Title: Control of invasive non-native species **IA No:** LAWCOM0036 **Lead department or agency:** Law Commission **Other departments or agencies:** Department for Environment, Food and Rural Affairs Welsh Ministers	**Impact Assessment (IA)** **Date:** 11/02/2014 **Stage:** Development/Options **Source of intervention:** **Type of measure:** **Contact for enquiries:** Keith Vincent 020 3334 3876

Summary: Intervention and Options

RPC Opinion:

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB on 2009 prices)	**In scope of One-In, Two-Out?**	**Measure qualifies as**
£m **91.46**	£m	£m		

What is the problem under consideration? Why is government intervention necessary?

The current legal regime for the management of invasive non-native species contains significant gaps. Except in certain sector-specific contexts, the current legislative framework does not allow those charged with the management and control of wildlife to enter privately owned land or premises without the landowner or occupier's consent to carry out operations to manage or eradicate invasive non-native species with the urgency sometimes required. Invasive non-native species can have considerable adverse impact on biodiversity and ecosystem services.

Invasive non-native species can also impose significant economic costs through damage to property, including private property and infrastructure. Government intervention is required in the form of legislation enabling swift access to identified populations to contain the risk of spread.

What are the policy objectives and the intended effects?

The main policy objective is to provide the tools to enable invasive non-native species to be managed effectively. Uneradicated populations may require ongoing containment or may prove to be the source of a future harmful expansion into the wider environment.

The intended effect is to provide a mechanism to manage the risk and associated costs posed by invasive non-native species to biodiversity, the ecosystem and capital infrastructure.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Policy option 0: Do nothing

Policy option 1: Species control order regime. This option provides a graduated regulatory response in order to manage invasive non-native species present on land or premises.

The first stage is that the relevant public body (the Secretary of State, Welsh Ministers, Natural England, Environment Agency, Forestry Commissioners and Natural Resources Wales) should offer a *species control agreement* to the owner or occupier of the affected land or premises. An order may be made where an agreement is impractical or proves not to have been properly performed. The regime provides powers of entry for purposes of investigation and monitoring or to allow the order to be carried out. The regime provides a right of appeal and a right to compensation for those with demonstrable losses.

Will the policy be reviewed? It will not be reviewed. **If applicable, set review date:** /

Does implementation go beyond minimum EU requirements?					
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro**	**< 20**	**Small**	**Medium**	**Large**
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:**	**Non-traded:**	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible : ---------- Date: ----------

Summary: Analysis & Evidence

Policy Option 1

Description:

Species control order regime

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: 45.84	**High: 137.09**	**Best Estimate: 91.46**

COSTS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Cost** (Present Value)
Low				
High				
Best Estimate	Negligible		N/A	**0.17**

Description and scale of key monetised costs by 'main affected groups'

Transitional Costs: Training of enforcement agents ; Administrative costs in setting up a new regime [Public bodies]

On-going costs: Negotiating and drafting a species control agreement/ species control order; operating costs in carrying out an agreement or order: payment of compensation to individuals suffering demonstrable loss. [Public bodies]
Costs of carrying out operations under agreement or order, if imposed on the individual [Members of the public].

Other key non-monetised costs by 'main affected groups'

Loss of property with sentimental value; the compensation scheme proposed does not cover such losses [Members of the public].

BENEFITS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Benefit** (Present Value)
Low	Optional		Optional	**45.96**
High	Optional		Optional	**137.31**
Best Estimate	N/A		N/A	**91.64**

Description and scale of key monetised benefits by 'main affected groups'

There are no transitional benefits

On-going benefits: Savings through the avoidance of costs in managing or eradicating invasive non-native species once established; savings from avoidance or reduction in costs from invasive non-native species' damage to property; savings from avoidance of costs in managing invasive non-native species [Public bodies and member of the public].

Other key non-monetised benefits by 'main affected groups'

Public and private sector

Reduction in the potential for considerable damage to biodiversity and the provision of ecosystem services. Ecosystem services affected can be those needed for critical infrastructure, such as watercourses and/or those used for leisure activities.

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5

Assumptions: Members of the public will not always comply voluntarily with eradication or management regimes; members of the public in control of land cannot always be identified; there are species not present in England and Wales that could be introduced and have a significant negative effect on biodiversity, the provision of ecosystem services and the economy; the cost of intervention is less than the damage caused by invasive non-native species with the probability of its occurrence taken into account.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			**In scope of OITO?**	**Measure qualifies as**
Costs:	**Benefits:**	**Net:**		

Evidence Base

Background

Law Commission wildlife project and the species control report

In July 2011, the Law Commission began a project on wildlife law. Its terms of reference were: *to review the law on the protection, management, usage and welfare of wildlife in England and Wales, and to make recommendations for its simplification and modernisation.*

At the request of the Department for Environment, Food and Rural Affairs we are publishing an early report on one aspect of our review. The report relates solely to our recommendations in relation to species control orders for the control of invasive non-native species. The Department wishes to consider whether this aspect of our final recommendations would be suitable for early implementation.

A provisional proposal to adopt species control orders was included in our consultation paper, published on 14 August 2012.[1] We proposed adopting a regime allowing for agreements and orders to control or eradicate invasive non-native species present on a particular portion of land or premises, modelled on a system put into place in Scotland in 2012.[2] Consultation ran from 14 August to 30 November 2012; the deadline was further extended to 21 December for some respondents. We received 488 consultation responses. We consider some of the responses in respect of species control orders below.

Subject matter

A species is generally considered to be "non-native" where it has been introduced by human agency outside its "natural range". The term "natural range" refers to the natural past or present distribution of a species but for the direct intervention of man.[3] Invasive non-native species are defined by the Invasive Non-Native Species Framework Strategy for Great Britain as those non-native species "whose introduction and/or spread threaten biological diversity or have other unforeseen impacts".[4]

Economic costs arise because invasive non-native species can damage property, affect adversely the proper functioning of services, including critical infrastructure such as watercourses and water treatment plants and damage ecosystem services.[5] "Ecosystem services" have been broadly defined as "the benefits people obtain from ecosystems". These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.[6]

Consultation responses

Consultation responses to the proposed adoption of the model put in place in Scotland were overwhelmingly favourable. A number of stakeholders, including the Countryside Council for Wales[7] and the RSPB, highlighted the absence of effective tools to achieve the eradication or containment of invasive non-native species as a key driver for the reform of the existing regulatory framework. The Hampshire and Isle of Wight Wildlife Trust (New Forest Non-Native Plants Project) told us that the ability of a landowner to refuse to cooperate with an eradication programme and difficulties in tracing landowners have jeopardised the effectiveness of control programmes.

---

[1] Wildlife Law (2012) Law Commission Consultation Paper No 206.

[2] The model in Scotland was the result of amendments made to the Wildlife and Countryside Act 1981 by the Wildlife and Natural Environment (Scotland) Act 2011.

[3] Sixth Ordinary Meeting of the conference of the Parties to the Convention on Biological Diversity, 7 – 19 April 2002 – The Hague, Netherlands, Decision VI/23, ft 57.

[4] Department for Environment, Food and Rural Affairs, *The Invasive Non-Native Species Framework Strategy for Great Britain* (2008) para 3.3.

[5] Invasive non-natives are regarded as posing the second greatest threat to biodiversity after climate change, and can have catastrophic effects on the provision of ecosystem services. Department for Environment, Food and Rural Affairs, The Invasive Non-Native Species Framework Strategy for Great Britain (2008) para 1.2.

[6] The Millennium Ecosystem Assessment Report Ecosystems and Human Well-being: A Framework for Assessment (2005) p 49

[7] Since April 2013, Natural Resources Wales has taken over the functions of the Countryside Council for Wales.

Problem under consideration

The costs of control and the damage (in terms of economic cost and negative effect on biodiversity and the provision of ecosystem services) caused by invasive non-native species increase significantly where such a species establishes a self-sustaining population.

Consequently, where an external threat – a species not previously present in the UK – materialises, the threat needs to be managed swiftly. For example, the Asian hornet (which has a significant impact on honey bee populations) is expected to reach Great Britain in the near future.[8] Swift and effective action, at that point, would be key to preventing its establishment. Similarly, where an established non-native species is identified as a threat, that threat also needs to be controlled; this was the case when it was discovered that the ruddy duck, which is native to the Americas but established in the UK, was having a detrimental effect on the European population of white-headed ducks - a species which is globally threatened with extinction.[9]

While current legal regimes make it an offence to release certain non-native species into the wild,[10] there is no general restriction on holding non-native species, whether or not invasive. Many non-native species are of significant economic and leisure benefit – such as plants used in forestry or recreational gardening – and therefore a general ban on the possession and use of non-native species would not be appropriate.

Currently there are powers available to deal with particular threats. The Plant Health Act 1967, for example, contains an order-making power to authorise the competent authority to enter onto land or into any other premises to destroy certain plant pests or any material infected with plant pests.[11] The scope of the order-making powers under the 1967 Act, however, is limited: they can only be used to control pests and diseases which are injurious to agricultural or horticultural crops, or to trees or bushes. However, there is no generally available power to control invasive non-native species present on land or premises on account of the general environmental or economic threat they pose. This legislative gap can hamper control programmes and lead to significant ongoing costs.

Rationale for intervention

The rationale for intervention arises from the harmful spill-over effects on the economy and the environment that can result from the actions or inaction of individuals.

Effective eradication or control of invasive non-native animals or plants often requires coordinated management measures being carried out uniformly over potentially large areas of land. For the most part access to invasive non-native species can be secured, permitting them to be managed by destruction, containment or other control measures. However, in a minority of cases management is prevented because an owner or occupier of land or premises refuses to carry out the necessary management measures or to grant access to the land or premises for the purpose. Failure to co-operate in an eradication or control programme may have deleterious consequences for the entire programme and result in significantly increased economic and environmental costs.

This is an area where the market will not regulate itself, and state intervention is therefore needed.

Policy objectives

It is ecologically and economically important to seek to eradicate, or otherwise manage, invasive non-native species swiftly and effectively and the regulatory regime should facilitate this. The species control order recommendations seek to fill a gap in the current law of England and Wales: at present there is no general mechanism to compel an owner or occupier to manage or to cooperate with the management of invasive non-native species on land or premises.

---

[8] See http://www.nonnativespecies.org/alerts/index.cfm?id=4 (last visited: 15 January 2014).

[9] The white-headed duck is a globally threatened species with a world population of only 10,000. Around 2,500 of these are found in Spain - the population having recovered from near extinction in the 1970s. The main risk to the survival of the white-headed duck is hybridisation with the introduced North American ruddy duck. Ruddy ducks were introduced to the UK in the 1940s. They established a feral population after some escaped and this numbered 6000 in January 2000. Before the start of the eradication programme in the UK in September 2005 – co-financed by Defra and the EU LIFE-Nature programme – around 95% of the feral European population occurred in the UK.

[10] See, for instance, the Wildlife and Countryside Act 1981, s 14.

[11] Plant Health Act 1967, s 3.

Main stakeholders

The key groups affected by the proposed regime are those involved in the agriculture, horticulture, aquaculture, forestry and construction sectors. The legal regime is also of import to ordinary citizens, for instance those interested in gardening or rearing and keeping exotic birds. The main stakeholders are:

- Relevant regulatory bodies (Defra, Welsh Ministers, Natural England, the Environment Agency, the Forestry Commissioners and Natural Resources Wales)
- Non-governmental organisations and charities with an interest in wildlife conservation;
- Regulatory addressees –
    - individual land owners and occupiers;
    - developers;
    - those involved in trade in or keeping of non-native species (such as the ornamental plant trade)
    - those involved in forestry;
    - those involved in agriculture or aquaculture;
- General public;
- First-tier Tribunal (Environment).

Scale and scope

In the six decades from 1950 to 2010 over 600 non-native species have arrived in Great Britain. The frequency of those introductions has increased significantly in the last 100 years. Not all non-native species, though, are invasive: from a preliminary assessment of the 1849 established non-native species in Great Britain, only 282 species (15%) were found to have either a negative ecological or human impact.[12]

The annual cost of invasive non-native species to the economy is estimated at £1.3 billion in England and £125 million in Wales.[13] These costs relate to control and eradication, structural damage to property or infrastructure and loss of production (for instance in agriculture or forestry) due to the presence of invasive non-native species. There are also prevention costs associated with invasive non-native species, as well as costs associated with repairing damage, research and publicity. The biggest cost is to agriculture, estimated at over £910 million annually in England and Wales.[14] However, there are significant costs to other sectors. For instance, the total estimated cost of invasive non-native species to the construction and development sector, as well as to infrastructure in Great Britain is some £226 million annually.[15] Other direct costs include increased flooding and erosion caused directly by the negative impact of an invasive non-native species on existing ecosystem services.

Below we set out the current economic costs of two invasive non-native species: Japanese knotweed and the ruddy duck.

Costs of two examples of invasive non-native species

Example 1: Japanese knotweed

Japanese knotweed was introduced to Britain from Japan as an ornamental garden plant in the mid-nineteenth century. It has become widespread in a range of habitats, particularly roadsides, riverbanks and derelict land; it causes serious problems by displacing native flora and causing structural damage. The total annual cost of Japanese Knotweed in England and Wales has been estimated at over £160 million.[16]

[12] H E Roy and others, *Non-native species in Great Britain: establishment, detection and reporting to inform effective decision making* (2012) pp 5-6.

[13] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010), p 11.

[14] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010), p 11.

[15] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010), p 129.

[16] Williams and others, *The economic cost of invasive non-native species on Great Britain* (2010), p 41.

Table 1: Total annual costs of Japanese Knotweed

	England	Wales
Local authorities	£270,000	£66,000
Research	£319,000	£19,000
Railways	£1,726,000	£100,000
Roadsides	£3,901,000	£438,000
Riparian	£3,444,000	£469,000
House devaluation	£963,000	£56,000
Development	£141,358,000	£7,644,000
Householders	£383,000	£23,000
Total	£152,364,000	£8,815,000

Source: F Williams and others, *The economic cost of invasive non-native species on Great Britain* (2010)

It has been estimated that there are 12,845 development sites in England and Wales with Japanese knotweed treatment requirements. The average annual cost per site associated with Japanese knotweed control is estimated at £11,600. The total annual cost of Japanese Knotweed on development sites in England and Wales is some £149 million.[17]

Example 2: Ruddy duck

The ruddy duck is a North American bird introduced to the UK over 60 years ago. A small number escaped from captivity and formed a feral population which, at its peak in 2000, numbered around 6000 birds.[18] Ruddy ducks present no threat in the UK. However, in the early 1990s, ruddy ducks (almost certainly originating from the UK) began to appear in Spain where they hybridised with the native white-headed duck. In the long-term, hybridisation could lead to the extinction of the white-headed duck.

After conducting research into the control of ruddy ducks, the Food and Environment Research Agency (FERA) found that control measures costing £300,000 annually were sufficient to prevent further increase in population numbers but not sufficient to bring about a reduction.[19] Following several years of research into the most effective methods, an eradication programme for ruddy ducks in the UK began in September 2005.

By the end of the EU LIFE-funded eradication programme in March 2011, the UK ruddy duck population is thought to have fallen to around 100 birds, a number of which were often to be found on land whose owners or tenants place a number of restrictions on control, including those who refuse to allow any control. The total cost of the LIFE-funded programme was £3.3 million. Since then numbers have fallen to around 40 birds, and on-going costs (£470,000 for the period April 2011 to March 2014) have been covered by Defra.

Estimated costs by sector

In a report prepared for Defra, the Scottish Government, and the then Welsh Assembly Government, Williams and others estimated the following as the annual costs to the economy of invasive non-native species. It is worth noting that the figures include some species that have been established for a considerable time (such as rabbits) and that in some cases (such as deer) it is difficult to distinguish between the cost of damage caused by non-native and costs caused by native plants or animals.

[17] Williams and others, *The economic cost of invasive non-native species on Great Britain* (2010), p 35.

[18] See http://www.nonnativespecies.org/index.cfm?pageid=244 (last visited: 27 January 2014).

[19] Information supplied by FERA.

Table 2: Estimated total cost of invasive non-native species in England and Wales by sector

Sector	England	Wales
Agriculture	£839,189,000	£71,110,000
Forestry	£45,780,000	£14,950,000
Quarantine and Surveillance	£14,523,000	£1,956,000
Aquaculture	£4,370,000	£2,053,000
Tourism and Recreation	£78,920,000	£5,759,000
Construction, Development, Infrastructure	£194,420,000	£11,078,000
Transport	£62,894,000	£8,768,000
Utilities	£8,515,000	£483,000
Biodiversity and Conservation	£11,176,000	£6,218,000
Human Health	£37,844,000	£5,816,000
Total costs	**£1,291,461,000**	**£125,118,000**

Source: F Williams and others, *The economic cost of invasive non-native species on Great Britain* (2010), p 189. (Note, the total costs given take into account some double counting in the sectors above. They are not, therefore, a mathematical total of the figures by sector).

Cost of state intervention

In table 3 below we outline the costs of eradication at different stages. So, for example, the estimated cost of eradication operations in respect of the Asian long-horned beetle (which attacks hardwood trees) would be £34,000 if carried out early, but £1,316,426,000 if carried out later, not including losses resulting from damage or destruction of trees.

Table 3: Cost of eradication by species (2010)

Species	Control stage	Cost
Asian long-horned beetle	Early stage eradication	£34,000
	Late stage eradication	£1,316,416,000
Carpet sea squirt	Early stage eradication	£2,356,000
	Late stage eradication	£927,608,000
Water primrose	Early stage eradication	£73,000
	Late stage eradication	£241,908,000
Grey squirrel	Early stage eradication	£440,000
	Late stage eradication	£850,734,000
Coypu	Mid stage eradication	£4,700,000
	Late stage eradication	£18,800,000

Source: F Williams and others, *The economic cost of invasive non-native species on Great Britain* (2010), p 184.

Regulatory bodies involved:

The main regulatory bodies involved in the management of invasive non-native species are as follows:

1. Department for Environment, Food and Rural Affairs (Defra)

Defra is the Government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom. It makes policy and legislation, and works with others to deliver its policies, in areas such as the natural environment, biodiversity, plants and animals; sustainable development and the green economy; food, farming and fisheries; animal health and welfare; environmental protection; pollution control; and rural communities issues. Although Defra only works directly in England, it works closely with the devolved administrations in Wales, Scotland and Northern Ireland.

2. Welsh Ministers
Nature conservation is a devolved matter. Like Defra, the Welsh Ministers make policy and legislation in areas such as farming; animal health and welfare; protection, conservation and management of the environment; forestry; food and fisheries.

3. Natural England
Natural England is the non-departmental public body of the UK Government responsible for ensuring that England's natural environment is protected and improved.

4. Environment Agency
The Environment Agency plays a central role in implementing the Government's environmental strategy in England. Its overarching purpose is to "to protect or enhance the environment, taken as a whole" so as to promote "the objective of achieving sustainable development".[20] It is the regulatory authority in England for a wide range of environmental protection legislation.

5. Forestry Commission England
The Forestry Commission England is both a non-ministerial Government department and a statutory body with a board of Commissioners. Under the Forestry Act 1967, it is charged with the general duty of promoting the interests of forestry, the development of afforestation and the production and supply of timber and other forest products.[21] Its general functions include the protection of trees from pests and diseases, the protection and restoration of forest habitats, the management of woodland and creation of new forests. The Forestry Commissioners for England have regulatory powers to control the felling of trees and are the responsible authority for the implementation and enforcement of plant health legislation relevant to forestry.

6. Natural Resources Wales
Natural Resources Wales is the principal adviser to the Welsh Government on wildlife, environmental protection and sustainable development. It has taken over the functions of the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales, as well as some functions of Welsh Government. It is the regulatory authority in Wales for a wide range of environmental legislation, including waste, industrial pollution, water resources, commercial fisheries, habitats and wildlife conservation and management. For most of the above activities Natural Resources Wales is responsible for granting permits, undertaking compliance assessment and taking formal enforcement action.

Micro-businesses
Micro-businesses are included in the scope of the proposed legislative framework as to exclude them could lead to significant gaps in the system. For example, 92.7% of the turnover of the agriculture, fishing and forestry sectors is produced by small and medium enterprises, the great majority of which are micro-businesses.[22] The manner in which invasive non-native species spread and the environmental consequences of their doing so mean that it is necessary to include micro-businesses. As explained above, lack of access in relatively small areas may significantly jeopardise eradication efforts. Adverse effects on businesses would be mitigated by the requirement to take into account the ability to pay of the addressee of a species control order when allocating eradication or control costs and by the compensation scheme outlined below.

[20] Environment Act 1995, s 4.

[21] Forestry Act 1967, s 1.

[22] Department for Business Innovation and Skills, *Business Population Estimates for the UK and Regions 2013* (2013) p 11, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254552/13-92-business-population-estimates-2013-stats-release-4.pdf (last visited: 21 January 2014). See also Independent Panel on Forestry, *Progress Report* (2011) p 19, available at http://www.defra.gov.uk/forestrypanel/files/Independent-Panel-on-Forestry-Progress-Report.pdf (last visited: 21 January 2014); and Commission for Rural Communities, *Rural micro businesses: what makes some thrive in a challenging economic climate?* (2011) p 13, available at: http://www.defra.gov.uk/crc/files/Rural-micro-businesses-what-makes-some-thrive-in-a-challenging-economic-climate2.pdf (last visited: 21 January 2014).

Option Description

The following two options have been considered:

- Option 0 – Do nothing
- Option 1 – Species Control Order regime

Option 0: Do nothing

This option would mean retaining the existing system. The current regime lacks the power to ensure that management or eradication measures can be carried out on land or premises. Whilst a programme can be largely effective, as most owners or occupiers do not wish to have invasive non-native species on their land or premises, some can be recalcitrant. Sometimes the process of negotiating access can lead to delay in the control of an invasive non-native species, which reduces the efficacy of control measures and may impose additional costs. Sometimes, no owner or occupier can be identified, and therefore an agreement to carry out works or operations cannot be made – and there is generally no other power to conduct the work.

In the ruddy duck eradication programme explored above, and in relation to monk parakeets, the lack of powers of entry has resulted in pockets of the species continuing to exist. Such pockets represent an ongoing risk to biodiversity, the environment and the economy. Resources have to continue to be allocated to their control – for instance, by monitoring and capturing those that spread.

The ongoing annual cost of parakeets (including the monk parakeet and the more widespread ring-necked parakeet) to the British economy, in terms of damage caused rather than control costs, is estimated at £38,000 per year. In the cases of species such as the carpet sea squirt, the figure is £107,000 per year; for the grey squirrels, the annual cost is estimated at £14 million.[23]

Option 1 – Species Control Order regime

The proposed regulatory regime would be additional to existing powers and provide generally for the management or eradication of invasive non-native species present on land – giving powers to enforce a management or eradication policy:

- *Investigation*: the provisions allow the relevant body to enter land or premises for the purpose of investigating whether a species outside its natural range is present;
- *Species control agreements*, made between the relevant body and the owner or occupier of land or premises on which invasive non-native species are present, govern the carrying out of operations to control or eradicate the species;
- *Species control orders*: if a species control agreement is impractical, cannot be agreed or is not carried out, the relevant body can make a species control order, specifying operations to control or eradicate invasive non-native species to be carried out on the land or premises in question.
- *Enforcement*: if the species control order is not complied with, then the relevant body can carry out the operations itself, or arrange for them to be carried out.

The investigation stage can be dispensed with where it is not necessary. Species control agreements can be dispensed with in an emergency, when a species control order can be used to enable operations to be carried out on land directly by the relevant body or persons designated by it.

Protection for individuals

The regime proposed would, ultimately, allow for entry onto land and the destruction or removal of species that are otherwise lawfully held. We, consequently, think that there should be the following legal features to the regulatory regime which would protect individuals.

Establishment of invasiveness

Not all non-native species are a risk. Some, in fact many, are of considerable use and benefit to both the economy (in particular the agricultural economy) or to individuals pursuing leisure activities (gardening, for instance). The regulatory regime proposed would require the relevant public body to demonstrate that the non-native species in question was also a threat to biodiversity or other environmental, social or economic interests.

[23] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010) p 191.

Need to show proportionality
We have concluded that the decision-maker should be satisfied that the interference with the legitimate interests of a person affected by an order or agreement is proportionate to the outcome the action seeks to achieve.

The requirement that a measure be proportionate necessarily implies that each operation required to be undertaken, or prohibited, by the order must be proportionate. An operation will only be proportionate if the importance of the aim justifies it and it is the least intrusive method for achieving the necessary end.

Right of appeal
Those affected by a species control order should have a right of appeal to the First-tier Tribunal (Environment).

Allocation of eradication or control costs
In determining whether to make provision for the payment or recoupment of costs the decision maker will be under a statutory obligation to consider the conduct of the owner or occupier of the relevant land or premises (whether the owner or occupier is responsible for the presence of the invasive non-native species in the relevant area).

Compensation
Compensation should be payable to those who suffer demonstrable financial loss under the regime.
There are two categories of compensation we recommend being paid:
(1) where an individual is deprived (either through removal or destruction) of an invasive non-native species having a monetary value and otherwise lawfully held or present on land or premises, including business losses flowing directly from that deprivation;
(2) where an individual is deprived of property or property is damaged in consequence of carrying out operations required by either a species control agreement or order, such as the removal of trees containing an invasive beetle or other works on the land or premises required by control operations.

Cost-benefit analysis

This impact assessment identifies both monetised and non-monetised impacts of intervention over a time period of 10 years. The aim is to set out our understanding of the overall impact on society and the wider environment. The costs and benefits of option 1 are measured against the "do nothing" option.

Impact assessments place a strong emphasis on valuing the costs and benefits in monetary terms. However there are important aspects that cannot sensibly be monetised. These might include impacts on equity and fairness, either positive or negative, or enhanced (or diminished) public confidence.

When calculating the Net Present Values (NPVs) for the impact assessment we have used a time frame of ten years, with 2013 being year 0. We have assumed that the transitional costs and benefits occur in year 0, and ongoing costs and benefits accrue in years 1 to 10. A discount rate of 3.5% has been used in all cases in accordance with Green Book guidance. Unless stated, all figures are at 2013 values, and have been uprated using the GDP deflator.

Option 0 – Do nothing

Costs

Incomplete eradication under the current regime gives rise to ongoing costs of long term control, which are in turn increased by the inability to reach pockets of the species where landowners or occupiers of land refuse to cooperate. Continuation of the current regime could, therefore, lead to the replication of costs on a similar scale to those of Japanese knotweed – though the risk of such occurring cannot be calculated accurately.

The total cost to the economy of invasive non-native species is estimated at £1.3 billion in England and £125 million in Wales, excluding the materialisation of new risks.[24] Future costs caused by the invasive non-native species not currently present in England and Wales are difficult to monetise but likely non-monetised costs would include damage to existing property and infrastructure, as well as wider damage

[24] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010), p 11.

to the environment and the provision of ecosystem services. Some of these costs could be avoided in future by more thorough control operations than option 0 permits.

For example, the ongoing cost of control in England of monk parakeets, whose eradication is frustrated by option 0, is estimated below as £50,000 per year.[25]

Option 1 – Species Control Order regime

We do not anticipate that species control orders will be used frequently. For the most part, the early eradication of a potentially very high cost invasive non-native species will be possible with the willing co-operation of landowners.

However, if special control orders are necessary for the control or eradication of an invasive non-native species, then the benefits of the regime could be considerable.

In order to seek to capture this, we consider below the costs and benefits of early eradication and late eradication for moderate and high cost invasive non-native species events, using figures obtained for known species as a proxy. The total costs and benefits of an eradication scheme have been adjusted to take into account the likelihood of an arrival occurring and the likelihood that species control orders are needed in order to achieve effective eradication.

Costs

Transitional Costs

1. Setting up a new regime

We are proposing to introduce a new regime of control agreements and orders that will enable appropriate bodies (Secretary of State, Welsh Ministers, Natural England, Natural Resources Wales, Environment Agency and the Forestry Commissioners) to make orders which enable or require control or eradication on measures on land or premises where an invasive non-native species is present. These bodies are already involved in this task. We do not, therefore, see significant administrative costs in setting up the new regime.

On-going Costs

2. Cost of management or eradication operations.

The additional element in Policy option 1 is the cost of managing or eradicating invasive non-native species under a species control agreement or species control order which the relevant body is unable to do under Policy option 0.

In order to posit a range for the cost-benefit analysis of the species control regime proposed, we consider an existing invasive non-native species and two categories of future invasive non-native species: moderate impact (those, such as the monk parakeet, where populations can be managed); and, high impact (those, which can have a considerable negative economic and environmental effects, such as the Asian long-horned beetle).

In order to assess the costs and benefits of species control orders for the control or eradication of invasive non-native species already established, we consider as an example the monk parakeet. There are existing populations that species control orders could assist in controlling. The chance of establishment is therefore 1 (100%) and we consider the potential need for a species control order as between 0.8 and 1 (or 80% to 100%), as the inability to control the remaining population is due, in large measure, to the absence of a power to enter the land or premises of landowners or occupiers who are unwilling to cooperate with the eradication programme.

In considering future threats, we work on the basis that there are estimated to be about 10 new non-native species arriving every year, of which 1 is invasive.[26] We, therefore, assume that there is 1

[25] Defra (2013).

[26] H E Roy and others, *Non-native species in Great Britain: establishment, detection and reporting to inform effective decision making* (2012) pp 5-6. This study found that currently an average of around 10 new non-native species arrive in Great Britain every year, and shows that the trend is likely to increase in the future. The study also found that 15% of non-native species that become established in Great Britain have a significant negative environmental or human impact. As not all new non-native species arriving in Great Britain establish a self-sustaining population, we have considered that the arrival of 1 moderate impact invasive non-native species requiring eradication and control measures every year to be an adequate estimate for the next ten years.

moderate eradication programme per year. We use the monk parakeet as the proxy for such a moderate cost invasive event.

We also need to consider the possibility of a high impact event, such as a future arrival of a non-native species with an invasiveness comparable to Japanese knotweed. We estimate that such an event could occur up to once every 5 years, and the frequency of invasive events is increasing – partly due to globalisation. However, for the purposes of this impact assessment, we are use the conservative assumption that a high impact arrival occurs once every 10 years. As a proxy for a high impact event, we use the figures for the Asian long-horned beetle.[27] Asian long-horned beetles attack and kill hardwood trees.[28]

Whilst this gives the probability of an event, it does not take into account whether a species control order is required. First, we expect that most owners or occupiers would comply with an invasive non-native species eradication programme. Second, there may already be powers of entry available under other regimes.

There have been significant access issues with three out of the six invasive non-natives species that are priorities for eradication currently (the ruddy duck, the American bullfrog and the monk parakeet). There are no access issues for the African clawed toad and water primrose, and there are powers of access available for the topmouth gudgeon in other regulatory regimes.[29] In the case of both moderate and high impact events, we estimate the probability that a species control order would be needed as between 0.05 and 0.15 (or a chance of them being needed at between 5% and 15%).

Control or eradication of existing invasive non-native species – Monk parakeet
There were estimated to be about 100 wild monk parakeets in 2011.[30] In 2002, the cost of removing a nest and controlling the occupants was estimated at $1500 per nest and occupants in the US.[31] The equivalent value in 2013 would be approximately £1207.[32]

Assumptions:
- Expansion of the population equates to 100 nests and occupants.
- Similar control costs exist between the two different territories [US and England/Wales].
- Monk parakeets are controlled in year 1.

Table 4: Monk parakeet – Total control cost

	Cost (£)
Control cost per nest	£1,207
Total control cost of 100 nests [@ £1,207 x 100]	£120,700
Present value of control cost in year 1 @3.5%	£116,618

[27] Note that the Asian long-horned beetle has been listed as a plant pest under the Plant Health (England) Order 2005 SI No 2005/ 2530 (as amended) and the Plant Health (Wales) Order 2006, SI 2006 No 1643 (W.158), as amended, issued under s 3 of the Plant Health Act 1967. Those two Orders, therefore, already provide the competent authority with broad powers to control the import and the spread of that particular pest. The figures, therefore, are merely used as proxies for a potential invasion from a species that could not be fully controlled through the existing regulatory framework.

[28] http://www.nonnativespecies.org/home/index.cfm (last visited 22 January 2014).

[29] GB Non-native species secretariat.

[30] http://www.birdwatch.co.uk/categories/articleitem.asp?item=758.

[31] ML Avery and EC Greiner, *Monk Parakeet Management at Electric Utility Facilities in South Florida* (2002) Wildlife Damage Management, Centre for USDA National Wildlife Research, Staff Publications, pp 140-145.

[32] Based on rate of exchange for end of December 2002 of £1.00 = US$1.6118 found at http://www.imf.org/external/np/fin/data/rms_mth.aspx?SelectDate=2002-12-31&reportType=REP

We estimate that the likelihood of the species control order regime being required is between 0.8 and 1. Therefore the range is as follows:

Existing Monk parakeet	Low (0.8)	High (1)	Best (0.9)
Cost (£)	93,294	116,618	104,956

Moderate impact future invasive non-native species events

We consider the costs of control in dealing with one moderately invasive non-native species per year. In table 3 above, we set out the cost of different early stage eradications. The lowest figure is for the Asian long-horned beetle, estimated at £36,124 in 2013 prices.[33] We use this figure as a useful proxy for the bottom end of the range for controlling or eradicating a single invasive event. Earlier we derived the cost for the eradication of the monk parakeet, at £120,700 in 2013 prices. This figure was derived from managing or eradicating monk parakeets from 100 nests. This, we suggest, is a useful proxy for the upper end of the range for controlling or eradicating a single invasive event. Taking the simple average, this gives a figure of £78,412 per year for a moderate impact event.[34] The species control orders will not be necessary in most situations. We assume that the probability of species control orders being necessary for comprehensive eradication is between 0.05 and 0.15. Table 5 below gives the annual cost for a moderate impact invasive non-native species events and the present value over 10 years.

Table 5: Cost of moderate impact future INNS events

Moderate impact	Low estimate (0.05)	Best estimate (0.10)	High estimate (0.15)
Annual cost of control adjusted by probability of occurrence	£3,921	£7,841	£11,762
Present value over 10 years	£32,606	£65,212	£97,818

High impact future invasive non-native species event

There is the possible future high impact event to be considered. To calculate this, we use the Asian long-horned beetle as the proxy, and assume that there will be one high impact event in the 10 years. The cost of early stage eradication of the Asian long-horned beetle was estimated at about £36,124. We assume that the probability of the event occurring is distributed evenly across the 10 years, such that 0.1 of the total cost (£3,612) is the cost attributed to each of the years 1 to 10. The present value over 10 years is, therefore, 10 years of £3,612 in each of the years, adjusted to give the present value, which gives £30,040. Assuming that the probability of species control orders being necessary is between 0.05 and 0.15, the control costs over 10 years are as follows.

High impact	Low (0.05)	Best (0.10)	High (0.15)
Cost (£)	1,502	3,004	4,506

Total costs

Taking the sum of the total estimated eradication costs for existing and future invasive threats, the total eradication costs under option 1 are as follows:

	Low	**Best**	**High**
Cost (£)	**127,402**	**173,172**	**218,942**

2. Compensation

We do not think that the compensation scheme would create a significant burden on public finances. Most invasive non-native species are of no value to the owners or occupiers of land on which they are present, and their presence may well detract from the value or utility of land. Invasive animals or plants are generally a pest.

Moreover, in many cases the animals or plants to be controlled or eradicated will be wild (such as many non-native deer or wildfowl) and/or not present as a result of the wish of the owner or occupier (including invasive plants that have invaded land). No property right normally attaches to wild animals.

[33] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010) p 172.

[34] Note that this figure is based on the average between the highest and lowest

In some cases, however, invasive non-native species may currently be held for private use or traded lawfully in the course of a legitimate business. In such cases, we recommend that compensation should be paid. The compensation payable would be the market value of the lost asset, and the lost business associated with the destruction or removal, but not the sentimental value of any animal or plant destroyed or removed.

We cannot, however, monetise future compensation costs generally, given the indeterminate nature of the threat presents and the discretionary nature of species control orders.

Monk parakeets
In the case of monk parakeets, we estimate that the cost of compensation could be as much as £250 per bird where it is necessary to kill or remove a monk parakeet. However, we would expect most of the parakeets controlled to be regarded as wild and therefore no compensation would be payable.

Asian long-horned beetle
The cost of compensation for the loss of profits, where trees are felled due to Asian long-horned beetle, was not included in the cost of eradication used above. However, the cost of replacing trees uprooted, some of which but not all would have no value due to the infestation, was included in the figures above.[35] This is also true in the case of figures for late stage eradication, considered below. We have not included compensation costs in our assessment.

3. Costs of species control agreements and orders
The Scottish Government estimated that the administrative task of site visits, meetings and drawing up and issuing an order would be between £200 and £1,000 per order.[36] No estimate of the cost of entering into an agreement was given. We imagine that it would be slightly lower.

Monk parakeet, Asian long-horned beetle
We have not estimated the number of orders needed, or of agreements that might only be concluded because of the existence in the background of the order-making power.

4. Appeals
There would also be possible costs to the Courts and Tribunals Service, as there would be appeals against species control orders. We do not expect these to be substantial, given that few orders are expected, and not all of those are likely to be appealed.

Monk parakeet and Asian long-horned beetle
We have not estimated the number of appeals for the purposes of establishing a range of costs for the current IA.

Benefits

Transitional benefits

There are no transitional benefits.

On-going benefits

1. Avoidance of future control costs

Future control costs arise when it is necessary to destroy specimens of an invasive non-native species which escape from an established population, where the population has become established on land or premises to which the authorities cannot gain access. These ongoing costs are therefore a consequence of the inability to eradicate the established population.

For the two examples we set out above, those costs are as follows.

Control or eradication of existing invasive non-native species – Monk parakeet
The current estimate for the annual ongoing management costs is approximately £50,000 per annum. Complete eradication, we assume, will remove these control costs. Taken over the 10 years, the present value of that benefit is £415,830.

[35] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010) p 178.

[36] Scottish Government, Explanatory note accompanying Wildlife and Natural Environment (Scotland) Bill (2010-11).

We estimate that the likelihood of the species control order regime being required is between 0.8 and 1. This differs from the 0.05 to 0.15 used for unknown future events, as the potential need for a species control order has been established in the context of the current eradication programme. Therefore the range is as follows

Existing Monk parakeet	Low (0.8)	Best (0.9)	High (1.0)
Benefit (£)	332,664	374,247	415,830

Moderate impact future invasive non-native species event
We estimate the annual ongoing management costs for a moderate value invasive non-native species event to be the same as those for monk parakeets, at approximately £50,000 per annum. Complete eradication will remove these control costs.

The benefit, though, is cumulative from each of the yearly eradications. So, in year 1, as the effective management of invasives avoids the future management costs of one invasion, the figure is £50,000. In year 2, the ongoing management costs of two invasions have been avoided, and, therefore, the figure is £100,000. In year 3, three have been avoided and, consequently, the benefit is £150,000.

Taken over the 10 years of this impact assessment, the present value benefit is £2,169,283.

Assuming that the probability of species control orders being necessary is between 0.05 and 0.15, then the figures for avoided control costs over 10 years are as follows.

High impact	Low (0.05)	Best (0.10)	High (0.15)
Benefit (£)	108,464	216,928	325,392

High impact future invasive species event
If it is impossible to eradicate an initial invasion of a species comparable to the Asian long-horned beetle, such that it becomes widespread over England and Wales, infesting existing hardwood forests, then the cost of eradication rises dramatically from that considered earlier to £843,743,107 in England and £141,360,102 in Wales, coming to a total of £985,103,209 for England and Wales. These figures were for 2010, and come to £1,046,651,657 in 2013.[37]

This figure is an underestimate, as it does not include the eradication of the beetle from habitats other than forestry where it may reside, such as hedgerows.[38]

We assume that the proposed species control regime would enable early stage eradication to tackle effectively the presence of a species comparable to the Asian long-horned beetle, and therefore avoid the need for late stage eradication of the pest. The monetary benefit is therefore the avoidance of expenditure on late stage eradication.

We took the likelihood of an event occurring as evenly distributed over 10 years, with 0.1 probability of occurrence in each of the years 1 to 10 (£104,665,168). This gives a present value benefit of £870,458,893.

Assuming that the probability of species control orders being necessary is between 0.05 and 0.15, then the figures for control costs over 10 years are as follows.

High impact	Low (0.05)	Best (0.10)	High (0.15)
Benefit (£)	45,522,945	87,045,889	136,568,835

Total benefits
Taking the sum of the total estimated benefits over 10 years from the avoidance of future control costs in relation to existing and future threats, the total benefits from avoidance of future control costs of option 1 are as follows:

	Low	**Best**	**High**
Benefit (£)	**45,964,073**	**91,637,065**	**137,310,057**

[37] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010) p 173.
[38] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010) p 173.

2. Avoidance of future damage

The proposed regime would also play a part in reducing the costs imposed on particular economic sectors, especially in the agriculture, forestry and construction sectors, by allowing for a complete programme of eradication or management – thereby removing any potential pockets of invasive non-native species which may subsequently spread into the wider environment. The avoidance of future damage includes damage to biodiversity and ecosystems which provide valuable services, such as the supply of essential material (drinking water) or land visited for tourism or used for leisure activities.

Monk parakeet

Currently, there are no separate figures for ongoing damage caused by monk parakeets. The annual figure for damage by parakeets is £40,374, but this figure includes damage caused by the more widespread and numerous ring-necked parakeets.[39] We are not able to give a distinct figure for damage caused by the monk parakeet.

Asian long-horned beetle

Working from the estimate in Williams and others (2010), the equivalent figure for England and Wales at 2010 values would be £325.29 million. It is not, though, possible to distinguish the cost of Asian long-horned beetle from others invasive wood boring insects and therefore the figures have not been included in the cost benefit analysis. They would, however, be considerable.

CONCLUSIONS

First we set out the specific figures based on the analysis above, in order to establish a range and some tentative figures for the costs benefit analysis. We then draw some wider conclusions as to the benefits of the species control order regime proposed.

Overall range[40]

	Low	**Best**	**High**
Cost (£)	**127,402**	**173,172**	**218,942**
Benefit (£)	**45,964,073**	**91,637,065**	**137,310,057**
Net Benefit (£)	**45,836,671**	**91,463,893**	**137,091,115**

General conclusions

The benefit of having a regime that facilitates the effective control and/or eradication of invasive non-native species clearly outweighs the potential costs.

The nature of the risk proposed by invasive non-native species can be such that even a small population may have to be managed, and the invasive species creating the risk eradicated or otherwise controlled. This would not be the case for all non-native species, and the regulatory regime proposed requires that measures taken are proportionate.

The regulatory regime under which those public bodies tasked with protecting the environment work should provide a full range of regulatory tools allowing for risks to be managed appropriately and effectively. That is currently not the case.

Though our estimates of costs and benefits are necessarily tentative, we cannot envisage the additional costs arising out of our proposed regime coming anywhere near the potential cost savings achievable through effective early intervention or through complete eradication, avoiding the ongoing costs of control if pockets of invasive non-native species are left uncontrolled under the current regime.

The regime proposed will potentially impose costs on individuals. However, the control mechanisms, proportionality and the requirement to consider the conduct of the individual concerned, limit this appropriately.

[39] Williams and others, *The Economic Cost of Invasive Non-Native Species on Great Britain* (2010) p 191.

[40] Note that this table only includes costs and benefits that we were able to monetise: the costs of eradication and the benefits from the avoidance of future control costs over a 10 year period. This table does not take into account, for instance, the administrative costs of species control orders and the potential downstream economic benefits of early eradication through species control orders and agreements.