GOOD PRACTICE MANAGEMENT

Himalayan Balsam (*Impatiens glandulifera*)

RAPID

Reducing and Preventing
Invasive Alien Species Dispersal

GOOD PRACTICE MANAGEMENT GUIDE FOR
Himalayan Balsam (*Impatiens glandulifera)*

Other names: Indian Balsam, garden balsam, policeman's helmet

For ID guides and more information:

http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=1810

https://himalayanbalsam.cabi.org

https://glnp.org.uk/getting-involved/local-surveys/submit-single-sighting.php

https://www.nature.scot/integrated-pest-management-nature-conservation-handbook

Himalayan Balsam (*Impatiens glandulifera*)

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MANAGEMENT SUMMARY

Ecology and impact of Himalayan Balsam

Himalayan Balsam is a widespread invasive species in Britain, this plant is often associated with riparian habitats, where waterways can provide corridors along which they can spread. Himalayan Balsam is very damaging, causing erosion to river banks, and forming dense stands that increasing likelihood of flooding and reduce or suppress native plants, as well as negatively impacting other biodiversity. As well as outcompeting native plants, it has also been suggested that the nectar-rich flowers may attract pollinators away from native plants, possibly reducing their reproductive success (though this is still debated).

Whilst Himalayan Balsam is an annual plant, its high level of seed production and vigorous seed dispersal means that it is highly invasive. Each plant produces at least 500 seeds, which can be propelled up to 7 metres from the parent plant by seed pods that are explosive to touch.

Effective management: summary

Whilst Himalayan Balsam is an annual plant (it germinates, flowers and sets seed before dying all in the same year), its reproductive strategies make it highly invasive and it can be a very difficult plant to manage. Himalayan Balsam is tolerant of a wide range of soil conditions (it can even grow in bare mud) and semi-shade and it mainly colonises riverbanks and other damp places, such as ditches, wet meadows and waste ground. Like many invasive plants, this species favours site disturbance. Himalayan Balsam grows in dense stands that suppress native flora and it flowers between June and October.

Flowering may vary from season to season and also with microclimate (there is a suggestion, for example, that plants growing at lower altitude or closer to the sea may set seed earlier than plants growing higher up).

When the seed pods mature, they explode when touched, scattering the seed up to 7 metres away. Seeds are also spread by water (or inappropriate waste disposal) and they may remain viable for up to two years. In autumn the Himalayan Balsam plants die back, leaving the banks bare of vegetation and therefore liable to erosion.

Effective management: summary (cont)

To attempt to fully eradicate Himalayan Balsam from a site, a key objective is to exhaust the plant's seed bank. This is done by repeatedly removing adult plants before they set seed. Seed bank longevity is about two years (though some sources suggest as long as three) and control programmes should be undertaken for the whole of this period followed by a five year monitoring programme. It may also be necessary to consider a bankside rehabilitation programme to prevent erosion.

Control of this species should generally be carried out before flowering and it is especially important to carry out any management before seeding. When clearing balsam in early summer, you will often get some new plants germinating later in the summer, so it is important to go back and repeat treatment two or three times before the winter.

Traditional control methods, such as manual removal of Himalayan Balsam has limited scope for eradication on a large scale. However, a concerted effort to control the species with targeted, strategic efforts go a long way towards containing Himalayan Balsam and avoiding further spread. A lot of effort already goes into the management of Himalayan Balsam in the UK; it can be made more successful with more groups working at a joined up catchment based approach. If this species is growing in an adjacent site (consider the explosive nature of the seed pods), or upstream of a site on a riverbank, then no matter how good on-site control is, re-colonisation is likely. An understanding of distribution in the wider area is necessary to determine if eradication or control efforts are likely to be successful. Working in partnership with neighbouring landowners and starting work upstream and then working down is critical when tackling Himalayan Balsam, to prevent re-colonisation.

When planning Himalayan Balsam management, it is best to use a multifaceted and adaptive approach. Try to select control methods that realistically reflect the available time, funding, and labour of the participants, the land use goals, as well as the values of the community and landowners. Management will require dedication over a number of years and should allow for flexibility in method as appropriate. It has been noted by Local Action Groups (LAGs) that Himalayan

Effective management: summary (cont)

Balsam can take longer to control then previous established guidance suggested, so it is important to be conservative when estimating timescales for projects.

Although there are potentially successful manual control options for small patches of Himalayan Balsam, landscape level projects and larger sites will likely require integrating herbicide into the control strategy. A combination of manual and chemical methods is recommended where possible.

It is best to be realistic and strategic when planning Himalayan Balsam management. It is highly unlikely that Himalayan Balsam will be eradicated from England and many sources (see references section) support this fact. This is often because the plant grows in inaccessible areas or sites of high conservation status where chemical and/or manual control is not an option. At this stage of its invasion, it is important that to prioritise areas for eradication work (such as particularly sensitive areas, or areas that have only recently been invaded, or areas with small populations) and focus the rest of our efforts on containment and preventing it from spreading further.

The most widely used approach for the management of Himalayan Balsam tends to be the manual and mechanical control activities – hand pulling and cutting – reflecting the suitability of these activities for volunteers with little or no training, as well as being cost effective. Large scale physical removal can be costly and chemical control requires training, which can also be expensive. Great care needs to be taken with the movement and disposal of cut or hand pulled material and any contaminated soil to avoid further spread. Non-chemical methods are generally suited to smaller, more isolated populations.

MANAGEMENT METHODS

Manual

Hand-pulling

Whilst labour intensive, if done in the correct manner hand pulling can be a very effective strategy where an infestation is relatively low. Pulling should be seen as a constant control mechanism, predicated by monitoring of the site in order to tackle any late germinating or small plants that may have been missed in the initial pulling regime. This method is potentially the gentlest for native species (so a good choice in sensitive areas), but as well as being very time consuming, in areas should occur before the plants have developed seed pods should into the autumn to 'catch' plants which have germinated late or which have been 'hiding' in brambles and scrub.

The Tweed Forum estimated the costs of hand pulling Himalayan Balsam on a 30 mile stretch of river to be in the region of £20,000.

Method: Hand-pulling, prior to seed formation and ensuring that waste material is either dried, burnt or carefully composted. Must be undertaken so that whole plant is uprooted and normally best done if pulled from low down the plant. Himalayan Balsam has a relatively small, shallow root network which is easily pulled out with the rest of the plant if the plant is pulled firmly and steadily from the base of the plant. If snapping occurs at a node the pulling must be completed to include roots. If broken off stems are left (even low down on the plant) then the Himalayan Balsam will re-shoot and send up new flowerheads.

Potential equipment requirements (excluding PPE): wheelbarrows, forks, rakes. Vehicle & trailer if not disposing at site.

Most suitable situation for method: Most effective in areas of sparse/isolated populations of Himalayan Balsam. A good method in sensitive sites if you want to avoid damage to non-target species. If the site is not subjected to seed-fall from upstream or nearby unmanaged Himalayan Balsam, some groups working with this method have claimed control can be achieved in 2 years. Suitable for volunteer groups, but as it is labour intensive, for effective management a number of volunteers will be needed.

Manual (cont)

Efficacy: Good

Constraints: Time-consuming, very labour intensive and requires good access. May be impractical for large populations. It takes a long time to clear a small area. Expensive if carried out by contractors (due to time required). Physically demanding method, so may not be suitable for all volunteers. It can be hard to retain volunteer interest due to the repetitive nature of balsam pulling. Often grows in areas full of brambles, nettles etc. so can be hard work carrying out removal.

Timescale: Hand-pulling could start as early as March, but by May the plants will be large enough to recognise easily. Pulling should continue at least through June, prior to seed formation, though some plants can germinate later in the season so hand-pulling may need to continue through the autumn. The optimum time for control is when the Himalayan balsam is just starting to develop flowering buds.

When to carry out control of Himalayan balsam by hand-pulling (depending on germination)

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Mechanical

Cutting or Mowing

Cutting can be done before the flowering stage in June. Plants must be cut at ground level, below the lowest node. Any cuts above the lowest node will lead to regrowth and re-flowering. Cutting too early will promote greater seed production from the plants that re-grow. Similarly, cutting once the seed-heads have formed will simply distribute them, making the problem worse. Cutting more than once a year might be required. Make sure you place cut Himalayan Balsam material on a surface that is not in direct contact with the ground to avoid regrowing.

Regular mowing is an alternative, though most of these plants would need to be cut beneath the lowest node (any stragglers that have been missed can be hand pulled later), provided the frequency is sufficient to prevent the formation of flowers and seeds. This is best carried out before June for maximum effectiveness.

As with a pulling regime, close monitoring should determine when cutting is needed again to prevent re-seeding. This method will need to be repeated annually until no more growth occurs. It will take several years of this technique to be effective and is likely best done in conjunction with other methods.

Method: Regular strimming, brush-cutting or flailing of stems, prior to seeding. All stems must be completely severed below the lowest node or joint.

Potential equipment requirements (excluding PPE): Strimmer, brushcutter, hook, flail, fork. Vehicle & trailer if not disposing at site

Most suitable situation for method: When tackling large areas where hand-pulling is impractical. In areas where is it acceptable to cause some non-target damage (Himalayan Balsam often grows interspersed with native species).

Mechanical (cont)

Efficacy: Good, if the stems are cut below the lowest node to prevent flowering. Good regeneration and coverage of native species may be achieved following works.

Constraints: Requires good access and appropriate methods for waste management prior to seeding. Inefficient where stems are in small numbers and spread out. On uneven ground it can be difficult to get below the lowest node; node can produce new branches with seeding potential later in season. Plants that grow back can produce more seed than they would if they had not been cut and if cut too early, can regrow rapidly with more flowers and has a bushier plant.

Stems fall readily on cutting; fallen stems may mask those which haven't been cut effectively. Exposes soil to more light and the promotion of further seedlings to germinate; any late emerging plants must be dealt with. When using cutting machinery, training may be required.

When to carry out control of Himalayan Balsam by cutting or mowing

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Chemical

Glyphosate

It is essential that a competent and qualified person carries out the herbicide treatment. Contractors must have the appropriate National Proficiency Tests Council (NPTC) certification (see Health and Safety). They must carefully follow the instructions on the herbicide label and wear appropriate protective equipment. You can only use certain herbicides in or near water, and you need approval from The Environment Agency before you can use these. Other permissions and health and safety requirements may need to be considered. For more information, please see the "Health and Safety" and "Legislation" sections.

The advantages of controlling plants like Giant Hogweed and Japanese Knotweed with glysophate are that the plants are both large and form dense monocultures which lend themselves to spot spraying. Himalayan Balsam is often interspersed with desirable native species, so chemical control needs to be planned more carefully.

Chemical control is often most practical for high density stands of Himalayan Balsam, where cutting or hand pulling would be difficult. Caution should always be taken where potential damage to surrounding vegetation may result from the use of herbicides, as glyphosate is a non-selective herbicide that will kill the plant and others around it. Use of a weed wiper or spot treatment with a hand lance can increase the selectivity of this herbicide (particularly useful in mixed stands). Fitting the hand lance with a guard can direct the spray to the target more accurately. Where a few plants are distributed across a large area, hand pulling can be more effective and prevent damage to non-target species. Where possible, you should avoid the flowering period to protect bees and other pollinating insects.

Anecdotal evidence from the River Tweed Forum found suggests that dilute concentrations of glyphosate were also effective, and in some cases as well as being a significant cost saving, this left non-target vegetation partially intact, helping to prevent further establishment of the balsam.

Chemical (cont)

The only herbicide recommended to use for the control of Himalayan Balsam in England is glysophate. This is also the only active herbicidal ingredient allowed to be used near any water body in the England, including rivers, streams lakes and ponds. Glyphosate is the active ingredient in products such as 'Roundup biactive' and 'Glyphos biactive'. Glyphosate is a translocated herbicide, which means the plant carries the herbicide down to its roots. Many formulations of glyphosate, are suitable for use in or near water, the product is deactivated by micro-organisms in soil, it doesn't leach and it possesses low toxicity to animals. The biactive formulations of glyphosate are generally regarded as the most suitable. Efficacy of Glysophate is thought to be greatly increased with use of the adjuvant Codacide Oil (@ 1 l/ha per Glyphosate @ 6 l/ha in 400 litres of water).

Repeated herbicide treatments over several years are normally recommended for complete control of Himalayan Balsam. It is important that an area that is chemically treated to manage Himalayan Balsam is monitored regularly after it has been sprayed for any signs of regeneration (or plants that have been missed) following the previous treatment. It is also essential to establish vegetation quickly after control measures have been applied. Dense grass sward tends to discourage seed germination. Control should be undertaken on a catchment basis, working from the upstream end to prevent seed recolonisation.

Chemical (cont)

Spraying Young Growth

Glyphosate is usually sprayed onto the foliage of Himalayan Balsam. Beware of drift on to non-target plants and lawns. Select the appropriate nozzle (deflector or even flat fan) and pressure (1 bar). If you are concerned about the risk to other plants, use a weed wiper to apply the herbicide instead of a spray. Note that weed wipers are labour intensive. Do not apply herbicide if rain is imminent or if it is windy. The treatment also needs time to get into the plants, therefore, select a day when the weather is likely to be dry for at least 6 hours after treatment. Spraying both top and underside of leaves improves control.

Method: Glyphosate @ 6 l/ha treatment of young (preferably < 1m) growth, either by weedwipe or knapsack sprayer.

Potential equipment requirements (excluding PPE): Knapsack sprayer

Most suitable situation for method: Large dense infestations, during the initial stages of long-term treatment. Encouraging good sward growth reduces the risk of erosion, so this method is usually replaced by control methods with less non-target damage. Can be useful for spot spraying in hard to access areas. Useful for projects with a limited timescale, as no disposal of treated plants is required, saving time.

Efficacy: Good

Constraints: Requires AqHerb01 approval and NPTC PA1 & PA6 qualifications. Potential non-target damage. Problematic in publicly accessible areas. Application reliant on weather conditions. Spraying as a means of control can result in entire lengths of riparian habitat being inadvertently destroyed, leading to a net loss in habitat and leaving river banks exposed to erosion.

When to carry out controlling Himalayan Balsam with glyphosate

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Environmental

Shading

There is not much empirical evidence on the efficacy of this method and Himalayan Balsam plants are known to be quite shade tolerant. However, anecdotal evidence suggests that maintaining dense, closed vegetation may prevent the establishment of Himalayan Balsam by suppressing the establishment of seed.

For rivers less than 25 metres across, shade limiting 50% of the light has been suggested to be sufficient to reduce plant development (both native and alien) to the point that they no longer create any significant hydraulic modifications.

A proportion of invasions by knotweed and balsams along river banks may be due to management methods for riparian vegetation over a number of decades that removed too many trees from the banks, thus greatly increasing the light reaching the soil and encouraging the establishment of opportunistic species. A return to management techniques allowing the creation of denser riparian vegetation and consequently more shade could contribute to reducing the proliferation of certain plants. However, this would cause major problems for techniques currently used to maintain the edges of aquatic environments involving machines that would be severely inhibited by significant tree growth

However, in many cases, the plant grows on riverbanks, on gravel and areas of river alluvium. In these areas, maintenance of dense vegetation is not possible due to inherent instability of the substrate.

Biocontrol

Rust fungus

In 2014 CABI completed the host-range testing of the Himalayan Balsam rust *Puccinia komarovii* var. *glanduliferae* from India, which proved the rust is a true specialist on its host. In total, 75 plant species of importance to Europe were tested including native, ornamental and economically important plant species. Following a Pest Risk Assessment (PRA) which fully detailed the research conducted on the host range, life-cycle and ecology of the rust and further evaluation (and changes following feedback) by the European Commission's Standing Committee on Plant Health Ministers approved the release of the rust on the 27th July 2014

The rust was released at 3 sites in 2014, and releases have continued in subsequent years (25 in 2015, 10 in 2016 and 22 in 2017) in 12 counties across England and South Wales. The rust was found to spread naturally up to 10 meters from the area of release in the first year. Successful overwintering of the rust has been shown at some sites with the development of good levels of leaf infection during the following growing season. The level of rust infection achieved in the field has improved significantly following a new release protocol and the matching of weed biotypes with rust isolates. Although these are early days, the results are encouraging, and provide evidence that the rust is well capable of establishment in the UK. The spread and impact of the rust will be monitored over the next few years.

The RAPID LIFE Project is funding some further releases by CABI of rust fungus for the control of Himalayan Balsam.

Biocontrol will not cause complete eradication of Himalayan Balsam in Britain. The rust will put natural pressure on it if it establishes successfully in Great Britain – but it won't make it disappear altogether. It is not in its interests to remove its only host. The ultimate aim of CABI's project is to turn the weed from a destructive and expensive environmental burden, into a more manageable plant which poses less of a threat to economic interests and our biodiversity.

For more information please see: https://himalayanbalsam.cabi.org/

Biocontrol (cont)

Grazing

Grazing can be effective if land populated by Himalayan Balsam is not susceptible to erosion (e.g. on bankside vegetation). Grazing is recommended from April right through the growing season and continued until no new growth occurs. Sheep are a good option as they typically graze close to the ground, below the lowest node which will prevent balsam from regrowth and flowering. In grazed fields, Himalayan Balsam is often only found in hedges or behind fences, where stock can't get at it, these areas will still need to be cut or hand-pulled to prevent re-colonisation.

In all cases, it is wise to first research which breed of animal will be best for the particular site, taking into account factors such as the local climate, suitability of the land, range of vegetation and practical aspects (such as safety, fencing and presence of the public).

Method: Using livestock to graze. Sheep are a good option as they typically graze close to the ground, below the lowest node which will prevent balsam from regrowth and flowering. Cattle can also be used, although different breeds have different grazing requirements related to digestibility and energy content. As they are heavier, cattle are more prone to poaching the ground, however, anecdotal evidence suggests they are particularly partial to Himlayan Balsam and so may still be a good choice in some scenarios.

Potential equipment requirements (excluding PPE): Access to livestock and possibly fencing to restrict their movements.

Most suitable situation for method: Grazing can be effective if land populated by Himalayan Balsam is not susceptible to erosion (e.g. on bankside vegetation). Likely to be used in conjunction with other methods.

Efficacy: Moderate, but dependent on site. Grazing is not an eradication tool but is helpful in suppressing the plant and reducing spread.

Biocontrol (cont)

Constraints: grazing animals can poach and erode the ground as well as spread plant fragments, so they need to be managed carefully to ensure that they are suppressing the plant and not causing further spread. This is also worth thinking about as disturbance can even speed up Himalayan Balsam growth and seed production regeneration, so lighter animals, such as sheep or goats may the best livestock option, if they will cause less erosion.

Timescale: Grazing is recommended from March/April right through the growing season and continued until no new growth occurs. Livestock are most likely to eat seedlings before the plant is able to form a threat, i.e. when small.

When to control Himalayan Balsam with grazing:

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Disposal

Ideally cut/pulled/sprayed plants should be left on site, but is crucial to prevent them for re-growing or producing seed. Do not discard plants with developed seed heads.

With a small amount of Himalayan Balsam, it is best to leave plants in an exposed place where it is not in contact with the ground to dry out and die quickly. These plants may need to be scattered, rather than collected into piles for composting, as you want the roots to dry out quickly to kill the plant.

If you have a large amount of waste plants, they can be left in piles to compost if they are securely covered with a tarpaulin to prevent re-growth. Subject to approval by The Environment Agency an option is to bury soil and plant material. Without sunlight, plants cannot survive and seeds will not germinate. Plant material should be buried at least 1 metre below ground level.

If they have set seed, or you do not have access to a membrane for composting or the depth for required for burial, they can be burnt on site, to do this you are likely to require a waste exemption from The Environment Agency.

If you cannot dispose of the plants on site and they need to be transported off site, the material is to be treated as controlled waste and can only go to licensed waste disposal stations (which are limited and will likely charge).

After disposal

Following eradication, you must ensure soil which may contain Himalayan Balsam seeds is not used until the year following the year where no new seedlings appeared.

Once you have successfully removed Himalayan Balsam from a site, the area will be exposed and vulnerable to soil erosion and further invasion. Following the treatment of Himalayan Balsam, it may be advisable to establish a new grass sward immediately after the first treatment of balsam and then keep the grass mown for 2/3 years until all remaining balsam seeds have germinated. Suitable meadow/riparian mix can be used for seeding. Note that chemicals that are persistent in the soil may delay the planting of replacement species. The habitat can be left to recolonise naturally, if erosion can be controlled.

Ineffective or unavailable control

Mechanical

Digging has been used in the past for uprooting large amount of Himalayan Balsam on river banks, but this is not recommended due to the erosion caused by this method and the potential for missing large amount of plant/seed material. In addition to this, a huge amount of contaminated soil then needs to be disposed of.

Chemical

Though stem injection is useful for plants with thick, woodier stems (like Japanese knotweed), this is not an effective method to use for chemical control on Himalayan Balsam

Several other herbicides have been used historically to control Himalayan Balsam such as 2,4-D amine. Apart from glysophate, at present no other herbicides are recommended due the effects they on the surrounding environment and new legislation reflects this, making it very difficult to use this chemical.

Preventing spread

Once escaped in the wild, dispersal of Himalayan Balsam can result from a variety of management and recreational activities. As this species is difficult to eradicate, raising awareness and practicing good biosecurity is key to effective management and preventing further spread. For guidance on this, please follow the Check, Clean, Dry guidance in the link below:

http://www.nonnativespecies.org/checkcleandry/index.cfm

In order to manage Himalayan Balsam successfully at a landscape level, conducting outreach to private landowners and the broader community, as well as recruiting volunteers, is important. Educating people in your community about what Himalayan looks like and the devastating effects that it can have will help to increase reports of new infestations, which are easier to manage when they first occur. Beekeepers will often encourage its growth (due to its nectar rich food provisioning for bees), so these are a good group to target with awareness raising. Other things that can be mentioned in awareness raising include:

- The real and potential financial impact on their property/business and neighbours downstream
- The nuisance impact of Himalayan Balsam on neighbours
- The environmental impact of allowing Himalayan Balsam to grow on their land
- How to correctly dispose of garden waste and contaminated soil
- Potential pathways for this plant to spread

If possible, (particularly if it is a publically used site), it is best to cordon off the infested area and put up a restricted access sign explaining about Himalayan, to avoid dispersing the plant. Access to the Himalayan Balsam should be restricted by installing a fence approximately 3-4m from the nearest plant to create an exclusion zone. Ideally, a Himalayan Balsam management plan can be developed and tailored for the site and key person made responsible for the plan. If possible restrict vehicular access to the site.

Legislation

Himalayan Balsam listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) with respect to England and Wales, making it an offence to 'plant or otherwise cause to grow in the wild'. It is also a listed Species of Union Concern in accordance with the EU Invasive Alien Species Regulation (Regulation EU No 1143/2014) on the prevention and management of the introduction and spread of invasive alien species. There is no legal obligation to eradicate this species from land or to report its presence. However, if this species spreads to the wild or to a neighbour's property then landowners/ managers could be liable.

A useful table covering the main legislation that applies to Himalayan Balsam can be found in the Property Care Association's guidance note on the management of Himalayan Balsam:

https://www.property-care.org/wp-content/uploads/2014/12/PCA-Guidance-Note-on-Himalayan-Balsam-Control.pdf

Himalayan Balsam is also covered by the Environmental Protection Act (Duty of Care) Regulations 1991. Under this legislation, any plant material of these species, and any soil contaminated with them, is classed as "controlled waste". This means that it must be disposed of safely at a licensed landfill site according to the Environmental Protection Act (Duty of Care) Regulations 1991.

Himalayan Balsam is not a notifiable weed. SEPA/ The Environment Agency does not have an obligation to control it. Furthermore, if it is present on your land, you are not legally obliged to remove/control it, but you should try to ensure it does not spread.

Links to other resources on legislation of INNS:

https://www.property-care.org/wp-content/uploads/2015/04/Guidance-Note-on-Legislation-for-Invasive-Non-native-Plant-Species-v5.pdf

http://www.nonnativespecies.org/index.cfm?sectionid=23

Health and Safety

Use of glyphosate requires AqHerb01 approval and NPTC PA1 & PA6 qualifications.

Application to use herbicides in or near water

City & Guilds Level 2 Principles of Safe Handling and Application of Pesticides (PA1)

City & Guilds Level 2 Award in the Safe Application of Pesticides using Pedestrian Hand Held Equipment

Health and Safety Executive Code of Practice for Plant Protection Products

Useful resources and guidance on health and safety when planning a project working with invasive species is available on the GBNNSS website:

http://www.nonnativespecies.org/index.cfm?pageid=266

Acknowledgements

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Environment Agency (2010) Managing invasive non-native plants in or near fresh water.

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ONEMA (2015) Invasive alien species in aquatic environments. In Practical information and management insights. Vol. 2 Management Insights. Emmanuelle Sarat, Emilie Mazaubert, Alain Dutartre, Nicolas Poulet and Yohann Soubeyran (editors)

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Tweed Invasives Forum (2006) The long-term control of Giant Hogweed and Japanese Knotweed: A case study of the Tweed and practical steps to establishing and delivering a successful, long-term control strategy. http://www.tweedforum.org/publications/tweed-invasives

Websites

https://glnp.org.uk/getting-involved/local-surveys/submit-single-sighting.php

http://www.gov.scot/Topics/farmingrural/SRDP/RuralPriorities/Options/Controlofinvasivenon-nati/Himalayanbalsam

https://himalayanbalsam.cabi.org/about/

http://invasivespeciesireland.com/species-accounts/established/terrestrial/himalayan-balsam

http://www.invasivespeciesscotland.org.uk

ww.invasivespeciesscotland.org.uk/himalayan-balsam-impatiens-glandulifera/

http://www.plantlife.org.uk/uk/discover-wild-plants-nature/plant-fungi-species/himalayan-balsam

www.property-care.org/homeowners/invasive-weed-control

http://www.rinse-europe.eu/

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Reducing and Preventing
Invasive Alien Species Dispersal

Where To Go For More Information

http://himalayanbalsamwales.co.uk/himalayan-balsam/control/

http://www.netregs.org.uk/environmental-topics/land/japanese-knotweed-giant-hogweed-and-other-invasive-weeds/#collapse2013

http://www.invasive-species.org/

http://www.europe-aliens.org/

http://www.nonnativespecies.org/beplantwise

http://www.nonnativespecies.org/home

http://www.cabi.org

RAPID

RAPID is a three year EU funded LIFE project led by the Animal and Plant Health Agency (APHA), with Natural England and Bristol Zoological Society as key partners that piloting innovative approaches to Invasive Alien Species (IAS) management in freshwater aquatic, riparian and coastal environments across England. The project is supported by a number of further Technical Partners.

http://www.nonnativespecies.org/rapid

Animal & Plant Health Agency

NATURAL ENGLAND

Bristol Zoological Society

Life

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