glyphosate based herbicide at a rate of 2.16 Kg active ingredient per hecatre.

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