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COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

Proposal for a Council and European Parliament Regulation on the prevention and management of the introduction and spread of invasive alien species

This report commits only the Commission's services involved in its preparation and does not prejudge the final form of any decision to be taken by the Commission

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Contents

1. INTRODUCTION

Alien species are species that are transported, outside of their natural range across ecological barriers, due to direct or indirect human action. Some of these species cannot adapt to the new environment and die out quite rapidly, but others may survive, reproduce and spread. A percentage of the species that become established can have a significant negative impact on the ecology of their new location as well as serious economic and social consequences: these are the **Invasive Alien Species (IAS)**. It has been estimated that of the **12,046 alien species** present in the European environment[1], **10-15 %** have reproduced and spread and **cause environmental, economic and/or social damage**[2].

IAS have significant consequences for biodiversity and are considered to be second in importance only to habitat loss as a **driver of biodiversity loss and recognised as being a major cause of species extinctions**[3]. It is expected that biological invasions in Europe will only increase[4]. When it comes to social and economic impacts, IAS can be **vectors of diseases or directly cause health problems** (e.g. asthma, dermatitis, allergies). IAS can **damage infrastructure and recreational facilities and hamper forestry or cause agricultural losses**, to mention but a few examples. IAS are estimated to have **cost the EU at least €12 billion/year** over the past 20 years[5], and the damage costs continue to increase.

Invasive Alien Species may be introduced for a purpose or come into Europe accidentally, through different pathways[6]. Roughly one quarter of the IAS already present in Europe were intentionally introduced: they were traded for a purpose, e.g. as ornamental plant species, as pet species, for forestry or agriculture or as biocontrol agents. They had therefore an economic value or yielded certain benefits that made them desirable[7]. The remaining three quarters of IAS came into the EU unintentionally, i.e. accidentally either as contaminants of other commodities (e.g. ragweed seeds in bird feed mixtures) or as "hitchhikers" and "stowaways" linked to people travelling or transport vectors (e.g. organisms introduced via ballast water).

Seeing the economic damage they cause, Member States are taking a number of measures to tackle IAS, at an expense of around €1.4 billion/year. Action is **predominantly reactive**, seeking to minimise the damage already being caused without sufficient attention to prevention or to detect and respond to new threats. **Efforts are fragmented, not covering all EU and often poorly co-ordinated**, which means that their overall effectiveness is reduced.

While acknowledging that it will not be possible to address or prevent the entry of all IAS at all times, there is ample scope for a prioritised and proportionate approach that would be introduced gradually and that builds on the existing efforts whilst increasing the efficiency and effectiveness of current action. Such an approach can respect subsidiarity by improving the coordination of the current efforts whilst leaving suitable freedom to Member States to respond to their own geographical circumstances. At the same time, a coordinated and

[1] DAISIE-project, "Delivering Alien Invasive Species Inventories for Europe", http://www.europe-aliens.org/
[2] Vilà *et al*., 2009
[3] Millennium Ecosystems Assessment, 2005
[4] Sala *et al*. 2000
[5] Kettunen *et al.* (2009) estimated the yearly cost of IAS in Europe based on an inventory of all possible costs related to IAS (management costs + all types of damage costs) over the last 20 years. See section 3.3 and Annex III.
[6] Pathways: this term refers to the routes of biological invasions, i.e. the mechanisms and vectors that allow the introduction and spread of IAS.
[7] Under the Nagoya Protocol, the benefits arising from the commercial and other utilization of genetic resources should be shared with the Party providing these resources. This issue is addressed in the Impact Assessment accompanying the Proposal for a Regulation implementing the Nagoya Protocol in the European Union. While the Nagoya Protocol is addresses the benefits of alien genetic resources, the IAS legislative instrument addresses the threats of alien living species.

increasingly prioritised approach can allow for a shift towards a more preventive approach and in so doing increase the efficiency of actions, and over time could lead to lower damage costs and costs of action[8].

2. PROCEDURAL ISSUES AND CONSULTATIONS

2.1. Procedural issues

In 2008 the European Commission published a Communication *"Towards an EU Strategy on Invasive Species (2008)*" setting out the case for tackling IAS. The 2010 Communication *"Our life insurance, our natural capital: an EU biodiversity strategy to 2020*" proposes action on IAS. Both Communications were preceded and followed by intensive rounds of consultation. In preparing this Impact Assessment, a **dedicated Inter-Service Steering Group** was established within the Commission (see Annex I).

2.2. Consultation of interested parties

A series of intensive rounds of stakeholder consultations took place between 2008 and 2012, which attracted the whole spectrum of interested parties, from nature conservation organisations to operators in the private sector, including organisations representing Small and Medium-sized Enterprises (SMEs) relying on alien species for their business. Main comments are provided in the following sections and details in Annex II.

An online public consultation held in 2008[9] showed widespread backing for action on IAS at EU level. 91 % of respondents agreed on the urgent need to bring in new measures to prevent the spread of such organisms and 86 % thought that Member States should be legally obliged to take action against the most harmful IAS. The same year, a working group of Commission services, Member States and stakeholders produced a discussion paper[10] bringing together the latest information and summarizing opinions on key issues. A second online consultation focused on specific policy options was held from end January to mid-April 2012 and attracted 5101 replies.

A stakeholder consultation meeting was held in September 2010[11], followed in 2010-2011 by three working groups, which elaborated possible policy options to address respectively prevention, early warning/rapid response and the management of established species[12]. The stakeholder consultation and the working groups were attended by Commission services, a wide range of stakeholder groups, representatives from Member States and experts from different backgrounds.

2.3. External expertise

Over the last five years the Commission's work on IAS has been supported by several external studies and research[13]. In particular, the EU-funded research project DAISIE[14] compiled an inventory of alien species in the EU. The Joint Research Centre is now developing the European Alien Species Information Network (EASIN) to facilitate the exploration of existing alien species information from distributed sources[15]. The European

[8] By cost of action it is meant any cost related to tackling the issue of IAS, ranging from prevention, early warning and rapid response to newly establishing IAS and management of established IAS.
[9] http://ec.europa.eu/environment/nature/invasivealien/docs/results_consult.pdf
[10] http://www.acceptance.ec.europa.eu/environment/nature/invasivealien/docs/ias_discussion_paper.pdf
[11] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/stakeholder_03092010&vm=detailed&sb=Title
[12] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/working_prevention&vm=detailed&sb=Title
[13] All studies are accessible from http://ec.europa.eu/environment/nature/invasivealien/index_en.htm
[14] DAISIE (2005-2008). More information at: http://www.europe-aliens.org/index.do
[15] http://easin.jrc.ec.europa.eu/

Environment Agency has also been conducting projects in this area. Annex III provides more details on this scientific work.

Furthermore, all analysis performed in this report was based on scientifically robust data. The major part of the data used to describe the problem and to analyse impacts and costs was retrieved from peer reviewed scientific articles. Information on damage cost, spread of species and the costs of measures in place were also provided or checked by Member States. Particular efforts were put into contacting directly the stakeholders involved in this issue, including those sectors that may be negatively impacted by the introduction of measures to tackle the IAS problem. Finally, the analysis also benefitted from the input of the world's top experts on IAS within and beyond the EU, which provided precious information and data on all aspects addressed by this report.

2.4. Consultation of the Impact Assessment Board

This impact assessment has been discussed at the 05/12/2012 meeting of the IA Board. The recommendations of the Board in the quality checklist and in its formal opinion have allowed improving the report. The following elements were addressed:

- Problem definition: while ultimately what needs to be solved is an ecological problem, it has been made clearer that what the EU action needs to address is a policy failure brought about by a very fragmented policy framework at European and national levels. From this new perspective, the text has improved the distinction between the problem, the drivers and the consequences. , the ;

- Definition of objectives: the formulation of the objectives and their relation to each other were clarified, namely through the introduction of tables. The evaluation arrangements were also re-formulated and clarified;

- Design of the options: the design, assessment and comparison of options was strengthened. In particular the text was streamlined so as to simplify the assessment and a table summarising the benefits and drawbacks of the different options was introduced. Cost estimates were clarified and the text screened to ensure the use of consistent language;

- Transposition and compliance: these issues were analysed in greater detail and an analysis of the interaction between the proposed measures and existing rules in Member States was added in Annex;

- Stakeholders' views: the views of stakeholders and Member States were more systematically introduced in the text and a section summarising the views of stakeholders was introduced in Annex.

3. POLICY CONTEXT, PROBLEM DEFINITION AND SUBSIDIARITY

3.1. Problem definition

There are two facets to the problem of IAS in Europe: 1) the ecological problem created by the entry, establishment and spread of IAS, 2) the policy failure caused by a very fragmented and incoherent policy set up at EU and national levels that is allowing the ecological problem to worsen.

3.1.1. An ecological problem

An **alien species** is defined in the Convention on Biological Diversity (CBD) as "*a species, subspecies or lower taxon, introduced outside its natural past or present distribution, including any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce*." Some of these alien species are unable to adapt to the new environment and simply die off, other species (e.g. certain crop species) need careful tending to survive and will not spontaneously reproduce in the environment. Other species, however, may establish and reproduce in the new environment to an extent where they start causing problems, i.e. they would become invasive. The CBD defines an **invasive alien species** (henceforth IAS) as "*an alien species whose introduction and/or spread threaten biological diversity*"[16]. IAS include animals, plants, fungi and micro-organisms, and affect the EU's continental landmass and water bodies, seas and islands.

Only a subset of the alien species in Europe is invasive and has a negative environmental, social or economic impact. It is estimated that 10-15% of the alien species present cause damage[17] which is borne by society at large as well as by businesses, including primary producers and landowners. This Impact Assessment will focus on IAS that are alien to the EU: species native in part of the EU but IAS in another will not be considered.

Climate change may aggravate the problems of IAS, as changing climatic conditions can lead to previously unsuitable ecological conditions becoming suitable, thus allowing an alien species to reproduce and start spreading and cause problems[18]. On the other hand it can be expected that alien species will naturally migrate to find more suitable conditions to evolve as the global temperature rises. It is not the intention of the Commission to hinder such natural and necessary migrations. Therefore these are not considered as IAS for the purpose of this exercise and would not be addressed.

IAS are a **major, and growing[19], cause of biodiversity loss and species extinction**, second in importance only to habitat loss, especially on islands and in freshwater habitats[20]. Some IAS lead to biodiversity loss by competition, predation or hybridisation with native species. Others modify habitats and ecosystems to the detriment of native species or have a broader impact on the environment, society and the economy, for example by **disrupting ecosystems and their services[21], causing allergies or transmitting diseases, damaging infrastructure and properties**[22] (see Table 1).

Table 1: Main types of impact caused by IAS[23]; IAS often have multiple impacts and an immediate direct impact can often lead to broader consequences, leading to loss or interference with the provision of ecosystem services that sustain livelihoods and which are the basis of many economic activities.

Impact	Sub-category of impact	Example	Consequences
On economic	Damage to infrastructure	Zebra mussels	Zebra mussels can cause damage by blocking pipes, vents or holes for the passage of water it is a major macrofoulant of power generating plants, industrial and municipal water

[16] The CBD definition will be used throughout this impact assessment, although also economic and social impacts will be taken into consideration.

[17] Vila *et al.*, 2010

[18] The interactions of IAS with climate change can be complex. Climatic changes may lead to ecosystems becoming stressed and less resilient to pressure from IAS, with previously harmless alien species suddenly finding the niche to outcompete native species. IAS may also lead to ecosystems becoming stressed and reduce their ability to adapt to climate change.

[19] Global Biodiversity Outlook 3, 2010

[20] Millennium Ecosystems Assessment, 2005

[21] Ecosystem services: the services provided by the natural environment that benefit people, e.g. catchments that provide drinking or irrigation water to a city or farming area, indigenous forest and vegetation that reduce hillside erosion, wetlands that purify water or reduce the risk of tidal floods.

[22] Scalera *et al.*, 2012.

[23] Based on EEA report *"The environmental and socio-economic impacts of IAS in Europe"*- Scalera *et al.*, 2013

activities			systems.
	Disruption of recreational activities	Water hyacinth	Water hyacinth creates dense floating mats on water bodies, interfering with recreational activities, such as boating and fishing.
	Damaging agriculture	Coypu	The coypu feeds on crops causing agricultural production losses. Moreover, with its burrowing activities, coypu causes great damage to river banks, leading to increased risk and severity of flooding as well as damaging irrigation systems.
On human health	Disease vector	Asian tiger mosquito, raccoon dog	Tiger mosquitoes can spread the Chikungunya virus, yellow fever, Rift valley fever and dengue. Raccoon dogs carry rabies, besides being a reservoir and vector of parasites that infects humans, e.g. sarcoptic mange, trichinella worms and fox tapeworm.
	Health impacts	Common ragweed, giant hogweed	Common ragweed is a common allergen causing rhinitis, dermatitis, asthma. Giant hogweed causes severe burning and dermatitis.
On ecosystem services	Interference with supporting services (necessary for the provision of other ecosystem services)	Japanese knotweed	Japanese knotweed builds up dense stands inhibiting growth of other plants, outcompetes native plants, disrupts invertebrate species communities, affects soil environment, its roots seriously damage infrastructure.
	Interference with provisioning services (products obtained from ecosystems)	Pontic rhododendron, Spanish slug	Pontic rhododendron displaces native species and affects species diversity, alters the ecosystems, thus affecting timber production. The Spanish slug feeds on horticultural plants and damages private gardens and agricultural fields.
	Interference with regulating services (benefits supplied by self-maintenance of ecosystem)	Yellow-legged hornet	The yellow-legged hornet is a highly effective predator of native bees and other beneficial insects, thus having an impact on the activities of pollinators.
	Interference with cultural services (non-material benefits derived from an ecosystem)	Killer shrimp, tree of heaven	Killer shrimp can quickly dominate the invaded habitats directly affecting fisheries quality with consequent impacts on recreational use of water bodies. The tree of heaven is a fast growing plant that can create dense stands leading to profound changes in touristic and culturally important landscapes: Mediterranean islands show for example 24% decrease in species richness, leading to an impoverished landscape.
On biodiversity	Competition	Bullfrog	The bullfrog colonises a range of habitats and has the ability to outcompete indigenous amphibians
	Predation	Common slider, harlequin ladybird	The omnivorous common slider predates on several species from insects to other invertebrates and vertebrates, including amphibians, reptiles, small mammals and birds. The harlequin ladybird predates on native ladybirds and caused the decline of several populations.
	Disease vector	Red swamp crayfish, grey squirrel	The red swamp crayfish is a carrier of crayfish plague, which kills native crayfish. The grey squirrel is a carrier of Poxvirus a disease which kills the native red squirrel.
	Hybridisation	Ruddy duck	The ruddy duck breeds with the native and vulnerable white headed duck and produce fertile hybrids which can gradually make the white headed duck species disappear.
	Changing habitats and altering ecosystems	Black locust	Black locust is a nitrogen fixing species that can achieve early dominance on soils where nitrogen is a limiting factor for other species, thus leading to completely different species composition.

The ecological problem has two main causes: 1) certain alien species are desirable and brought into the EU e.g. through trade for a reason (e.g. commercial interests, ornamental purposes, companion animals, biological control); 2) some alien species are unintentionally introduced as contaminants of goods (trade in other commodities), can be hitchhikers or stowaways in transport vectors or be transported unwittingly by travellers. Some IAS can also

travel through transport infrastructure (e.g. Danube-Mainz canal). The growing pressure of IAS on biodiversity is linked to the substantial increases in volume and extent of trade and travel, leading to more species being transported across the globe[24].

Figure 1 analyses the causal chain of the ecological problem: the top layer representing the drivers; the second layer from the top illustrating the pathways into the environment; the third layer from the top illustrating the state; and the bottom layer illustrating the consequences of the presence of IAS in the environment in the EU.

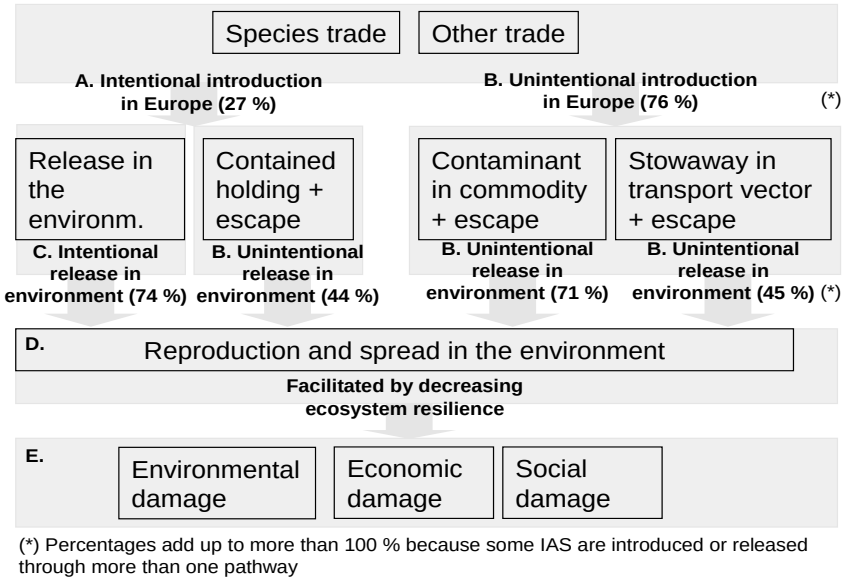


Figure 1: Analysis of the ecological problem, with estimates of the proportion of IAS intentionally or unintentionally introduced in Europe through trade, of IAS intentionally released in the environment, of IAS escaped from containment and IAS that entered the EU as stowaways or contaminants and then established and spread in the environment[25]

Based on research from Genovesi and Scalera (2007) who studied IAS introduced in Europe[26], it is estimated that **27% were intentionally introduced**, while **76% were unintentionally introduced**[27]. These figures show that for roughly three quarters of IAS introduced into Europe the benefits would be negligible as these species were not meant to be brought into the EU for any purpose. This is not the case for the remaining quarter of IAS intentionally introduced purposely in Europe for their benefits.

Of the IAS **intentionally introduced** into Europe, at least 74% were intended for release into the environment and more than half of those are plants used for forestry, landscaping or similar activities (e.g. black cherry in forestry). At least 44% were intended to be kept in containment but escaped into the environment (e.g. muskrat introduced for fur-breeding or pets), while 18% of the species were intended for both release and keeping in contained conditions. Of the IAS **unintentionally introduced** through trade into Europe and ending up in the environment, 71% came as contaminants in a traded commodity (e.g. weed seeds in pots of horticultural plants) and 45% as stowaways in a transport vector (e.g. marine organisms in ship ballast water). 16% of IAS entered the EU through both pathways (e.g.

[24] Rasplus, 2010
[25] Data from Genovesi and Scalera, 2007
[26] The study focused on 380 species, the selection was based on an exercise which collated the existing lists of known IAS in Europe (the European and Mediterranean Plant protection Organisation list, the SEBI list, the DAISIE list, the NOBANIS factsheets, the EU Wildlife Trade Regulation).
[27] The two percentages do not add up to 100 % because some species belong to the two categories, i.e. traded for a purpose and also entering unintentionally as contaminants or stowaways/hitchhikers.

ragweed seeds contaminating animal feed grains and hitchhiking on agricultural machinery). For more information on the pathways of introduction see Box 1.

Box 1: pathways of release into the environment

The pathways of release in the environment vary considerably according to the species group[28] (Figure 2). **Plant species** mostly escape from cultivation (e.g. gardens) because their seeds spread around (e.g. giant hogweed), with other important pathways being escapes from agriculture, stowaways in transport vectors and seed contaminants[29]. **Vertebrate animals**, besides escape (e.g. coypu escaping from fur farms), are also released intentionally in the environment (e.g. for hunting), while **invertebrate animals** often disperse unintentionally into the environment after being introduced in Europe as a contaminant in a commodity or a stowaway in a transport vector (e.g. zebra mussels on ship hulls). Transport networks are corridors through which IAS can colonise new territories. To date this has mainly been an issue for **aquatic species** (e.g. killer shrimp spreading though the Danube-Mainz canal). The pathways of release into the environment also vary across biomes. In **freshwater ecosystems**, for example, most alien species are the result of intentional releases for aquaculture and angling, although escapes from aquaculture are also important. In the **marine environment**, most alien species are the result of unintentional releases, i.e. from biofouling or mariculture escapes and ballast water contaminants.

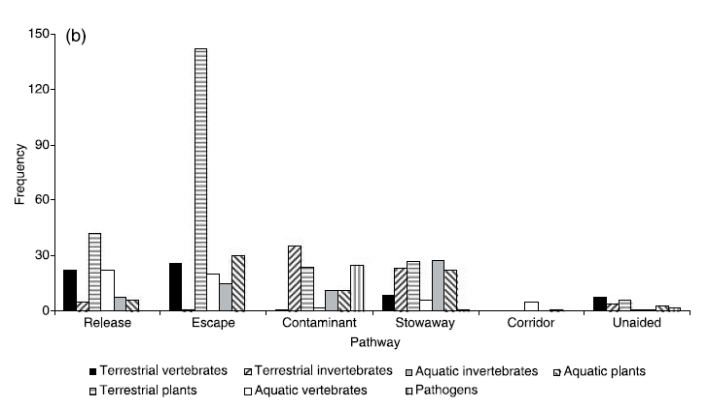


Figure 2: Pathways of intentional and unintentional release in the environment per species groups in the world[30]

The economic and social costs are widely recognised as being significant. One estimate is that IAS have **cost the EU at least €12 billion/year** over the past 20 years. Costs for key economic sectors, including agriculture, fisheries, aquaculture, forestry and health sectors account at over €6 billion/year[31], including damages costs and management costs[32] of IAS.

The problem is not limited to Europe: IAS are causing damage and management costs of similar magnitude across the globe. Despite being difficult to compare as they were collected with different methods, the data provided in Table 2 give an indication of the magnitude of the damage and management costs caused by IAS. The data may significantly underestimate the total economic cost as some costs, such as the loss of biodiversity and the damage to ecosystem services, are not fully quantified.

[28] Hulme *et al.*, 2007
[29] Hulme, 2007
[30] Hulme *et al.*, 2008
[31] Kettunen *et al.* 2009
[32] By management costs it is meant the cost to tackle species that are already established in the EU, either by eradication, containment or control measures.

Table 2: Estimated economic losses due to IAS across the globe[33]

	Estimated economic losses due to IAS	**Comments**
Globally	c. €1 trillion/year (almost 5 % of global GDP) - Pimentel *et al.*, 2001	Includes damage costs and management costs, including also costs linked to human viruses and bacteria
US	c. €90 billion/year - Pimentel *et al.*, 2005	Includes damage costs and management costs, including costs linked to human viruses and bacteria (c. €5 billion/year),
China	c. €11 billion/year (1.36 % of China's GDP in 2000) - Xu *et al.*, 2006	Includes direct damage costs and management costs as well as estimated costs of ecosystem services loss (no costs linked to human viruses and bacteria)
New Zealand	c. €2 billion/year[34]	Includes damage and management costs for pests, weeds and pathogens (no costs linked to human viruses and bacteria).
EU	€12 billion/year - Kettunen *et al.*, 2009	Includes damage and management costs of IAS in Europe, including some organisms covered by animal and plant health (no costs linked to human viruses and bacteria).
UK	€2 billion/year - Williams *et al.*, 2010	Includes direct damage costs (losses) and management and management costs of IAS, including plant pathogens, but excluding viruses, microorganisms and diseases of animals.

Finally, over time the **damage and management costs have been observed to grow continuously**[35] (see section 3.5): these economic losses stem from the costs of the increasing introduction of new IAS in the EU and the costs generated by the continuing spread of IAS already widely established in the European territory.

3.1.2. A policy problem

All Member States are taking some type of action to combat IAS. Few have comprehensive legal frameworks to address the ecological problem; others rely on voluntary actions or species specific programmes. Most Member States also appear to concentrate their effort on tackling IAS that are long established, rather than on prevention or early warning and rapid response. Annex V provides a detailed analysis of the current national policy frameworks for the Member States. Moreover, the responses to existing invasions are fragmented, uncoordinated and they do not constitute a coherent approach[36].

As regards the EU policy framework, it includes a variety of regulatory initiatives on IAS but these only address few parts of the problem and provide a fragmented response. There are substantial gaps in species covered and important inconsistencies between the use of terms and concepts in legal texts[37], which are leading inter alia to legal uncertainty in the context of the internal market. Similarly, integration of IAS policies into other policy areas, such as border controls, is largely absent Further details are given in section 3.4. .

The patchy approach in the Member States has two important consequences:

1. Action in one Member State is often undermined by lack of action in a neighbouring Member State, as IAS respect no borders. This is the case for example of Wallonia (Belgium), which is investing €0.5 mio/yr to eradicate giant hogweed, but efficiency and effectiveness will remain suboptimal as France has no such programme, and there will therefore be a permanent pressure of reinvasion along rivers entering the region from

[33] Some scientific papers consider human viruses and bacteria as IAS. This paper addresses the vectors of human viruses and bacteria, however the control of those viruses and bacteria is not included as this is considered as public health policy.
[34] http://www.biosecurity.govt.nz/files/pests/surv-mgmt/economic-costs-of-pests-to-new-zealand.pdf
[35] Hulme *et al.* 2009, Roques 2010, Genovesi *et al* 2011.
[36] Shine *et al.* 2010, Sonigo *et al.* 2011
[37] e.g. definition of alien species or IAS vary between Member States, but also in different legislation within one country.

France[38]. Similar examples of measures on one species being taken in one Member States with no action or non-comparable action being taken in neighbouring Member States abound (e.g. the so far successful eradication campaign on ruddy ducks could be undermined if no coordinated action is taken in all countries affected[39] - see also Box 3).

2. Different restrictions of commercialisation of IAS between Member States are highly ineffective as species can easily be transported or spread across borders throughout the EU. Such differentiated bans are moreover hampering the free circulation of goods in the internal market and disrupting the level playing field for those sectors using or trading alien species.

3.2. Who is affected and how?

IAS affect **businesses, citizens, public authorities and the environment** (See Table 3). In particular, when it comes to **small and micro enterprises**, primary producers in agriculture, animal husbandry, fisheries, aquaculture and forestry are often affected by IAS and suffer considerable economic damage. Businesses linked to tourism and recreational activities, which rely on pristine landscapes, clean water bodies and healthy ecosystems are often also affected. In addition, these businesses are burdened by the management costs to keep damaging IAS in check, although the majority of these costs are usually faced by the public authorities (see Annex VII). These enterprises **suffer from a lack of prevention and coordinated action to tackle IAS**. However, other small and microenterprises, e.g. traders in pets and horticultural species, draw benefits from IAS as they focus largely on alien species trade. In such cases, prevention and coordinated action to tackle IAS may pose some restrictions to these businesses. IAS also affect **society at large**, through biodiversity loss and compromising the ability of ecosystems to provide ecosystem services; moreover they transmit diseases, damage properties and affect the cultural heritage. A lack of prevention and coordinated action to tackle IAS has negative consequences in social terms.

The **costs and benefits from IAS are typically distributed unevenly**: those benefitting from bringing IAS into the EU usually have few or no economic incentives to minimise any IAS-related risks, while the costs associated with IAS damage and management are generally met by primary producers, public authorities and society.

Table 3: Examples of damage caused by IAS

IAS	Who is affected and how	Damage cost estimate
ECONOMIC DAMAGE		
Ragweed (most of EU)	Farmers: yield reduction (its resistance to herbicides and the germination capacity of its seeds of more than 30 years makes it difficult to manage)	Hungary: yield losses of €130 mio/yr (Kemives *et al.* 2006) EU: agricultural damage of €1.302 to 3.307 billion/year (Bullock 2012)
American mink (most of EU)	Animal husbandry and aquaculture: predates free ranging chickens, reared game birds, farmed salmon	Germany: €4.2 mio/yr (Bonesi, 2009)
Zebra mussel (most of EU)	Fishermen and fisheries: interference with fishing gear, alteration of fish communities Aquaculture: fouling the cages Water and electricity companies: clogging the water intake pipes Aquatic transport: fouling the ship hulls and navigational constructions	North America: annual multimillion losses (Zaiko & Olenin, 2009) US and Canadian water users: €370 mio/yr (Millennium Ecosystems Assessment, 2005)

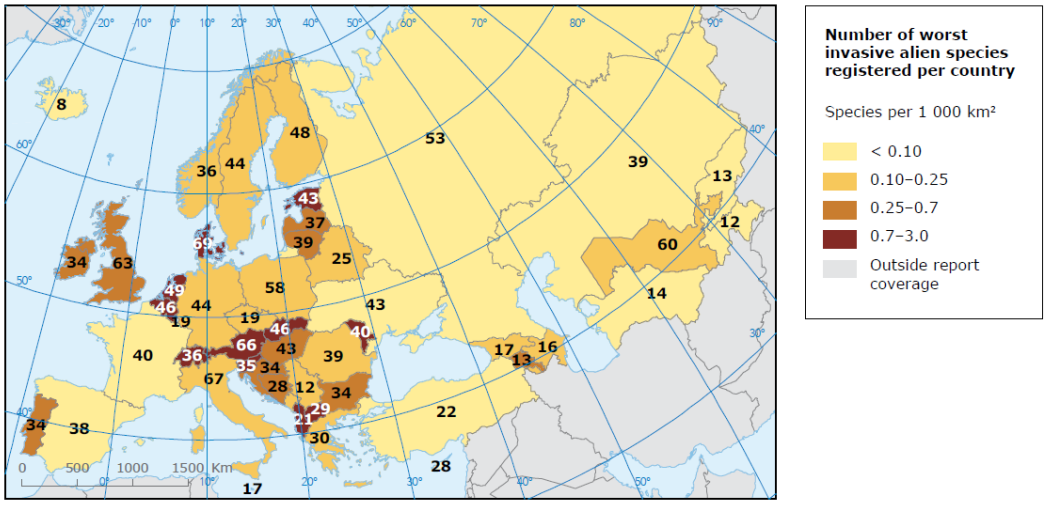
[38] Currently giant hogweed is targeted in Belgium, Czech Republic, Denmark, Estonia, Spain, Hungary, Ireland, Italy, Luxemburg, Latvia, Poland, Sweden, Slovakia and the UK.

[39] UK ruddy duck eradication programme project bulletin, April 2012

	Recreation: sharp shells cause injuries	
Musk rat (most of EU)	Water utility companies, electricity companies, transport companies, public authorities: undermines riverbanks, railroads, dams and fences, irrigation structures and aquaculture	Netherlands: €23 mio/yr (Van der Wijden *et al.*, 2007) Germany: additional expenditure for waterway maintenance €2.3 mio/yr (Reinhardt *et al.* 2003) and for maintenance of aquaculture facilities €1.6 mio/yr
Coypu (most of EU)	Water utility companies, electricity companies, transport companies, farmers, public authorities: undermines river banks and increases the risk and severity of floods	Italy: exceeded €10 million riverbank damage and exceeded €0.9 million impact on agriculture (Bertolino, 2009)
Japanese knotweed (most of EU)	Real estate companies, citizens, banks, public authorities, property owners: leads to loss of property value, refusal of mortgages	England, Scotland and Wales: €205 mio/yr (Williams *et al.*, 2010) Germany: €7 mio/yr for embankment repair and €16.7 mio/yr for embankment reinforcement
SOCIAL DAMAGE		
Ragweed (most of EU)	Citizens: allergic asthma and allergic rhinitis that cause severe public health problems	EU: medical costs of €118 to 763 million/year and workforce productivity loss of €0.049 to 1.361 billion/year (Bullock 2012) Germany: medical costs (prescribed medication) of €17-47 mio/yr (Reinhardt *et al.*, 2003)
Giant hogweed (most of EU)	Citizens: severe skin burning, tens of thousands of people affected every year, in the worst cases being fatal	Germany: medical treatment costs of €1 mio/yr (Reinhardt *et al.*, 2003)
Musk rat (most of EU)	Citizens: transmits echinococcosis that cause severe public health problems	Germany: medical treatment costs of €4.6 mio/yr (Reinhardt *et al.*, 2003)
Tiger mosquito (IT, FR, ES)	Citizens: vector of at least 22 arboviruses including Chikungunya and Dengue, often fatal to children	
ENVIRONMENTAL DAMAGE		
Black cherry (most of EU)	Forest biodiversity and foresters: Hinders natural regeneration of trees, impedes forest management measures such as thinning, timber harvesting or planting	Germany: additional expenditures for thinning and timber harvesting at least €1.4 mio/yr, manifest additional expenses for planting not included (Reinhardt *et al.* 2003)
Harlequin ladybird (UK, FR, BE, LU, NL, DE, DK, CZ, AT, GR, IT, ES)	Displaces native ladybirds, causes decline in native biodiversity, could impact on the resilience of ecosystems and severely diminish the services they deliver (Roy *et al.* 2012)	
Comb jelly (Black sea, Baltic sea, E-Mediterranean sea)	Marine biodiversity and fishermen: drastic decline in pelagic fish and fisheries catch	Black sea: several €100 million in total for collapse of fish stocks (Shiganova & Panov, 2009)
Canada goose (UK, IE, FR, BE, NL, DE, SE, FI)	Displaces native waterfowl, causes habitat modification, disturbs ecosystem functioning.	
Grey squirrel (UK, IE, IT)	Drives the red squirrel to extinction (Genovesi and Bertolino, 2009), damage trees by stripping bark, which allows the entry of rot and staining fungi, and reduces damages trees and timber quality	In the UK, the cost of damage caused by grey squirrels to tree species and their services to be about €12.5 million in total, of which €10 million is the estimated cost to private estates and €2.5 million to publicly owned woods. This is not an annual cost but the loss of value of the woodlands[40].

[40] http://www.europeansquirrelinitiative.org/RevChap6.pdf

IAS in general affect all **Member States**, albeit perhaps at different times and by different species (see also Annex VII). While some IAS affect most EU Member States, others are only a problem in certain regions, or under certain ecological or climatic conditions. As shown by Figure 3, all Member States have IAS in their territories, with numbers varying, but within a similar order of magnitude across all Member States. It can be assumed that countries with higher trade volumes and numerous entry points are likely to suffer more introductions of IAS. It is not possible to ascertain the magnitude or concentration of intra-EU movements as there are no internal checks for commodities or monitoring of aliens species moving in the wild across the borders. As IAS impacts are relevant to the whole of the EU, coordinated action to tackle IAS would thus benefit all EU Member States, while clearly requiring efforts from all Member States.



Note: How to read the map: of the list of 163 'worst invasive alien species', 34 are present in Portugal.

Source: EEA/SEBI2010, 2006.

Figure 3: Map of the number of worst IAS (causing the most damage) per country and an approximate estimate of their density, given as number of species per country per 1000 km².

3.3. Policy baseline

IAS are widely recognised as a problem by **international organisations**[41], with a significant number of **international conventions** focusing on IAS[42]. See Annex IV for details.

Major EU trade partners have already developed streamlined and stringent IAS policies, considerably more advanced – in particular on the prevention side - than the current policies and actions in the EU Member States. Interesting examples are New Zealand, Australia, the US and Canada[43] where strict border control and quarantine measures apply. Risk assessment procedures are in place, not only applying to species (intentional introductions), but also to commodities, pathways and modes of transport (unintentional introductions). Both Australia and New Zealand are treating IAS, pathogens and pests through the same system, thus implementing an integrated plant health, animal health and IAS-regime. Both countries are following the strictest approach, considering all alien species to be potentially invasive,

[41] Including the European and Mediterranean Plant Protection Organisation (EPPO), the World Organisation for Animal Health (OIE), the World Trade Organisation (WTO) and the International Maritime Organisation (IMO)

[42] Including the Convention on Biological Diversity (CBD)[42], the Bern Convention on the Conservation of European Wildlife and Natural Habitats[42], the International Plant Protection Convention (IPPC)[42], the WTO Sanitary and Phytosanitary (SPS) Agreement[42] and the International Convention for the Control and Management of Ships Ballast Water and Sediments (BWC)

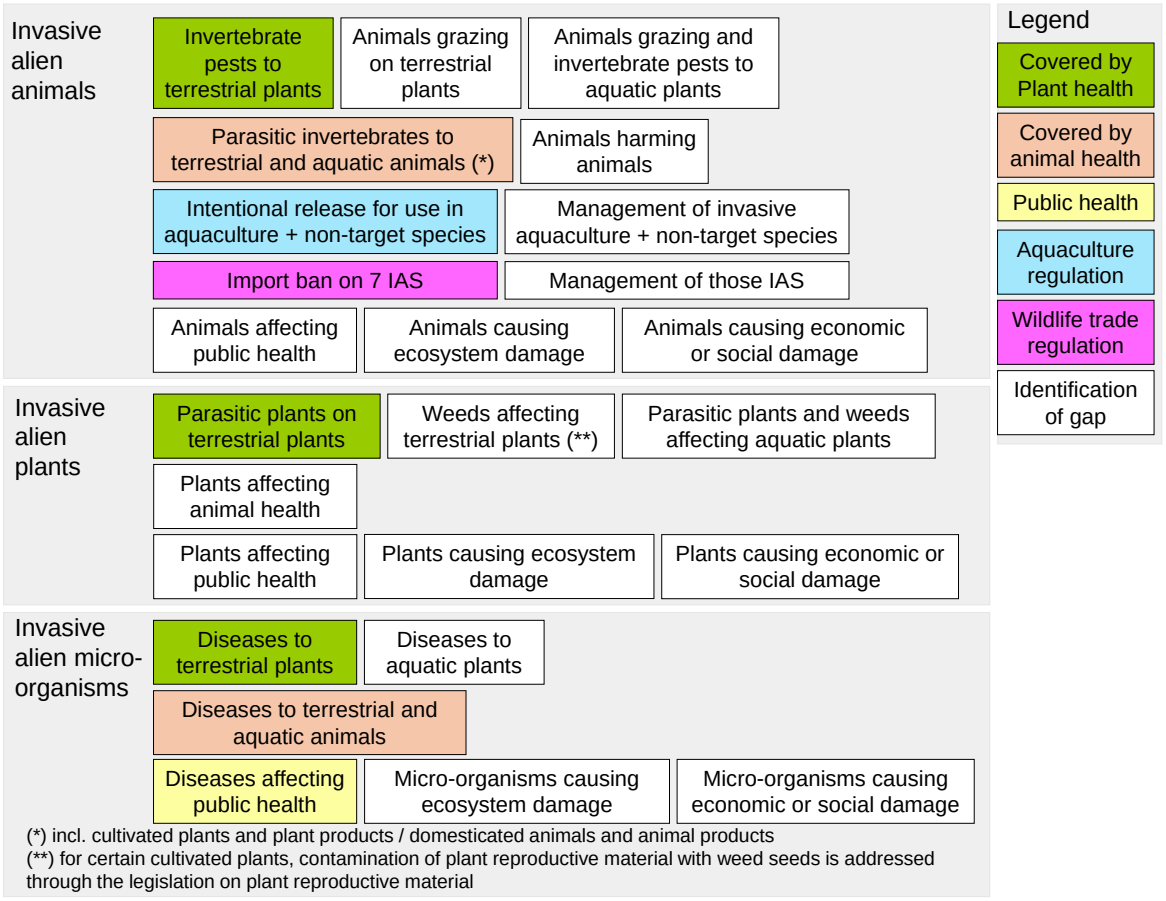
[43] Sonigo *et al.*, 2011

unless a risk assessment has declared them harmless. The US and Canada, by contrast, only consider alien species to be harmful if proven so by a risk assessment. Stakeholders in these countries tend to have a higher level of awareness of IAS related problems than in the EU[44].

In terms of baseline, the current and historical load of alien species in the EU is 12,046 out of which 10-15% are IAS. Figure 4 shows that at the **EU level** few IAS are addressed by legislation. Disease agents and pests of animals and plants and their products are covered respectively by the animal health regime (various regulations and directives) and by the plant health regime (2000/29/EC). These policies adopt a preventive approach, and require rapid response in case of outbreaks, similar to the approaches taken in the US and Canada. Action focuses on list of priority species for the EU and is based on risk assessments, an approach which has delivered significant results[45] (see also Box 2). The Commission proposals for a revised animal and plant health regime include pest and disease agents affecting wild plants and animals. The Wildlife Trade Regulation (338/97) restricts the import of endangered species, including the import of seven IAS[46]. The Regulation concerning the use of alien and locally absent species in aquaculture (708/2007) addresses the release of alien species for aquaculture[47]. The regulations on plant protection products (1107/2009) and on biocides (528/2012) address the intentional release of micro-organisms respectively as plant protection product or biocide. Finally the Birds Directive (2009/147/EC) and the Habitats Directive (92/43/EEC), the Water Framework Directive (2000/60/EC) and the Marine Strategy Framework Directive (2008/56/EC) require the restoration of ecological conditions and refer to the need to take into consideration IAS. Nevertheless, existing EU action leaves most IAS unaddressed and what action is taken at national level focuses on damage mitigation rather than on addressing the drivers of the problem (see also Annex V).

[44] Sonigo *et al.* 2011
[45] See impact assessments on the revision of the animal and plant health regimes (2012)
[46] Ruddy duck, painted turtle, American bullfrog, red-eared terrapin, Pallas's squirrel, grey squirrel, Eastern fox squirrel
[47] Except aquatic organisms belonging to Bacteria

Figure 4: IAS unaddressed by existing EU legislation – the non-shaded boxes describe what species are currently unaddressed by EU legislation



Box 2 – lessons drawn from the plant health regime (PHR)

The issue of plant pests is close to that of IAS: in fact plant pests and diseases are IAS that are already tackled by PHR. The measures in place through PHR have therefore provided substantial inspiration for the proposed actions to tackle IAS. Since its adoption, the PHR has successfully protected the EU against the introduction and spread of many pests; however, with the increasing globalisation of trade, the systems faced new challenges that brought about the need to review its functioning.

The European Commission carried out a review and commissioned an evaluation which thoroughly examined the functioning of the system, including the opportunities to tackle more IAS. The evaluation was conducted by the Food Chain Evaluation Consortium (FCEC) and completed in 2010. The current revision and the FCEC study provided a useful oversight of pitfalls and shortcomings of the system in place, from which valuable lessons can be learnt: 1) prevention should be strengthened and more coordination of action will be needed to stop the spread of pests across the EU, namely through surveillance, contingency planning, rapid outbreak eradication and containment, were pests may have gone unnoticed during import inspection; 2) more solidarity needed, with a move from national to EU action; 3) implementation of some aspects of the regime has not always been consistent, hampering the effectiveness of the system, more consistency of action needed (see annex V for more details)

Most **Member States** have taken regulatory or non-legislative initiatives on the IAS which are not already covered by EU legislation (Table 4 and Annex V). However, as outlined in section 3.1.2, those initiatives are predominantly reactive rather than preventive and they are

fragmented and uncoordinated, they do not constitute a coherent approach[48] and leave substantial gaps.

Table 4: Overview of IAS-measures in the EU-27: legal provision (black), provision in preparation (vertical lines), informal provision (horizontal lines) and scattered initiatives (dots) (updated from Sonigo et al. 2011)

	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
General provisions																											
Risk assessment framework																											
Permitting system																											
Inspection system																											
A. Prevent intentional introduction in the EU																											
Specific IAS banned from Import																											
Specific IAS banned from Sale																											
Specific IAS banned from transport and/or holding																											
B. Prevent unintentional introduction in the EU and unintentional release in the environment																											
Pathway management																											
C. Prevent intentional release into the environment																											
General ban from release in environment																											
Specific IAS banned from release in environment																											
D. Early warning and Rapid Response																											
Information system																											
Surveillance and monitoring																											
Early warning and Rapid Response system																											
E. Management of established IAS																											
Eradication programmes																											
Management programmes																											
Restoration																											
Strategy																											

Note: this table aims at giving an overview of different types of measures already taken at national level, categorised according to broad categories of intervention. This necessarily leads to a simplification and the table might not reflect accurately some of the nuances of measures taken. The data was collected in 2011 and the situation may have evolved in some Member States.

3.4. How will the problem evolve?

If no action is taken to tackle the policy problem, the ecological problem will get worse as new IAS establish themselves and those already established spread further. This will result in an increase in damage costs and management costs.

Growing number of IAS - The number of alien species introduced into the EU and in the environment has been steadily growing (Figure 5): over the period 1970-2007 their numbers grew by 76%[49].

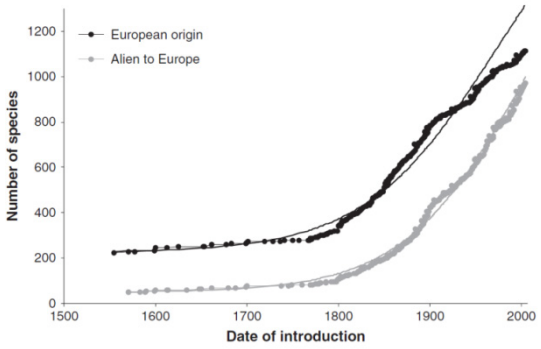


Figure 5: Cumulative number of introduced alien plant species, with the number of species alien to Europe continuously increasing (grey line)[50] over time in Europe.

International trade has been growing at an average of 12 % per year over the last decade and is projected to carry on rising[51]. While increased awareness might reduce the trade of IAS as commodities, this trade coupled with limited deployment of bio-security measures will lead

[48] Shine *et al.* 2010, Sonigo *et al.* 2011
[49] Butchart *et al.* 2010
[50] Lambdon *et al.* 2008
[51] WTO, 2009

to continued unintentional introductions of IAS. Furthermore, some established, but not yet invasive, alien species may start showing an invasive behaviour after a certain time lag[52].

IAS have regularly been released in the environment intentionally, e.g. for agriculture/forestry, hunting/angling or for purely ornamental purposes. While the proportion of intentional releases has been observed to decrease due to increased awareness of the problem[53], we can expect that new species will continue to be released, as new needs/markets emerge. Based on the above observations, we may reasonably assume that the number of IAS in the environment will continue to increase.

Spread of IAS and increased damage per IAS - A characteristic of IAS is that, once established in the environment, they rapidly reproduce and spread. If an IAS is allowed to spread, the damage it causes will increase in line with its population size. Climate change, pollution, habitat loss and land use change are expected to aggravate this trend, by disturbing ecosystems and reducing their resilience to invasions.

Many data are available on the damage cost of IAS (Table 3), but this data is hardly ever available in the form of trends. Where such trends are available they are mostly based on single species, but they consistently indicate that costs per IAS tend to increase in line with their spread, as illustrated by the evolution of costs of the zebra mussel invasion in the Ebro delta in Spain (see Figure 6). There is evidence that many IAS are continuing their expansion and, consequently, it is reasonable to expect that the average damage per IAS will increase.

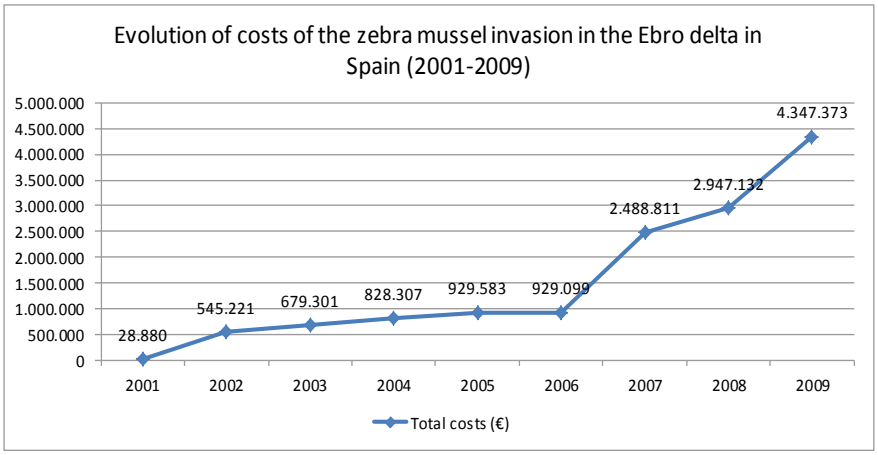


Figure 6: Evolution of the total annual cost of the zebra mussel invasion in the Ebro delta in Spain from 2001 to 2009 (in €)[54]

Growing total damage by IAS - As new IAS will continue to enter into the EU, the number of IAS present and causing damage will be increasing. This will add to the increasing damage of established IAS reproducing and spreading. The overall result will be ever **increasing damage and management costs** across the EU in the years to come. Table 5 identifies the five main aspects of the IAS problem where intervention would be needed and illustrates the expected evolution of the problem.

Table 5: How the problem would evolve <u>without additional measures</u> (based on problem analysis in Figure 1)

Problem	**Expected trend in IAS**	**Comments**

[52] Essl *et al.* 2011
[53] Hulme *et al.* 2008
[54] Perez y Perez and Chica Moreu, 200

A. Intentional introduction of IAS in the EU through trade	↑	Trade volumes will continue increasing, including trade in alien species, with consequently continuous intentional introductions of IAS in the EU
B. Unintentional introduction of IAS in the EU and unintentional release of IAS in the environment	↑	Trade volumes will continue increasing, which will lead to further unintentional introductions and releases of IAS in EU as contaminants of other commodities or as stowaways on transport vectors.
C. Intentional release of IAS in the environment	↑	Intentional release of IAS in the environment is expected to continue increasing
RESULT of A+B+C (in respect to number of IAS in the EU)	↑↑	**Cumulative number of IAS in the environment will continue increasing** (Figure 5)
D. Reproduction and spread of IAS in the environment	↑↑	The number of specimens per IAS in the environment will continue increasing
E. IAS causing economic, social and environmental damage	↑↑	The damage caused by every IAS will continue increasing (Figure 6)
RESULT of D+E (in respect to spread and damage from IAS)	↑↑↑	**Total damage by IAS will be the sum of the damage increase per IAS**, leading to increasing management costs

3.5. The EU's right to act and justification

3.5.1. The legal basis for action

The EU has already acted on pests and pathogens (plant and animal health) and developed measures towards alien species in aquaculture. The right for the EU to act in the field of IAS causing environmental damage is set out in Articles 191 and 192 of the Treaty on the Functioning of the European Union requiring a **high level of protection and improvement of the quality of the environment and human health** in the EU. The management of species and habitats has trans-boundary considerations and the principle of **EU involvement in managing biodiversity is now well established.**

Tackling IAS has important implications for the achievement of other **EU legal obligations**, such as the targets of the Birds and Habitats Directives (favourable conservation status), the Water Framework Directive (good ecological status) and Marine Strategy Framework Directive (good environmental status), as well as international commitments. Current EU legislation only addresses a small proportion of IAS, as discussed in section 3.4. To address this gap, the Commission adopted a Communication: "*Towards an EU Strategy on Invasive Species (2008)*"[55], which was endorsed by the Council on 25 June 2009[56]. In its Conclusions of both 25 June 2009 and 21 June 2011[57] the Council expressed its support for action on IAS, including legislative elements. Support was also expressed by the Committee of Regions[58] and the European Economic and Social Committee (2009)[59].

In March 2010, the EU leaders endorsed a 2050 vision and an ambitious 2020 headline target[60] aiming at "***halting the loss of biodiversity*** *and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss*." This was reflected at international level, in the context of the Strategic Plan for Biodiversity 2011-2020[61] agreed in the 10th meeting of the Parties of the CBD, when the following global target was set: "*By 2020, IAS and their*

[55] COM(2008) 789 final
[56] Environment Council Conclusions, 25 June 2009
[57] Environment Council Conclusions, 21 June 2011
[58] Opinion of the Committee of the Regions on a new impetus for halting biodiversity loss, DEVE-IV-039
[59] Opinion of the European Economic and Social Committee on the Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions – Towards an EU strategy on invasive species
[60] European Council Conclusions, 25-26 March 2010
[61] COP 10 Decision X/2 Strategic Plan for Biodiversity 2011-2020

pathways are identified and prioritised, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment."

The Commission Communication *"Our life insurance, our natural capital: an **EU biodiversity strategy to 2020***"[62], endorsed by the Council on 19 December 2011, responds to both the EU and the CBD and mandates that *"by 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS"*. To achieve this target the Communication proposes to fill the existing policy gap by developing a **dedicated legislative instrument on IAS by 2012**. The **European Parliament** urged the Commission to come forward with a legislative proposal to combat IAS[63].

Finally, action to tackle IAS will contribute to the **Europe 2020 Strategy** responding to the sustainable growth priority and contributing to other priority areas, namely **employment and poverty reduction** (e.g. avoiding collapse of Baltic Sea fishing industry due to an IAS)

3.5.2. Promoting solidarity

EU action on IAS promotes the "solidarity principle", since IAS and their impacts are unevenly distributed across Member States. Indeed IAS may be more damaging in one country than in another (e.g. water hyacinth affecting Mediterranean countries, but unable to survive in North-European countries). Moreover, some IAS may be invasive in one country, but extend their damage to other countries (e.g. ragweed invasion in Hungary leading to pollen dispersal and allergenic problems in Poland). In such cases, exercising the solidarity principle among Member States will protect the interest of those that are likely to suffer the most negative consequences. Tackling IAS will require efforts from Member States, but it will bring significant benefits for the EU as a whole in the medium and long term.

3.5.3. Subsidiarity

Necessity test: IAS **problems are increasing and cross-border by nature:** due to the lack of EU level action, Member States are putting in place measures to cope with the problem at national level. They are investing resources and efforts in eradicating a harmful IAS but such efforts can be undermined by lack of action in a neighbouring Member State where the species is also present. Equally, no coordinated EU action exist to ensure that where IAS first enter the Union, Member States take prompt measures to the benefit of other Member States not yet affected. Furthermore, the protection of the internal market – and the free circulation of goods – has to be taken into consideration: a coordinated approach will ensure **legal clarity and a level playing field for those sectors using or trading alien species** while avoiding a fragmentation of the internal market due to different restrictions of commercialisation of IAS between Member States.

EU Value added-test: the fact that the number of IAS and damages are increasing across the EU despite national/regional policies/initiatives, indicates that the problem cannot be solved without EU action. Current efforts are highly **fragmented and inconsistent, leaving considerable policy gaps and leading to ineffectiveness** (see 3.1.2, Table 4 and Annex V) and they do not solve the IAS problem. A **mixture of EU and national, regional and local measures** will be needed, in line with the principle of subsidiarity, and a coherent approach at EU level will increase the effectiveness of the measures. Member States which currently have legislation on IAS will benefit from a common approach which will guarantee that neighbouring Member States take actions for the same species (see Box 3).

[62] COM(2011) 244
[63] 2011/2307(INI)

Box 3 – The Ruddy Duck

This North American duck is the biggest threat to the continued survival of the globally threatened white-headed duck. It out-competes the white-headed duck and threatens it through hybridisation.

- Spain/EU have spent at least **€6.3 Million** on successful White Headed Duck conservation efforts since 1977 (the population increased from 22 in 1977 to about 2,000 today).
- Spain first highlighted the potential ruddy duck problem in **1980**. [*UK Ruddy Duck population was 2,000*]
- Spain discovered the first ruddy duck in 1982 and started to control them in 1984.
- At the time - about 95% of the feral Ruddy Ducks were in the UK, most of the rest in France, then the Netherlands.
- The UK took 10 years to look at feasibility of control which began in 1992, trial eradication began in 1999 and full eradication started in 2005 (part funded by LIFE).
- In 1999 the Bern Convention produced an Action Plan for Eradication of Ruddy Ducks in Europe. [*UK Ruddy Duck Population was 6,000*]
- The total cost of Ruddy Duck control to the UK government is €4.8 million. Cost to the EU (contribution to LIFE bid in UK) - €1.8 Million. Costs by NGOs estimated at over €4 million [**Total €6.6M to EU and UK, €10.6 overall**]
- However, even in 2012, 30 years after the problem was first identified, apart from the UK and Spain, action in other MS has been limited:
  - Only 4 Member States ban the keeping of Ruddy Duck.
  - Only 7 out of 14 Member States with breeding Ruddy Ducks have adequate monitoring
  - Only 6 Member States have a control program, 13 Member States do not (situation unclear in 8 Member States)
  - Control in France (now with almost 50% of feral EU birds) is still insufficient to eradicate the population and still no control has ever happened in the Netherlands (3rd biggest population with 20% of feral birds).

In summary: A total spend of ~ €17 million is jeopardised by a fragmented approach including inaction, insufficient action and delayed action by many Member States 32 years after the problem was first identified.

4. OBJECTIVES

The growing damage costs expected in the coming years show the need for action to close the current policy gap. The general objectives of this action are the following:

- to minimise the negative impact of IAS on biodiversity and the environment and to contribute to the **EU 2020 biodiversity target**[64], by fulfilling its Target 5 stating that: *"by 2020, IAS and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS;*
- to minimise the negative economic and social impact of IAS for the EU economy and the Europeans and in particular protect their wellbeing and health, thus contributing to the **Europe 2020 Strategy**.

While ultimately the EU will need to tackle the ecological problem caused by IAS, it must be stressed, that, given the current trade patterns and the rate at which species are transported across the globe, action to address all of IAS in the EU would be prohibitively expensive. Some IAS are already present in the EU (legacy of the past) and are so widely spread that at most it will be possible to mitigate or reduce the damage they cause. When it comes to preventing new IAS coming into Europe, given the permeability of the EU borders with its long coastlines and borders with third countries, and multiple harbours and airports, it must be accepted that some species will anyway come in undetected.

[64] EU 2020 Biodiversity target: "*halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.*"

Therefore the real added value of EU actions stems from addressing the policy failure identified. Thus action should not seek to deal with the problem in its entirety, but rather to devise a cost-effective system, based on identified priorities for action and improved responses. Therefore the specific objectives to address the policy failure will be the following:

- shifting the current reactive to a more preventive approach towards IAS;
- prioritising action towards IAS where the highest net benefits are to be obtained;
- fostering a coherent approach on IAS across the EU.

Table 6: Relation between general (columns) and specific (rows) objectives

	General objectives
Specific objectives	**EU 2020 Biodiversity Strategy and EU 2020 Strategy**
1 - More preventive approach	Prevention will seek to reduce the number of new IAS coming into EU thus avoiding increasing threats to biodiversity and negative impacts on society and economy.
2 - Prioritising action	Prioritisation will allow acting efficiently by focusing resources on the worst IAS, i.e. where most benefit is to be obtained for biodiversity and for society and the economy
3 - Fostering a coherent approach	Acting in a coherent and coordinated manner across the EU will increase the effectiveness and efficiency of actions at EU level, i.e. avoiding action in one Member State being undermined by lack of action in another Member State

Based on the analysis of the ecological problem (Figure 1), the policy failure will be addressed by applying the 3 specific objectives to the five elements of the ecological problem which constitute the five operational objectives (Table 7).

Table 7: Relation between specific objectives (columns) and operational (rows) objectives

	Specific objectives		
Operational objectives	**1 - More preventive approach**	**2 - Prioritising action**	**3 - Fostering a coherent approach**
A – Prevent intentional introduction of IAS of EU concern into the EU	More focus on preventing IAS being intentionally introduced into the EU	Focus resources to prevent the worst IAS from entering	Common approach to prevent the worst IAS from entering
B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	More focus on preventing IAS being unintentionally introduced into the EU and into the environment	Focus resources on the major pathways of introduction	Common approach addressing the major pathways of introduction
C – Prevent intentional release of IAS into the environment	More focus on preventing IAS being intentionally introduced into the environment	Focus resources to prevent the worst IAS from being released into the environment	Common approach to prevent the worst IAS from being released into the environment
D – Early warning and rapid response to prevent reproduction and spread of IAS of EU concern	More focus on a rapid eradication of IAS that circumvented the prevention measures	Focus resources to prevent the worst IAS from spreading	Common approach towards newly establishing IAS
E – Eliminate, minimise or mitigate damage by	The above prevention efforts aim at reducing	Focus resources to keep the worst damage under	Common approach towards the worst

managing IAS of EU concern established in the environment	and avoiding new invasions so as to avoid the need to manage established IAS	control	established IAS

5. DESCRIPTION OF POLICY OPTIONS

Different options have been identified to address the ecological problem and the policy failure. All of the options address the five operational objectives, but with a different level of ambition. The options were constructed using a dual approach, which included at the same time an analysis of the measures needed to tackle the operational objectives (the content), as well as the type of policy instrument (the form). For each option identified, each of the operational objectives was systematically addressed, proposing concrete measures to tackle IAS.

5.1. Option 0 - Business as Usual (baseline option)

This option maintains the current policy actions as identified in the policy baseline.

Prevention - Prevention of the intentional introduction into the EU through trade and transport (**operational objective A**) would be possible for IAS included in the **Wildlife Trade Regulation (WTR)** (see 3.4). The list of IAS covered could be extended; moreover, WTR includes a provision to include rules on possession and holding of certain species. As it is the case now, Member States would continue to introduce trade bans on species problematic in their territory (see Annex V). Existing voluntary codes of conduct (e.g. codes of conduct on horticulture and on companion animals drawn within the Bern Convention) encourage sectoral action to tackle IAS trade, marketing and transport.

The unintentional introduction of IAS in the EU and their accidental release into the environment (**operational objective B**) is currently addressed for certain groups of species: pests and diseases, that are generally introduced unintentionally, would continue to be addressed by the **animal and plant health regimes**[65]. The planned revision of the **plant health regime** will explicitly include disease agents and pests of wild plants in its scope[66]. Similarly, the **new animal health law** will cover diseases of wild animals, besides those of commercially reared animals, where the former could threaten human or animal health or the environment. For the aquatic environment, the **Ballast Water Convention**, once entered into force, will address stowaways in ballast water; while biofouling is being addressed through the voluntary application of dedicated guidelines (see 3.4). Existing voluntary codes of conduct focus attention on pathways of introduction into the EU and the environment. Member States have also developed a variety of measures at national level (Table 4).

When it comes to the **intentional release of IAS** into the environment (operational objective C), the EU **Birds Directive**[67] and **Habitats Directive**[68] refer to the need to regulate or prohibit the release of IAS into the environment, but it has led to a myriad of actions (some

[65] The plant and animal health regimes are addressing pathways of pests and diseases through certification systems for traded plants and animals.

[66] The option of including invasive alien plants in the scope of the revised plant health law, which was considered in the plant health impact assessment, was not retained. See Annex V for more details.

[67] Birds Directive, Art 11: *Member States shall see that any introduction of species of bird which do not occur naturally in the wild state in the European territory of the Member States does not prejudice the local flora and fauna.*

[68] Habitats Directive, Art 22(b): *In implementing the provisions of this Directive, Member States shall: (b) ensure that the deliberate introduction into the wild of any species which is not native to their territory is regulated so as not to prejudice natural habitats within their natural range or the wild native fauna and flora and, if they consider it necessary, prohibit such introduction.*

regulatory some voluntary), which are often species-based and seldom coherent. The **Regulation on the use of alien and locally absent species in aquaculture** (708/2007) prohibits the release into the environment for aquaculture purposes of species, unless they obtained a permit or were listed in the annex of the regulation, while the **legislation on plant protection products and on biocides** addresses the release of micro-organisms for plant protection and biocidal purposes. Further, Member States would continue taking initiatives for those species that pose problems in their territory (see Annex V).

Reaction - The EU has early warning and alert systems (operational objective D) for disease agents and pests affecting animal and plants – **animal and plant health regimes.** For other IAS, there is no EU system although some intergovernmental networks exist, for example NOBANIS[69], a northern European network which includes 14 EU Member States. Efforts to rapidly respond to newly establishing IAS are the responsibility of Member States.

For the management of established IAS (operational objective E) there is currently **no obligation to address the problem of already established IAS** in the *acquis*. Member States would continue to act on an ad hoc basis driven by damage costs on a species basis. Such efforts are sometimes carried out in collaboration with neighbouring Member States. Such initiatives can be supported by EU funds, e.g. LIFE, ERDF and EAFRD. Management of established species could also be driven by the aim of complying with the objectives of the Birds and Habitats Directives (favourable conservation status), the Water Framework Directive (good ecological status) and Marine Strategy Framework Directive (good environmental status).

5.2. Option 1 – Enhancing cooperation and supporting voluntary action

Fostering voluntary action and enhancing cooperation would include the development of guidelines, sectoral codes of conduct and other awareness and educational campaigns. This would be in addition to what is already done with option 0.

Prevention - A voluntary approach would not generate EU trade bans for certain species to prevent the intentional introduction of IAS into the EU (operational objective A), but the Commission could produce an inventory of any **trade, marketing and transport bans** existing at Member State level. In particular, the Commission could **provide guidance for developing IAS regimes** at national of regional levels**.** It could also foster further development of **codes of conduct** that different sectors could voluntarily adopt. Similarly, the Commission could promote awareness-raising initiatives and communication campaigns to encourage consumers and operators to refrain from buying, keeping or trading IAS.

The Commission would adopt a similar approach to address the unintentional introduction into the EU and unintentional release (escape) into the environment by **addressing the pathways** (operational objective B) as well as the **prevention of intentional releases of IAS** (operational objective C). It would promote the development of guidelines or codes of conduct to address the major pathways of introduction of IAS into the EU and of release into the environment, be it intentional or unintentional. The Commission could engage in awareness raising campaigns to complement national initiatives and to alert consumers, and it could promote the use of codes such as those developed under the Bern Convention (e.g. for horticultural plants).

Reaction - In order to encourage cooperation between Member States and achieve an early warning and rapid response to prevent the reproduction and spread of newly establishing IAS (operational objective D), the Commission would promote initiatives such as the NOBANIS

[69] The European Network on Invasive Alien Species (NOBANIS) is a gateway to information on alien and invasive species in North and Central Europe: http://www.nobanis.org/

network, e.g. through communication campaigns. Actions to rapidly **respond to newly establishing IAS** and to **manage established IAS** would, however, mostly be left to Member States, albeit with some EU funding possible.

5.3. Option 2 – A dedicated legislative instrument

Adding to option 0 and 1, the introduction of legal provisions to tackle the problems caused by IAS would build on actions already being taken under the *acquis* (Option 0) and voluntarily (Option 1) by Member States and sectors.

For such a fairly new policy area, the legislative instrument could be based on a gradual approach, whereby a set of priorities would be established in the proposal while in-building the possibility of reviewing the regime after a first phase of implementation when more coordinated experience is gained. The gradual approach would be an inherent part of some of the provisions in particular as regards:

1. the number the species that would be tackled through the regime which could be limited at the beginning
2. the number of routes of entry that would need to be addressed
3. the information system underpinning the regime

These aspects would evolve over time, starting with a simple and manageable framework to be reviewed (see Box 4).

A legislative instrument tackling the issue of IAS would need to set up a simple framework for action and a process. It would not be possible to aim for an obligation of results with predefined environmental objectives included therein. Rather, the environmental objectives to be reached are included in other environmental Directives (favourable conservation status under Habitats and Birds Directives, good ecological status in the Water Framework Directive and the good environmental status in the Marine Strategy Directive). The Member States would be required to take certain actions against IAS and the Commission would screen the measures taken for IAS pursuant to this legislation against the above objectives. This entails that some control mechanisms need to be introduced (notifications and exchange of information).

Box 4 – A gradual approach to tackling IAS.

A gradual approach is necessary to ensure that in a new area of EU policy such as this, experience is gathered and developed before actual obligations start applying. This could be done through tackling a limited number of species, through limiting the numbers of routes of entry to be addressed and through establishing gradually an information system to underpin the regime. All of these aspects would evolve over time as experience is gathered.

Such mechanisms could be embedded in a dedicated legislative instrument: bans and obligations would be applicable to a selected set of species considered to be of concern for the EU, but before IAS are recognised as species of concern for the EU, there would be the need to perform a full assessments of the risks linked to that species, examining the impacts it has, its features, the likelihood of entry into the EU and spread, its route of entry, its invasive characteristics, etc. Thus before a species gets listed, and bans and obligations start applying, Member States would have the chance to thoroughly assess the candidate species and acquire extensive knowledge on it. Listing would thus be done with full knowledge of the consequences involved and with the full participation of Member States. Such list of species of EU concern would need to be reviewed periodically, with the possibility of adding species or removing species depending on need and in light of experience. Equally, the measures to manage the pathways of introduction would only be applicable to pathway deemed by Member States to deserve priority action, after the Member States have performed several stages of analysis (screening of pathways, identification of priorities, etc) that would provide them with a solid knowledge base and experience on all aspects of pathways, which would enable them to devise realistic and efficient measures. A similar gradual approach would apply to the development of an information system, which could initially be a simple

interface to access and share existing information and gradually develop into a tool to manage notifications linked to the early warning system and only later develop into a more comprehensive information management system.

Linked to the gradual approach is also the need to set up a mechanism to target action to a limited number of priority species and pathways. This would need to be a core feature of a dedicated legislative instrument. Listing of IAS of EU concern would be based on precise elements to perform a thorough risk assessment, giving a very clear idea now on which grounds the species would be listed, including an assessment of the possible uses of the species, its potential benefits as well as a quantification of its impacts so as to explicitly target the species that justify action at EU level. Similarly, the management of pathways would be limited only to those which the Member States concluded to be the route of entry of a large number of IAS or of IAS with large negative impacts.

Based on feedback from the consultation, different levels of ambition and/or intervention were identified for each operational objective which resulted in different sub-options for the design of the legislative instrument (Table 8). An initial screening led to discarding sub-options which were unfeasible, or simply not as effective as others (see Annex VI).

Table 8: Five operational objectives with three levels of intervention: retained (bold) and discarded actions

Problems (see Figure 1)	**Operational objectives (see Table 7)**	**Range of Options to address the operational objectives, with different level of ambition**
-Intentional Introduction of IAS of EU concern into the EU (e.g. through species trade)	A - Prevent intentional introduction of IAS of EU concern into the EU	A.1 – list of IAS of EU concern Example: EU Wildlife Trade Regulation
		A.2 - list of IAS of EU concern + emergency measures **Example: EU Plant health regime**
		A.3 – all alien species considered to be potentially of EU concern, unless included in an EU list of approved alien species Example: EU Regulation on biocidal products
-Contained holding and escape -Contaminant in commodity and escape -Stowaway in transport vector and escape	B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	B.1 - Member States manage major pathways
		B.2 - Member States manage major pathways, share information and Commission provides guidance
		B.3 - Member States manage major pathways, share information and require approval from the Commission
Intentional release in the environment	C - Prevent intentional release of IAS into the environment	**C.1 - IAS of EU concern are not allowed to be released into the environment.**
		C.2 – no release of IAS of EU concern + permitting system for IAS of Member State concern
		C.3 – strict ban on any release of any alien species unless included in an EU list of species approved for release into the environment
Reproduction and spread in the environment	D – Alert and Rapid Response to prevent reproduction and spread of IAS of EU concern into the environment	D.1 - Member States eradicate, control or contain newly establishing IAS of EU concern
		D.2 - Member States quickly eradicate, control or contain newly establishing IAS of EU concern, share information and Commission provides guidance
		D.3 -Member States do not have the choice they have an obligation to quickly eradicate newly establishing IAS of EU concern and share information. If Member States wish to resort to control or containment instead, they need to seek the approval of the Commission.
- Environmental	E - Eliminate,	E.1 - Member States eradicate, control or contain the IAS of EU concern

damage - Economic damage - Social damage	minimise or mitigate damage by managing IAS of EU concern established in the environment	**E.2 - Member States eradicate, control or contain IAS of EU concern, share information and Commission provides guidance**
		E.3 - Member States eradicate, control or contain IAS of EU concern, share information and require approval from the Commission for the measures envisaged

The problems and objectives of this proposal can be addressed in a proportional and realistic manner by the following sub-options retained for further analysis, presented below.

The **basic legislative instrument,** containing actions A2, B2, C1, D2 and E2, represents the minimum level of EU intervention. The main delivery mechanism would be a single list of IAS of EU concern, linked to certain harmonised EU obligations: bans on import, holding, sale, purchase, exchange; no release into the environment, early warning and rapid response to newly establishing IAS, as well as eradication, control and containment of established IAS of EU concern. Furthermore, there would be obligations linked to the management of pathways of introduction and spread of IAS. Stakeholders supported also elements which go beyond the basic legislative instrument, thus the following actions have been considered, as add-ons or alternatives:

a) adopting a more stringent approach and extending the scope of certain provisions to go beyond the single list of IAS of EU concern for the **release into the environment** by:

- **add-on C2**: introducing provisions on permits for release of IAS of Member State concern; or
- **add-on C3**: strict ban on any release of any alien species unless included in an EU list of alien species approved for release.

b) adopting a more stringent and interventionist approach as regards **early warning and rapid response** by:

- **alternative action D3**: Member States do not have the choice they have an obligation to quickly eradicate newly establishing IAS of EU concern and share information. If Member States wish to resort to control or containment instead, they need to seek the approval of the Commission.

This resulted in the analysis of the following variants of the legislative instrument:

- **option 2.1:** the basic legislative instrument (A2, B2, C1, D2 and E2)
- **option 2.2:** introducing provisions on permits for the release into the environment of IAS of Member State concern (A2, B2, C1+C2, D2, and E2)
- **option 2.3:** introducing a general strict ban on the release of any alien species, unless included on an EU list of IAS approved for release (A2, B2, C1+C3, D2 and E2)
- **option 2.4:** introducing an obligation for rapid eradication of newly establishing IAS of EU concern, with the possibility for derogations (A2, B2, C1+C2, D3 and E2).

5.3.1. Option 2.1: the basic legislative instrument

The basic legislative instrument would be underpinned by **a single list of IAS of EU concern**. The use of a list linked to obligations is an effective, reliable and science-based tool to set priorities for regulating species. It has been used with success in other policy areas, at EU level (e.g. animal and plant health), by third countries (e.g. US and Canada) and by EU Member States (e.g. Germany, France, Latvia, the Netherlands, Poland, Portugal). Notably,

the mechanisms governing the basic legislative instrument would be similar to those supporting the EU plant health regime and would build on lessons learned therein[70].

This list would include alien species proven to be invasive by risk assessment[71], performed, as it is the case presently, by Member States, consortia of Member States or other organisations (e.g. EPPO[72]), based on pre-agreed criteria (including environmental as well as socio-economic considerations)[73]. A technical process would be established with Member States to decide on minimum standards to perform the risk assessments, in order to ensure sufficient coherence and mutual recognition amongst Member States. Risk assessments would then be evaluated by a **dedicated standing committee**, which would include Member States representatives and which would also decide on whether a species should be included in the list or otherwise. In order to reduce administrative burden the procedure to decide on listing of IAS should be triggered for several species at a time.

Building up the single list of IAS of EU concern will be a gradual process, as it is not expected that all IAS will be listed immediately. The process could start with a limited number of IAS. Furthermore, the list would be a dynamic one to enable the inclusion of new IAS requested by Member States, whose invasiveness has been ascertained based on new scientific evidence, as well as the exclusion of listed species when justified. The risk entailed by the listed species would be high enough to justify harmonised EU-wide action, even if the species is only affecting certain Member States (see 3.6.2 on solidarity). Although it is not possible at this stage to know how many species will be listed as IAS of EU concern, the 167 species listed in the SEBI list of IAS threatening biodiversity has been used as a reference[74] in this Impact Assessment but they will not constitute the EU list.

The list of IAS of EU concern is associated with obligations aiming both to stop listed species from entering into the EU (**prevention**) and to address the listed species that have already entered the EU and become established (**reaction**) to avoid their further spreading. These species might also be listed in national lists; in that case listed species would be subject to EU rules as well as to national rules. The obligations triggered by the list of IAS of EU concern would be:

Prevention - Species listed as IAS of EU concern would be **banned from trade/import/marketing/transport** (operational objective A) as well as from **release into the environment** (operational objective C). Similar to the plant health regime, provisional emergency bans would be possible for alien species that are not yet listed, but that are thought to be invasive and should therefore be listed, while the risk assessment is in preparation. The **border checks,** to establish whether plants and live animals **intentionally introduced** are on the EU list, would be integrated within the border control system of

[70]The FCEC evaluation of the plant health regime recommended that the system should be modernised through strengthening the measures on prevention and enhancing coordinated action to prevent the spread of harmful organisms that enter the EU. The evaluation also highlighted the need for prioritisation and for strengthening the EU approach for joint action to tackle risks of EU significance. The proposed measures draw extensively from the existing plant health regime and learnt lessons from the FCEC evaluation. A preventive approach is proposed, including surveillance, early warning and rapid response as well as management obligations for those IAS that enter and establish in the EU.

[71]Risk assessments evaluate the invasiness of species under given conditions, potential geographical distribution and negative impacts. They allow for a prioritisation between species on the basis of their occurrence and damage.

[72]The European and Mediterranean Plant Protection Organisation (EPPO) is currently performing risk assessments for invasive alien plants.

[73] The analysiss is based on the assumption that the EU risk assessments would be modelled on the EPPO risk assessment protocol, which focuses primarily on the environmental risks presented by species, although it includes some socio-economic considerations; nevertheless, it has been considered a good model for the purpose of assessing IAS. The socio-economic considerations are indeed expected to be put forward in the risk assessments and then further developed and discussed by the Commission and the Member States representatives in the standing committee discussions.

[74]The SEBI list includes 167 IAS recognised as particularly threatening to biodiversity in Europe, identified in the framework of an exercise to streamline indicators of biodiversity in Europe, led by the European Environment Agency.

Regulation 882/2004: this would maximise the synergies of the IAS legislative instrument with existing legislation, thus achieving considerable cost savings. Other border control checks, including those to detect illegal or unauthorised introductions, will be performed by customs officials at EU entry points (e.g. airports, harbours). It is expected that such checks would add to the current responsibilities of customs officers and there would be a need to organise trainings or to develop guidelines to facilitate their task.

A proportion of the listed species would, however, be **introduced unintentionally** in the EU and escape or disperse into the environment. Moreover, many other unlisted alien species can be brought into the EU unintentionally and may become invasive. To capture these species in the regime (objective B), it will be necessary to **manage their pathways of introduction and release**. Pathway management, which received special attention in the Council Conclusions[75], would include, but would not be limited to, border checks (e.g. on cargo or commodities shipments) to help detect IAS, alongside other biosecurity measures. While the pathways of pests and diseases are very specific (i.e. infected animals and plants), the pathways of IAS are varied and numerous (see 3.2).

Here again a gradual approach could be proposed. The legislative instrument would concentrate on a very limited number of priority pathways of introduction known to be major routes of entry of IAS on all Member States (such as ballast waters) as well as requiring Member States identify other pathways of relevance to their territory.

Member States would then be required to take action to control the limited set of priority pathways and those they have identified at national level. The measures taken, which could include merely awareness and voluntary measures and possibly regulatory measures, similar, for example, to the system under the plant health regime, would have to be reported to the Commission. The latter could thus maintain an oversight of the process and engage with the Member States to review the approach if need be. The system is designed to develop with increasing implementation experience.

Reaction – the species listed as IAS of EU concern would also be subject to the following obligations: listed IAS newly establishing in the environment would need to trigger an **immediate reaction** (operational objective D). The choice of the appropriate and proportionate type of reaction, **to quickly eradicate, control or contain that species,** would rest with the Member States. They would have to **notify the Commission and other Member States of the presence of that species** on their territory and the measures taken.

Finally, the list of IAS of EU concern may also include species that are already known to be established in the territory of some Member States (legacy of the past). In these cases, concerned Member States would be obliged to take action to manage such species: they would be free to select the **appropriate and proportionate measures for the management (eradication, containment or control)**[76] **of established IAS** (operational objective E) and would have to inform the Commission and other Member States of the measures taken. The Commission could provide guidance, if appropriate, to optimise effectiveness across the EU.

In summary, Member States would be required to **notify the measures** taken to 1) manage major pathways for listed and unlisted IAS; 2) rapidly respond to newly establishing listed IAS and 3) manage the established listed IAS. The Commission would provide advice where appropriate.

[75] Environment Council Conclusions, 19 December 2011

[76] The choice of what provision to apply will largely depend on the IAS and on the circumstances: for some species eradication is still possible (e.g. ruddy duck), for other species control, i.e. keeping numbers down, is still possible (e.g. black cherry), while for other species containment, i.e. avoiding their spread, could be the only option left (e.g. killer shrimp).

The above package of actions would need two **implementing mechanisms**: 1) a **dedicated standing committee** (mentioned above for its role in evaluating risk assessments and adding/removing species to/from the list of IAS of EU concern) and 2) a **repository of information to collect and exchange information on IAS**. The notification obligations to report to the Commission on measures taken and the sharing of information to the repository of information will act also as implementation mechanisms: they will be check points enabling an overview of the process and monitoring and measuring progress against the operational objectives and against the targets set by the Birds and Habitats Directives, the Water Framework Directive and the Marine Strategy Framework Directive; they will also facilitate improved co-ordination amongst Member States and the Commission.

5.3.2. Option 2.2: introducing provisions on permits for the release of IAS of Member State concern (i.e. basic legislative instrument with the addition of action C2)

Besides banning the release of IAS of EU concern, this alternative would require permits for releasing **IAS of Member State concern**, aiming to prevent the release of IAS that may cause considerable damage in the future. The idea of a stricter approach to release into the environment was favoured by Member States representatives and also by a number of stakeholders within the Working Groups on IAS. The idea of permitting requirements was supported by almost 34% of respondents to the 2012 online consultation, compared to compared to 36% in favour of introducing a list of species approved for release and 12% in favour of simply focusing on the list of EU concern (basic legislative instrument) (Annex II).

This additional requirement would only apply to **IAS not in the list of IAS of EU concern, but for which Member States consider that the damage deriving from their release, while not fully ascertained, could be significant.** Member States would have the freedom and responsibility to identify such species relevant for their territories (see Figure 8) for which they have reasons to believe they may become invasive, for example because they have shown invasive behaviour in similar ecological conditions. Based on current practice, Member States may identify a few dozen species each[77]. For these species of Member State concern, the Member State would be required to introduce a system of permits to allow their release into the environment, which may be linked to conditions set by the Member State[78]. A permitting approach is already in place for certain species in several Member States (e.g. France, Germany and UK) and a similar system has been successfully introduced with Regulation 708/2007 on the use of alien species in aquaculture. The added value of EU-action would be that this system would be recognised EU-wide, Member States would cooperate on the selection of IAS, and their selection would become an important reference when considering new candidates for listing as IAS of EU concern. Figure 8 provides a schematic representation of the rough proportions of the problem addressed by the basic legislative instrument with the addition of action C2.

[77]By way of illustration, some Member States produce list of species not yet detected in their environment but considered likely to have a negative impact: e.g. Belgium lists 14 species, Ireland lists c. 50 species. In these two cases the majority of the species listed are intentionally introduced. EPPO also produces lists for species that are not yet present or present in a limited area in the European region and that may present a risk: currently EPPO lists around 22 such species.

[78]For example, limited number of specimens released, requirement of pilot phase, or compulsory contingency planning.

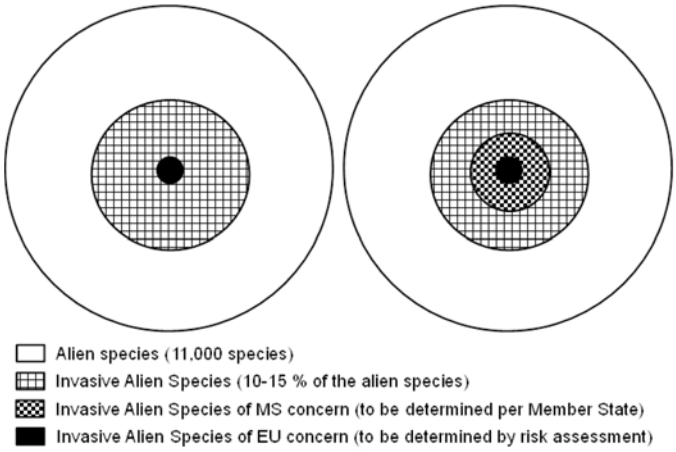


Figure 8: Schematic representation of the rough proportion of the problem to be addressed by the basic legislative instrument (i.e. the IAS of EU concern) adding action C2 (i.e. list of IAS of MS concern).

5.3.3. Option 2.3: introducing a strict ban on the release of any alien species, unless included on an EU list of IAS approved for release (i.e. basic legislative instrument with the addition of action C3)

In addition to the basic legislative instrument, action C3 introduces a very ambitious precautionary approach to deal with the release of species into the environment: no alien species would be allowed to be released unless proven to be harmless by risk assessment[79]. The additional action will be based on a common **EU list of alien species allowed for release** in the whole EU, besides the list of IAS of EU concern, which would still be valid for obligations other than those linked to release. Unlike the approach based on the IAS of Member State concern under action C2, this common EU list would be established, managed and applied at EU level. The idea of such stringent approach to address release into the environment was proposed by a significant number of stakeholders within the Working Groups on IAS, although it found less support from Member States representatives. The idea of introducing an EU list of species approved for release was supported by almost 36% of respondents to the 2012 online consultation (see Annex II).

5.3.4. Option 2.4: introducing an obligation for rapid eradication of newly establishing IAS of EU concern, with the possibility for derogations (i.e. basic legislative instrument with alternative action D3)

While the basic legislative instrument leaves the choice between eradication, control and containment to the Member States, with this alternative they will be **obliged to rapidly eradicate newly establishing IAS of EU concern.** Member States will be able to apply for a derogation and they will need to prove that eradication is technically unfeasible, a thorough cost benefit analysis shows that costs are exceptionally high and disproportionate or eradication methods are not available or those existing have very serious negative impacts on human health or the environment. The Standing Committee would decide upon it, within a limited time. Pending the Committee's decision the Member State would be required to take measures to contain the IAS and prevent its spread. The eradication obligation entails a high level of EU intervention and was discussed during the Working Groups on IAS: representatives from Member States were cautious about this approach, recognising the need to have EU intervention, but worried about an obligation to eradicate at all costs. Nature

[79] It is not possible to know in advance how many alien species would need to be risk assessed although it could presumably be many since it will be needed for any new alien species intended for release. It is not possible to know in advance how many of these species would be found safe for release.

conservation organisations tended to favour an approach with stricter obligations. Eradication of IAS was supported by almost 39% of respondents to the online consultation, but the majority (slightly over 62%) advocated an approach based on cost/benefit analysis. The approach proposed, with the possibility for derogations, seeks to address these views.

Table 9 below summarises the role of different actors in providing for the variable actions and variants of the legislative instrument.

Table 9: Responsibilities for the Commission and the Member States for establishing the measures foreseen in the proposed options.

Operational Objectives	European Commission	Member States
A - Prevent intentional introduction of IAS of EU concern into the EU	**Option 2.1, 2.2, 2.3, 2.4:** Management of list of IAS of EU concern	**Option 2.1, 2.2, 2.3, 2.4:** Development of risk assessments and proposing species for listing as IAS of EU concern Border control on IAS of EU concern
B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	**Option 2.1, 2.2, 2.3, 2.4**	**Option 2.1, 2.2, 2.3, 2.4:** Pathway management
C - Prevent intentional release of IAS into the environment	**Option 2.1**: no further action **Option 2.2, 2.4**: no further action **Option 2.3**: management of list of alien species not yet present but approved for release	**Option 2.1**: prevent release into the environment of IAS of EU concern **Option 2.2, 2.4** (additional to 2.1): management of permitting system based on national catalogue **Option 2.3** (additional to 2.1): prevent release of alien species unless listed in the EU list of alien species approved for release
D - Early Warning and Rapid Response to prevent reproduction and spread of IAS of EU concern into the environment	**Options 2.1, 2.2, 2.3**: - management of notification and EU early warning system for IAS of EU concern **Option 2.4** (additional to above): - management of applications for derogation	**Options 2.1, 2.2, 2.3**: - surveillance on IAS of EU concern - notification of new populations of IAS of EU concern - rapid response to new populations of IAS of EU concern **Option 2.4** (additional to above): - rapid eradication of new populations of IAS of EU concern or application for derogation
E - Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment	**Option 2.1, 2.2, 2.3, 2.4**	**Option 2.1, 2.2, 2.3, 2.4:** Management of IAS of EU concern
Horizontal measures	**Option 2.1, 2.2, 2.3, 2.4:** - Management of information system on IAS - Reviewing progress - Management of standing committee	**Option 2.1, 2.2, 2.3, 2.4:** - Participation in information system on IAS - Participation in standing committee

6. ANALYSIS OF THE OPTIONS

The different options will be analysed in the following sections. Table 10 provides a summary of the provisions of the different options.

Table 10: Summary of the provisions of the different options per operational objective

Operational Objectives	**Option 0 - Business as Usual (baseline option)**	**Option 1 – Non-legislative initiatives and voluntary action**	**Options 2.1, 2.2, 2.3, 2.4: – Dedicated legislative instrument**
A - Prevent intentional introduction of IAS of EU concern into the EU	- Wildlife Trade Regulation (however unconnected to the other objectives) - Non-harmonised bans in MS disrupting the internal market	- Guidelines encouraging joint action among MS - Additional awareness raising	- Risk-based list of IAS of EU concern
B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	- Ballast Water Convention (when into force) - Voluntary codes of conduct	- Additional codes of conduct - Additional awareness raising	- Efforts towards a harmonised approach across the EU, which could include awareness raising and voluntary actions and regulatory measures
C - Prevent intentional release of IAS into the environment	- Alien species in aquaculture - Micro-organisms as biocides	- Guidelines encouraging joint action among MS - Additional awareness raising	- **Option 2.1:** Harmonised approach across the EU on the release of IAS of EU concern - **Option 2.2, 2.4:** adding a permit requirement for IAS of MS concern - **Option 2.3:** in addition introducing a strict ban on any release of any alien species into the environment unless included in a common EU list of alien species approved for release
D - Early Warning and Rapid Response to prevent reproduction and spread of IAS of EU concern into the environment	- Voluntary initiatives	- Guidelines encouraging joint action among MS - Additional awareness raising	- EU-level early warning system - **Option 2.1, 2.2, 2.3:** Rapid response obligation (eradication, control or management) for newly establishing IAS of EU concern - **Option 2.4:** introducing the obligation to eradicate newly establishing IAS of EU concern with a possibility of derogation
E - Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment	- Ad-hoc approach	- Guidelines encouraging joint action among MS - Additional awareness raising	- Obligation for MS to manage widely spread IAS of EU concern, though the choice of measures is left to them

One inherent difficulty faced in analysing the impacts of different options was the fact that it is impossible to know in advance how many and what sort of invasions will need to be tackled. Similarly, it is not yet known what and how many species will be included in the list of IAS of EU concern[80]. Finally, the assessment would have benefitted from the availability

[80] For the sole purpose of being able to ascertain possible impacts of a list, the SEBI list of 167 IAS was used as a reference This should not be interpreted as an indication that the SEBI list will be adopted as the list of IAS of EU concern.

of more data, especially for certain sectors[81] and for certain species[82], but until recently large-scale and comprehensive economic studies on IAS in general have been rare[83].

Another important consideration to be made is that the sectors likely to be affected by the legislative instrument are thought to include several **SMEs, including microenterprises**. The Commission is concerned about the impact of legislation on small and microenterprises and has a policy of minimising the burden on these businesses; however, they would be expected to fall under the scope of the legislation. IAS can have serious negative impacts on SMEs in sectors such as forestry, agriculture, tourism and recreational activities, businesses currently suffering from the lack of coordinated action on IAS. These sectors would thus benefit from the introduction of coordinated measures to tackle IAS. On the other hand, other SMEs, such as pet traders and the horticultural sector, benefit from trading alien species and could be impacted by the introduction of legislation to tackle IAS, which may pose some restrictions on the use of alien species although it is generally recognised that for most purposes there is always a choice of substitute species that do not present invasive characteristics. Hence the SMEs may adapt their activities without severe losses. Nevertheless, trade in pets and horticultural species are recognised as important pathways of introduction of IAS. Therefore, SMEs and microenterprises will be expected to fully apply the provisions of proposed legislation that apply to them, as excluding these players would completely undermine the effectiveness of the instrument in achieving the proposed goals. Were the microenterprises to be excluded, action on IAS would mostly be taken by public authorities. Action on prevention would be largely undermined as the system would not cover some important sectors responsible for the introduction of IAS into the EU. This would also lead to increased costs for public authorities and other stakeholders in eradicating or otherwise managing IAS, brought in by other sectors leaving unaltered the current situation, where costs and benefits are unevenly distributed. SMEs and microenterprises would thus need to comply with the proposed legislation. It must be underlined, however, that the system envisaged caters for some flexibility to tackle these sectors, while keeping the impact on small and microenterprises to a minimum[84].

6.1. Economic impacts

6.1.1. Option 0: Baseline

The analysis of the baseline found that the total cost of this action amounts to €1.4 billion/yr (see Table 11 and Annex VII), mostly for predominantly reactive action (management of damage) (see rows D and E in Table 11).

Table 11: Estimated cost of action for option 0, based in so far as possible on current expenditure

Option 0	Estimated cost	Expected trend in costs
A - Risk	Implementation cost of €3 mio/yr[85] for Member States	=

[81] Many sectors that have a stake in the IAS debate, either as users or as victims of IAS, are largely small and microenterprises, which do not have the resources to collect or maintain comprehensive data sets on their own business. The pet industry and the horticultural sector, for example, provided mostly qualitative data on the structure of their business and on the volume of species traded

[82] Information on microorganisms, algae, fungi tends to be scares, while more is available for plants and vertebrate animals, in particular birds and mammals.

[83] Scalera, 2009

[84] Despite significant efforts, through contacts with the sectors involved and research, the data found on the structure of these sectors were scarce. From consultations with stakeholders, however, it was possible to infer that the sectors with a commercial interest in certain alien species are likely to include a large number of retailers (mostly microenterprises) trading alien species directly with the public and sourcing their products from larger players, importing such species into the EU. The larger players are thought to be a heterogeneous group, including a sizeable proportion of SMEs. Some of the proposed measures would be relevant to these larger players, rather than to the microenterprises in the retail sector.

[85] Total cost of current risk assessments in Member States (Shine *et al*. 2010)

Assessments		
B - Pathway management	Implementation cost of ballast water treatment: € 109 mio/yr[86] and biofouling treatment: min. €13,700/vessel/event[87] for operators Some awareness campaigns in Member States	↑↑ When Ballast Water Convention enters into force ↓↓ as the technologies for ballast water treatment evolve and become more efficient and cheaper
C - Release into the environment	Variety of systems in Member States, difficult to quantify	=
D – Surveillance	Implementation cost of €7 mio/yr[88] for Member States EEA: Nature Watch - pilot project on IAS[89]	=
D - Rapid eradication	Included in management of IAS	=
E - Management of IAS	Implementation cost of €1.309 bio/yr[90], for Member States, EU and citizens	↑↑ or large damage increase (see 3.5)
Information system	Implementation cost of €3.4 mio/yr for Member States and EU, including information systems at Member State level (€3.3 mio/yr[91]), NOBANIS (€120,000-140,000/year[92]) and efforts by JRC into EASIN (€230,000/year[93])	=
Policy management	Strategy development, policy development and coordination and policy support (studies): implementation cost of €2 mio/yr for Member States[94]	=
	€ 1.433 bio/yr	**↑↑ or large damage increase (see 3.5)**

6.1.2. Option 1: Cooperation and voluntary action

The actions proposed under Option 1 include voluntary exercises to coordinate and communication and awareness raising campaigns.

The additional costs of option 1, compared to potion 0, are thought to be limited: they would be limited to organising campaigns and voluntary actions, generally cheaper than the actions needed to manage the damage of IAS. On the other hand, a number of effective campaigns could reduce the cost increase of damage management. It is nevertheless very difficult to assess the possible impacts of cooperation and voluntary action: thus it can be reasonably assumed that their impact on the massive damage management costs will remain limited. The cost of option 1 will thus be considered within the same magnitude as option 0, thus €1.4 billion/yr, although the cost increase in the future might be less pronounced.

[86] Pending Ballast water Convention: €8,000/year/vessel (based on http://globallast.imo.org/Monograph_19_Economic_Assesment_web.pdf) x 13,616 vessels in the EU (based on http://www.ecsa.eu/images/files/downloads_annualreports/Rapport%202010-2011.pdf)

[87] Shine *et al*. 2010

[88] Total cost of current surveillance in Member States (Shine *et al*. 2010)

[89] No cost estimate available

[90] Based on data on current management costs, an average cost per acting MS per addressed IAS per year was estimated for a series of species groups (Table A10, Annex VII). Next, building on the overview of IAS which MS are currently managing at the MS-level (Table A6, Annex V) and on the cost estimates in Table A10, the total current management cost was estimated per species group (Table A11, Annex VII), leading to an estimated total current IAS management cost of €1.309 bio/yr. See Annex VII for further details.

[91] Shine *et al.* 2010: current average of €122,000/year/Member State

[92] Estimated investment in NOBANIS, has been funded by some Member States

[93] Estimated investment by the Joint Research Centre: €690,000 in 3 years = €230,000/year

[94] Shine *et al*. 2010: (1) current average for "IAS policy development and coordination" of €40,000/year/MS (together €1 million/year) + (2) "development of strategies for the MS" that do not yet have them and strategy revisions (current average of €130,000 to 1.5 million/strategy) and "policy assessment and support" assuming one study (current average of €50,000/study) every 3 years (all together roughly another €1 million/year), thus cost of (1) and (2) = €2 million/year

6.1.3. Option 2.1: the basic legislative instrument

The basic legislative instrument would introduce mandatory provisions aiming (1) at preventing new species entering or establishing in the EU and (2) at coordinating the management of established species so as to eliminate, minimise or mitigate their damage.

The measures would lead to a **reorganisation of the current expenditure -** focusing more on prevention and less on reaction - **and to a more efficient use of resources** – through a coherent prioritisation**. Additional costs** compared to the baseline **would be kept to a minimum** – by making maximum use of existing provisions. Efficiency gains will accrue from: 1) more focus on prevention, which will result in an avoidance of damage costs growing by billions a year; 2) coordinated action focusing on the list of IAS of EU concern, resulting in streamlined measures, avoiding action in one Member State being undermined by lack of action in a neighbouring Member State; 3) sharing information, thus avoiding parallel investment and the duplication of efforts, e.g. investments in data collection and risk assessments; and 4) integrating actions into existing systems in so far as possible by (a) integrating IAS surveillance into the current surveillance of biodiversity, (b) building an IAS information system based on current information systems and (c) integrating the border control on intentional introductions of IAS into the current border control in support of the animal and plant health regimes, thus keeping additional costs to a minimum.

The **costs of option 2.1** have been estimated on the basis of similar experiences in EU policy implementation and in Member States or with other organisations (e.g. EPPO). See Table 12 below. Based on an analysis of the current Commission staffing for the Plant Health Regime, and on a comparison of the work needs deriving from the two systems, it was concluded that no additional staff would be necessary to manage the new policy compared to the current set up. The necessary additional costs for the Member States for action stemming from Option 2.1 would be around €26-40 million/yr. This minimal increase compared to the current costs of €1.4 billion/yr is due to the efficiency gains outlined above. How this cost of action develops over time will be a function of Member States' efforts to manage pathways and IAS of EU concern. As this is uncertain, it is difficult to predict how those costs will change, but it is possible that they will decrease over time: Table 12 sets out a realistic scenario whereby due a concerted action on a common set of listed IAS that would focus efforts of several Member States on the same species, the population would be brought down and a 50% reduction in the current management costs could be reasonably expected, thus bringing the total costs over time to €1 billion/yr.

Table 12: Costs of option 2.1

Option 2.1	Estimated costs	Expected trend in costs
A – List of IAS of EU concern	Some opportunity costs for traders of exotic species[95]	= The availability of alternatives will lead to a reduction of opportunity costs while newly listed species will raise the opportunity costs
A - Risk assessments	Implementation cost of €1.4 mio/year[96], mainly for Member States	↓ Once a first list is in

[95] Only in so far as species of interest to a sector were banned, traders of exotic species (mostly small and microenterprises) would be affected by the introduction of a list of IAS of EU concern, at least until the identification of suitable substitute species, see 6.1.3 for more details.

[96] Shine *et al.* 2010: current cost of EU-level risk assessment is €42,000 per assessment. Assuming that all 167 IAS on the SEBI-list would be assessed during the next 5 year, this would make 33 risk assessments/year or 1.4 mio/year. The cost per

		place the cost of additional risk assessments will decrease
A - Border control on intentional introductions	Limited implementation costs for Member States[97], thanks to integration with current controls on live animals and plants for planting (see 5.3.1)	=
B - Pathway management, incl. border control on unintentional introductions	€135.5 to 150.1 mio/year of implementation costs to be shared among Member States and transport operators. This amount includes an additional cost of + €26 mio/yr[98] + € 0.5 mio/yr[99], optionally + €14.6 mio[100]/yr on top of €109 mio/yr baseline costs for ballast water treatment[101]	↑ Gradual cost increase as pathway management develops
C - Release into the environment	Some opportunity costs for primary producers[102]	=
D - Surveillance	Implementation costs of €7 mio/year for Member States[103]	=
D – Rapid eradication	Included in Management of IAS	↑ New IAS circumventing the prevention will more often be eradicated[104]
E - Management of IAS	Implementation costs to manage or eradicate IAS: €1.309 bio/year[105]	↓ Expected to decrease to € 0.922 bio/yr for Member States[106]
Information system	Implementation cost (including some administrative costs for notification) of €3.6 mio/year[107]	= Expected to shift from Member States to Commission
Policy management	Implementation cost (including some administrative cost for reporting) of €2.1 mio/year[108]	=

risk assessment could be higher, in particular when adding more economic information, but potentially replacing 27 risk assessments by one risk assessment will lead to considerable cost savings.

[97]Thanks to integration in current controls on live animals and plants for planting. Based on the costs of similar exercises coordinated by the services in charge of customs and taxation of the Commission, it was estimated that a small project to develop guidelines for customs on IAS consisting of 3-4 meetings of 10 experts would costs €20,000-30,000 in total, using Commission facilities and excluding translation costs

[98]Current costs for border control in plant health: €26 mio/yr (Food Chain Evaluation Consortium (FCEC), 2010). As harmful organisms are never introduced intentionally, the total plant health border control cost can be considered as border control on unintentional introductions.

[99]Costs of pathway management are extremely difficult to estimate as this area of work is not yet developed. One example of is the UK "check clean dry" campaign, costing roughly €50,000/year over 2 years. Assuming all MS organise one such campaign in the next 5 years (or several smaller campaigns), this would make €20,000/MS/year, in total €540,000/year.

[100]Current costs of regulatory pathway management within the plant health regime: €14,574,239/year (Food Chain Evaluation Consortium (FCEC), 2010)

[101]Pending Ballast Water Convention – expected to come into force in 2012-2013 (see Annex IV). These costs would be part of the baseline as they would not derive from this proposal.

[102]Only in so far as species of interest to a sector were banned, primary producers (mostly small and microenterprises) would be affected by the introduction of a list of IAS of EU concern, at least until the identification of suitable substitute species, see 6.1.3 for more details.

[103] Shine *et al.* 2010: current average of €260,000/year/MS

[104] Very unpredictable and thus impossible to quantify

[105] See cost of option 0

[106] Out of the 173 IAS that are currently contributing to the control cost (see Annex VII), 74 are listed in SEBI. We used this as an indication of the number of IAS contributing to the control cost that might be listed. Assuming that the concerted action towards those IAS could lead to a reduction of their future control costs by 50 %, and taking into account the control cost in Table A11 in Annex VII, this would lead to a cost saving of € 387 mio/yr.

[107] Current cost of €3.4 mio/year (see baseline) PLUS estimation for the expansion of the work by JRC of €170,000/year, TOGETHER €3.6 mio/year, details in Table A12

[108]Current cost of €2 mio/year (see baseline) PLUS €80,000/year (steering group - based on costs Wildlife Trade Regulation, assuming 3 meetings/year and 1 representative/MS, assuming a maximum travel and subsistence cost of €800

TOTAL	**€1.459-1.473 bio/yr** plus some opportunity costs for traders of exotic species and primary producers	**?** Expected to decrease to 1.072-1.086 bio/yr over time Although expected cost increase for IAS that circumvent the prevention measures **In total, far less damage increase than under options 0 or 1 (see quantification of benefits)**

A quantification of the **benefits of the basic legislative instrument** is difficult as the benefits – or the avoided damage costs – will depend on which IAS will threaten the EU and will, through legislation, be prevented from entering, spreading and causing excessive damage. As there are uncertainties on the number and invasiveness of IAS, a preliminary assessment is made.

In terms of **avoidance of damage cost increase** based on an estimation of the IAS that enter the EU every year, assuming that half of those could be stopped by the legislative instrument and taking into account cumulative benefits, it has been estimated that a €2 billion/yr saving in the long term after 4 years[109] of implementation could be achieved. Moreover, wherever newly establishing IAS could not be prevented but would be listed and managed in a coherent way, even more damage costs would be avoided. It will indeed not be possible to completely eliminate increasing damage and costs of action through new invasions. This estimate is of course rough, but illustrates the potential benefits in a simplified manner.

In summary, the basic legislative instrument would result in the current costs of damage and management of at least €12 bio/yr not to increase as much as they would without the EU action, thanks to

- the prevention of additional invasions and all related costs, although some IAS will still circumvent the prevention measures;
- coherent and targeted action towards established IAS and unstopped new IAS, as to keep their damage and management costs to a minimum.

The **impacts of the different measures** are illustrated in the following paragraphs:

Single list of IAS of EU concern banned from trade/transport/marketing and release into the environment – Current total spending on risk assessments in the EU is estimated to amount to

euro/MS/meeting and €426/translation/slot for 6 languages, this would bring the cost for the Commission to €80,000/year), TOGETHER €2.1 mio/year, detals in Table A12

[109] In terms of avoidance of damage cost increase on the basis of data from NOBANIS, it is estimated that roughly 8 new IAS are entering the EU each year (although many more alien species enter every year). Based on the data on damage of the species listed in Table 3, Table A6 (Annex V) and Table A13 (Annex VII), it was estimated that the 30 IAS currently most addressed by the Member States are causing in the longer term a damage of €3.86 billion/year, i.e. an average of €130 million/IAS/year. This means that if 8 new introductions a year would occur, these 8 IAS would cause a damage of roughly €1 billion/yr in the longer term. It also means that these damages would accumulate as every year more new IAS would enter: €1 billion/yr in the long term after the introduction of 8 IAS in year 1, €2 billion/yr in the long term after the introduction of an additional 8 IAS in year 2, €3 billion/yr in the long term after the introduction of another 8 IAS in year 3, €4 billion/yr in the long term after the introduction of another 8 IAS in year 4, and so on. If out of the 8 new IAS entering the EU every year, 4 could be prevented from entering or spreading, this would generate an avoided cost of roughly €0.5 billion/yr in the long term after preventing 4 IAS in year 1, avoiding €1 billion/yr in the long term after preventing an additional 4 IAS in year 2, €1.5 billion/yr in the long term after preventing another 4 IAS in year 3, €2 billion/yr in the long term after preventing another 4 IAS in year 4, and so on.

€3 mio/yr. Developing common risk assessments, which could be used by all Member States, is estimated to cost roughly €42,000 per species[110]. Adopting a gradual approach with the development of 167 risk assessments over the next 5 years (estimate based on the SEBI list), the estimated cost for the whole EU could amount to €1.4 mio/yr, less than half the current yearly expenditure (see Table 11). Thus developing such a list entails **costs** for **Member States** and other organisations for carrying out risk assessments. However, **considerable savings** can be made as risk assessments will be used by all Member States and for compiling an EU list, thus avoiding duplication of efforts.

Border controls on **intentional** introductions would be integrated in the system of border controls already in place for plants and live animals, at designated entry points, thus **minimising the costs of check on intentionally introduced IAS plants and animals:** a study to support the review of the plant health regime[111] found that the additional costs of integrating border control on invasive alien plants in the current system would be negligible, as no adaptation to current practices would be required. The same can be assumed for invasive alien animals, however, there will be some moderate extra costs for special training for designated entry points' staff to enable them to detect IAS. Other border inspections will be carried out by customs authorities at any EU entry points: such checks would add to the current responsibilities of customs officers and there will be a need to organise trainings or developing guidelines to facilitate their task. The cost of these initiatives will be borne partly by the Member States and partly by the Commission (see Table 12). As many Member States already have trade bans on IAS in place, it is expected that the additional costs of action would be moderate (see Table 12).

These prevention measures will significantly benefit public authorities in terms of **cost avoidance**: wherever the intentional introduction or release of a new IAS is prevented, enormous subsequent damage and management costs are avoided[112] (see also Annex VII).

Only in so far as species of interest to a sector were banned, **primary producers** (mostly small and microenterprises) would be affected by the introduction of a list of IAS of EU concern, at least until the identification of suitable substitute species. Based on input from stakeholders, non-invasive or native substitute species would be readily available in most cases[113]. On the other hand, primary producers would also benefit significantly from prevention: wherever the intentional introduction or release of a new IAS is prevented, enormous subsequent damage and management costs are avoided. For example, the forestry sector suffers the consequences of the intentional introduction of black cherry: had the introduction of this species been prevented, the sector would not be burdened with the costs of management (e.g. € 3.4 mio/yr for management in German forests[114] - see Annex VII).

For **traders or breeders of exotic species**, (also mostly small and microenterprises), the introduction of a list of IAS of EU concern is expected to have an economic impact, but the

[110] Shine *et al.*, 2010

[111] Food Chain Evaluation Consortium, 2011

[112] €23 mio/yr in the Netherlands (Van der Weijden *et al.*, 2007)[112] alone could have been saved had the introduction of species like muskrat been avoided; €205 mio/yr in England, Scotland and Wales (Williams *et al*,. 2010)[112] saved if Japanese knotweed had not been introduced

[113] Taking the SEBI list as a reference, no species of agricultural interest were identified. When it comes to biomass production, and forestry, species are usually selected for their fast growth and adaptability, characteristics that can make an alien species invasive. However, for these sectors, only one species of commercial interest, black locust, is in the SEBI list, thus a list of IAS of EU concern will have a limited impact. As for the horticultural sector, which relies especially on the growing and sales of ornamental (often alien) species, the SEBI list includes 11 plants with a commercial interest. However, these plants are generally not of high value – only 4 of these species were considered of economic value by nurseries – and species substitution with non-invasive or native species would generally be possible (more information in Alter IAS project).

[114] Reinhardt *et al.*, 2003

extent of this impact will depend largely on the number and the species included in the list. The sectors involved recognise that IAS are a problem, but stressed the need for any trade bans to be based on scientific grounds. The SEBI list includes 27 species sold as pets. Most of these species are not high value commodities and are traded in small volumes: many rarely enter the regular pet trade but are rather exchanged by hobbyists[115]. Turtles, clawed toad and ring-necked parakeet are an exception as they are commonly sold. Only koi was identified as a highly valuable species, the banning of which would have rather heavy economic consequences on the sector. Notwithstanding the considerable data gathering efforts, it was not possible to precisely assess the impact on specialised dealers as those enterprises have no obligation to register traded species. If there are traders that deal with a limited number of species and these species were to be banned, then these businesses would be negatively impacted. These concerns will be duly considered by the Member States experts and representatives during the listing procedure[116]. For most species, however, it is thought that non-invasive or native substitute species would be readily available.

One important benefit of the introduction of the list of IAS of EU concern would be to ensure the smooth functioning of the **internal market** by **setting a harmonised and transparent approach** to risk assessment, representing a substantial improvement compared to the current situation where Member States are introducing non harmonised trade/marketing/transport bans, which hinders the free movement of goods.

International trade of alien species would be affected to the extent to which traded species were banned. This disruption is likely to be limited as the species likely to be listed would a) be traded in small volumes or b) not necessarily be high value commodities, with some exceptions: indeed a high value species may be listed where justified on the basis of risk[117]. In any case, any ban on trade would be based on risk assessment and thus be compatible with WTO and SPS agreement.

In terms of **legal certainty for business**, including small and microenterprises, all sectors using IAS would benefit from a clear framework, harmonised across the EU and focused on a common set of species to be banned from trade/marketing/transport and release that would ensure a level playing field across the EU. In terms of **competitiveness and profitability of business**, certain sectors will face certain constraints in choice. This will be the case for example for biomass producers: if a valuable, fast-growing plant species were to be banned on account of its invasiveness, certain operators may find themselves at a disadvantage compared to international competitors. It has to be stressed, however, that major trading partners such as the US and Canada already have stringent IAS policies in place, which also place constraints on the choice of species for potential competitors to EU businesses. These constraints concern only proven IAS and they could be overcome by species substitution, which will imply more efforts for businesses in their business strategies, being mindful of the invasiveness potential of the species they select and understanding that substitution is not always an immediate opportunity. Furthermore, there are some businesses that rely heavily on a single species and their profitability would be seriously undermined, were this species is to be banned. One example is the fur breeding sector: an important and profitable sector in

[115] European Pet Organisation, *pers. comm.*

[116] Listing of species will be based on risk assessments (see section 5.3.1), carefully evaluating positive and negative impacts of the concerned species, and taking into consideration directly and indirectly depending businesses, including SMEs, and the whole supply chain.

[117] Listing of species will be based on risk assessments (see section 5.3.1), carefully evaluating positive and negative impacts of the concerned species, and taking into consideration directly and indirectly depending businesses, including SMEs, and the whole supply chain.

the EU, it relies heavily on the American mink[118] and would suffer a significant negative impact from a ban. Impacts on such sectors and related supply chains will be thoroughly evaluated by the Commission and the Member States representatives during the listing procedure. Socio-economic impacts will be an integral part of the analysis and procedure on the basis of which species will be listed.

Obligation to manage major pathways of unintentional introduction into the EU and unintentional release into the environment – the obligation to **manage major pathways** seeks to address species coming in accidentally, which have been estimated to represent roughly three quarters of all introductions. It is therefore an important provision, addressing a substantial part of the problem and enabling to go beyond what the list of IAS of EU concern could achieve, by capturing new IAS arriving by accident. The need to address pathways was recognised by the Member States during the consultations. Such provisions will entail substantial costs of action, mostly for Member States (e.g. increased controls on commodities or transport vectors), but potentially also for the private sector (e.g. implementing more stringent biosecurity measures), depending on the type of measures introduced. A gradual approach could be introduced whereby action is required on a limited set of pathways known to be major routes of entry of IAS into the EU and evolve further with the identification of major pathways of relevance to the Member State. While it is not possible to know in advance how many and what type of measures Member States will establish, it is clear that the costs of action will be proportional to the stringency of the measures (see Box 5). The same can be said about the benefits, with the chances of stopping new IAS at the borders – that would otherwise come in undetected – being higher with a more stringent system and more impermeable borders. The fact that Member States will have freedom to choose what measures to apply should provide them with enough flexibility to ensure that costs are not disproportionate and do not exceed benefits and allows an evolution over time.

Box 5 – Provisions for pathway management

The routes by which invasive alien species enter a new area or new habitats are known as pathways. Since about three quarters of the IAS are unintentionally introduced into the EU addressing pathways of unintentional introduction will be increasingly important.

In the EU, some pathways have been identified and actions have been taken on them hence experience is being gained, like on ballast water contaminated with aquatic organisms (Ballast Water Convention – not yet in force)

Many Member States are starting to further address the issue, with a particular focus on the collection and analysis of information on pathways of IAS. The option analysed in this Impact Assessment, building on experience already gained at EU level, would require that Member States identify the major routes of introduction of IAS in their territory. This exercise has already been done by some countries, such as France, as shown in Figure 9.

[118] American mink accounts for 92 % of the stock of animals bred for fur in Europe. Europe accounts for 60% (31.3 million pelts) of world mink production (EFBA)

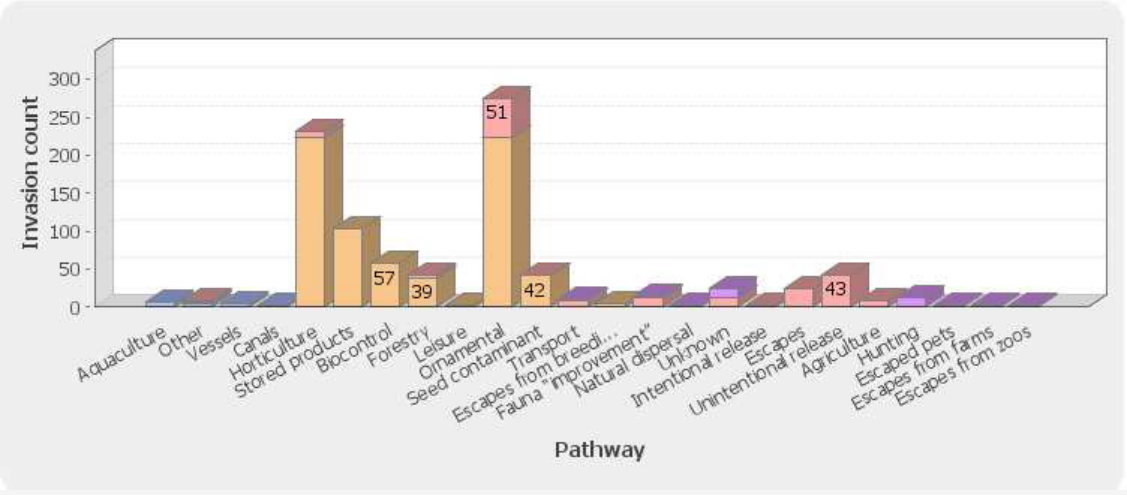


Figure 9: Pathways of introduction into France (pink = plants, orange = invertebrates, blue = fishes, purple = vertebrates) (Ménigaux, 2010)

The option envisaged would also require Member States to take actions to control the major pathways identified. Few Member States have developed targeted action towards specific pathways of IAS. One example of such action is the UK "check clean dry" campaign which cost approximately €100,000. This programme is making water users aware of how they unknowingly are helping the spread of IAS from one water body to another through equipment.

This would entail **costs for public authorities**; they would be organising the campaigns or setting the regulatory measures, as well as organising more stringent controls - under the plant health regime pathway management currently costs €26-40 mio/yr (Table 12). Border controls for unintentional introductions in particular could entail significant costs.

Depending on the type of measures adopted, **costs will also be faced by traders, transport companies and operators**: certain implementation costs may be entailed by the introduction of biosecurity requirements on certain commodities or transport vectors. There are already some Sanitary and Phytosanitary Standards besides the rules regulating the release of alien species for aquaculture and the provisions of the Ballast Water Convention. Nevertheless, for the other pathways, limited initiatives have been taken, mostly consisting of the development of awareness-raising campaigns and voluntary codes of conducts in certain sectors. The obligation to manage pathways and the provision for EU advice would be expected to stimulate and gradually strengthen a coordinated approach. The cost involved needs to be measured against the **cost of not acting** to manage pathways, which **could become prohibitive** in terms of damages caused by IAS to be borne by society at large.

Some additional costs are expected for traders of some commodities that can be contaminated by IAS (e.g. animal feedstuff containing IAS seeds, wood containing IAS invertebrates), who could be required to inspect their goods before entry into the EU. However, such measures will significantly benefit public authorities: wherever the unintentional introduction of an IAS is prevented, enormous damage and management costs are avoided (e.g. €130 mio/yr of yield losses in Hungary[119] would have been avoided if introduction of ragweed had been prevented, see Table 3 and Annex VII for more examples).

Obligations linked to early warning and rapid response action – requirements linked to rapid response to species listed as IAS of EU concern include the **costs of surveillance and of notification** to the Commission and other Member States. These requirements will, however, rely in so far as possible on existing structures and information systems, thus keeping **new**

[119] Kemives *et al.* 2006

costs for public authorities to a minimum. When it comes to eradication, containment or control, the costs are highly variable and depend on the species in question and the circumstances and environment where it is detected. To provide an indication of the magnitude of costs entailed, it is useful to consider that currently Member States are spending between €50,000 and €14 million per invasion to eradicate IAS[120]; containment and control measures may be cheaper, but would continue indefinitely. These costs are largely met by **public authorities and to a lesser extent by affected private sector operators.** Again, the costs of taking early action may be substantial, but will be **largely offset by the benefit of cost avoidance** (see examples above, Table 3 and Annex VII).

Obligation to eradicate, contain or control established IAS of EU concern – the obligation to manage established species listed as IAS of EU concern will entail **substantial costs for Member States public authorities and the private sector because these often spread over large areas.** However, the exact cost is impossible to calculate as it will largely depend on which and how many listed IAS will already be established in Member States. Activities to manage widely spread IAS in Member States (e.g. management of floating pennyworth in the Netherlands[121], muskrat in Germany[122], giant hogweed in Latvia[123], IAS in waterways in the UK[124]) have costs ranging from €0.5 million to €24.5 million a year[125] (see Table A-10 in Annex VII). The magnitude of the cost will also depend largely on the effectiveness of the measures taken to prevent the introduction into the EU and the establishment in the environment of IAS. During the consultations, Member States mostly stressed the need to maintain flexibility in addressing established IAS, but recognised the importance to take coordinated action and recognised that provisions linked to a single EU list would ensure coherent action across the EU. This would **avoid waste of funds** (see 3.4) and **yield benefits in terms of damage cost avoidance**.

Implementing mechanisms – there is currently no dedicated **standing committee** working on IAS, although some work on aquatic IAS could be done through the existing legal structures implementing the Marine Strategy Framework Directive the Water Framework Directive and the Aquaculture Regulation. However, for terrestrial IAS or for integration across regional seas, catchments and biogeographic regions, an additional structure would be needed: based on costs of existing similar structures supporting the implementation of the Wildlife Trade Regulation, a dedicated structure could cost the **European Commission** around €80,000/year, assuming three yearly meetings.

As regards the **centralised repository of information**, there is currently a variety of information systems in place at the international, EU, regional and Member States level (see 3.4). Average Member States' current expenditure, on collecting (excluding on surveillance on the ground), managing and sharing information, amounts to €120,000/year per Member State (roughly €3 mio/yr in total)[126] and some Member States are already investing in a common early warning system (NOBANIS). At EU level, the Joint Research Centre is working on the integration of information on alien species in Europe which could evolve in a phased approach as needs emerge and implementation experience is gained. Developing a central repository would lead to a certain **shift in costs from Member States to the EU** for

[120] Shine *et al.*, 2010
[121] Van der Wijden *et al*., 2007
[122] Reinhardt *et al*., 2003
[123] Sonigo *et al*. 2011
[124] Williams *et al.*, 2010
[125] This figure is higher than the interval of 50,000 and €14 million per invasion to eradicate IAS because it refers not only to eradication but also containment and control of widely spread species that need to be pursued indefinitely
[126] Shine *et al.* 2010

gathering and processing data, but costs are **not expected to increase** substantially compared to current national expenditure.

In conclusion, the basic legislative instrument could **negatively impact** on international trade (but only if commonly traded high value IAS were banned) and, in so far as suitable alternatives could not be found, on those small and microenterprises cultivating IAS or trading pets and ornamental species. The instrument would **positively impact** the efficiency of spending by Member States public authorities and the legal certainty and market predictability for businesses. It would prevent continuously growing damage and management costs to the benefit of public authorities and small and microenterprises affected by IAS. On **balance the economic impact of the basic legislative instrument was considered to be positive** while some short term investments will be needed**.**

6.1.4. Option 2.2: Adding permits for releasing of IAS of Member State concern

A summary of the costs of option 2.2 can be found in Table 14.

Managing a system of permits for releasing certain species is would represent a **cost for public authorities,** with additional staffing needs for some Member States; however the cost cannot be estimated as the system set up will depend on the Member States. Charging the permit applicants, who have a benefit from the release of a species can help reducing the costs of the system. Member States authorities would also have to evaluate which IAS they consider of Member State concern and the basis on which permits for release could be granted. It is not possible, however, to provide an estimate of total costs as this will depend on the number of IAS and on the level of interest for releasing such species. It has to be considered, however, that 14 Member States are already legally restricting release into the environment (see Table 4 and Box 6), which means that this action would entail limited or no additional costs for those Member States. In addition Member States expressed their preference for requiring a permit for any release of alien species in the environment. Also the public consultation revealed that 34% were in favour (see Figure A-3 in Annex VI) of a general permit requirement for releases. Such system would indeed entail **significant benefits**. IAS of Member State concern would be released only in cases where the benefits of their release would justify taking the risk. This option would decrease the risk of new invasions, with **benefits in terms of damage avoidance**.

Box 6 - Permitting systems for IAS of Member States concern

The option envisaged would require Member States to set up permitting systems for IAS which they deem to be of concern. Today a majority of Member States already have a permitting system in place regulating the release of alien species into the environment. **Permits are required for every single release**. Most Member States considered this as the most effective way of controlling the release of species that can potentially cause significant environmental and economic impacts. Some indications of the administrative cost of such system can be given on the basis of existing permitting systems. For the Wildlife Trade Regulation (WTR), including a similar permitting system, it was calculated that each permit could cost around €157[127] (See Table 12) (this includes the human resources costs of handling the permit).

Looking into Member States permitting systems for release into the environment yearly costs can be estimated. The UK prohibits the release into the environment of non-native species although a release may be authorised under a licence from the competent authority (Natural England). Applications can be submitted online and are processed within 30 working days. The system relies on approximately 1 Full Time Equivalent (FTE) who acts as a licensing manager. In 2010 the system received and processed 34 requests for release of alien species in the environment and 37 in 2011. Denmark conveyed to the Commission that it devotes 150 man-hour/year (roughly 0.1 FTE/year) for the administration of permits for releasing non-native species. In Germany, permits are handled at the Länder level. Germany indicated that the number of applications for licenses is rather limited,

[127] Estimation of the cost of the CITES-permitting system (incl. permitting and scientific advise), based on current costs in Member States: 1.5 to 3 FTE, issuing <100 to 1000 permits per year, would cost €60,000 to €112,500 per year. Taking a very rough average of those figures, 550 permits would cost €86,250, or €157 per permit.

with for example, less than 10 applications per year in Rhineland Palatinate and 1 in 2010 and none in 2011 in Hesse. Based on a realistic estimate that Member States spend roughly between 0.1 and 1 FTE on permitting (on the basis of information about staff time and volume of applications processed), and given an average salary of average hourly tariff of a technician or associate professional of €23.2, the cost of the permitting is estimated to be €3,714 to 37,142 per Member State per year, or €100,000 to 1 mio for all 27 Member States. Comparing this cost estimate with the cost per permit under the Wildlife Trade Regulation shows that this estimate is rather on the high end of the range.

This indicates that the burden of the permitting systems for IAS of Member States Concern would be limited particularly taking into account that many Member States already have such system in place.

Primary producers, such as **agriculture and forestry**, and the **horticultural** sector, would face costs for collecting evidence in support of the application for a permit for the release of IAS of Member State concern, and paying permit fees, where required (although it may be expected that it would be rather the larger importers seeking a permit to bring such species into the EU). This will entail **costs**, which will also depend on the type of requirements linked to the permits by Member States and on the degree of cost recovery by Member States[128]. This system is expected to place **some constraints on the choice** of species that can be released in the environment or brought onto the market. However, the impact on the **competitiveness and profitability of business** for these sectors will remain limited to **the subset of IAS of Member State concern**. The system may require a shift in the business planning of certain operators that will have to consider alternative species. However, considering the abundance of species available, it is thought that substitution for certain species would be possible.

It should also be stressed that primary producers often suffer from the consequences of an invasion of certain species and would therefore **benefit from a more proactive approach** that prevented new invasions. According to the polluter pays principle, those responsible for damage should pay: having to apply for a permit to release certain species has thus the potential to help private sectors players **avoid future liabilities**[129].

Other private sector operators would be affected in so far as the species they sell are meant to be released into the environment. Traders of **biological control** agents could be affected, nevertheless, the need for precaution in this sector is generally more commonly accepted and Member States are gradually introducing obligations in this regard (e.g. France). Some of the benefits in terms of awareness-raising and knowledge gathering highlighted in the previous paragraph would also apply to this sector.

A permitting system would thus entail costs for public authorities and small and microenterprises involved in primary production, besides placing some constraints on the choice of species for release. However, the system would focus on a limited number of species for which Member States seriously suspect that that may have a negative impact. Furthermore, this proactive approach would entail additional benefits for Member States and small and micro primary producers in terms of avoidance of damage and management costs, offsetting the negative impacts. Overall, the economic impacts of this action were found to be **positive** for public authorities and moderately **negative** for various economic actors.

[128] Aggregated data on similar provisions already in place was not available, since such schemes are usually managed at the local administrative level.

[129] This is because having to carefully consider the implications of releasing a species will force operators to look at the possible consequences of such release, protecting them from future liabilities in case a species became problematic, if they can demonstrate that they complied with the permit requirements. Additional benefits of such approach would be that operators, on the basis of the knowledge gathered in preparing permit applications, would become more aware of the possible consequences of their activities and potentially reconsider certain practices, which could lead to a business model mindful of the issue of IAS.

6.1.5. *Option 2.3: Include a strict ban on release of any alien species into the environment unless it is included in a common EU list of species approved for release into the environment*

A summary of the costs entailed by option 2.3 can be found in Table 14.

Public authorities would face the costs of carrying out the risk assessments to be able to include species on the EU list of alien species approved for release. The number of risk assessments to create a list of approved alien species could be large, as it would include all new species intended for release into the environment. It may also be **more costly for public authorities in terms of enforcement efforts**. It has to be stressed, however, that during the consultations, Member States representatives were generally in favour of a precautionary approach to release into the environment, some favouring a list of approved alien species. During the 2012 public consultation, 36% favoured a list of approved alien species (see Figure A2 in Annex VI). The creation of an EU list of alien species approved for release would also increase the burden on the European Commission in terms of developing and maintaining the list of alien species approved for release up-to-date, thus increasing the cost of running the supporting structures. The benefit of this stringent option would be a further **avoidance of damage.**

Primary producers (mostly small and microenterprises in agriculture, forestry and horticulture), would be **negatively impacted** by the introduction of a ban on release unless a species was placed on an EU list of alien species approved for release: they would face opportunity costs and their business and activities would be **disrupted** for the period that the necessary risk assessments are being carried out. This option would not only restrict the choice of species for release, but would rather determine the limited choices available, hampering business and negatively affecting the **competitiveness and profitability of these sectors,** as also the possibility of using substitutes would depend on a positive risk assessment. Such constraints will be particularly felt by the sectors dealing with plant species, considering the volume of alien plant species that are traded[130]. As primary producers often suffer the consequences of an invasion, they would also **benefit from a more proactive** approach, but at the cost of serious disruption of certain activities.

Taking all the above factors into account, despite the substantial benefits in terms of prevention of new invasions, the **negative economic impact on Member States and on small and microenterprises involved in primary production** was considered significant.

6.1.6. *Option 2.4: Obligation to rapidly eradicate newly establishing IAS of EU concern*

A summary of the costs entailed by option 2.4 can be found in Table 14.

The introduction of the obligation for Member States to eradicate newly establishing IAS of EU concern, unless derogation is granted by the Commission, entails **significant costs**. Although **costs of surveillance and notification** to the Commission and other Member States would be the same as for the basic legislative instrument, the costs of eradication are likely to be **substantial** and highly variable[131] and will largely be met by **public authorities**.

There is evidence, however, that an **immediate eradication would entail significant benefits** for all actors involved, in particular the Member States public authorities and the small and microenterprises involved in primary production (farmers), as eradicating an IAS would permanently solve the problem, and thus avoid the need for continuous management.

[130] It has been estimated that in Europe there are at least 55,000 woody plant and perennial species available for sale. See http://www.alterias.be/en/list-of-invasive-and-alternative-plants/alternative-plants

[131] They will depend on the species in question and the circumstances and environment where it is detected

The economic benefit of a **rapid eradication in the early invasion stage, rather than attempting eradication later**, once an IAS is fully established, is clearly illustrated in the UK case in Table 13. All data show a substantial increase of costs along the invasion stage. Determining the invasion stage will depend largely on the species lifecycle, but it will also be a function of the number of specimens and geographical spread: if the number of specimens is small enough and/or sufficiently contained in a certain area for eradication to be readily possible, then it is possible to talk of early invasion stage.

Table 13: Eradication costs in earlier and later invasion stages in the UK (invasion stage differs depending on the species' life cycle)[132]

IAS	Eradication costs (€)	
	Earlier invasion stage	Later invasion stage
Asian long horned beetle	39,000	1,524,974,000
Carpet sea squirt	2,728,000	1,074,173,000
Water primrose	85,000	280,129,000
Grey squirrel	510,000	985,216,000
Coypu	5,443,000	21,776,000

Preferring eradication when it comes to rapid response has considerable cost-saving opportunities: the UK successfully eradicated the coypu between 1981 and 1989 at a cost of €5 million. In Italy, the coypu was instead allowed to establish and spread, costing €11.6 million in damage and €2.6 million in management activities between 1995 and 2000, with projected future damage and management costs of €9-12 mio/yr (Figure 10).

Eradication at an early stage of invasion would need to focus on a relatively limited number of specimens, presumably concentrated in a smaller geographical area, thus rendering the eradication operations easier and quicker from a logistical and operational point of view.

When and where eradication proves impossible or no longer feasible Member States could ask for derogation. This would entail **some administrative cost for the Member States**, as the application would need to be motivated and backed by evidence, and **for the European** Commission to evaluate such application. However, it is expected that this Option will provide a stronger incentive to Member States to attempt eradication wherever possible, thus avoiding damage and management costs in the future, which is expected to **off-set the initial higher costs** of eradication programmes.

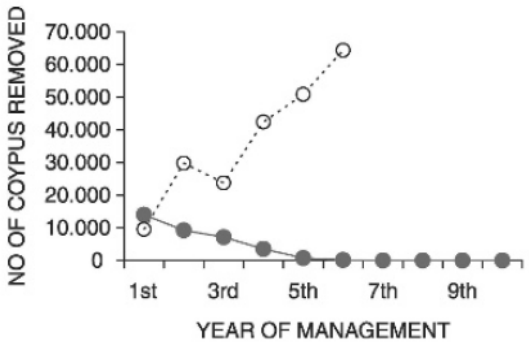


Figure 10: Total number of coypus removed (per year) in the successful eradication campaign in the UK during 1981-1992 (black dots) and in the management operations in Italy during 1995-2000 (white dots)[133]

[132] Williams *et al.*, 2010
[133] Panzacchi *et al.*, 2007

While small and microenterprises involved in **primary production** would benefit in terms of avoided damage costs, they may **also face the burden of participating in eradication efforts**, albeit with some support from public authorities.

In conclusion, this action is likely to entail higher costs for Member States and the Commission, but the substantial benefits in terms of cost avoidance are expected to greatly outweigh such costs. The economic impact would therefore be **very positive** (see Figure 10).

Table 14: summary of the additional costs of options 2.2, 2.3 and 2.4 in comparison with option 2.1

	Option 2.2	**Option 2.3**	**Option 2.4**
A – List of IAS of EU concern	Same as option 2.1	Same as option 2.1	Same as option 2.1
A - Risk assessments	Same as option 2.1	Same as option 2.1	Same as option 2.1
A - Border control on intentional introductions	Same as option 2.1	Same as option 2.1	Same as option 2.1
B - Pathway management, incl. border control on unintentional introductions	Same as option 2.1	Same as option 2.1	Same as option 2.1
C - Release into the environment	Some additional opportunity costs and some administrative costs for primary producers[134]	Much higher opportunity costs for primary producers[135] Much higher implementation cost (risk assessments) for Member States [136]	Same as option 2.2
D - Surveillance	Same as option 2.1	Same as option 2.1	Same as option 2.1
D – Rapid eradication **E - Management of IAS**	Same as option 2.1, however less new IAS will circumvent the prevention[137]	Same as option 2.1, however far less new IAS will circumvent the prevention[138]	More implementation costs for Member States (more IAS to eradicate), however more rapid eradication will further decrease the number of new invasions[139]
Information system	Same as option 2.1	Same as option 2.1	Same as option 2.1
Policy management	Same as option 2.1 PLUS • Permitting system: implementation cost of €100,000-1mio/yr[140] for Member States (see	Same as option 2.1 PLUS • Implementation cost for management of EU list of approved species for the Commission	Same as option 2.1 PLUS • Administrative cost of handling derogations for Commission and Member States

[134] Only in so far as additional species of interest to a sector were requiring a permit for release, primary producers (mostly small and microenterprises) would be affected by the introduction of IAS of Member State concern, see 6.1.4 for more details.

[135] Primary producers (mostly small and microenterprises in agriculture, forestry and horticulture), would be negatively impacted by the introduction of a ban on release unless a species was placed on an EU list of alien species approved for release: they would face opportunity costs and their business and activities would be disrupted for the period that the necessary risk assessments are being carried out – very difficult to quantify.

[136] Public authorities would face the costs of carrying out the risk assessments to be able to include species on the EU list of alien species approved for release. The number of risk assessments to create a list of approved alien species could be large, as it would include all new species intended for release into the environment.

[137] Very unpredictable and thus impossible to quantify, however through IAS of MS concern less IAS will circumvent the prevention

[138] Very unpredictable and thus impossible to quantify, however thanks to the EU list of approved alien species far less IAS will circumvent the prevention

[139] Very unpredictable and thus impossible to quantify, will end up between option 2.2 and option 2.3

[140] 0.1 to 1 FTE/yr for 27 MS at €23.2/hr x 1600hrs/yr = €100,224 to 1,002,240/yr

	5.3.2 and Box 6)		
TOTAL	Same as option 2.1 PLUS • €100,000-1mio/yr for Member States • Some additional opportunity costs and administrative costs for primary producers • **More avoidance of damage increase than option 2.1 (see 6.1.4)**	Same as option 2.1 PLUS: • Management cost Commission • Serious risk assessment cost Member States • Serious opportunity costs primary producers • **Far more avoidance of damage increase than option 2.2 (more than option 2.4) (see 6.1.5)**	Same as option 2.2 PLUS • More eradication cost for Member States • Administrative cost of handling derogations for Commission and Member States • **More avoidance of damage increase than option 2.2 (see 6.1.6)**

6.1.7. Summary of distribution of responsibilities and costs

Tabel 15 provides an overview of the distribution of responsibilities and costs among the Commission, the Member States and the economic operators for the measures foreseen in the proposed options. It shows how additional costs are minor in comparison with the ever increasing damage costs that could be avoided through them (see 6.1.3). Member States and economic operators would benefit the most from the avoided damage costs. The cost of the instrument will be met through existing dedicated budgets, but within those budgets there will be a gradual shift from reaction to prevention as well as a shift from the current fragmented approach to a common set of prioritised species. Future fincancing of the instrument will thus depend on the maintenance of those existing dedicated budgets, in particular in the Member States. An analysis of the distribution of costs among the Member States is provided in Table 16. The Commission is committed to provide support and guidance to the Member States where needed in order to facilitate the effective and cost-efficient implementation of the proposal.

Table 15: Responsibilities and costs for the Commission, the Member States and the economic operators for the measures foreseen in the proposed options.

Operational Objectives	**European Commission**	**Member States**	**Economic operators**
A - Prevent intentional introduction of IAS of EU concern into the EU	**Option 0, 1: -**	**Option 0, 1:** Risk assessments: 3 mio/yr	**Option 0, 1:** -
	Option 2.1, 2.2, 2.3, 2.4: Management of list of IAS of EU concern: current personnel	**Option 2.1, 2.2, 2.3, 2.4:** Risk assessments: 1.4 mio/yr Border control on IAS of EU concern: minimal	**Option 2.1, 2.2, 2.3, 2.4:** Opportunity costs in case of banned species
B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	**Option 0, 1: -**	**Options 0, 1:** very few initiatives	**Option 0, 1:** Ballast water treatment: €109 mio/yr
	Option 2.1, 2.2, 2.3, 2.4: -	**Option 2.1, 2.2, 2.3, 2.4:** Pathway management: 135.5-150.1 mio/yr (could be recovered from operators)	**Option 2.1, 2.2, 2.3, 2.4:** Ballast water treatment: €109 mio/yr Additional costs

			depending on cost recovery by MS
C - Prevent intentional release of IAS into the environment	**Options 0, 1: -**	**Options 0, 1:** Current systems included in horizontal costs	**Options 0, 1:** Some opportunity costs
	Option 2.1: - **Option 2.2, 2.4**: - **Option 2.3**: Management of list of alien species not yet present but approved for release: current personnel	**Option 2.1**: included in horizontal costs **Option 2.2, 2.4**: permitting system 0.1-1 mio/yr **Option 2.3**: serious management cost	**Option 2.1**: Some opportunity costs **Option 2.2, 2.4**: Some opportunity costs **Option 2.3**: Heavy opportunity costs
D - Early Warning and Rapid Response to prevent reproduction and spread of IAS of EU concern into the environment	**Options 0, 1: -**	**Options 0, 1: -** Surveillance: 7 mio/yr	**Options 0, 1: -**
	Options 2.1, 2.2, 2.3: Management of notification and EU early warning system for IAS of EU concern: included in information system **Option 2.4** (additional to above): Management of applications for derogation: current personnel	**Options 2.1, 2.2, 2.3**: Surveillance on IAS of EU concern: 7 mio/yr Notification of new populations of IAS of EU concern: minor cost Rapid response to new populations of IAS of EU concern: increase through shift of expenses from management to rapid eradication (see E) **Option 2.4** (additional to above): Rapid eradication of new populations of IAS of EU concern or application for derogation: some more increase through shift of expenses from management to rapid eradication (see E)	**Option 2.1, 2.2, 2.3, 2.4: -**
E - Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment	**Options 0, 1:** LIFE-projects	**Options 0, 1:** Management of IAS: 1.3 bio/yr + raising needs	**Options 0, 1:** Raising needs for IAS management
	Option 2.1, 2.2, 2.3, 2.4: LIFE-projects	**Option 2.1, 2.2, 2.3, 2.4:** Management of IAS of EU concern: 1.3 bio/yr (gradual decrease through enhanced effectiveness, some shift of expenses to rapid eradication)	**Option 2.1, 2.2, 2.3, 2.4: -**
Horizontal measures	**Options 0, 1:** EASIN: 0.2 mio/yr	**Options 0, 1:** Information system: 3.2 mio/yr Policy management: 2 mio/yr	**Options 0, 1: -**

	Option 2.1, 2.2, 2.3, 2.4: EASIN: 0.4 mio/yr (expected to increase) Reviewing progress: current personnel Management of standing committee: 0.1 mio/yr	**Option 2.1, 2.2, 2.3, 2.4:** Information system: 3.2 mio/yr (expenses will shift to Commission) Policy management: 2 mio/yr	**Option 2.1, 2.2, 2.3, 2.4: -**

Table 16: Member States' cost distribution

	Distribution of effect of IAS on Member States	**Costs for Member States linked to a dedicated legislative instrument**
Presence of IAS	- IAS present in all Member States with numbers varying, but within a similar order of magnitude - higher presence can be assumed for MS with high levels of trade, long trading history and numerous entry points	Costs linked to: - early eradication obligations - surveillance (using insofar as possible existing systems) - management obligations
Entry from outside the EU	- more frequent entries can be assumed for MS with high levels of trade and numerous entry points	Costs linked to: - border controls (using existing systems in so far as possible) - surveillance for early detections (using existing systems in so far as possible)
Intra-EU movements	- impossible to ascertain the magnitude of these movements as there are no internal checks for commodities or monitoring of aliens species moving in the wild across the borders	Costs linked to: - surveillance to monitor the spread - possible development of joint management actions with neighbouring MS
Impacts on biodiversity, human health and economy	These depend on: – how many IAS are invading – which species are invading – ecological or geographical circumstances of the affected territory – sectors affected	Costs linked to: – management actions and restoration actions
Costs distribution	It is not possible to quantify how the costs will be distributed amongst the Member States as costs will be a function of: - presence of which and how many species listed as IAS of EU concern - rate of entry - rate of spread within MS and across borders - ecological, climatic and geographical/topographical circumstances - actions already taken in MS and their interplay with EU measures (see Annex V)	

6.2. Social impacts

6.2.1. Option 0: Baseline

Option 0 (status quo) would introduce no change or limited change to the current situation with mixed impacts on **employment**. On one hand, the absence of regulatory measures may avoid certain impacts on the employment in certain sectors trading in alien species. On the

other hand, the negative effects on employment already felt by sectors, such as forestry, agriculture or other sectors, e.g. tourism, relying on pristine environments to thrive, would continue unabated and even worsen due to the increase in biological invasions. As regards **public health**, option 0 would have detrimental effects as the problems linked to IAS would remain largely unaddressed.

6.2.2. Option 1: Cooperation and voluntary action

Option 1 would add guidelines, codes of conduct and awareness raising campaigns to option 0. Those activities would be aimed at reducing social impacts. However, we assume that this reduction will remain limited given the significant damage to public health.

6.2.3. Option 2.1: The basic legislative instrument

Single list of IAS of EU concern and obligations to manage pathways – provisions linked to prevention are expected to have a **mixed impact** on employment. The introduction of a single list of IAS of EU concern would have a negative effect on employment for those sectors who suffered from a ban on certain species (e.g. in the pet trade sector) where no substitute can be found. It was estimated that the economic impacts on the private sector would remain moderate. Consequently, **the effect on employment is thought to remain limited** as well. This would not be the case for sectors depending almost exclusively on one species, such as mink fur farming: there are 7,200 mink fur-farmers in the EU involving up to 60,000 full-time jobs[141]. If the American mink was banned, the consequences on employment in the sector would be negative.

It also has to be considered that many IAS can have dramatic consequences on the ecosystem services sustaining the livelihood of certain groups, and action to prevent their introduction will have the **positive impact of avoiding job losses.** The yellow legged hornet, for example, is an aggressive predator of honeybees and can lead to significant beehive losses (preliminary observations in France noted losses of 14,000 honey bees per hive per month)[142], with negative consequences on jobs in apiculture (and broader impacts on agricultural production due to loss of pollination services). Another example relates to the collapse of pelagic fish catch in the Black Sea and Caspian Sea (several hundred million € of damage[143]) due to the comb jelly, with consequences on viability of fishing.

When it comes to **public health**, the introduction of a ban on the species listed as IAS of EU concern would have a **beneficial effect** as the most hazardous species would be banned uniformly across the EU[144]. The obligation to manage pathways of introduction will be particularly beneficial for **public health**, as species with a negative impact on health are often introduced unintentionally: with pathway management the chances of stopping such hazardous species would increase. Such a system could have stopped the ragweed unintentional introduction, which is currently causing medical costs of €118 to 763 million/year in the EU[145]. Some IAS are agricultural weeds or pests and preventing their entry and establishment in the EU will have a positive impact on crop production and ultimately on **food security** (e.g. ragweed is also an agricultural weed causing yield losses of at least €1.3 billion/year in the EU[146]).

[141] European Fur Breeders' Association - http://www.efba.eu/
[142] Rortais, 2008
[143] Shiganova and Panov, 2009
[144] For example, if giant hogweed, which was introduced intentionally and causes severe burns, had been prevented by an EU-wide system, health impacts and related costs could have been avoided (giant hogweed costs Germany €1 mio/yr of medical costs. See Reinhardt *et al*., 2003
[145] Bullock, 2012
[146] Bullock, 2012

Society will also benefit in terms of **property value**: prevention of IAS will protect private properties and estates from IAS infestations which can severely decrease their value. Infestation of Japanese knotweed in the UK, for example, is leading to mortgages being refused for properties infested with this weed, which can undermine constructions. Citizens will also benefit when it comes to **recreational activities:** a ban on certain species may preserve the possibility to carry out sport or leisure activities (e.g. boating or fishing hindered by waterways invaded by invasive aquatic plants). Citizens may also be impacted in so far as pathway management measures may touch upon certain recreational, outdoor or sports activities (e.g. cleaning requirement for the equipment for angling, hunting, boating) but the impact is estimated to be **negligible**. Benefits for citizens include also the preservation of **cultural patrimony**, including traditional landscapes. On the other hand, the banning of certain species will have an effect on the **choices of citizens** (e.g. pet owners and hobbyists) but given the availability of substitute species this impact can be considered negligible.

Obligations linked to early warning and rapid response and management of established IAS of EU concern – the rapid response requirements and the management obligations are expected to provide **some employment opportunities**: the removal or management of certain species is labour intensive and requires specialised skills as well as equipment, which is likely to bring about employment opportunities. For example, in the UK a flourishing business has emerged specialising in the eradication of Japanese knotweed with several companies specialising in the management and removal of this weed. Works to remove water hyacinth from the Guadiana River in Spain lasted from 2005 until 2009 and maintenance activities and awareness raising campaigns are on-going[147]. Such employment opportunities might be temporary for certain species, but some established species will be impossible to eradicate and require on-going management. **Public health** will **benefit** from the requirement to remove or otherwise manage IAS which have an impact on health.

When it comes to **citizens**, the early warning (and surveillance) requirements would have the benefit of increasing their awareness and enable them to be prepared and take defensive measures against new invasions. Surveillance will most likely involve the citizens (citizens' science), thus increasing awareness. One sensitive effect of rapid response or management, which may include eradication or other management measures, is the need to confront the negative public opinion: especially when it comes to mammals and birds, certain measures may be resisted by the public. This resistance may be manageable, provided that appropriate information campaigns are conducted. Benefits may also accrue to citizens in terms of **preservation of recreational value**, e.g. clearing watercourses of invasive aquatic plants.

In conclusion, the basic legislative instrument is expected to yield benefits to society, in terms of public health, preparedness and increased awareness of problems linked to IAS. Some job opportunities may be created, although some localised negative consequences may be felt in terms of employment, if certain sectors were to be particularly hard hit by the banning of certain species. Benefits would also accrue to citizens in terms of preservation of recreational opportunities and cultural values. Balancing the above elements, **the social impact is therefore considered positive**.

6.2.4. Option 2.2: Adding permits for releasing of IAS of Member State concern

A permitting system of IAS of Member State concern will affect **employment** as far as certain sectors are affected, but the impact on employment is considered to be insignificant.

A permitting system would yield similar benefits to those of the basic legislative instrument, but by placing more emphasis on prevention and by enlarging the focus to species beyond

[147] EPPO, 2008

those listed on the list of IAS of EU concern these benefits would be more pronounced. Benefits would be **particularly felt** when it comes to **public health,** as the system would limit or regulate the release into the environment of IAS of Member State concern. By encouraging a more thorough reflection on the possible consequences of release, it can be expected that a reduced number of IAS detrimental to health would be released unwittingly into the environment.

A more precautionary approach will also yield significant **benefits for citizens**, in particular landowners and property owners, as certain IAS can significantly decrease the value of private property and land[148].

On the whole, the additional social impact of this action is considered **very positive**.

6.2.5. Option 2.3: Introducing a strict ban for any release of any alien species unless included in the EU list of species approved for release into the environment

Introducing an EU list of species approved for release will impact **employment** according to the sectors to be affected. Considering the **serious disruption** that the creation of a list of approved species would entail to business and activities of primary producers the impact on employment was considered **negative**.

But this approach to release into the environment would yield **substantial benefits for public health**, as only species proven safe by risk assessment would be allowed for release. This is due to the same reasons discussed above, but the benefits would be even more pronounced than with the introduction of a permitting system for IAS of Member State concern. The same can be said as regards the benefits to **citizens**. Citizens may be faced with reduced choices, for example when it comes to ornamental plants, and certain outdoor activities that involve the release of species may be impacted (e.g. hunting and angling). However, such activities would be able to continue but focusing on native species rather than relying on the introduction of alien species.

On the whole, this action was found to have a substantial positive impact on public health and to yield benefits for private citizens. On the other hand, employment could be negatively affected. On the whole, the social impact was estimated to be **positive**.

6.2.6. Option 2.4: Obligation for rapid eradication of newly establishing IAS of EU concern

The **rapid eradication obligation** might create **new employment opportunities**, as the removal or management of certain species is labour intensive and requires specialised skills as well as equipment. The benefits in terms of **public health** could be very significant, as there would be greater emphasis on quickly eradicating IAS with a high impact on health. Finally, **substantial benefits** are also expected to accrue for **citizens** that from IAS invasions, as early eradication would avoid the establishment of species and the subsequent devaluation of private property. The same can be said for the **preservation of amenities and recreational values**. One potential drawback of the emphasis on eradication would be the need to **manage negative public opinion**, an important element not to be underestimated. However, it has to be stressed, that a rapid eradication programme solving an IAS problem indefinitely may be more acceptable than continuous management measures. Balancing the above elements, **the social impact was considered very positive.**

[148] Substantial damage to properties and infrastructure in the UK would have been avoided, had it been possible to prevent the introduction of Japanese knotweed, by taking a more precautionary approach to its release.

6.3. Environmental impacts

6.3.1. Option 0: Baseline

Maintaining the status quo with option 0 would have a very negative **impact on biodiversity**, seeing that IAS are a major cause of biodiversity loss. Lack of action is also expected to have a very negative impact on the **provision of ecosystem services**.

6.3.2. Option 1: Voluntary action

Voluntary action proposed by option 1 will only entail limited benefits and have been shown to be ineffective in meeting all the challenges posed by the IAS problem[149]. Also option 1 would thus have a very **negative impact on biodiversity** as well as on the **provision of ecosystem services**.

6.3.3. Option 2.1: The basic legislative instrument

Single list of IAS of EU concern and obligations to manage pathways – considering that IAS are a major cause of biodiversity loss, with severe and documented impacts on native species and ecosystems, provisions to prevent IAS from entering the EU would be **beneficial for biodiversity**: of the 174 European species listed as critically endangered, 65 are in danger because of IAS[150], thus an IAS policy is important for the conservation of vulnerable native species. IAS can also disturb the functioning of whole ecosystems (e.g. disrupt water and soil systems), with negative consequences on ecosystem services and resilience[151]. Given the high and growing proportion of unintentional introductions into the EU and unintentional releases into the environment, pathway management, designed to capture in the system the species introduced and released accidentally, is also **expected to have a beneficial impact on biodiversity** as it will tackle inflows or transfers of IAS, going beyond the species listed as IAS of EU concern. The benefits of preventive measures would be **particularly felt in aquatic ecosystems**: it is widely recognised that once an IAS establishes in an aquatic environment, it is in most cases close to impossible to eradicate or otherwise manage (with some exceptions, e.g. floating plant species). In such cases, a failure on prevention would lead to significant damage caused to the ecosystem, which would be very difficult to eliminate or mitigate. Effective prevention would instead yield benefits in terms of **species composition** (healthy fish stocks and diverse species communities) and **structure of the food chain**, besides ensuring **water quality** and a clean environment in which **recreational activities** can take place. Preventing the entry of IAS would also be **beneficial for animal welfare**, as preventing invasions would avoid any later need for eradication or management measures.

Obligations linked to early warning and rapid response and management of established IAS of EU concern – the requirement to rapidly respond to newly establishing species listed as IAS of EU concern and the obligation to manage established ones is expected to have a **positive impact on biodiversity and ecosystem services.** Newly establishing IAS would not be allowed to establish and spread: this would nip problems in the bud and avoid the onset of the damages caused by IAS to native species and ecosystem services (see section 3.1). When it comes to established IAS, efforts to eradicate, contain or manage will mitigate their negative consequences. As previously mentioned, 65 European species that are listed as critically endangered are directly threatened by IAS: these would be IAS already established in the EU and action to eradicate or manage them would directly contribute to **improving the**

[149] Burt *et al*, 2007
[150] Shine *et al*. 2010
[151] Pontic rhododendron displaces native species and affects species diversity, leading to ecosystems alterations and losses in timber production Scalera *et al.*, 2012

status of those threatened species. Management of established species is a reactive approach, but it is still important as it is demonstrated that conservation programmes aimed at managing IAS are useful: globally, 11 bird species (since 1988), 5 mammals (since 1996) and 1 amphibian (since 1980) have had their risk of extinction substantially reduced due primarily to the successful management or eradication of IAS[152]. Rapid reaction and management provisions would also **facilitate compliance with other EU legislation** and contribute to meeting the status required under the Nature Directives, the Marine Strategy Framework Directive and the Water Framework Directive, as well as the 2020 Biodiversity Strategy target. In terms of **animal welfare**, these requirements may have a **negative impact**: however, rapid eradication should follow humane standards and would avoid the need for more and long term control and containment methods. Considering all the above, the basic legislative instrument is considered to yield **positive benefits for the environment**.

6.3.4. Option 2.2: Adding permits for releasing of IAS of Member State concern included in national catalogues

The **benefits** from adding this action will be greater, due to the fact that the action encourages a more thorough reflection on the possible consequences of releasing a species in the environment. Adding to the precautionary approach the IAS of Member State concern, there will be more benefits as **more invasions could be prevented**, thus avoiding subsequent negative effects on biodiversity and ecosystem services and the need to react to new invasions[153]. Such a precautionary approach would also **benefit animal welfare** in that it would avoid new invasions and the subsequent need to embark on eradication or other management campaigns. On the whole the additional impact on the environment was considered **very positive**.

6.3.5. Option 2.3: Introducing a strict ban for any release of any alien species unless included in the EU list of species approved for release into the environment

This option would be from the **environmental point of view the most ambitious**. Indeed this fully fledged precautionary approach would yield the highest benefits for biodiversity and ecosystem services, compared to Options 2.1 and 2.2, as no new alien species would be allowed to be released into the environment, unless proven harmless by risk assessment. The type of benefits - similar to those discussed above – would be significantly more pronounced given the stringent precautionary approach proposed. This would also result in benefits in terms of **animal welfare**, as eradication and control efforts may be limited to the species already established. The environmental impact from adding this action would be **very positive.**

6.3.6. Option 2.4: Obligation for rapid eradication of newly establishing IAS of EU concern

The requirement to rapidly eradicate newly establishing IAS of EU concern is expected to have a **substantial positive impact on biodiversity and ecosystem services** as newly establishing IAS would be quickly eliminated, wherever possible, thus avoiding all their impacts on native biodiversity and the functioning of ecosystems, as discussed above. This action will lead to more eradication programmes, with **negative consequences on animal welfare**, however more long term management requirements would be avoided (Figure 10). On balance however, given the benefits for biodiversity and ecosystem services, as well as

[152] Global Biodiversity Outlook, 2010

[153] For example, the black cherry was intentionally introduced in Europe for soil improvement and wood production on sandy soils where it grows easily. The species has now proven to be invasive and causes significant negative impacts on forestry: a more thorough analysis of the consequences of release might have prevented the introduction.

for the welfare of native species, this action was considered to have a **very positive environmental impact** although it needs to be taken into account that for those species for which a derogation from eradication is granted, those will need to be managed over time and this would yield less environmental benefits.

7. COMPARING THE DIFFERENT OPTIONS

Based on all previous information, table 17 provides a summary comparison of the options in terms of effectiveness, efficiency and coherence.

Option 0, although it includes several pieces of EU and national legislation (see policy baseline), leaves the large majority of species and pathways unaddressed (see Figure 4). Hence it is not able to stop the increasing number of IAS in the EU environment, which is leading to continuously growing damage. **Option 1** has already been attempted to a certain extent under the framework of the Bern Convention. Even with additional efforts in fostering voluntary action, awareness-raising and sectoral guidelines, the voluntary nature of such initiatives leads to conclude that despite the added value, Option 1 would remain insufficient. The difference in effectiveness between the EU current non-legislative approach and legislative approaches followed by other countries is illustrated by the levelling off of the number of insects in the US and Canada coinciding with the introduction of preventive measures, while in Europe the numbers of insects increased (Figure 11). The failure of options 0 and 1 to prevent the increasing negative economic, social and environmental impacts means they are ineffective in reaching the objectives of this proposal, besides seriously jeopardising the possibility for the EU to meet its 2020 biodiversity target and even its 2020 Strategy.

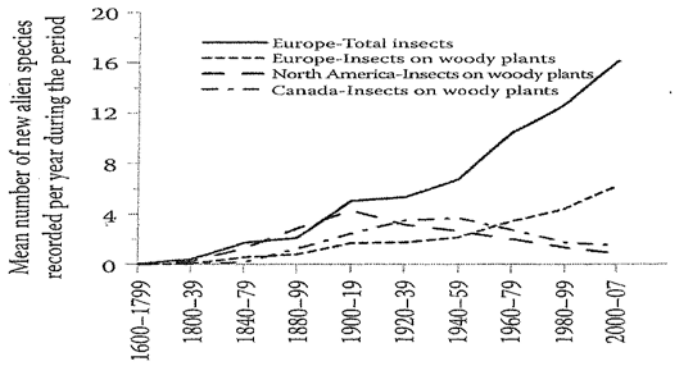


Figure 11: Total number of alien insects on woody plants in Europe compared to North America[154].

On the contrary, **option 2.1** could significantly reduce the economic, social and environmental impacts of IAS and allow achieving the overarching objectives. It would thus be effective as well as coherent with overarching objectives. While options 0 and 1 are estimated to cost €1.4 bio/yr already, option 2.1 would only add €26 to 40 mio/yr. Moreover in time the overall cost could decrease to €1 bio/yr. Option 2.1 would thus also be more efficient than options 0 and 1. Option 2.1 is thus preferable to options 0 and 1. This preference for a legislative approach reflects the results of the 2012 consultation, where a majority of respondent backed obligatory provisions: e.g. 83 % of the respondents were in favour of some type of ban on IAS, while only 16 % did not support any form of trade bans. Similarly, roughly 94% of respondents were in favour of some restrictions to release of IAs in

[154] A. Roques, Invasive patterns of alien terrestrial invertebrates in Europe (in: Pimentel, 2011)

the environment, against roughly 4% against any restriction[155]. The consultations with Member States, stakeholders and experts provided similar feedback: (1) no support for the baseline option or solely voluntary action, because insufficient in tackling IAS and (2) an overall agreement that legal provisions for an EU level approach would be beneficial.

In comparison with option 2.1, further costs of action and additional benefits can be expected from the more stringent options 2.2, 2.3 and 2.4, although, due to several unpredictable elements, they are very difficult to quantify.

Option 2.2, adding legal provisions to restrict the release into the environment of IAS of Member State concern would strengthen option 2.1, where only the release of IAS of EU concern is addressed. This option would thus better address operational objective C and make the approach more effective than option 2.1. The additional cost would be very moderate, as the Member States would often build upon existing systems, the option would thus be efficient. The option would also improve the coherence with overarching objectives.

Option 2.3, adding legal provisions to restrict the release into the environment of any new alien species would further strengthen option 2.1, much more than option 2.2, where only the release of IAS of EU and MS concern is addressed. This option would thus be even more effective in addressing operational objective C. The option would however at the same time impose a significant burden on certain economic operators, in particular those involved in primary production, which would negatively affect the efficiency of the approach. While coherence with the 2020 biodiversity objective would be better, the coherence with the EU 2020 Strategy would be hampered by the economic cost.

Option 2.4, adding a legal obligation to rapidly eradicate newly establishing IAS of EU concern, would allow stopping the spread of such species more effectively that option 2.2. This would be a significant improvement towards operational objective D and again increase the effectiveness. The cost would nevertheless remain moderate. Member States would be obliged to increase efforts only on newly established IAS and a derogation system would be available for when the expenditure would not be proportionate. The option would thus also be efficient, and would also improve the coherence towards overarching targets.

In summary, option 2.3 is expected to generate the best result in terms of effectiveness as on top of the provisions of option 2.1 on IAS of EU concern, it would be very strict in terms of releasing new species into the environment. Its trade-off towards the economic domain is however deemed too substantial and therefore its cost/benefit ratio is estimated to be less favourable than for option 2.2. On the other hand, the additional benefits of option 2.4 have been estimated to be substantial and to outweigh the additional costs in comparison to option 2.2. Therefore, **option 2.4** was selected as the **preferred option**, yielding the highest benefit in relation to costs, although it is not the option yielding the highest biodiversity benefits (which would be Option 2.3). Option 2.4 integrates the benefits of option 2.1 with the additional benefits of the permitting system for release into the environment of IAS of MS concern and the obligation of early eradication for newly establishing IAS of EU concern, but does not include the substantial opportunity and administrative costs which option 2.3 implies.

[155] This is also in line with the 2008 stakeholder consultation where 71 % of respondents considered it very important to prevent the import of IAS into the EU and 82 % considered it very important to prevent the introduction of IAS into the environment.

Choosing option 2.4, it is to be expected that 1) the yearly cost of action would remain stable or would even decrease over time, 2) the magnitude of the benefits (i.e. damage and management cost avoidance) would continue to increase over the years, as increasing numbers of invasions are avoided, 3) the overall costs of the problem would not increase as much as it would without EU action.

Table 17: Comparison of effectiveness, efficiency and coherence

	Effectiveness	**Efficiency**	**Coherence**
Option 0- Baseline	No objectives achieved, **damage by IAS continues increasing**	€1.4 billion/year, mainly reactive costs, while damage by IAS continues increasing	Barrier towards achieving EU Biodiversity target and EU 2020 target
Option 1- Voluntary action	No objectives achieved, **damage by IAS continues increasing**	€1.4 billion/year, mainly reactive costs, while damage by IAS continues increasing	Barrier towards achieving EU Biodiversity target and EU 2020 target
Option 2.1- Basic legislative instrument	Operational Objectives A/C/D/E: step by step build-up of the list of IAS of EU concern – IAS are prevented from introduction and establishment (*) and there is a coherent management of established IAS (**) Operational Objective B: step by step development of pathway management – IAS are prevented from unintentional introduction (*) **Significant reduction in economic, social and ecological damage**	€1.5 billion/year, but may decrease to €1.1 billion/year, while damage increase by IAS is levelled off **Significant benefit for very moderate cost increase or a cost decrease on the longer term**	Reduction of barrier towards achieving EU Biodiversity target and EU 2020 target
Option 2.2- Basic legislative instrument and action C2 – permitting system for IAS of Member States concern	Additional to Option 2.1: Operational Objective C: more pro-active approach on release into the environment – more IAS are prevented from intentional release (*) **Further reduction in economic, social and ecological damage in comparison to option 2.1**	Additional to Option 2.1: Some additional costs for operators, additional policy management cost for Member States (although often building upon existing systems), while damage increase by IAS is further levelled off **Additional benefits (to option 2.1) were estimated to be substantial and to outweigh the additional cost**	Reduction of barrier towards achieving EU Biodiversity target and EU 2020 target (better than under option 2.1)
Option 2.3- Basic legislative instrument (A2, B2, C1, D2 and E2) and action C3 – strict ban on release of any alien species unless included in an EU list of species approved for release into the environment	Additional to Option 2.1 Operational Objective C: much more pro-active approach on preventing the release into the environment – many more IAS are prevented from intentional release (*) **Much further reduction in economic, social and ecological damage in comparison to option 2.2**	Additional to Option 2.1: Significant additional costs for operators, significant additional policy management cost for Member States, while damage increase by IAS is significantly levelled off **Additional cost deemed substantial, in particular the additional burden on economic operators, the cost/benefit balance for the option 2.3 is estimated to be less favourable than for option 2.2.**	Reduction of barrier towards achieving EU Biodiversity target and EU 2020 target (much better than under option 2.1), although **serious trade-off towards the economic domain** (significant additional costs for operators)
Option 2.4 Basic legislative	Additional to Option 2.2:	Additional to Option 2.2:	Reduction of barrier towards achieving EU

instrument (A2, B2, C1 and E2), action C2 and alternative D3 – obligation to rapidly eradicate newly establishing IAS of EU concern, unless derogation granted	Operational Objective D: stricter application of rapid eradication – more introduced IAS are prevented from establishing (*) **Further reduction in economic, social and ecological damage in comparison to option 2.2**	Some additional eradication costs for Member States, some additional policy management costs for Member States and Commission, while damage increase by IAS is further levelled off **Additional benefits (to option 2.2) were estimated to be substantial and to outweigh the additional cost**	Biodiversity target and EU 2020 target (better than under option 2.2)

(*) every prevented IAS leads to a cost avoidance of €130 million/year of damage/control costs on the longer term + avoidance of damage to biodiversity which is not readily quantifiable

(**) coherent management of IAS leads to an increased efficiency and could reduce management costs on the longer term + decreased biodiversity loss which is not readily quantifiable

8. MONITORING AND EVALUATION

8.1. Progress indicators

Monitoring and evaluation of the proposed instrument will be addressed via the periodical reporting obligations embedded in the legal text (after 3 years and every 4 years thereafter, see Table 20) and the notifications transmitted by Member States based on their surveillance systems. This data will feed the Common Information System allowing to gather all the information centrally based on existing systems and new data generated. On this basis the Commission and other bodies will be able to report on the indicators established in Table 18 (after 4 years and everey 4 years thereafter, see Table 20) and thus periodically evaluate the impact of the instrument, including the development of the list.

This monitoring system will also be used to feed the integrated framework for evaluating progress towards the 2020 biodiversity target being developed and managed by the European Environment Agency and its European Topic Centre on Biological Diversity in partnership with the European Commission. Finally, the Commission, in consultation with the Member States, will develop, in time to provide information for the mid-term review of the Biodiversity Strategy, a set of indicators building on the 2010 core set[156], including coverage on IAS which could build upon the indicators in Table 18. This set of indicators will fully take into account and be streamlined with the reporting framework to be adopted under the Convention on Biological Diversity (CBD) at the Conference of the Parties in Hyderabad in October 2012. Those indicators will deal with the measures put into place (Table 18) and the impact of IAS on biodiversity (Table 19) and allow following compliance by the Member States.

Table 18: Indicators assessing progress towards the operational objectives

	Indicators on progress towards achieving the objectives		
Specific objectives **Operational objectives**	**More preventive approach**	**Prioritising action**	**Fostering a coherent approach**
A – Prevent intentional introduction of IAS of EU concern into the EU	Number of interceptions of IAS of EU concern at border	Number of IAS of EU concern	Number of IAS of EU concern
B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	Number of pathways on which Member States are acting		
C – Prevent intentional release of IAS into the environment	Number of IAS of Member State concern		
D – Early warning and rapid response to prevent reproduction and spread of IAS of EU concern	Number of IAS detections generated by the surveillance systems	Number of rapidly eradicated new invasions of IAS of EU concern	Number of notifications exchanged between Member States
E – Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment		Number of IAS of EU concern that are subject to management measures and their impact on the	Number of joint management measures taken by several affected Member States.

[156]See EU 2010 set from the Streamlining European Biodiversity Indicators initiative at: http://biodiversity.europa.eu/topics/sebi-indicators

		objectives of other environmental legislation (See Table 19)	

Table 19: Indicators assessing progress towards EU 2020 Biodiversity target

	Indicators on the impact of IAS on biodiversity
Birds Directive / Habitats Directive	Percentage of species not in favourable conservation status (partly) due to IAS Percentage of habitats not in favourable conservation status (partly) due to IAS
Water Framework Directive	Percentage of rivers not in good ecological status (partly) due to IAS
Marine Strategy Framework Directive	Percentage of seas not in good environmental status (partly) due to IAS

8.2. Monitoring

In order to gather the information necessary to enforce obligations arising from the legislative instrument and to feed into indicators, reporting provisions would be included in the legal text. These provisions would build upon existing reporting mechanisms such as those carried out under the Birds and Habitats Directives, Water Framework Directive and Marine Strategy Framework Directive as well as the Animal and Plant Health and Aquaculture regimes. Such provisions would be limited to the strictly minimum required to ensure enforcement of the legal text and other international commitments such as those under the CBD, so as to avoid unnecessary administrative burden. These monitoring provisions could be complemented by surveillance done by citizens on a voluntary basis (also known as citizen science)[157].

8.3. Evaluation

The legal text would include a review clause and a periodical progress evaluation clause that would allow updating the approach according to scientific and technical progress and would allow a gradual further development in light of issues arising during the implementation. The timing of reporting and reviewing is specified in Table 20. The review of the list can lead to adding or removing species from the list.

Table 20: Reporting and reviewing provisions allowing the development of a gradual approach

	Year 1	**Year 3**	**Year 4**	**…**	**Year 7**	**Year 8**	**…**
Member States		1st progress report			2nd progress report		
Commission	Propose first list		1st progress report 1st review of list			2nd progress report 2nd review of list	

[157] cf. Nature Watch, including a pilot project on IAS, is presently under development at the European Environment Agency

Impact Assessment Annexes

1. ANNEX I: INTERSERVICE CONSULTATION

The IAS issue is a multifaceted one, which touches upon and interesects with several policy areas. Intense consultations have therefore been carried out with several services of the European Commission, both via the establishement of a dedicated Inter-Service Steering Group (ISG) on the impact assessment (IA) and via several rounds of bilateral contacts with the units both in DG Environment and in other DGs, concerned by the development of an instrument to tackle invasive alien species.

The Impact Assessment ISG met 4 times: 23 September 2011, 6 December 2011, 15 February 2012 and 28 March 2012 and included representatives from the following DGs: ENV, SG, SANCO, AGRI, MARE, MOVE, TRADE, ENTR, MARKT, EMPL, ENER, TAXUD, DEVCO, RTD and REGIO. The meetings were useful to collect the reactions of its members and to stimulate discussion. Furthermore, many participants provided written feedback and drafting suggestions which have been taken into account in so far as possible while drafting the Impact Assessment report.

There has also been constant interaction at bilateral level, to ensure that synergies could be found and that the IAS instrument could deliver on its promise to close the policy gaps left by existing EU legislation. There has also been a considerable effort to streamline policy ideas with existing requirements, structures and processes, thereby seeking to minimise legislative complexity, administrative burden and costs and avoiding contradictions.

Furthermore, the issue of a forthcoming IAS instrument featured regularly on the agenda of the Biodiversity Interservice Steering Group.

2. ANNEX II: STAKEHOLDER CONSULTATION

2.1. Stakeholder participation

An **online public consultation** was published on Your Voice in Europe from 3 March 2008 to 5 May 2008, attracting 880 replies, three quarters of which from individuals. Feedback was provided by means of an online summary report[158]. The consultation revealed widespread backing for action on IAS at EU level. Some 91% of respondents agreed on the urgent need to bring in new measures to prevent the spread of such organisms and 86% thought that Member States should be legally obliged to take action against the most harmful IAS. The same year, a **working group of Commission services, Member States and stakeholders** integrated the state of knowledge and opinions in a discussion paper[159].

A **stakeholder consultation** was organised in Brussels on 3 September 2010, based on an open call and attracting 62 participants, representing a broad range of interests, including from Member States ministries and institutions, NGOs, trade associations. All details are available online[160]. Following the consultation more written contributions were collected.

Between December 2010 and July 20122, the working group on invasive alien species of 2008 was reconvened. Its structure was revisited and the membership renewed: this resulted in the creation of **three working groups**, each focusing on one of the three main axes of 1) prevention; 2) early warning and rapid response; and 3) management of established species. The groups included experts from Member States ministries and institutes, from academia and from stakeholder organisations. Following an expression of interest, a selection was made, based on the willingness to take on an active role in the Working Group and privileging representatives from organisations with European membership. Selections were made also on a sectoral basis, seeking to ensure an adequately balanced and a fair representation of stakeholders. The main results and positions expressed during the meetings of these working groups have been summarized by stakeholders in ten dedicated reports[161], which are all available and freely accessible online, on:

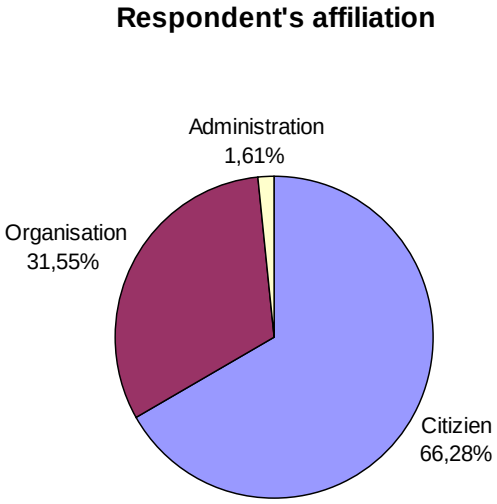
- Priority Species
- Priority Pathways
- Risk Analysis
- Information systems
- Surveillance
- Early warning and rapid response
- Citizen science
- Eradication, management and restoration
- Awareness and Communication
- Finance and Liability

[158] http://ec.europa.eu/environment/nature/invasivealien/docs/results_consult.pdf
[159] http://www.acceptance.ec.europa.eu/environment/nature/invasivealien/docs/ias_discussion_paper.pdf
[160] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/stakeholder_03092010&vm=detailed&sb=Title
[161] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/working_prevention&vm=detailed&sb=Title

Finally, a **second online consultation** was held from end January to mid-April 2012[162]. The consultation attracted 5101 answers in total, the majority of which came from citizens, followed by organisations, with a small percentage of replies coming from public administrations. A wide range of sectors were represented, with particularly high interest from associations of hobbyists interested in exotic species, with several submissions from associations of breeders and keepers of exotic birds. In terms of geographical representation, the majority of replies came from the UK, which may reflect the linguistic bias due to the fact that the questionnaire was available only in English; this possible linguistic bias was duly taken into account. Interestingly, however, the majority of replies tended to come from Member States which are actively involved in the IAS debate: beside the UK, large part of the answers came from Spain, Belgium, Germany, the Netherlands and France. These countries were also consistently and actively involved in the Working Groups that were held between 2010 and 2011. The number of answers may therefore reflect the active involvement and the concerns of such countries, where the debate at national level is more active than in other countries. The questionnaire comprised 11 questions focusing on specific aspects of possible policy options to tackle IAS and grouped according to the three-step hierarchical approach: prevention, early warning and rapid response and management of established species.

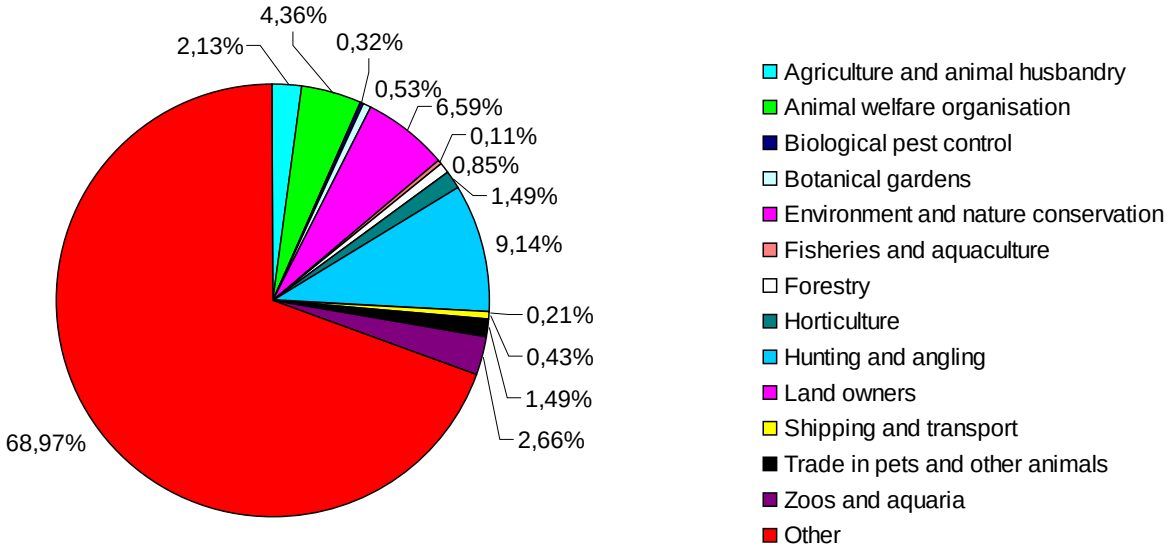
2.1.1. Statistics related to the 2012 online consultation

A. Respondent's Profile

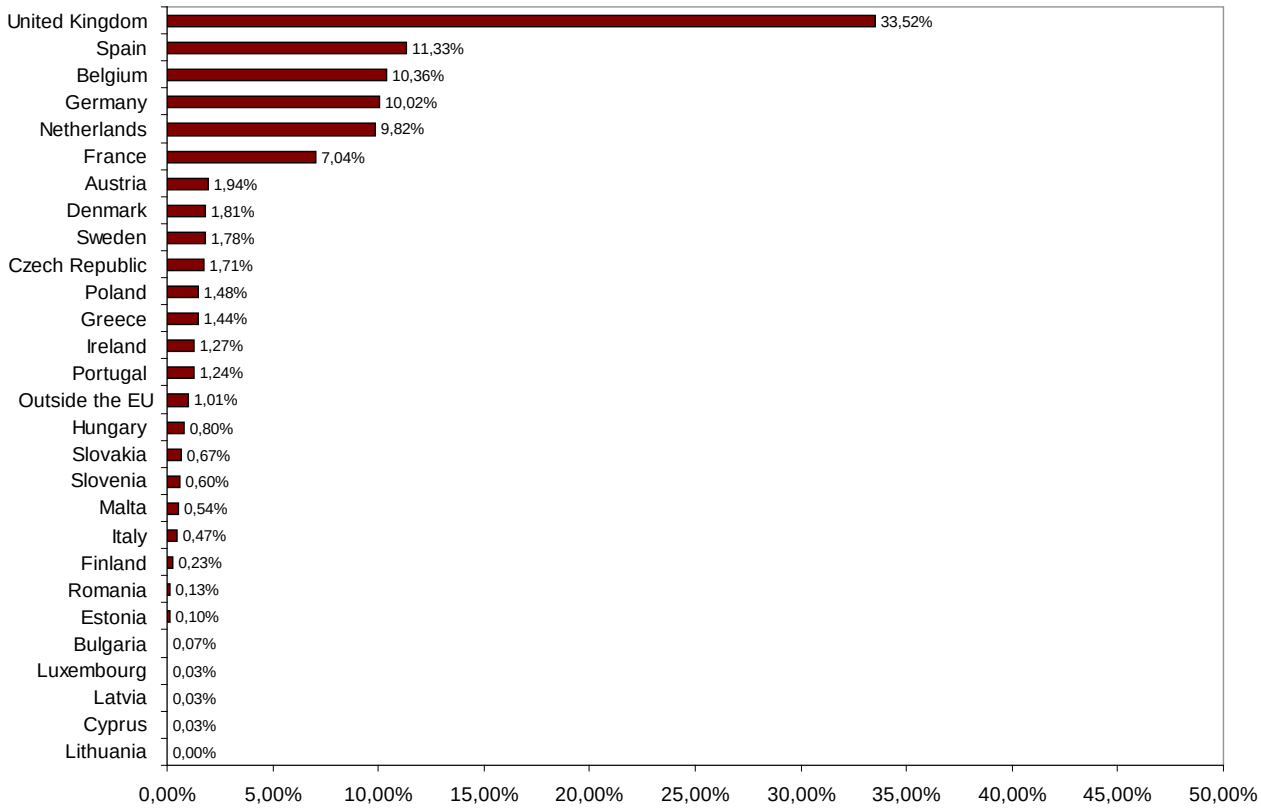


[162] The results are available online: http://ec.europa.eu/environment/nature/invasivealien/docs/results_consultation.pdf

Type of Organisation

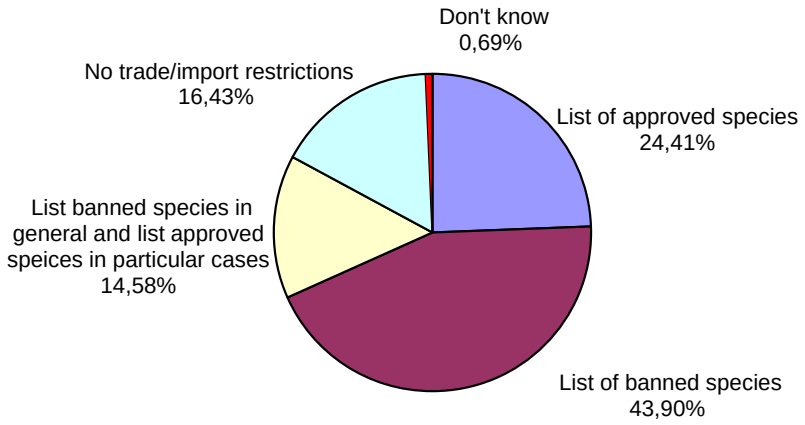


Repondent's country

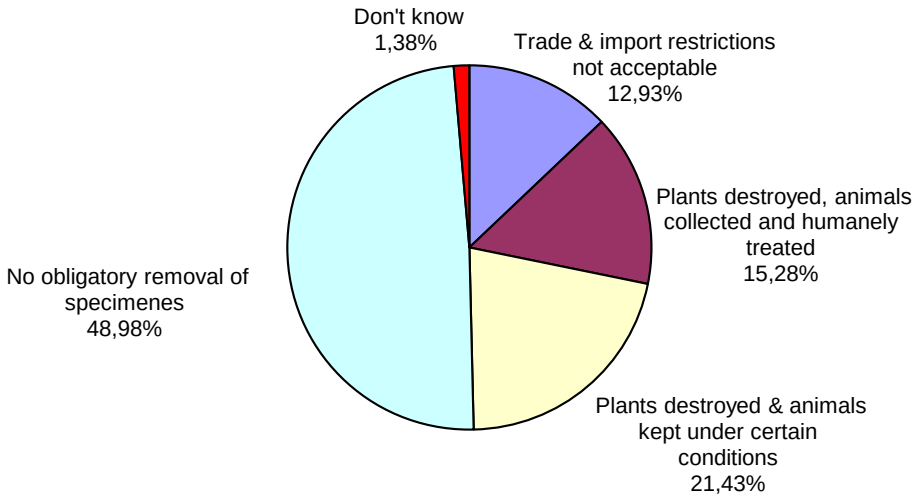


B. Prevention

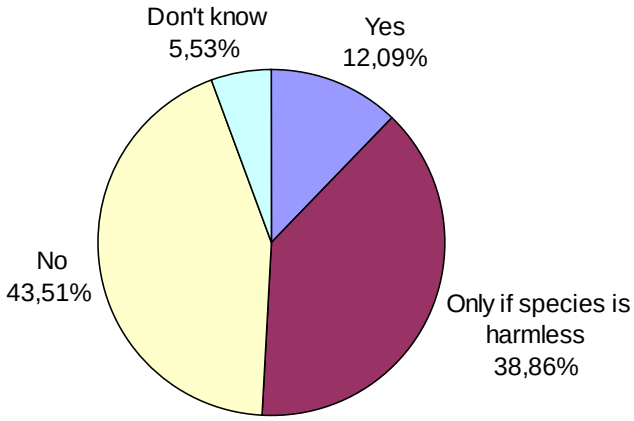
Could trade and import restrictions be imposed for alien species?



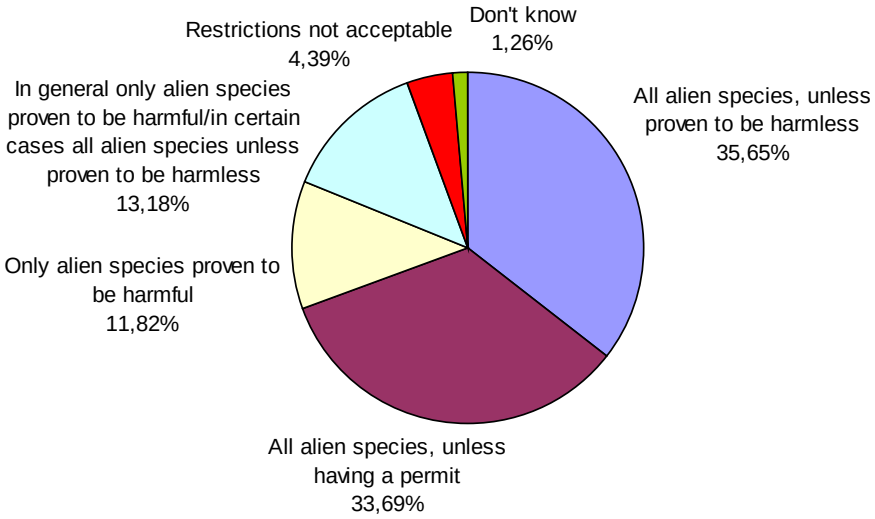
If trade and import restrictions were imposed, how should the specimens of those species already in possession be treated?



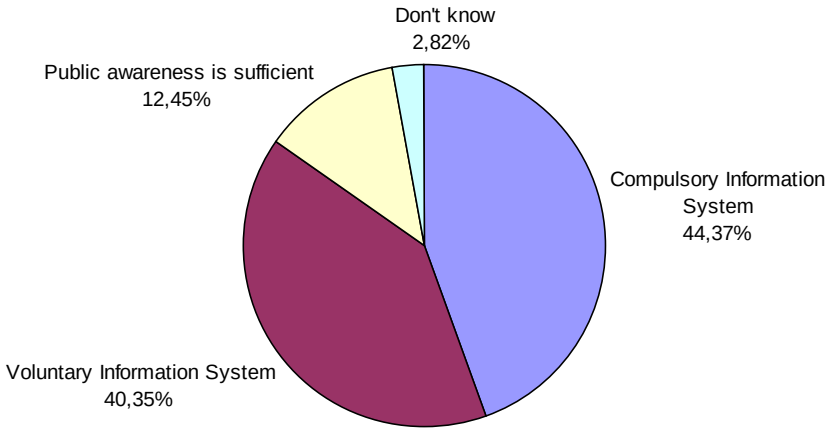
Would you buy alien species through internet trade?



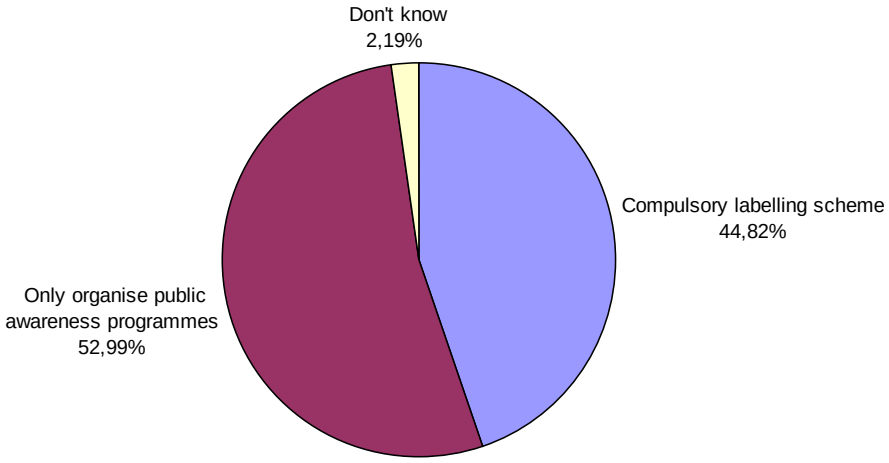
Should the release of alien species in the environment be restricted?



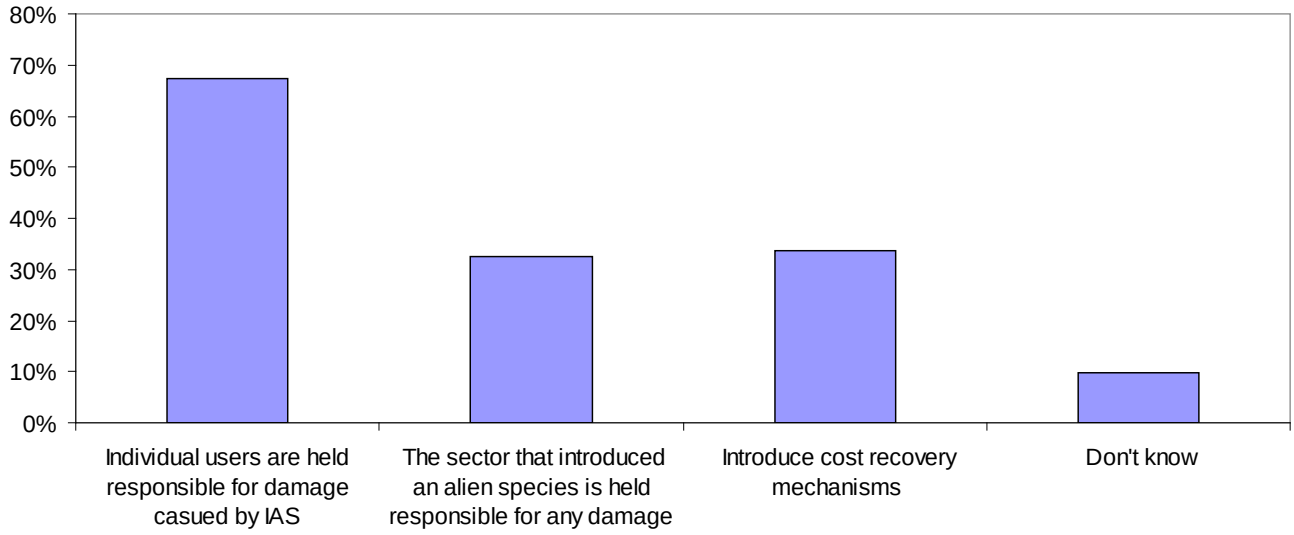
What could be done to limit the escapes of ornamental plants from gardens for species that are not restricted from trade?



What could be done to avoid the release or escape of pets?

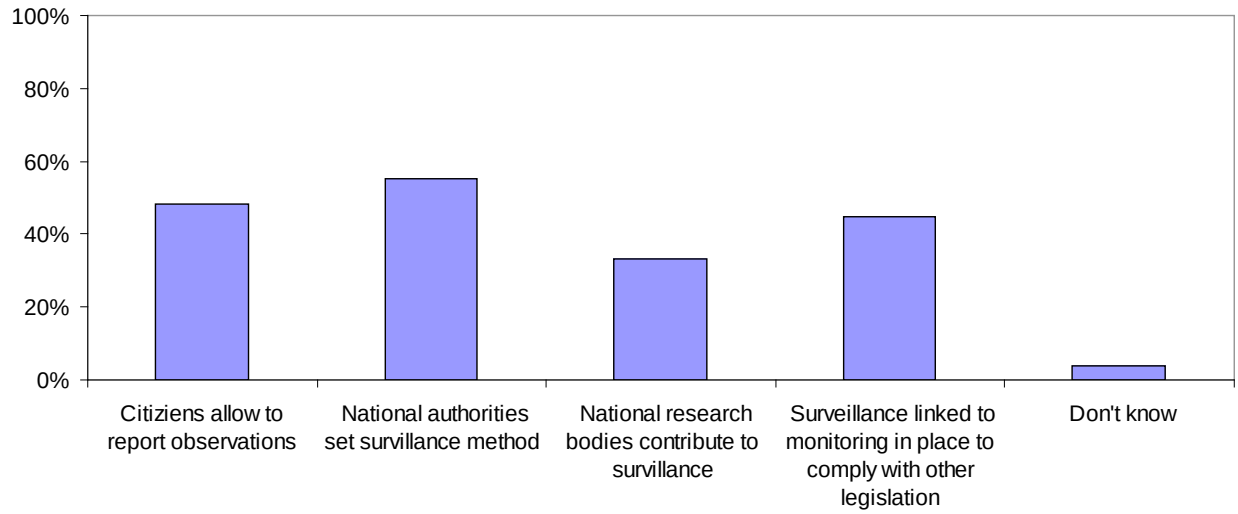


The Polluters Pay Principle is a guiding principle of all EU legislation and it will be enshrined in so far as possible in the IAS dedicated legislative instrument. How could this be done?

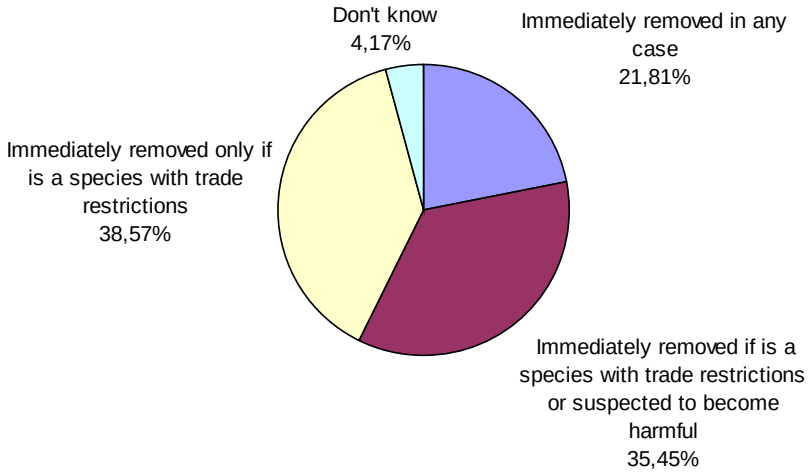


C. Early warning and rapid response

Surveillance to spot any alien species in the environment will be crucial to the success of any early warning and rapid response mechanism. How can this surveillance be organised?

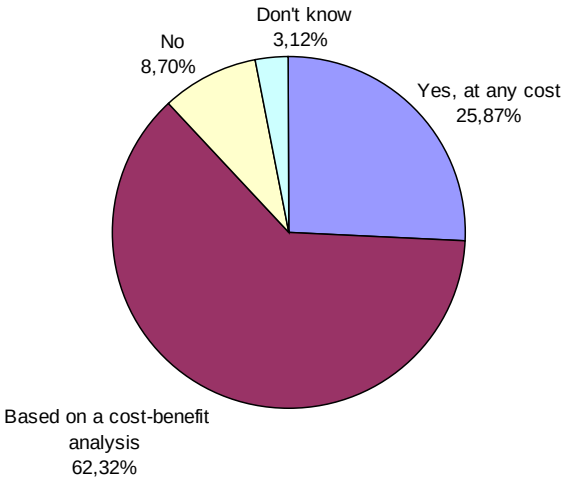


If a new alien species is found in the environment, what should be done?

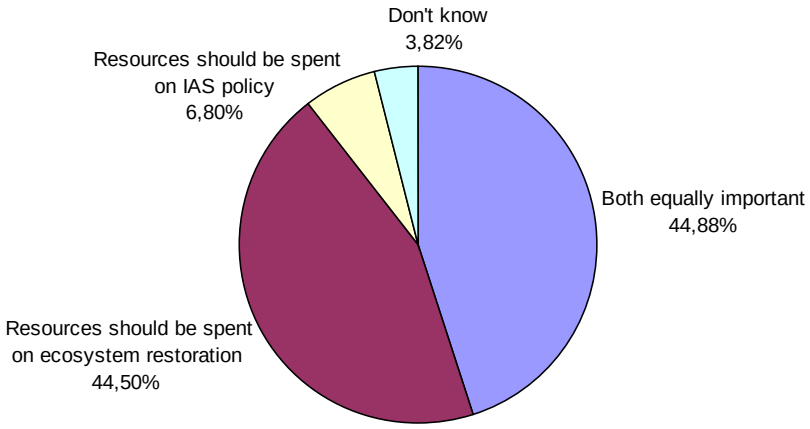


D. Management and Restoration

If an invasive alien species is spreading in the environment and causing damage, should eradication be attempted?



Should resources be spent on ecosystem restoration rather than on the eradication and management of invasive alien species?



2.2. Summary of the positions of the main stakeholders

The following chapter will summarise the positions of the main stakeholders' groups. The material is organised according to the three main axes of work according to the Convention on Biological Diversity: prevention; early warning and rapid response; management of established species.

2.2.1. Prevention

Three main elements were debated in the framework of the various meetings organised with stakeholders and with the Working Group on invasive alien species: the possibility of using a list-based system to address the introduction of IAS into the EU; the need to address pathways of introduction into the EU; and the need to tackle the intentional release of IAS into the environment.

As regards the **listing of species**, two alternatives were discussed: 1) a list of restricted species, i.e. the listed species to be banned from introduction into the EU; and 2) a list of allowed species, i.e. no alien species to be introduced into the EU unless shown to be harmless by risk assessment. The latter approach is the approach taken for example by Australia and New Zealand. The majority of stakeholders favoured the first approach, i.e. a list of banned species. More in details, **Member States** were generally against the idea of banning every alien species unless shown to be safe, conscious of the administration involved in managing such an approach, conscious of the resistance of certain stakeholders group and

of the large costs such an approach would generate. Furthermore, Member States underlined that while such an approach may be workable on an island, it could result unfeasible at the EU scale, with long coast lines and borders with third countries, as well as numerous entry points, such as harbours and airports. Very few Member States expressed a preference for banning all alien species unless proven safe and one proposed that a dual system could be considered with a list of banned species for continental Europe, with the possibility for Member States to introduce a list of allowed species for certain areas, such as oversees regions.

Traders and users of invasive alien species, for example the pet traders and the traders of ornamental species, were against the approach of banning all alien species except those shown to be harmless, backed by the organisations of hunters and anglers, as well as by the organisations of farmers and foresters. On the contrary, **nature conservation organisations** tended to favour the stricter approach afforded by a list of allowed species. Strong support for the approach of listing the allowed species came especially from the **organisations working on animal welfare issues**.

On the same topic, the **online consultation** revealed that a majority of respondents (almost 44%) supported the idea of a list of restricted species, proven to be harmful, although about a quarter of the replies favoured instead the idea of restricting all alien species unless proven harmless, i.e. by drawing a list of allowed species.

As regards the **management of pathway of introduction into the EU and release into the environment**, there was general agreement to the idea of addressing the main pathways of introduction as there was consensus on the fact that several invasive alien species enter the EU unintentionally and that therefore pathways should be addressed to stop the inflow of species into the EU and in the environment. **Member States** tended to adopt a favourable approach to pathway management and recognised the value that action at EU level would have although cautioning against a too prescriptive approach to a complex mosaic. **Traders and users of invasive alien species**, including pet traders and traders of ornamental species, the organisations of hunters and anglers, tended to have a more defensive approach, recognising in some cases the role played by their sector in introducing invasive alien species in the EU, but stressing the voluntary action and the awareness raising activities that their sector are undertaking and urging the Commission to favour such type of self-regulatory activities to more prescriptive measures. **Nature conservation organisations** and **animal welfare organisations** had a more proactive stance to pathway management, calling for EU regulatory action in this field. Awareness-raising and provision of information as one way of addressing certain pathways, was considered important also by several **respondents to the online consultation**: when it comes to ornamental plants a large majority of respondents (roughly 85%, with roughly half in favour of a compulsory system and another half in favour of a voluntary system) considered important to introduce an information system alerting buyers of the possible harmfulness of the plants they buy. The results were slightly different when it comes to pets: over 50% of respondents thought that public awareness programmes should be organised to educate pet owners, while a sizeable proportion (c. 44%) was in favour of a compulsory labelling scheme for pets, alerting buyers of the potential risks of releasing such species in the environment.

As regards **the release of species into the environment**, there was widespread support for the idea of regulating the release into the environment. The ideas debated included a system

of permits or the establishment of a list of species allowed for release, i.e. no alien species would be allowed for release unless shown to be harmless.

Member States were in favour of regulating the release of alien species into the environment; in fact a majority of Member States already has a general ban for release into the environment although with broad exceptions to such ban for certain uses, an approach similar to the establishment of a list of species allowed for release. Many Member States already have a permitting system in place to regulate the release of alien species and saw the benefit of an EU wide system to tackle this aspect of the problem. **Nature conservation and animal welfare organisations** were in favour of strictly regulating the release into the environment, in some cases favouring the approach based on a list of species allowed for release. Also **pet traders** and **users of alien species in confined conditions** (e.g. fur farmers) favoured a stricter approach to release into the environment, as they have no interest in the release of the species they use. On the contrary, **users of alien species that are introduced with the purpose of releasing them into the environment** – such as foresters and the agricultural sector – expressed concern that regulating release into the environment could hamper their activities, although they recognised that their sector is often also a victim of IAS. A majority of **respondents to the online consultation** favoured a precautionary approach with roughly 35% of respondents in favour of establishing a list of alien species allowed for release into the environment and roughly 33% favouring a system based on permits for release.

2.2.2. Early warning and rapid response

There are two aspects to be considered: the need to carry out surveillance so as to enable an early warning system to function and the issue of what action should be taken to rapidly respond to new invasions.

On **early warning**, there was general consensus, and this was also observed in the responses to the online consultation, that national authorities should be in charge of devising the most appropriate surveillance systems, but that citizens should be involved in the surveillance process and that existing monitoring systems should be used in so far as possible.

Views were more divided on the issue of **rapid response**. **Member States** generally recognised the need to act rapidly and that early eradication is the cheapest and most cost effective instrument to tackle a new invasion, however, several Member States urged caution in setting an eradication obligation, worried about the costs and the implications of a blanket eradication obligation. The same Member States recognised however the importance of coordinated EU action when it comes to rapid response. **Traders and users of alien species** were less vocal on this aspect, which touches them less directly as rapid response tend to be considered as the responsibility of public administrations. **Nature conservation organisations** were on the contrary highly in favour of a rapid eradication obligation, which would ensure those new invasions are promptly dealt with. **Animal welfare organisations** stressed the need to focus first and foremost on prevention, so as to avoid getting to a stage where eradication may be necessary, however they recognised that early eradication would be necessary. They however urged the Commission to ensure that animal welfare are taken into consideration when designing eradication programmes. The online consultation focused its question on what species should be subject to rapid eradication: any alien species found in the environment, alien species found in the environment suspected to be harmful or only the species banned from introduction into the EU. The majority of **respondent to the online consultation** (c. 38%) thought that only restricted species detected in the environment should

be rapidly eradicated, while roughly 35% favoured a more proactive approach where also non restricted species found in the environment should be eradicated if suspected of becoming harmful. Around 21% went further indicating a preference for eradicating any new alien species detected in the environment.

2.2.3. Management of established species

When it comes to the management of established IAS, the main issue discussed regarded whether an **eradication obligation** should be introduced. **Member States** were generally not in favour of a blanket eradication obligation, keen to retain their ability to manage established IAS according to their national situations. Member States did, however, recognise the need to have coordinated action and that management activities should be carried out on a common set of species. **Nature conservation organisations** favoured the introduction of an eradication obligation, as this would permanently solve the problems linked to a particular invasion. **Animal welfare organisations** were more cautious: they accepted the need to intervene to eradicate certain IAS but stressed the importance of using humane methods to perform such programmes, and emphasised the need to focus more efforts on prevention so as to avoid getting to the stage where eradication is needed. **Traders and users of alien species** were less vocal on this issue. Certain organisations, such as the **hunters and anglers organisations** highlighted their potential role in certain eradication programme. When it comes to the **online consultation**, there was a clear preference for performing eradication on the basis of cost benefit analysis. Around 25% of respondents thought instead that eradication should be attempted in any case, except where physically impossible.

2.3. Assessment against Commission's minimum standards for consultation:

Minimum Standard A: preparatory documentation

Participants to the stakeholder consultation meeting organised in September 2010 have received a background document[163] to allow them to prepare their input. The consultation was introduced by presentations on the development of an EU-strategy, the technical support and on other relevant initiatives at the EU-level (plant health and wildlife trade).

The working group discussions have been framed by scoping documents that were sent in advance to the participants and that aimed at providing an overview of the issues to be discussed, presenting potential policy options and a series of questions for the groups to reflect upon. The documents focused on: "Prevention"[164], "Early Warning and Rapid Response"[165] and "Eradication, Management and Control"[166]. The working methods of these groups and the approval procedure for the reports had been clearly detailed in advance and discussed with the members of the groups.

As regards the online consultations, background documents and access to all documentation available online, was provided and facilitated by providing all links to the relevant internet pages in the consultation announcement.

Minimum Standard B: target groups

[163] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/stakeholder_03092010&vm=detailed&sb=Title

[164] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/working_prevention/working_prevention&vm=detailed&sb=Title

[165] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/working_prevention/working_response&vm=detailed&sb=Title

[166] http://circa.europa.eu/Public/irc/env/ias/library?l=/general_information/working_prevention/management_restoration&vm=detailed&sb=Title

During the entire process of consultation (2008 online public consultation, 2010 stakeholder consultation, 2010-2011 working groups, 2012 final online stakeholder consultation), a wide range of relevant stakeholder organisations had the opportunity to express their views. Furthermore, the consultation involved several experts from academia and research centres as well as Member States representatives. See table A1 for a full list of stakeholders that provided input in the consultation.

- Stakeholder organisations involved in the movement of alien species (intentional and unintentional), including pet traders, traders in ornamental species, cruise shipping sector, ship owners, dredgers, the general public.
- Stakeholder organisations involved in the utilisation of certain alien species, including bio-control sector, fur breeders, horticultural sector, hawkers, zoos and aquaria, farmers, foresters, hunters, anglers, fishery sector, landowners, forest owners, the general public.
- Stakeholder organisations concerned about the damage by IAS, including nature conservation sector, water managers, farmers, foresters, hunters, anglers, fishery sector, landowners, forest owners, the general public.
- Stakeholder organisations involved in the control of IAS, including chemical industry, bio-control sector, farmers, foresters, hunters, anglers, fishery sector, landowners, forest owners.
- Stakeholder organisations concerned about the control of IAS, including animal welfare sector, the general public.

Table A1: Stakeholder organisations that participated in the consultations

ADS Insight
Asociación Española de Distribuidores de Productos para Animales de Compania - AEDPAC
Bayer CropScience AG , Sustainable Development
Birdlife International
Boomkwekerij Gebr. Van den Berk BV
Bundesverband Garten-, Landschafts- und Sportplatzbau e. V.
Bureau of Nordic Family Forestry
CEEweb for biodiversity
Confederation of European Forest Owners - CEPF
COPA COGECA
Eurogroup for animals/Eurogroup for Wildlife and Laboratory Animals - EWLA
European Anglers Alliance
European Association of Zoos and Aquaria + national organisations
European Bureau for Conservation and Development
European Centre for Nature Conservation ECNC

European Community Shipowners' Associations - ECSA
European Cruise Council
European Dredging Association - EuDA
European Environment Bureau - EEB
European Fur Breeder Association - EFBA
European Landowners organisation
European Pet Organisation - EPO
European Squirrel Initiative
Federation of Associations for Hunting and Conservation – FACE
Federlegno Arredo
Finnish Association for Nature Conservation
Friends of the Earth Europe
Humane Society International - HSI
International Association for Falconry and Conservation of Birds of Prey + national organisations
International Biocontrol Manufacturers' Association - IBMA
International Union for the Conservation of Nature – IUCN
International Union for the Conservation of Nature – IUCN, Invasive Species Specialists Group
Joint Nature Conservation Committee
Natuurpunt vzw
Neobiota
Ornamental Fish International - OFI
Österreichischer Fischereiverband
Plantlife
Pro Wildlife
Schuman Associates s.c.r.l.
Sustainable Users Network

Table A2: Public authorities that participated in the consultations

AT	Amt der Steiermärkischen Landesregierung
AT	Austrian Environment Agency
BE	Federal Public Service Health, Food Chain Security and Environment - DG Environment
BE	Agency for Nature and Forest - Fauna and Flora, Flanders
BE	Service Public de Wallonie, invasive species unit

CY	Ministry of Agriculture, Natural Resources and Environment
CZ	Ministry of the Environment
DE	Ministry of Environment
DE	Federal Agency for Nature Conservation - BfN
DE	Ministry of the Environment, Energy, Agriculture and Consumer Protection of Hesse
DK	Greenland Representation in Brussels
DK	Danish Forest and Nature Agency
DK	Danish AgriFish Agency
EE	Ministry of Environment
ES	Ministry of Environment - Technical Assistance in the Ministry of the Environment and Rural and Marine Affairs - TRAGSATEC
ES	IHOBE S.A., Sociedad Pública de Gestión Ambiental del Gobierno Vasco
ES	Catalan Water Agency / Agència Catalana de l'Aiga - ACA
ES	Dirección General de Medio Natural, Agricultura, Alimentación y Medio Ambiente
ES	Subdirección General de Biodiversidad Dirección General de Medio Natural y Política Forestal
FI	Ministry of Agriculture and Forestry
FR	Ministry of Ecology, Energy, Sustainable Development and the Sea
FR	Direction générale de l'alimentation, ministère de l'agriculture
FR	Ministère de l'écologie, du développement durable, des transports et du logement, Direction de l'eau et de la biodiversité
HU	Institute of Ecology and Botany of Hungarian Academy of Sciences
HU	Ministry for Rural Development
HU	Vidékfejlesztési Minisztérium, Természetmegőrzési Főosztály, Természetvédelmi Monitorozó Osztály
IE	Species Protection Unit -Science and Biodiversity Section National Parks and Wildlife Service - Department of Environment Heritage and Local Government
IE	Inland Fisheries Ireland (previously Central Fisheries Board)
IE	National Parks and Wildlife Service, Species Protection Unit
IT	Ministero dell'Ambiente e della Tutela del Territorio e del Mare
LT	Ministry of the Environment
LT	Ministry of Agriculture, State Plant Service
LU	Ministère du Développement durable et des Infrastructures - Département de l'environnement
LV	Ministry of Agriculture
MT	Office of the Prime Minister – EU Secretariat

MT	Biodiversity Strategic Policy, Ecosystems Management Unit, Environment Protection Directorate
NL	Food and Consumer Product Safety Authority, Invasive Alien Species Team
NL	Dutch Ministry of Economic Affairs, Agriculture and Innovation
NL	Provincie Limburg
NL	Dutch Permanent Representation, Environment and Nature Department
PL	General Directorate for Environmental Protection
PT	Environment Department / Direcció General del Medi Natural. Departament de Medi Ambient i Habitatge
SE	Environmental Protection Agency
SI	Ministry of the Environment and Spatial Planning
SK	State Nature Conservancy of SR, Regional Office
SK	Ministry of the Environment, Division of Nature Protection and Landscape Development
UK	GB Non-native Species Secretariat
UK	Department for Environment, Food and Rural Affairs
UK	Cayman Islands Department of the Environment
UK	Countryside Council for Wales
UK	Scottish Government

Table A3: Research centres and academic institutions that participated in the consultations

BE	Belgian Biodiversity Platform
BE	Research Institute for Nature and Forest, Flanders
BE	Université de Liège Gembloux Agro-Bio Tech
BG	Institute of Biodiversity and Ecosystem Research
BG	University of Forestry
DK	Aarhus University
FR	Anses, Laboratoire de Santé Animale, Unité épidémiologie
FR	Université de Poitiers, Ecologie, Evolution, Symbiose
GR	Hellenic Centre for Marine Research - HCMR
IE	National Biodiversity Data Centre
IT	Sardinian Forest Service
IT	Institute for Environmental Protection and Research - ISPRA
IT	Sapienza University of Rome
LU	Musée d'Histoire Naturelle
PL	University of Silesia, Faculty of Biology and Environmental Protection

PT	Centre for Functional Ecology. University of Coimbra
PT	Escola Superior Agrária de Coimbra/Instituto Politécnico de Coimbra
PT	Department of Biology, University of Minho
PT	Centre of Marine and Environmental Research – CIIMAR
RO	University Ovidius Constanta
UK	Centre for Ecology and Hydrology

Table A4: International organisations that participated in the consultations

CAB International
Council of Europe
European and Mediterranean Plant Protection Organization - EPPO
European Environment Agency - EEA
European Network of Invasive Alien Species - NOBANIS
European Topic Centre on Biological Diversity
Regional Euro-Asian Biological Invasions Centre

Minimum Standard C: publicity

Announcements of the online public consultations (2008 and 2012) were published on Your Voice in Europe[167] as well as on the DG Environment Europa website. A press release[168] was published for both consultations on Rapid. In order to encourage further spreading of the online consultation, an e-mail announcement was sent to lists of Member States' representatives, stakeholder organisations and experts, inviting them to further circulate the message.

The stakeholder consultation meeting held in September 2010 was announced on both the DG ENV Europa website (under the headings News and Consultations[169]) and Your Voice in Europe[170]. Furthermore, an announcement was mailed to lists of Member States' representatives, stakeholder organisations and experts, involved in previous work on invasive species or biodiversity in general, inviting them to further circulate the message to relevant contacts and colleagues.

The working groups (December 2010- August 2011) were announced at the September 2010 stakeholder consultation. Later, an invitation was mailed to lists of Member States' representatives, stakeholder organisations and experts, inviting them to further circulate the message to contacts and colleagues.

Minimum Standard D: time

The 2008 online public consultation period took place from 3 March to 5 May 2008 (9 weeks). The stakeholder consultation (3 September 2010) was announced on 1 July 2010 (65

[167] http://ec.europa.eu/environment/consultations_en.htm#closed
[168] IP/08/373 in March 2008 and IP/12/199 in February 2010
[169] http://ec.europa.eu/environment/consultations/invasive.htm
[170] http://ec.europa.eu/yourvoice/consultations/2010/index_en.htm

days in advance; registration by 14 July 2010). The working groups (2010-2011) were announced on 21 October (48 days prior to the first working group meeting on 8 December 2010; registration by 8 November 2010). The final online public consultation remained open from 27 January to 12 April 2012 (11 weeks): the last consultation built on a solid basis of contributions collected between 2008 and 2012, from the whole spectrum of interest groups and involving Member States representation. The focus was on the policy measures being considered, which were based on the input and feedback collected from all relevant stakeholders in the process that started in 2008. The Consultation therefore built on material collected in a participative manner from all sectors involved and focused on very specific policy choices formulated in a rather limited number of questions, which justified a slightly shorter period of consultation (11 weeks instead of 12 weeks).

Minimum Standard E: acknowledgement

All expressions of interest, as well as the written contributions were acknowledged. All meetings were summarised in minutes, which are accessible by all stakeholders via the dedicated page of the Europa website[171].

[171]http://ec.europa.eu/environment/nature/invasivealien/index_en.htm

3. ANNEX III: TECHNICAL SUPPORT

Given the complex nature of the issues related to invasive alien species, extensive technical support was sought by the Commission since 2006. The studies and reports listed discussed below, as well as Commission-backed research projects, have provided a wealth of important and useful material to inform decision-making and were extensively used in support of this Impact Assessment.

DAISIE project

Ground breaking progress was achieved with the EU-funded research project DAISIE (2005-2008) - Delivering Alien Invasive Species Inventories for Europe[172] - which focused on the development of a pan-European inventory of invasive alien species with the objective of mobilising existing expertise for species records, including and describing alien species likely to enter the EU and spread from neighbouring countries, and identifying priority species. DAISIE compiled an inventory of 10,961 alien species in the EU, and elaborated a list of the worst 100 IAS in the EU, mainly for awareness-raising purposes.

Joint Research Centre online information system pilot project

Information on alien species in Europe is provided online by a large number of global, regional or national databases. The Joint Research Centre (JRC) is currently developing the European Alien Species Information Network (EASIN) that aims to facilitate the exploration of existing alien species information from distributed sources through a network of interoperable web services. EASIN will allow extraction of alien species information from online information systems for all species included in an alien species inventory (EASIN catalogue), which was produced by reviewing and standardizing available information from 43 online databases. The EASIN catalogue includes the basic information needed to efficiently link to existing online databases and retrieve spatial information for alien species distribution in Europe. Using search functionality powered by a widget framework, it is possible to make a tailored selection of a subgroup of species based on various criteria (e.g., environment, taxonomy, pathways) and to produce 'on the fly' distribution maps of the selected species. EASIN can be accessed from http://easin.jrc.ec.europa.eu/

External contracts

Further technical support was engaged through several studies carried out by the **Institute for European Environmental Policy** and by **Bio-Intelligence Service**, providing a very thorough understanding of (1) the current impacts of IAS, (2) the current IAS framework in and beyond the EU and scoping of policy responses in Member States and other OECD countries, (3) information on costs and benefits of IAS policy measures and (4) recommendations for the further development of an IAS policy.

The reports are the following: "Recommendations on policy options to minimise the negative impacts of invasive alien species on biodiversity in Europe and the EU"[173], "Assessment of the impacts of invasive alien species in Europe and the EU"[174], "Policy options to minimise the negative impacts of invasive alien species on biodiversity in Europe and the EU"[175], "Analysis of the impacts of policy options/measures to address IAS"[176], "Assessment to

[172] http://www.europe-aliens.org/index.do
[173] Shine *et al.* 2009
[174] Kettunen *et al.* 2009
[175] Shine *et al.*2008 and its annexes
[176] Shine *et al.* 2009

support continued development of the EU strategy to combat invasive alien species"[177], prepared by IEEP and "Comparative assessment of existing policies on Invasive Species in the EU Member States and in selected OECD countries"[178], prepared by BioIntelligence Service. These reports are available online on the dedicated DG Environment webpage[179].

These studies resulted in a preliminary estimate of the cost of inaction of roughly €12.5 billion per year in Europe[180] and a preliminary exploration and cost estimate of possible policy actions[181]. Such costs of action would be much lower than the cost of inaction and tend to decrease overtime while costs of inaction would only increase. Those studies also allow drawing lessons from the EU's international partners' experiences, while taking fully into account the national efforts undertaken so far.

The €12.5 billion estimate is based on an assessment of the **documented monetary impacts** of a list of 125 species, chosen on the basis of their documented impacts on the environment, society and the economy. The list was not meant to be exhaustive but to provide an estimate of the possible magnitude of costs. Of this total, the documented costs for the agricultural, fisheries, forestry and health amount to roughly €6 billion a year. These costs were then extrapolated to give a more accurate overview of the magnitude of costs at EU level: extrapolation was done on the basis of available information on the area of coverage of IAS impact and the total known range of the IAS in question. Using this method the total cost to the EU could go up to €20 billion, which would still be an underestimate, considering that these monetary costs refer only to a subset of IAS.

The **estimated annual costs of key actions** based on the indicative assessment produced by Shine *et al*. (2010) suggests that the possible scale of total costs (not incremental costs) of key actions only, at EU and national level, could amount to €40-190 million a year. The low estimate is largely based on existing costs: such level of investment should therefore be considered as the baseline. For a significant number of measures, some level of investment is already taking place at national level. Cost of damage has been estimated to amount to roughly €9.6 billion a year. If we compare the cost of damage with the higher end range of cost of action, €190 million a year, it is possible to see that the avoided cost of IAS damage would be manifold to the cost of policy action.

It is to be considered that the estimate of damage costs includes a number of costs related to plant pest or animal diseases that fall under the scope of the EU plant health regime, however costs caused by IAS non covered by any existing regime formed a significant proportion of the estimate and the estimate is based on a sub-set of IAS. The existing estimate of the costs is therefore likely to be a serious underestimation. Furthermore, the available data on monetary costs remains scarce and unevenly distributed between geographical areas and taxa. Moreover, benefits in terms of biodiversity, recreational or cultural values are often not available. Nevertheless, the comparison between the estimated cost of action vs. the cost of inaction is thought to be robust and to provide a solid idea of the magnitude of costs and benefits.

European Environment Agency

Also the **European Environment Agency** has been supporting the process identifying IAS within the framework of the process of Streamlining European Biodiversity Indicators

[177] Shine *et al.* 2010
[178] Sonigo *et al.*, 2011
[179] http://ec.europa.eu/environment/nature/invasivealien/
[180] Kettunen *et al.*, 2009
[181] Shine *et al*,. 2010

(SEBI)[182], commissioning a study on the development of an early warning and information system for IAS threatening biodiversity in Europe and embarking on a pilot project on the surveillance of IAS through citizen science (Nature Watch, within the Eye on Earth project). The report "Towards an early warning and information system for invasive alien species (IAS) threatening biodiversity in Europe"[183] is available online[184].

[182] http://www.eea.europa.eu/data-and-maps/indicators/invasive-alien-species-in-europe/invasive-alien-species-in-europe
[183] Genovesi *et al*., 2007
[184] http://www.eea.europa.eu/publications/information-system-invasive-alien-species

4. ANNEX IV: INTERNATIONAL POLICY CONTEXT

Convention on Biological Diversity (CBD)

The Convention on Biological Diversity[185], to which the EU and the Member States are contracting party, is an international legally-binding treaty with three main goals: conservation of biodiversity; sustainable use of biodiversity; fair and equitable sharing of the benefits arising from the use of genetic resources. The scope of the Convention for Biological Diversity includes measures concerning the introduction and spread of invasive alien species (IAS). At the 10th meeting of the Parties to the Convention on Biological Diversity in 2010 (Nagoya, Japan), the 2020 20 biodiversity targets were agreed, including Target 9 specifically referring to IAS: "By 2020, invasive alien species and pathways are identified and prioritised, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment."

International Plant Protection Convention (IPPC)

The international framework for regulatory plant health is the International Plant Protection Convention[186], to which the EU and the Member States are contracting parties. The objective of the IPPC is to protect cultivated and wild plants against the introduction and spread of pests, while minimising interference with international trade. To this end, the IPPC develops International Standards for Phytosanitary Measures (ISPMs). Such standards may also be developed by regional organisations under the IPPC. For the EU, the relevant regional organisation is the European and Mediterranean Plant Protection Organisation (EPPO).

Overlap exists between the scope of CBD and IPPC, CBD including non-native plants and animals as well as non-native pests and pathogens of plants and IPPC focussing on 'pests' (the equivalent for 'harmful organism' in the EU legislation) including invasive alien *plant* species. While the IPPC-definition is applied in the EU plant health regime, no IAS plants have been regulated so far under that regime other than parasitic plants. Cooperation between the secretariats of the CBD and IPPC is governed by a Memorandum of Cooperation signed in 2004 to promote synergies, avoid overlaps and duplication, and ensure effective cooperation.

World Organisation for Animal Health (OIE)

The OIE is the intergovernmental organisation responsible for improving animal health worldwide. Terrestrial animal means a mammal, bird or bee. Aquatic animals means all life stages (including eggs and gametes) of fish, molluscs, crustaceans and amphibians originating from aquaculture establishments or removed from the wild, for farming purposes, for release into the environment, for human consumption or for ornamental purposes. OIE has established Terrestrial and Aquatic Animal Health Codes that are providing frameworks to which EU rules are aligned.

The main objects of the OIE are: 1) to promote and co-ordinate research work on contagious diseases of livestock; 2) to collect and disseminate knowledge on the spread of epizootic diseases and the means to control them, ensuring coordination between sanitary services; 3) to examine international draft agreements regarding animal sanitary measures and to provide signatory Governments with the means of supervising their enforcement.

[185] http://www.cbd.int/convention
[186] https://www.ippc.int/IPP/En/default.jsp

World Trade Organisation (WTO) - Sanitary and Phytosanitary (SPS) Agreement

The WTO Sanitary and Phytosanitary (SPS) Agreement[187], to which the EU is also contracting party, provides a multilateral framework of rules and disciplines to guide the development, adoption and enforcement of sanitary and phytosanitary measures in order to minimize their negative effects on trade. The SPS Agreement for this purpose acknowledges IPCC and OIE as reference organisations. The SPS Agreement does not interfere with the decisions of its Members concerning the appropriate level of protection of the environment, but sets rules how that level may be achieved without undue interference with trade. Sanitary and phytosanitary measures should be applied only to the extent necessary to protect human, animal or plant life or health and be based on scientific principles and evidence, so as not to discriminate between Members where identical or similar conditions prevail.

International Maritime Organisation (IMO)

The International Convention for the Control and Management of Ships Ballast Water and Sediments was adopted in 2004. It is expected to enter into force in 2012-2013. Parties undertake to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. The Convention has been ratified by four Member States (France, the Netherlands, Spain and Sweden). The International Maritime Organisation (IMO) is also facilitating the development and application of guidelines on the fouling of ship hulls with such organisms.

Convention on the conservation of European wildlife and natural habitats (Bern Convention)

The Bern Convention is a binding international legal instrument in the field of nature conservation, which covers the natural heritage of Europe and some States of Africa. The Convention aims at conserving wild flora and fauna and their natural habitats and promoting European co-operation, with a particular focus on endangered natural habitats and endangered vulnerable species, including migratory species. Parties to the Bern Convention must promote national policies for the conservation of wild flora and fauna, and their natural habitats and take them in due consideration in planning and developing policies. Members also engage in education and awareness-raising on the need to species of wild flora and fauna and their habitats and encourage and co-ordinate research and sharing of experience and best-practices.

To better focus the implementation efforts, the Bern Convention created specialised groups of experts, including one dedicated to Invasive Alien Species. The group collected and analysed different national laws dealing with invasive species and proposed work aimed at the harmonisation of national regulations on introduced species, particularly on the fields of definitions, territorial scope of regulation, listing of species whose introduction is undesirable, identification of authorities responsible for permits, conditions for issuing such permits and control involved. The group published in 2003 a European Strategy on IAS, which has inspired several valuable initiatives in EU Member States.

[187] http://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm

5. ANNEX V: EU AND NATIONAL POLICY BASELINE

5.1. EU policy

5.1.1. EU legislation addressing part of the IAS problem[188]

Animal health regime

The EU Animal Health Regime, currently under revisions, focuses on prevention and an integrated approach to animal health and welfare. The revision aims at establishing a modernised single regulatory framework, to modernise and simplify the existing legislation, and to adjust the harmonised EU framework for improved coordination, as well as responsibility and cost-sharing. The revision will support: risk-based prioritisation of EU interventions; improved border and on-farm biosecurity; and improved science, innovation and research.

The revised regime aims to covers the health of all animals in the EU, including wild animals, but it does not address environmental risks associated with the import, release and/or escape of alien animals. However, the framework contributes to IAS prevention by providing a basis to regulate import and intra-EU movement of animals that are vectors of diseases that could affect native biodiversity. For example, the EU-wide ban on import of wild birds was adopted to prevent transmission of avian flu and resulted in 2 million fewer birds being imported each year. However, import restrictions do not apply to captive-bred species reared or kept in captivity for breeding or re-stocking supplies of game; birds imported for approved conservation programmes; pets accompanying their owner; or birds imported for zoos or experiments.

Plant health regime

The plant health regime establishes protective measures against the introduction into the EU and the intra-EU spread of organisms harmful to plants or plant products. The EU plant health regime is under revision to take account of emerging threats linked to globalisation and climate change, consistent with key international instruments, notably the IPPC. The scope of the revised plant health law will cover pests and disease agents – harmful organisms – affecting plants, both cultivated and wild ones. Nevertheless, the introduction of invasive alien plant species will not be covered by the revised plant health law.

Wildlife Trade Regulation (WTR)

The WTR regulates border, import and transit controls in relation to trade in protected species of wild fauna and flora and aims to ensure that trade will not have a negative impact on their conservation. Its main focus is the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) but it also covers endangered EU species not threatened by international trade to ensure policy coherence e.g. with the birds and habitats Directives. The WTR provides a legal basis to suspend the import into the EU of 'live specimens of species for which it has been established that their introduction into the natural environment of the Community presents an ecological threat to wild species of fauna and flora indigenous to the Community'. Since 1997, seven animal species have been banned for import but there is no restriction on their intra-EU movement/holding, no provisions ensuring early warning or rapid response in case of detection of such species in the environment, nor any management provision.

[188] Based on Shine *et al.* 2010

Regulation on the use of alien and locally absent species in aquaculture

The Regulation on the use of alien species in aquaculture establishes a dedicated framework to assess and minimise the possible impact of alien and locally absent species used in aquaculture on the aquatic environment. It is the only EU instrument to focus on the ecological risks associated with alien species introductions by a specific sector. Member States must ensure that all appropriate measures are taken to avoid adverse effects to biodiversity, including ecosystem functions, from such introductions / translocations and the spreading of these species in the environment.

The Regulation has a dual focus: intentional introduction of alien species (species / subspecies of an aquatic organism occurring outside its known natural range and the area of its natural dispersal potential) and intentional movement of locally absent species (species / subspecies of an aquatic organism locally absent from a zone within its natural range of distribution for biogeographical reasons). It also covers environmentally harmful non-target species moved with introduced or translocated organisms, excluding disease-causing organisms regulated under the animal health regime. The Regulation does not cover translocations within Member States except if there is a risk to the environment, nor to pet-shops, garden centres or aquaria where there is no contact with EU waters. The Regulation introduces a list of alien species that can be released without a permit (effectively a list of permitted species).

Habitats and Birds Directives

The Habitats Directive and Birds Directive underpin EU biodiversity policy through two pillars of activity: the Natura 2000 network of protected sites and a strict system of species protection. Implementation measures should be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest, taking account of economic, social and cultural requirements and regional and local characteristics. Both Directives contain an explicit IAS prevention obligation. The Habitats Directive requires Member States to ‘ensure that the deliberate introduction into the wild of any species which is not native to their territory is regulated so as not to prejudice natural habitats within their natural range or the wild native fauna and flora and, if they consider it necessary, prohibit such introduction’ (Art.22b). The Birds Directive more loosely requires MS to 'see that any introduction of species of bird which do not occur naturally in the wild state in the European territory of the Member States does not prejudice the local flora and fauna’ (Art.11). In practice, these provisions, worded in general terms, have not led to the creation of regulate the introduction of alien species in the environment, but led to a myriad of diverse and not often coherent action, and have proved ineffective in preventing the continued introduction and spread of IAS in the EU territory.

Certain measures under the Directives may have unintended consequences for IAS: some alien species are currently listed for protection and as priority species for co-financing; certain species are protected in their whole current range although they are native only in part of the European range; some bird species alien to the whole of Europe are listed in the birds Directive and subject to the same protection/management and derogation provisions as naturally occurring species; for some habitat types, alien species are included in the EU Habitats Interpretation manual as characteristic species.

Water Framework Directive (WFD)

The WFD establishes a framework for national measures to achieve or maintain a good ecological status for European inland, transitional and coastal waters by 2015 and prevent their further deterioration. It provides for indicators to assess and monitor water status for this

purpose. IAS are not mentioned in the WFD text but are included as a 'potential anthropogenic impact' in an annex: IAS are a pressure that alters taxonomic composition and detracts from naturalness, Member States should therefore take their impacts into account as part of WFD implementation. In 2009 a consultative process (ECOSTAT 2009) examined how alien species could be more consistently incorporated in WFD implementation: however, some constraints to achieving consensus on a single approach were identified, *inter alia* the fact that Member States procedures for using alien species data in ecological status classification vary widely, according to country, biological element and surface water type.

Marine Strategy Framework Directive (MSFD)

The MSFD requires each Member State to develop a marine strategy, based on the ecosystem approach, with the aim of achieving or maintaining 'good environmental status' in the marine environment by the year 2020 at the latest. Actions should be based on the principles of preventive action, rectification of environmental damage at source and the polluter pays principle. IAS are explicitly covered by one of the 11 descriptors of good environmental status: 'non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems'. This is particularly important in the marine environment where IAS eradication and control are particularly challenging. The Member States initial assessment of marine status (by 2012) should include an IAS inventory and assess the entity of their pressure.

5.1.2. Lessons learnt from the plant health regime (PHR)

The issue of plant pests is close to that of IAS: in fact plant pests and diseases, as argued in this Impact Assessment, are IAS that are already tackled by PHR. The measures in place through PHR have therefore provided substantial inspiration for the proposed actions to tackle IAS. Since its adoption, the PHR has successfully protected the EU against the introduction and spread of many pests; however, with the increasing globalisation of trade, the systems faced new challenges that brought about the need to review its functioning. In order to assess its successes and shortcomings, the European Commission carried out a review and commissioned an evaluation which thoroughly examined the functioning of the system. The evaluation was conducted by the Food Chain Evaluation Consortium (FCEC) and completed in 2010. The current revision and the FCEC study provided a useful oversight of pitfalls and shortcomings of the system in place, from which valuable lessons can be learnt.

The FCEC evaluation in particular suggested that the plant health regime should strengthen the measures on prevention and enhance coordinated action to prevent the spread of harmful organisms that enter the EU. The study also recommended more solidarity, i.e. moving from a MS based to EU approach for joint action to tackle risks of EU significance. Recognising the importance of prevention as the most cost effective way of avoiding problems related to IAS, the measures proposed seek to refocus the use of resources currently spent on IAS (those not covered by existing EU legislation) on prevention rather than on measures to react to problems already established, in line with the approach of the PHR. The FCEC study even highlighted the need to strengthen prevention in the plant health regime by strengthening the instruments for the follow-up, including surveillance, contingency planning, rapid outbreak eradication and containment, should a harmful organism have gone unnoticed during import inspection. The proposed measures to tackle IAS are fully in line with this recommendation and establish a system which includes surveillance, early warning and rapid response as well as management obligations for those IAS that enter and establish in the EU. Furthermore, the introduction of provisions to address unintentionally introduced IAS through pathway

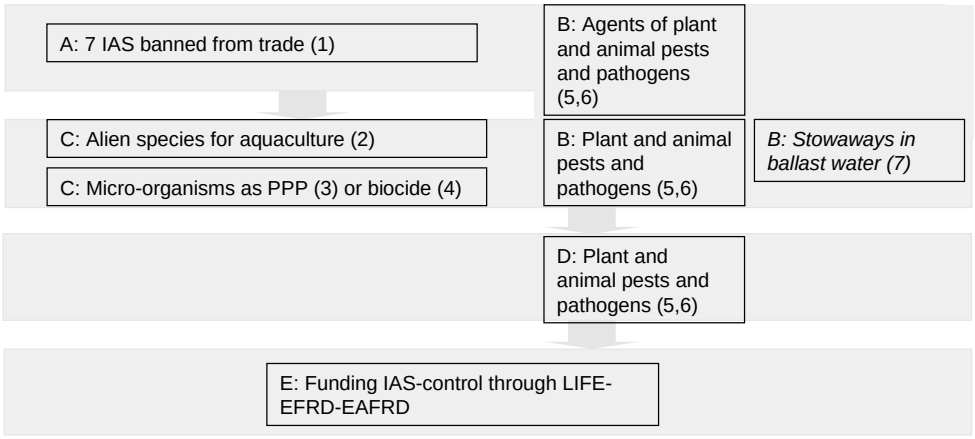
management seeks to further strengthen the prevention element by going beyond the species listed as IAS of EU concern.

The FCEC study also highlighted the need for the PHR to place more emphasis on the natural spread of pests, rather than simply on the movement of host plants, by introducing more flexible provisions to contain the spread of harmful organisms that could not be eradicated. The proposed measures reflect this message by introducing management obligations for the IAS of EU concern, ensuring that established IAS, if they cannot be eradicated, will be contained or controlled so as to minimise or mitigate the damage they cause and avoid their spread in the EU. At the same time, the management obligations provide enough flexibility for Member States to select the most appropriate management options.

The FCEC evaluation also found that implementation of some aspects of the regime has not always been consistent, hampering the effectiveness of the system. The need for consistent action is recognised by the proposed measures, which propose to set obligations focusing on the IAS of EU concern. Conscious that limited resource may hamper the implementation of certain measures, the system has been designed to cater for flexibility, whenever possible, and to recognise the fact that Member States are already taking some action to tackle IAS.

5.1.3. EU policy gap analysis

As seen in section 5.1.1, some IAS are already addressed by EU legislation. Figure A1 is replicating the structure of the operational objectives (section 4 of the Impact Assessment report) and is summarising the scope of existing legislation in relation to those objectives.



(1) Wildlife Trade Regulation (338/97)
(2) Regulation concerning the use of alien and locally absent species in aquaculture (708/2007)
(3) Regulation concerning the placing on the market and use of biocidal products (1451/2007)
(4) Regulation on the placing of plant protection products on the market (1107/2009)
(5) Plant health regime (2000/29/EC)
(6) Animal health regime
(7) Ballastwater Convention (not yet into force)

Figure A1: Response tree, identifying current international and EU legal provisions to address the various aspects of the operational objectives in (Figure 7), labelled A, B, C, D and E

Current EU legislation has some clear shortcomings:

Gaps in species and pathways coverage - taxonomic coverage of EU instruments is weakest for alien animals and for alien plants that do not qualify as diseases or pests and has gaps in relation to microorganisms causing ecosystem damage as well as social or economic damage. Table A5 summarises the current situation highlighting the species groups covered by

existing legislation and identifying the remaining policy gaps. When it comes to pathways, the EU legislation has very limited scope: the Regulation on the use of alien and locally absent species in aquaculture addresses the release into the environment of aquatic species used for aquaculture purposes; the regulations on the use of biocidal products and plant protection products regulate the release into the environment of microorganisms used as biocides or as plant protection products. The EU has also some rules on: wood packaging material carrying alien invertebrates (2004/102/EC); animal feed carrying undesirable weed seeds (2002/32/EC); plant reproductive material contaminated with other genera or species (EU plant reproductive material regime). However, these are only a few of the possible pathways of introduction, which are mostly left unaddressed, beside some scattered national initiatives.

Examples on the remaining gaps:

- Animals grazing on terrestrial plants: Canadian goose overgrazing wetlands
- Animals grazing on aquatic plants: common slider consuming all aquatic vegetation
- Animals harming animals: grey squirrel outcompeting red squirrel
- Management of invasive aquaculture species: aquaculture regulation is only addressing release, not management of e.g. red swamp crayfish
- Management of IAS banned from trade through Wildlife Trade Regulation: this regulation is only addressing trade, not management of e.g. American bullfrog
- Animals affecting public health: poisonous spiders
- Animals causing ecosystem damage: sika deer disturbing forest ecosystems
- Animals causing economic or social damage: musk rat damaging river banks, dams and railroads
- Weeds affecting terrestrial plants: ragweed causing loss of agricultural production
- Weeds affecting aquatic plants: waterweeds outcompeting native vegetation
- Plants affecting animal health: ragweed affecting livestock
- Plants affecting public health: giant hogweed causing medical problems
- Plants causing ecosystem damage: black cherry disturbing forests
- Plants causing economic or social damage: Japanese knotweed damaging infrastructure
- Diseases to aquatic plants:
- Micro-organisms causing ecosystem damage: algal blooms of e.g. Chinese diatom
- Micro-organisms causing economic or social damage

Complexity, legal uncertainties and insufficient focus on prevention – The fact that different IAS and different aspects of the IAS problems are addressed by separate EU legislation creates complexity. The lack of a dedicated policy at EU level leads to a situation where Member States take individual initiatives on the IAS not already covered by EU legislation. Furthermore, except for aquaculture organisms, EU legislation does not clarify the criteria on which Member States may regulate IAS movement/holding without impeding operation of the internal market, creating legal uncertainties. Finally, apart from the animal and plant health regimes, the EU lacks an approach to managing IAS and invasion pathways from pre-border to post-border and down to control and management at appropriate scales. Current policies are insufficiently precautionary and do not optimise efforts for prevention.

Other difficulties in the current EU policy set up – Lack of a common EU definition of IAS leads to different Member States adopting rules on the basis of different definitions. While a wealth of data is often available, this is often not readily accessible and, unlike in the areas of animal and plant health, there is no EU system on IAS. This affects all areas of IAS

policy, particularly early warning and rapid response. Furthermore, IAS impacts on biodiversity and ecosystem functions are not explicitly addressed in existing EU risk assessment frameworks except for aquaculture. A few Member States have made substantial investments to develop robust systems to assess a wider range of species, often modelled on the EPPO Pest Risk Assessment methodology, but in most cases risk assessments are not well coordinated with other national systems. When it comes to management of established species, there are no EU instruments to support a common approach. The use of existing funding, such as LIFE +, is not optimal, due to a lack of a coordinated approach at EU level. Moreover the current focus is often on the management of existing IAS problems rather than on prevention of new invasions. Finally, the lack of awareness both at political and public level often acts as an impediment to take action and there is no overarching strategy or platform to foster awareness-raising of IAS as a transboundary problem.

5.2. The 2020 Biodiversity Strategy

International commitments

In October 2010, in Nagoya, Japan, at COP10 of the Convention for Biological Diversity, the EU and its international partners adopted a new Strategic Plan, which includes one specific target related to IAS: target 9 aims to achieve that, **by 2020, invasive alien species and pathways are identified and prioritised, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment**.

The threats from invasive alien species will have to be addressed in line with these international commitments and if the EU is to achieve its own 2020 goal of halting the loss of biodiversity and the degradation of ecosystem services in the EU, restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.

The EU commitments

Invasive Alien Species (IAS) were already identified as an environmental concern in the 6th EAP and in the 2006 Communication on Halting the Loss of Biodiversity.

In 2008 the Communication "Towards an EU Strategy on Invasive Species" (COM (2008) 789) was published and it was received positively at the highest political level:

- The Environment Council of June 2009[189] noted the fragmentation, generality and lack of consistency of legislation at community level, national and international level and called for a comprehensive Strategy to fill the existing gaps, including new dedicated legislative elements and, where necessary amending or incorporating existing provisions.
- The Committee of the Regions[190] expressed support for a dedicated legislative measure to tackle the threat of IAS
- The Economic and Social Committee[191] echoed the conclusions of the Committee of the Regions and also called for a creation of a European Agency to monitor implementation.

Finally, the European Council in March 2010 committed to halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as

[189] http://ec.europa.eu/environment/nature/pdf/council_concl_0609.pdf
[190] https://toad.cor.europa.eu/BrowseDocuments.aspx?type=1&folder=cdr\deve-iv\dossiers\deve-iv-039
[191] http://eescopinions.eesc.europa.eu/EESCopinionDocument.aspx?identifier=ces\nat\nat433\ces1034-2009_ac.doc&language=EN

feasible, while stepping up the EU contribution to averting global biodiversity loss by 2020. Being IAS one major driver of biodiversity loss, the EU effectively committed itself to take action against IAS.

Delivering on the commitments

In line with the commitments (both international and at EU level) outlined above, the Commission published, in May 2011, **the EU 2020 Biodiversity Strategy** – "Our life insurance, our natural capital: an EU biodiversity strategy to 2020"[192] – which sets a specific target to address the issue of IAS and proposes the publication of a dedicated legislative instrument to tackle the problem.

Concretely, the new Biodiversity Strategy proposes:

- **Target 5**: by 2020, Invasive Alien Species and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS.

The measures proposed to help achieve this target are:

- **Action 15: Strengthen the EU Plant and Animal Health Regimes -** The Commission will integrate additional biodiversity concerns into the Plant and Animal Health regimes by 2012 – these regimes are currently being reviewed by SANCO and this is the area where close cooperation with DG SANCO is needed.
- **Action 16: Establish a dedicated instrument on Invasive Alien Species -** The Commission will fill policy gaps in combating IAS by developing a dedicated legislative instrument.

Delivering on action 15

One of the measures proposed by the EU 2020 Biodiversity Strategy is to integrate IAS concerns into existing instruments, mainly the animal and plant health legislation. As described above, close cooperation has been maintained with DG Health and Consumers (SANCO), to establish how the revised plant and animal health regime could include further biodiversity concerns. The scope of the two instruments will be widened to include pests and diseases of wild plants and animals. However, the option of including invasive alien plants in the new plant health law, which was considered in the plant health impact assessment was not retained, mainly because this would have implied a change in the intervention logic: while the plant health regime regulates disease agents and pests of plants and plant products, the IAS-policy will deal with entire plants that can be harmful.

The most promising aspect of integrating biodiversity concerns into the animal and plant health regimes is, however, the idea of integrating border controls on IAS within the border controls that are already being carried out for animal and plant health. This would avoid creating a parallel system of controls and would take advantage of a well-functioning system with limited extra investment.

Delivering on action 16

This is the focus of the policy proposals, discussed in this impact assessment report.

[192] COM(2011)244

5.3. IAS policies and initiatives in Member States[193]

A dedicated study was commissioned to provide an inventory of existing policies and initiatives to tackle IAS in Member States. The assessment was performed systematically, by evaluating each policy/initiative against a set list of criteria. The information was updated and confirmed in November 2012 and is summarised in Table A6. The main findings are reported in the paragraphs that follow, but the whole study can be accessed from this webpage: http://ec.europa.eu/environment/nature/invasivealien/index_en.htm.

5.3.1. A fragmented policy field

Most Member States have policies and initiatives on IAS but these tend to be highly fragmented, leading to policy gaps. Most Member States also appear to concentrate their effort on tackling IAS that are long established rather than on prevention or early warning and rapid response. However, a number of Member States have begun to adopt a black listing approach in relation to trade and keeping of IAS but these lists in general are not systematically supported by formal risk assessments and are potentially open to challenge.

In summary, the EU has one of the best pools of IAS information and experts worldwide[194] and, as awareness of the IAS impacts increases, a variety of initiatives are taken to tackle such problems. However, the disparate nature of the legislation/initiative leads to a heterogeneous approach which leaves considerable policy gaps and there is a rising awareness of the need to streamline national policies, by building upon existing tools, particularly when it comes to risk assessment, information sharing, early warning and rapid response. Moreover, there is increasing appreciation of the need to shift the emphasis away from long term management of IAS towards prevention.

5.3.2. Approaches across Member States

A. Prevent <u>intentional</u> introduction

Risk assessment is a key tool to underpin prioritisation and support decision making and it is also important in relation to underpinning inhibition of trade. Despite this, no Member State has a formal, legally-binding risk assessment framework in place and only 8 Member States have developed any risk assessment framework at all. These Member States use at least 4 different methodologies which are also widely divergent, some are short screening tools while others are comprehensive mechanisms (involving peer review and expert panels), some consider only environmental impacts (excluding economic and social impacts) while others do not cover all IAS taxa. The existing complex situation is likely to become even more complex and divergent as individual Member States develop further methodologies and, without and EU framework, there will be substantial waste of resources as many Member States will "re-invent the wheel".

To date 12 Member States have imposed import restrictions on IAS with between 1 and 136 species listed per Member States (overall 226 species are subject to prohibition on import in at least one Member State). These 12 Member States apply restrictions both on import from third countries and on intra-community trade, but comprehensive risk assessments are rarely

[193] Based on Sonigo *et al.* 2011 and feedback from Member States representatives that participated in the IAS Working groups.
[194] Hulme and Weser, 2011, Diversity and Distributions, 1-9.

applied to back up import restrictions. Only 3 of these Member States back up their import restrictions with any type of risk assessment.

11 Member States have restrictions on the sale of some IAS and again rarely are such restrictions backed by comprehensive risk assessments. Only 3 of these 11 Member States back their restrictions on sale with any type of risk assessment.

13 Member States also have restrictions on holding/keeping of IAS with between 1 and 136 species subject to restrictions per Member State.

B. Prevent unintentional introduction

No Member State has a comprehensive framework for prioritising pathways and managing risk on pathways, although frameworks for assessing risk on pathways and vectors are in development in a small number of Member States. There is a serious risk of divergent approaches in this complex area if these frameworks continue to develop in isolation. Contingency plans are a key tool in the prevention agenda of the plant and animal health regimes. However, only one Member State has a contingency plan in place for an IAS not yet present in its territory (and this is only for a single species).

C. Prevent intentional release into the environment

While most Member States do have a general prohibition on release of alien species into the environment, 8 Member States do not have any such prohibition. Of the Member States which do have this provision there is a bewildering array of different exceptions and few countries define precisely the environment and/or what release into the environment means. Liabilities related to release into the environment are often not well-defined in the legal instruments.

D. Early warning and rapid response

Information systems and information sharing

As regards centralised information systems on IAS, several Member States have relevant websites, often hosted by the national environmental agencies or ministries, but only a few Member States have a centralised dedicated website on IAS. Currently, some Member States cooperate and share information with some other European countries via a common platform: NOBANIS is an IAS joint-information system in place in 14 Member States in northern and central Europe, and in another 4 non-EU countries and the European part of Russia. The DAISIE database could also be a useful platform and repository of information and knowledge on IAS. After the conclusion of the project that created it, DAISIE has been updated in an ad hoc manner and based on the initiatives of individual experts only. It was however recently re-launched with updated information and the expert networks and data collected could provide a scientifically sound basis for the development of other further initiatives.

Early warning and alerts

Currently, no comprehensive early warning system for IAS, similar to that in Plant and Animal Health, exists for IAS in the EU. Indeed, recognising this gap, a recent EEA report stressed the needs for developing an EU-wide early-warning system to detect and react to

invasions[195]. Early-warning and alert measures for IAS are also generally missing at Member State level, whether in terms of targeted monitoring and surveillance or horizon scanning.

Rapid responses
Furthermore, virtually no Member States have any rapid response protocol or framework for rapid action. This is reflected in the paucity of rapid responses – only 8 Member States are carrying out (or have carried out) national rapid response eradications on IAS and these have involved only 14 IAS (5 Mammals, 2 Birds, 2 Amphibians, 2 Fish, 1 slug and 2 Plants). This is in stark contrast to the much greater effort expended by Member States on long-term control of species which involves 20 Member States and over 100 species (see point E below).

E. Eliminate, minimise or mitigate damage
Only 5 Member States are carrying out (or have carried out) large scale eradications on IAS where the objective is the complete elimination of the species from the Member State. The most ambitious of these is the ongoing eradication of the Ruddy Duck but even this has taken over 30 years and action is still lacking in many Member States.

In contrast most (20) Member States are carrying out control on species that is large scale and/or is being funded by government (national, regional, local). These Member States are controlling between 1 and 41 species each and in total approximately 110 species of IAS are involved.

5.3.3. The interplay between existing national measures and the measures proposed under the preferred option

The system envisaged aim to build upon existing actions at national level and the measures envisaged were designed drawing extensively on the experiences at Member States level as well as from third parties.

The proposed approach is focused on a single list of IAS of EU concern: Member States will have to apply a series of legal obligations to these species, namely: prohibit and prevent the import, sale, keeping, transport, release of the listed species. Member States will also have to alert the Commission and the other Member States if they see a listed IAS for the first time and proceed to rapid eradication. Finally, Member States will have to manage the listed species if they are well established in their territories.

Species listed as species of EU concern may also be listed in national lists, in that case listed species would be subject to EU rules as well as to national rules. As seen above, however, the majority of national rules adopt approaches that are mirrored in the proposed approach, e.g. bans on import, sale, possession. In other cases, listed species will not be listed by Member States and in this case the EU rules will need to be applied on the listed species.

The proposed approach goes beyond the list of species of EU concern in two aspects: the management of pathways of introduction and the release into the environment. In the first case, as discussed in section 4.4.2, there is hardly any initiative taken at Member States level to manage pathways of introduction beyond what is already mandated by other EU legislation. It is left however to the Member States to take stock of their national situation and

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define their priority pathways of introduction and devise ways of managing them. When it comes to release into the environment, if species are not listed as IAS of EU concern, but are considered risky by Member States, then only the requirement for the permit for release into the environment would apply in additional to national obligations. Table A5 summarises the interplay between the proposed measures and national legislation.

Table A5: interplay between the proposed measures and national measures

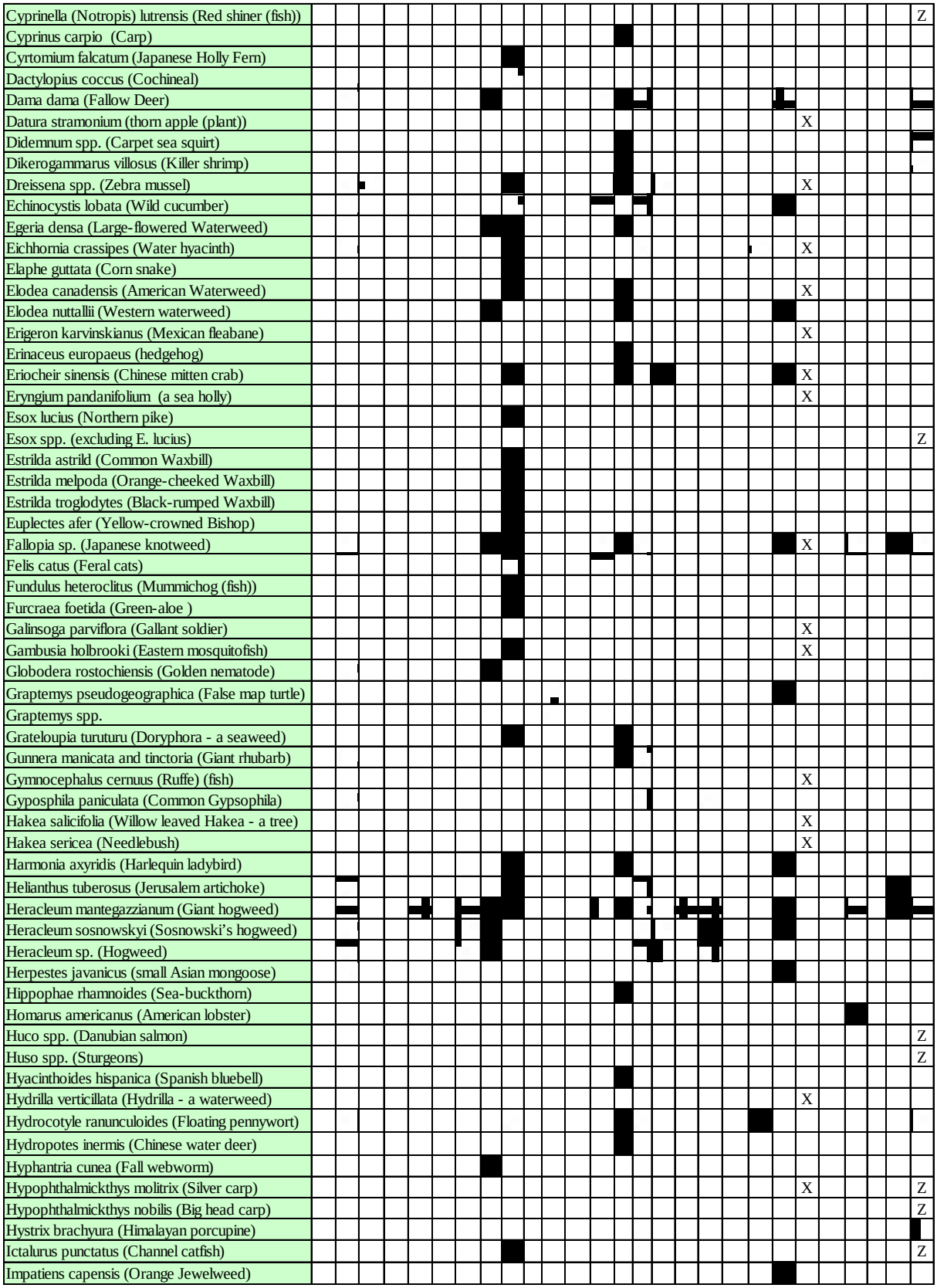
Operational objectives	**Measures of the preferred option**	**Interplay with national rules**
A - Prevent intentional introduction of IAS of EU concern into the EU	**A.2 - list of IAS of EU concern + emergency measures**	• EU listed species will be subject to import/sale/transport bans across the EU • If the same species were also listed in national lists, the EU rules plus the national rules would apply. In case of contradictions, EU law takes precedence. • 8 MS already have import restrictions and would not face an additional burden if the species they ban were on the EU list • Species listed in national lists, but not under the EU list, would only be subject to national rules. NB – national measures must be in line and compatible with trade and internal market rules.
B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	**B.2 - Member States manage major pathways, share information and Commission provides guidance**	• Obligations linked to pathway management are not linked to EU listed species • Efforts required of MS to address their priority pathways • Very little action taken at national level on managing pathways of introduction. Large flexibility given to Member States to devise measures to manage pathways, so any initiative already taken could continue unhindered by the proposed measures
C - Prevent intentional release of IAS into the environment	**C.2 – no release of IAS of EU concern + permitting system for IAS of Member State concern**	• EU listed species would be subject to a ban on release into the environment. • If the same species were also listed in national lists, the EU rules plus the national rules would apply. In case of contradictions, EU law takes precedence. • 19 MS have a general ban on release into the environment • Species listed in national lists, but not under the EU list, would be subject to a permit requirement in addition to national obligations. In case of contradictions, EU law takes precedence. • MS devise their own permitting system; the proposed measures therefore are not incompatible with existing permitting systems.
D – Alert and Rapid Response to prevent reproduction and spread of IAS of EU concern into the environment	**D.3 - obligation to quickly eradicate newly establishing IAS of EU concern and share information. Possibility of derogations.**	• EU listed species would be subject to rules on early warning and rapid response. • If the same species were also listed in national lists, the EU rules plus the national rules would apply. In case of contradictions, EU law takes precedence. • Species listed in national lists, but not under the EU list, would only be subject to national rules. • The proposed system of early warning is not incompatible with existing early warning or information sharing systems. • The rules on early eradication would not be incompatible with possible eradication rules at national level.
E - Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment	**E.2 - Member States eradicate, control or contain IAS of EU concern, share information and Commission provides guidance**	• EU listed species would be subject to rules on management if well established in Member States. • If the same species were also listed in national lists, the EU rules plus the national rules would apply. In case of contradictions, EU law takes precedence. • Species listed in national lists, but not under the EU list, would only be subject to national rules. • 20 MS are already carrying out long-term control of species. The

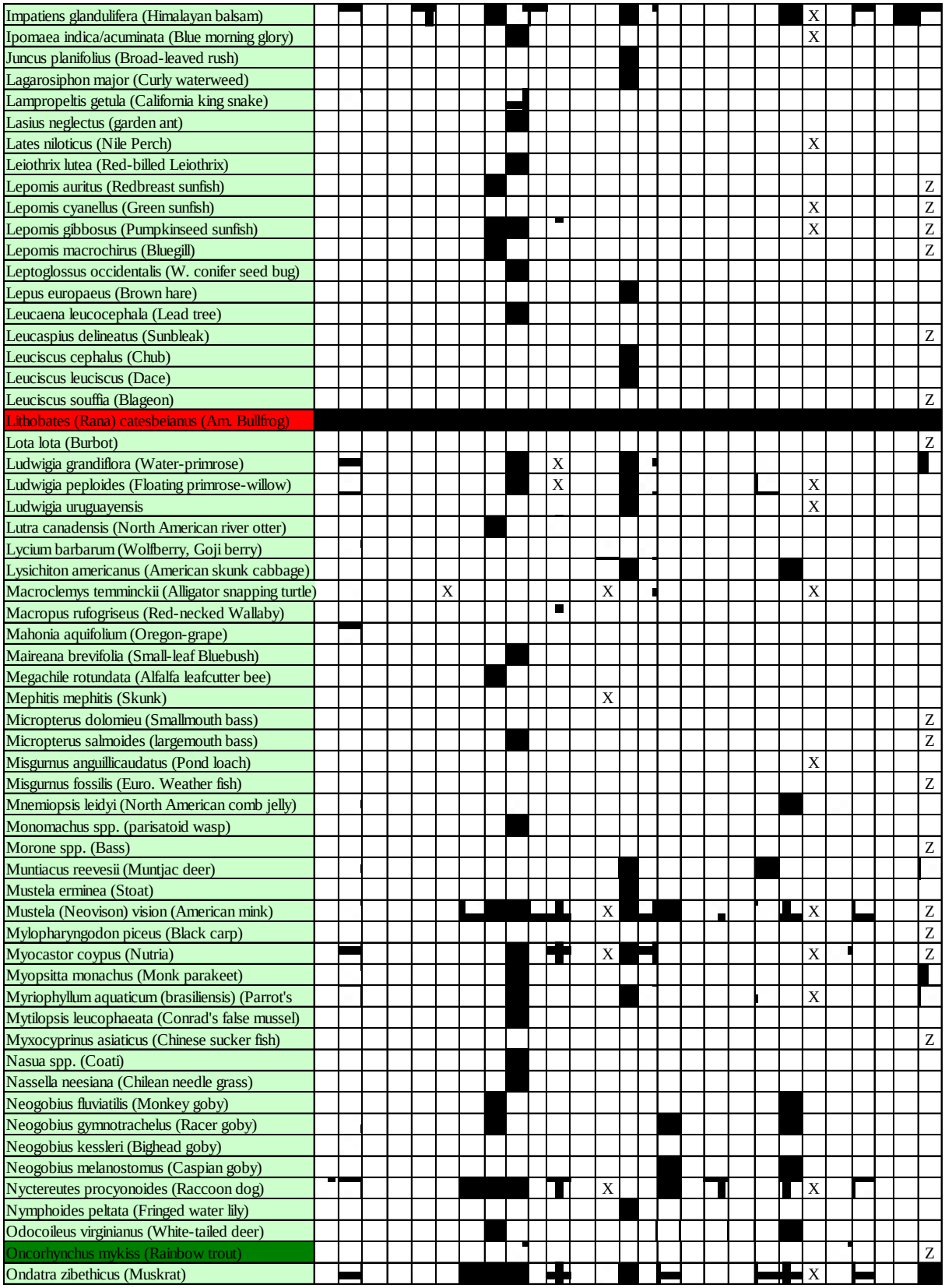
		proposed measures would not be incompatible with existing management efforts, given the flexibility given to MS to select the most appropriate management measures for the EU listed species.

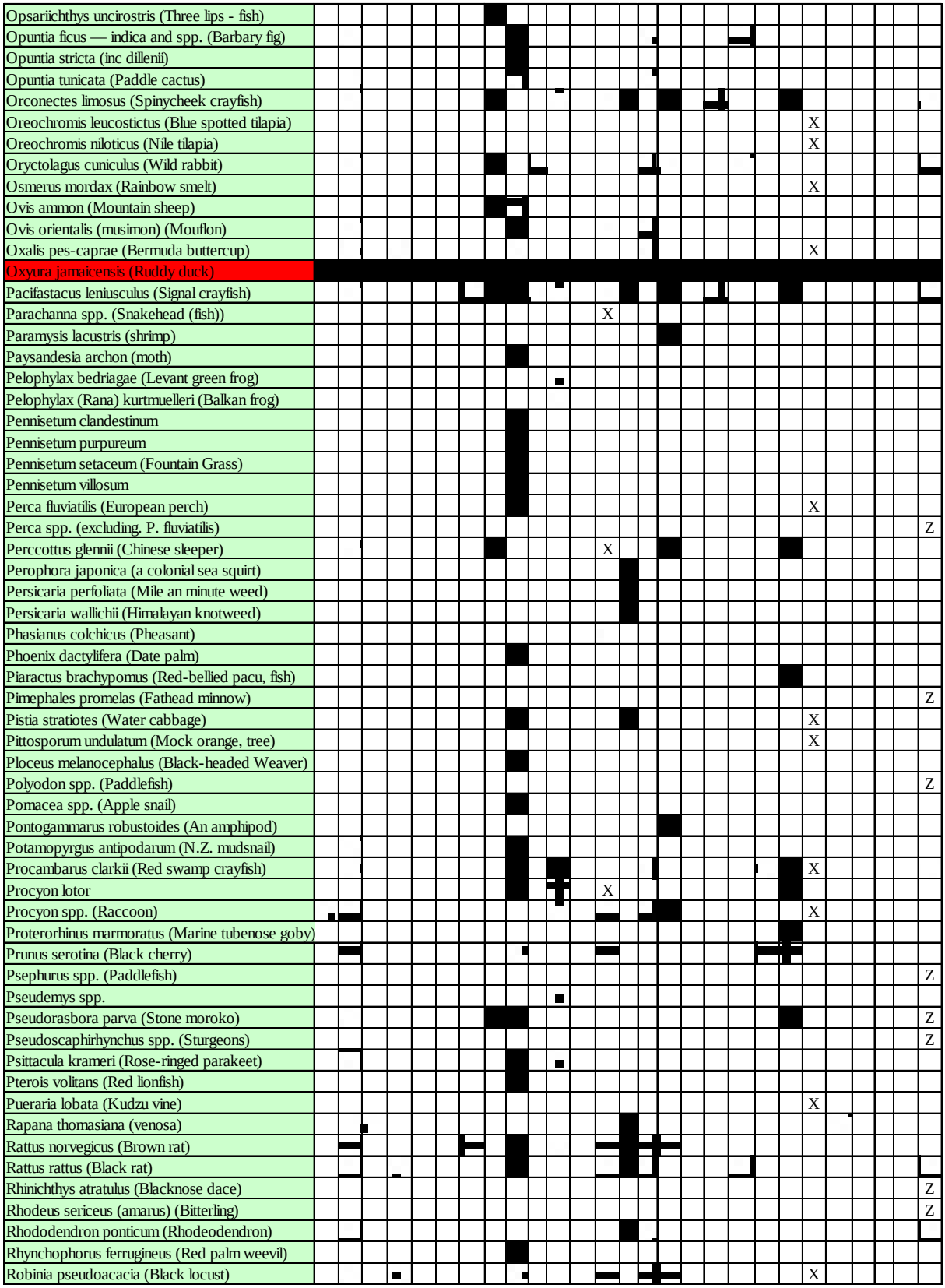
Table A6: Overview of measures on specific IAS in the EU-27: trade ban (black), sale ban (X), keeping ban (Z), eradication (vertical lines), management and control (grid) and other measures (dots)

IAS	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
Abramis ballerus (Blue bream)																											Z
Acacia dealbata (Silver Wattle)																						X					
Acacia farnesiana																						X					
Acacia karroo																						X					
Acacia longifolia																						X					
Acacia mearnsii																						X					
Acacia melanoxylon																						X					
Acacia pycnantha																						X					
Acacia retinodes																						X					
Acacia saligna = A. cyanophylla (Blue leaf wattler)																						X					
Acacia salicinia																											
Acer negundo/Negundo aceroides (Manitoba Maple)																											
Acer rufinerve (Redvein Maple)																											
Achatina fulica (East African land snail)																											
Acipenser spp. (Sturgeons)																											Z
Acridotheres tristis (Mynah)																											
Acroptilon repens (Russian Knapweed)																											
Aedes albopictus (Asian Tiger Mosquito)																											
Agave americana (Century plant)																											
Ageratina adenophora																											
Ageratina riparia (Mistflower)																											
Ailanthus altissima (Tree-of-heaven)																						X					
Alburnoides bipunctatus (Schneider (Fish))																											Z
Alburnus alburnus (Common bleak)																											
Allium triquetrum (Three cornered leek)																											
Alopochen aegyptiacus (Nile goose)																											
Alternanthera caracasana																						X					
Alternanthera herapungens																						X					
Alternanthera nodiflora																						X					
Alternanthera philoxeroides (Alligator weed)																						X					
Amandava amandava (Red Munia)																											
Ambloplites rupestris (Rock bass)																											Z
Ambrosia artemisiifolia (Common ragweed)																											
Ameiurus melas (Black bullhead)																											Z
Ameiurus nebulosus (Brown bullhead)																											Z
Ammotragus lervia (Barbary Sheep)																											
Amorpha fruticosa (Desert false indigo)																											
Anser anser (Greylag goose)																											
Araujia sericifera (Moth Plant)																											
Arion lusitanicus (Spanish slug)																											
Arctotheca calendula (Cape marigold)																						X					
Aponogeton distachyos (Cape pondweed)																											
Arundo donax (Giant cane)																											
Asclepias syriaca (Common Milkweed)																											
Asparagopsis armata (Red algae)																											
Asparagopsis taxiformis (Limu kohu)																											
Asparagus asparagoides (Bridal creeper)																											
Aspius aspius (Asp - fish)																											Z
Astacus leptodactylus (Narrow-clawed crayfish)																											
Aster novi-belgii agg. (New York aster)																											
Atlantoxerus getulus (Barbary ground squirrel)																											
Atriplex semilunaris (a plant)																											
Australoheros facetus (Chameleon cichlid)																											
Axis axis (Chital or cheetal)																											
Azolla caroliniana																						X					
Azolla filiculoides (Water Fern)																						X					
Baccharis halimifolia (Eastern Baccharis)																											
Balanus improvisus (Bay Barnacle)																											
Barbus spp. (Barbel)																											Z
Bidens frondosa (Devil's Beggarticks)																											

Bison bison (American bison)																									
Bombina orientalis (Oriental fire-bellied toad)												X													
Branta canadensis (Canada goose)																									
Buddleja davidii (summer lilac)																									
Bufo bufo (Common toad)																									
Bufo marinus (Cane Toad)																									
Bursaphelenchus xylophilus (Pine wood nematode)																									
Cabomba caroliniana (Green Cabomba)																									
Cactus dillenii (Erect Prickly Pear)																									
Callosciurus erythraeus (Pallas's squirrel)																									
Callosciurus erythraeus (Pallas's squirrel)																									
Callosciurus fynlaisonii (Finlayosn's squirrel)																									
Calotropis procera (Apple of Sodom)																									
Carassius auratus gibelio (Goldfish)																									
Capra hircus (Feral goat)																									
Caprella mutica (Japanese skeleton shrimp)																									
Capreolus capreolus (Roe deer)																									
Carcinus maenas (shore crab)																									
Carpobrotus acinaciformis (Sally-my-handsome)																									
Carpobrotus edulis and C. spp. (Iceplant)																				X					
Carpobrotus sp. pl. (Pigface or Ice plants)																									
Castor canadensis (North American beaver)					X						X									X					
Castor fiber (European beaver)																				X					
Catostomus commersoni (white sucker (fish))																									Z
Caulerpa racemosa (sea grapes)																									
Caulerpa taxifolia (Killer algae)																									
Ceratostoma inornatum (Asian oyster drill)																									
Cercopagis pengoi (fish hook waterflea)																									
Cervus canadensis (N. Amer. red deer, Wapiti)																									
Cervus elaphus sibiricus (Red deer)																									
Cervus nippon (Sika Deer)																									
Chalcalburnus chalcoides (Danube bleak)																									Z
Channa argus (Northern snakehead)												X													Z
Channa marulius (Great snakehead)												X													
Channa micropeltes (Giant snakehead)												X													
Chelydra serpentina (Common snapping turtle)					X							X								X					
Cherax destructor (Common yabby)																									
Chondrostoma nasus (Nase)																									Z
Chondrostoma toxostoma (French nase)																									Z
Chrosomus (Phoxinus) eos (N. Redbelly dace)																									Z
Chrosomus (Phoxinus) erythrogaster																									Z
Chrysemys picta (Painted turtle)																									
Clemmys spp.																									
Codium fragile (Green sea fingers)																									
Conyza bonariensis (Fleabane (plant))																				X					
Corbicula fluminea/fluminalis (Asiatic clam)																									
Cordylophora caspia (freshwater hydroid)																									
Coregonus spp. (Whitefish)																									Z
Cortaderia selloana (Pampas grass)																									
Corvus splendens (Indian house crow)																									
Cotoneaster horizontalis (Rockspray cotoneaster)																									
Cotula coronopifolia (Button weed)																									
Coturnix japonica (Japanese Quail)																									
Crassostrea gigas (Pacific oyster)																									
Crassula helmsii (Australian swamp stonecrop)																									
Crepidula fornicata (Slipper limpet)																									
Ctenopharyngodon idella (Grass carp)																									Z
Cyclepyus elongatus (Blue sucker(fish))																									Z
Cygnus atratus (Black Swan)																									
Cylindropuntia tunicata (a cactus)																									


Cyprinella (Notropis) lutrensis (Red shiner (fish))
Cyprinus carpio (Carp)
Cyrtomium falcatum (Japanese Holly Fern)
Dactylopius coccus (Cochineal)
Dama dama (Fallow Deer)
Datura stramonium (thorn apple (plant))
Didemnum spp. (Carpet sea squirt)
Dikerogammarus villosus (Killer shrimp)
Dreissena spp. (Zebra mussel)
Echinocystis lobata (Wild cucumber)
Egeria densa (Large-flowered Waterweed)
Eichhornia crassipes (Water hyacinth)
Elaphe guttata (Corn snake)
Elodea canadensis (American Waterweed)
Elodea nuttallii (Western waterweed)
Erigeron karvinskianus (Mexican fleabane)
Erinaceus europaeus (hedgehog)
Eriocheir sinensis (Chinese mitten crab)
Eryngium pandanifolium (a sea holly)
Esox lucius (Northern pike)
Esox spp. (excluding E. lucius)
Estrilda astrild (Common Waxbill)
Estrilda melpoda (Orange-cheeked Waxbill)
Estrilda troglodytes (Black-rumped Waxbill)
Euplectes afer (Yellow-crowned Bishop)
Fallopia sp. (Japanese knotweed)
Felis catus (Feral cats)
Fundulus heteroclitus (Mummichog (fish))
Furcraea foetida (Green-aloe)
Galinsoga parviflora (Gallant soldier)
Gambusia holbrooki (Eastern mosquitofish)
Globodera rostochiensis (Golden nematode)
Graptemys pseudogeographica (False map turtle)
Graptemys spp.
Grateloupia turuturu (Doryphora - a seaweed)
Gunnera manicata and tinctoria (Giant rhubarb)
Gymnocephalus cernuus (Ruffe) (fish)
Gyposphila paniculata (Common Gypsophila)
Hakea salicifolia (Willow leaved Hakea - a tree)
Hakea sericea (Needlebush)
Harmonia axyridis (Harlequin ladybird)
Helianthus tuberosus (Jerusalem artichoke)
Heracleum mantegazzianum (Giant hogweed)
Heracleum sosnowskyi (Sosnowski's hogweed)
Heracleum sp. (Hogweed)
Herpestes javanicus (small Asian mongoose)
Hippophae rhamnoides (Sea-buckthorn)
Homarus americanus (American lobster)
Huco spp. (Danubian salmon)
Huso spp. (Sturgeons)
Hyacinthoides hispanica (Spanish bluebell)
Hydrilla verticillata (Hydrilla - a waterweed)
Hydrocotyle ranunculoides (Floating pennywort)
Hydropotes inermis (Chinese water deer)
Hyphantria cunea (Fall webworm)
Hypophthalmickthys molitrix (Silver carp)
Hypophthalmickthys nobilis (Big head carp)
Hystrix brachyura (Himalayan porcupine)
Ictalurus punctatus (Channel catfish)
Impatiens capensis (Orange Jewelweed)


Impatiens glandulifera (Himalayan balsam)
Ipomaea indica/acuminata (Blue morning glory)
Juncus planifolius (Broad-leaved rush)
Lagarosiphon major (Curly waterweed)
Lampropeltis getula (California king snake)
Lasius neglectus (garden ant)
Lates niloticus (Nile Perch)
Leiothrix lutea (Red-billed Leiothrix)
Lepomis auritus (Redbreast sunfish)
Lepomis cyanellus (Green sunfish)
Lepomis gibbosus (Pumpkinseed sunfish)
Lepomis macrochirus (Bluegill)
Leptoglossus occidentalis (W. conifer seed bug)
Lepus europaeus (Brown hare)
Leucaena leucocephala (Lead tree)
Leucaspius delineatus (Sunbleak)
Leuciscus cephalus (Chub)
Leuciscus leuciscus (Dace)
Leuciscus souffia (Blageon)
Lithobates (Rana) catesbeianus (Am. Bullfrog)
Lota lota (Burbot)
Ludwigia grandiflora (Water-primrose)
Ludwigia peploides (Floating primrose-willow)
Ludwigia uruguayensis
Lutra canadensis (North American river otter)
Lycium barbarum (Wolfberry, Goji berry)
Lysichiton americanus (American skunk cabbage)
Macroclemys temminckii (Alligator snapping turtle)
Macropus rufogriseus (Red-necked Wallaby)
Mahonia aquifolium (Oregon-grape)
Maireana brevifolia (Small-leaf Bluebush)
Megachile rotundata (Alfalfa leafcutter bee)
Mephitis mephitis (Skunk)
Micropterus dolomieu (Smallmouth bass)
Micropterus salmoides (largemouth bass)
Misgurnus anguillicaudatus (Pond loach)
Misgurnus fossilis (Euro. Weather fish)
Mnemiopsis leidyi (North American comb jelly)
Monomachus spp. (parisatoid wasp)
Morone spp. (Bass)
Muntiacus reevesii (Muntjac deer)
Mustela erminea (Stoat)
Mustela (Neovison) vision (American mink)
Mylopharyngodon piceus (Black carp)
Myocastor coypus (Nutria)
Myopsitta monachus (Monk parakeet)
Myriophyllum aquaticum (brasiliensis) (Parrot's
Mytilopsis leucophaeata (Conrad's false mussel)
Myxocyprinus asiaticus (Chinese sucker fish)
Nasua spp. (Coati)
Nassella neesiana (Chilean needle grass)
Neogobius fluviatilis (Monkey goby)
Neogobius gymnotrachelus (Racer goby)
Neogobius kessleri (Bighead goby)
Neogobius melanostomus (Caspian goby)
Nyctereutes procyonoides (Raccoon dog)
Nymphoides peltata (Fringed water lily)
Odocoileus virginianus (White-tailed deer)
Oncorhynchus mykiss (Rainbow trout)
Ondatra zibethicus (Muskrat)


Opsariichthys uncirostris (Three lips - fish)
Opuntia ficus — indica and spp. (Barbary fig)
Opuntia stricta (inc dillenii)
Opuntia tunicata (Paddle cactus)
Orconectes limosus (Spinycheek crayfish)
Oreochromis leucostictus (Blue spotted tilapia)
Oreochromis niloticus (Nile tilapia)
Oryctolagus cuniculus (Wild rabbit)
Osmerus mordax (Rainbow smelt)
Ovis ammon (Mountain sheep)
Ovis orientalis (musimon) (Mouflon)
Oxalis pes-caprae (Bermuda buttercup)
Oxyura jamaicensis (Ruddy duck)
Pacifastacus leniusculus (Signal crayfish)
Parachanna spp. (Snakehead (fish))
Paramysis lacustris (shrimp)
Paysandesia archon (moth)
Pelophylax bedriagae (Levant green frog)
Pelophylax (Rana) kurtmuelleri (Balkan frog)
Pennisetum clandestinum
Pennisetum purpureum
Pennisetum setaceum (Fountain Grass)
Pennisetum villosum
Perca fluviatilis (European perch)
Perca spp. (excluding. P. fluviatilis)
Perccottus glenii (Chinese sleeper)
Perophora japonica (a colonial sea squirt)
Persicaria perfoliata (Mile an minute weed)
Persicaria wallichii (Himalayan knotweed)
Phasianus colchicus (Pheasant)
Phoenix dactylifera (Date palm)
Piaractus brachypomus (Red-bellied pacu, fish)
Pimephales promelas (Fathead minnow)
Pistia stratiotes (Water cabbage)
Pittosporum undulatum (Mock orange, tree)
Ploceus melanocephalus (Black-headed Weaver)
Polyodon spp. (Paddlefish)
Pomacea spp. (Apple snail)
Pontogammarus robustoides (An amphipod)
Potamopyrgus antipodarum (N.Z. mudsnail)
Procambarus clarkii (Red swamp crayfish)
Procyon lotor
Procyon spp. (Raccoon)
Proterorhinus marmoratus (Marine tubenose goby)
Prunus serotina (Black cherry)
Psephurus spp. (Paddlefish)
Pseudemys spp.
Pseudorasbora parva (Stone moroko)
Pseudoscaphirhynchus spp. (Sturgeons)
Psittacula krameri (Rose-ringed parakeet)
Pterois volitans (Red lionfish)
Pueraria lobata (Kudzu vine)
Rapana thomasiana (venosa)
Rattus norvegicus (Brown rat)
Rattus rattus (Black rat)
Rhinichthys atratulus (Blacknose dace)
Rhodeus sericeus (amarus) (Bitterling)
Rhododendron ponticum (Rhodeodendron)
Rhynchophorus ferrugineus (Red palm weevil)
Robinia pseudoacacia (Black locust)

Rosa rugosa (Japanese rose)																										
Rousettus aegyptiacus (Flying fox (bat))																										
Rubus spectabilis (Salmonberry)																										
Rudbeckia laciniata (Cutleaf)																										
Ruditapes philippinarum (Manila clam)																										
Rutilus rutilus (Common Roach)																										
Sagittaria latifolia (Broadleaf arrowhead)																				X						
Salvelinus fontinalis (Brook trout)																										Z
Salvinia molesta																										
Salvinia Spp.																										
Salmo marmoratus (Marbled trout)																										Z
Salmo salar (non-anadromous types)																										Z
Sander lucioperca (Zander)																				X						Z
Sargassum muticum (Wire weed)																										
Scaphirhynchus spp. (Sturgeons)																										Z
Sciurus carolinensis (Eastern grey squirrel)																										
Sciurus lis (Japanese squirrel)												X														
Sciurus niger (Eastern fox squirrel)																										
Senecio bicolor (Silver Ragwort)																				X						
Senecio inaequidens																				X						
Silurus glanis (Wels catfish)																				X						Z
Sinanodonta woodiana (Chinese pond mussel)																										
Solidago canadensis (Goldenrod)																										
Solidago gigantea (Late goldenrod)																										
Spartina alterniflora (Smooth Cordgrass)																										
Spartina anglica (Common cord-grass)																										
Spartina densiflora (Dense-flowered cordgrass)																				X						
Spartina patens (Saltmeadow cordgrass)																										
Spiraea spp.																										
Stizostedion vitreum (Sander vitreus) Walleye																				X						
Streptopelia roseogrisea (African Collared Dove)																										
Strix aluco (Tawny owl)																										
Styela clava (Stalked sea squirt)																										
Stypopodium schimperi (a Brown alga)																										
Sus scrofa (wild boar)																										
Sylvilagus floridanus (Eastern cottontail rabbit)																										
Tamias sibiricus (Siberian chipmunk)																										
Tamiasciurus hudsonicus (Amer. Red squirrel)												X														
Threskiornis aethiopicus (Sacred ibis)																										
Thysanoptera (Thrips, thunderflies)																										
Tilapia zilli (melanopleura) (a cichlid fish)																				X						
Trachemys scripta (Common slider)																										
Trachemys scripta elegans (Red-eared slider)																										
Tradescantia fluminensis (River Spiderwort)																				X						
Trapa natans (water chestnut)																										
Trichosurus vulpecula (Brush tailed possum)																										
Triops longicaudatus (longtail tadpole shrimp)																										
Ulex europaeus (Common Gorse)																										
Umbra krameri (European mudminnow)																										Z
Umbra pygmaea (Eastern mudminnow)																										Z
Undaria pinnatifida (Wakame)																										
Urosalpinx cinerea (American oyster drill)																										
Vespa velutina (Asian Hornet)																										
Vimba vimba (Vimba (fish))																										Z
Vulpes vulpes (Fox)																										
Xenopus laevis (African clawed frog)																										
Zacco platypus (Dragon fish)																										Z
Zostera japonica (Dwarf eelgrass)																										

6. ANNEX VI: SCREENING OF LEGISLATIVE SUB-OPTIONS

When it comes to the legislative measures, it was necessary to examine the different objectives so as to be able to select the most appropriate level of ambition and EU intervention to ensure effectiveness, while balancing costs and benefits. Based on the suggestions expressed during the consultations, three different sub-options were identified for each operational objective, reflecting the different types or levels of intervention that are possible. An initial quick screening exercise led to the discarding of the sub-options that were considered unfeasible or simply not as effective as others, with feasible and effective sub-options retained for further analysis.

This is described below and summarised in table A7.

Operational objective A - Prevent the intentional introduction of IAS of EU concern into the EU through trade, marketing and transport. Three sub-options have been identified to prevent the intentional introduction into the EU of invasive alien species:

A1: a list of IAS of EU concern could be developed. This list would include alien species proven to be invasive by risk assessment. These species would be banned from trade, marketing and transport. Unlisted alien species would face no such ban. Example: EU Wildlife Trade Regulation.

A2: a list of IAS of EU concern could be developed as in A1, but the possibility to establish emergency measures would be introduced to address alien species not yet listed but for which there may be evidence of invasiveness. This would be temporary measures allowing to, for example, ban trade while a risk assessment is being performed in view of potential listing on the EU list. Example: EU Plant health regime.

A3: an EU-list of approved alien species could be developed, where only alien species proven not to be invasive by risk-assessment are allowed to be traded, marketed or transported. Unlisted species would not be allowed unless proven safe. Example: EU Biocides regulation.

While being attractive for its simplicity, **sub-option A1 was discarded** as it was not considered to be sufficiently effective in reaching the overall objective of prevention: by allowing unlisted species to be brought into the EU without the possibility for emergency measures, it would eliminate the possibility of a rapid response during the early stages of invasion, when costs could be contained. Emergency measures have proven successful within the plant and animal health regime and it would be a missed opportunity not to include this mechanism. **Sub-option A3** would be the most precautionary and most effective approach and as such it was the preferred option of some animal welfare and nature conservation organisations consulted, as well as of 24 % of the respondents in the 2012 public consultation (Section 2.1.1 of Annex II). This approach is implemented in some countries, like New Zealand. However, it was **discarded** because it would be **disproportionate** and **extremely costly** to develop such a system at the European level given the intensity of trade relations and the porous borders with several entry points of the EU. Under this option no alien species would be allowed for trade unless proven safe, implying that a large number of species that are currently traded as well as new species entering the market would first need to be risk assessed. Considerable investment of resources would be needed to develop all the necessary risk assessments, in terms of money, human resources and time. Considering that large numbers of alien species are traded – e.g. more than an estimated 6000 pet species are currently traded in Europe, and the number of traded horticultural species is likely to be

significantly larger (e.g. there are at least 55,000 woody plants and perennials available for sale[196]) – having to prepare risk assessments for every traded species or for any new species to be brought onto the market would entail a major disruption to trade as it would take years to develop those risk assessments and trade would put on hold for the time being. This would represent a considerable opportunity cost for traders which would be unable to trade those species for a prolonged period of time. . The lack of proportionality was also stressed by a large number of stakeholders consulted, including pet traders, hunters, sustainable use and landowners' organisations, who found the idea of a list of IAS of EU concern as more manageable. Of the three sub-options only **sub-option A2 was retained**. 58% of the respondents of the 2012 public consultation were in favour of a list of banned species (See section 2.1.1 of Annex II).

Operational objective B - Prevent the unintentional introduction into the EU and unintentional release (escape) in the environment of IAS by addressing the pathways. There would be a legal obligation to tackle the pathways of unintentional introduction and unintentional release (escape) of IAS. The three sub-options identified relate mainly to the level of EU-level centralisation or decentralisation of the system:

B1: the decision on which measures should be taken to manage the pathways is left entirely to the Member States

B2: Member States can decide what measures to take to tackle pathways, but have an obligation to share information with the Commission, which may provide advice.

B3: Member States draw up measures to tackle pathways but need to have these measures approved by the Commission.

Sub-option B1 was discarded for **not being as effective as B2**. Indeed despite the legal obligation to manage pathways, it would give no indication or obligation to inform the Commission of the measures taken, thus maintaining the current fragmented approach, effectively the status quo or the baseline. As the number of introductions of IAS is increasing and the proportion of unintentional introductions is increasing as well, tackling pathways will become increasingly important in the future. Moreover, as pathways often cross borders, this option would miss the chance to work towards a more coordinated EU-approach. This lack of coordination would be corrected by **sub-option B3**, which requires the formal approval of the Commission and would thus ensure coordination. However, sub-option B3 was discarded because of its **disproportionate administrative burden** on both the Commission and on Member States. A formal approval system would imply that the Commission supervise and approve all management measures which may be diverse across the EU: this would entail staff time, expertise required as well as management of the process. Also Member States would face a burden as they would be required to seek approval for each measure planned. Member States would need to wait for formal approval from the Commission, which could entail delays and in general a slower, less nimble procedure with consequent administrative costs.Pathway management is new in the EU and Member States should be encouraged to explore mechanisms to address pathways. Adding such layer of administrative burden may act as a deterrent to action leading to a **loss of effectiveness**. Of the three sub-options **only sub-option B2 was retained**. In this option, the Commission may provide advice wherever appropriate, thus including a chance for coordination without adding a disproportionate administrative burden. Within the animal and plant health regimes, pathway management is organised at the European level.

[196] http://www.alterias.be/en/list-of-invasive-and-alternative-plants/alternative-plants

Operational objective C - Prevent intentional release of IAS into the environment.

Three sub-options have been identified to prevent the intentional release of invasive alien species into the environment:

C1: The species on the list of IAS of EU concern (sub-option A2) would also be banned from release into the environment. Unlisted alien species would face no such ban.

C2: The species on the list of IAS of EU concern (sub-option A2) would also entail a ban on release into the environment. Unlisted species, however, could be considered of Member States concern and placed on a national catalogue by Member States, which would establish a permitting system for the release of those species in the environment.

C3: An additional EU-list of alien species approved for release could be developed (EU-list of species approved for release), and only those alien species not yet present that are proven (by risk-assessment) to be non-invasive would be allowed to be released in the environment.

All of the three options described here were considered to be effective, to a greater or lesser degree, in preventing the intentional release of IAS into the environment. During the consultations there was an agreement that release of IAS into the environment should be restricted (94% of respondents to 2012 public consultation, see section 2.1.1 in Annex II), but views diverged as regards the precautionary approach towards the release of alien species. 69.34% of the respondents to the 2012 consultation indicated that any release into the environment should only be allowed if proven harmless or after obtaining a permit. Pet traders stressed the importance to focus on restricting release into the environment (i.e. importance of objective C), minimising the need of a list of IAS of EU concern that would affect trade (objective A), thus favouring a more precautionary approach on release in the environment. The forestry and the renewable energy sector, on the other hand, were not in favour of permitting requirements or other restrictions to release into the environment, worried that this would entail a lack of flexibility when it comes to introducing new species for example for climate change adaptation or for biomass production. They prefer more emphasis on risk based restrictions to trade/marketing/transport (i.e. favouring C1). Another element to be taken into consideration is that Regulation 708/2007 on the use of alien species in aquaculture adopted the approach of developing a list of species allowed to be released (approach similar to C3). Given the above elements and given that all three sub-options were considered to be effective in preventing the intentional release of IAS into the environment, **no sub-option was discarded** at this stage.

Operational objective D - Early Warning and Rapid Response to prevent the reproduction and spread of IAS of EU concern. The possibility of eliminating IAS from the environment before they start reproducing and spreading needs a solid early warning and alert system. The legislative option would include a notification obligation for Member States to be distributed to all other Member States. When it comes to the type of rapid response that detection and notification of a species on the list of IAS of EU concern would trigger, the following options were identified:

D1: The decision on what rapid response measures should be taken is left entirely to the Member States.

D2: Member States would have an obligation to rapidly act when a newly establishing IAS of EU concern is found in the environment and they may select the most appropriate

course of action to eradicate, contain or control the species. Member States would be required to notify the measures taken to the Commission, which may provide advice.

D3: Member States would have an obligation to rapidly eradicate newly establishing IAS of EU concern detected in the environment. In cases where eradication is unfeasible or no longer possible, Member States could decide to take other measures (containment and/or control). Member States should notify such proposed measures to the Commission and get approval for them before they can derogate from the rapid eradication obligation.

Sub-option D1 was discarded because it was **not considered as effective as sub-option D2**, because of missing chances for coordinated action and effectively maintaining the current fragmented approach (similar to sub-option B1). **Sub-options D2 and D3 were retained** as they were both considered effective, to a greater or lesser extent, to meet the objective of preventing the reproduction and spread of IAS. During the consultations, Member States representatives stressed that an unconditional eradication obligation would entail disproportionate costs. However, other organisations, while recognising that an unconditional eradication obligation may not be practicable, called for eradication to be considered the preferred options wherever possible.

Operational objective E - Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment. There would be a legal obligation to manage the established species, if listed on the list of IAS of EU concern, in order to eliminate, minimise or mitigate their negative impacts. The three sub-options identified relate mainly to the level of EU-level centralisation or decentralisation of the system:

E1: The decision on which measures should be taken to manage established IAS of EU concern is left entirely to the Member States.

E2: Member States can decide what measures to take to manage established IAS of EU concern, but have an obligation to share information with the Commission, which may provide advice.

E3: Member States draw up measures to manage established IAS of EU concern but need to have these measures approved by the Commission.

Sub-option E1 was discarded for not being as effective as sub-option E2. It would miss the chance of coordinated action and effectively maintaining the current fragmented approach and the status-quo (similar to sub-options B1 and D1). This would be corrected by **sub-option E3**, which requires the approval of the management measures by the Commission and would thus ensure a level of coordination, although leading to a **disproportionate administrative burden** on both the Commission and on Member States (similar to sub-option B3). A formal approval procedure would requires resources for the Commission to examine all measures proposed and it would place a burden on Member States that would need to submit detailed plans to the Commission to explain the measures taken. Member States would then need to wait for formal approavl before enacting the proposed measures, thus causing delays in tackling IAS where quick action is often of essence. This was confirmed by the feedback received during the consultations preceding the preparation of this Impact Assessment where Member States representatives considered requiring EU-approval for management as disproportionate and not respecting subsidiarity, but recognised the need of a level of EU intervention to ensure that management measures are taken in a timely fashion and to ensure coordinated action and streamlined efforts at EU level. Of the three sub-options **only sub-option E2 was retained**.

Retained sub-options

To summarise, only 8 of the 15 sub-options described were retained for further analysis (Table A7). The retained sub-options are the following: A2, B2, C1, C2, C3, D2, D3 and E2.

Table A7: Five operational objectives with three levels of intervention each: retained (grey) and discarded (white) sub-options

Objective	**Level of ambition and/or EU intervention**		
Operational objective A - Prevent intentional introduction of IAS of EU concern into the EU	A.1 – list of IAS of EU concern Example: EU Wildlife Trade Regulation	A.2 - list of IAS of EU concern + emergency measures Example: EU Plant health regime	A.3 – all alien species considered to be potentially of EU concern, unless included in an EU list of approved alien species Example: EU Regulation on biocidal products
Operational objective B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment	B.1 - Member States manage major pathways	B.2 - Member States manage major pathways, share information and Commission provides guidance	B.3 - Member States manage major pathways, share information and require approval from the Commission
Operational objective C - Prevent intentional release of IAS into the environment	C.1 - IAS of EU concern cannot be released into the environment.	C.2 – no release of IAS of EU concern + permitting system for IAS of Member State concern included in national catalogues	C.3 – no release of any alien species unless included in an EU list of species approved for release into the environment Example: Regulation on alien species in aquaculture
Operational objective D - Early Warning and Rapid Response to prevent reproduction and spread of IAS of EU concern into the environment	D.1 - Member States eradicate, control or contain the IAS of EU concern, no EU intervention	D.2 - Member States rapidly eradicate, control or contain newly establishing IAS of EU concern, share information and Commission provides guidance	D.3 - Member States rapidly eradicate newly establishing IAS of EU concern, share information and require approval from the Commission if they want to resort to control or containment
Operational objective E - Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment	E.1 - Member States eradicate, control or contain the IAS of EU concern, no EU intervention	E.2 - Member States eradicate, control or contain IAS of EU concern, share information and Commission provides guidance	E.3 - Member States eradicate, control or contain IAS of EU concern, share information and require approval from the Commission for the measures envisaged

7. ANNEX VII: ANALYSIS OF COSTS AND BENEFITS OF THE PROPOSED MEASURES

This Annex provides more details on the costs and benefits of the retained sub-options compared to the baseline option (Table A8). The distributional impacts of legislative action on IAS are also briefly discussed.

The retained sub-options were combined in a basic legislative instrument, representing the minimum level of EU intervention, including components A2, B2, C1, D2 and E2 (see Table A8). However, each component has been examined individually and the impacts of the two implementing mechanisms – a standing committee and a centralised information system – were included in the discussion.

When it comes to **release into the environment** (operational objective C) the basic legislative instrument could be made more stringent, by increasing its ambition and strengthening the level of EU intervention:

- either by introducing provisions on permits for release of IAS of Member State concern (add-on C2)
- or by introducing an EU list of species approved for release (add-on C3)

When it comes to **early warning and rapid response** (operational objective D), the basic legislative instrument could be made more stringent and ambitious with a higher level of EU intervention:

- by introducing the obligation for Member States to eradicate newly establishing IAS, unless a derogation was granted by the Commission (alternative action D3)

These three more ambitious elements described were also analysed but separately.

Table A8: Sub-options retained after initial screening and for which the in depth analysis will follow (basic legislative instrument in grey, optional add-ons in white):

Objective	**Level of ambition and/or EU intervention**		
Operational objective A - Prevent intentional introduction of IAS of EU concern into the EU		A.2 - list of IAS of EU concern + emergency measures Example: EU Plant health regime	
Operational objective B - Prevent unintentional introduction of IAS into the EU and unintentional release into the environment		B.2 - Member States manage major pathways, share information and Commission provides guidance	
Operational objective C - Prevent intentional release of IAS into the environment	C.1 - IAS of EU concern cannot be released into the environment.	C.2 – no release of IAS of EU concern + permitting system for IAS of Member State concern included in national catalogues	C.3 – no release of any alien species unless included in an EU list of species approved for release into the environment Example: Regulation on alien species in aquaculture
Operational objective D - Early Warning and Rapid Response to prevent reproduction and spread		D.2 - Member States rapidly eradicate, control or contain newly establishing IAS of EU	D.3 - Member States rapidly eradicate newly establishing IAS of EU concern, share

of IAS of EU concern into the environment		concern, share information and Commission provides guidance	information and require approval from the Commission if they want to resort to control or containment
Operational objective E - Eliminate, minimise or mitigate damage by managing IAS of EU concern established in the environment		E.2 - Member States eradicate, control or contain IAS of EU concern, share information and Commission provides guidance	

The analysis of the costs and benefits of the different components has encountered several difficulties:

- It is not possible to predict how many and what sort of invasions will need to be tackled
- It is not possible to predict which invasive alien species will establish, invade and require management
- It is not possible to predict the damage they will cause over the years to come.
- It is not yet known which and how many species will be listed as IAS of EU concern.

To overcome some of these difficulties for the analysis, the SEBI-list of IAS[197] was used as a reference. This should in not be interpreted as an indication that the SEBI-list will be adopted as list of IAS of EU concern, but rather as an exercise to make the assessment of the impacts more concrete. The SEBI-list contains 167 IAS threatening biodiversity in Europe, recognised as being particularly harmful.

The assessment would have been facilitated had more data been available, but until recently, large-scale and comprehensive economic studies on IAS in general have been rare[198]: it has often been necessary to reply on studies focusing on specific IAS.

7.1. Distributional impacts

7.1.1. Member States

Invasive alien species can be plants, animals or other organisms, belonging to any taxon. This diverse group will have different impacts and consequences depending on several environmental and ecological factors. This means that while many IAS are causing impacts EU-wide, other species are only problematic in certain regions, or under certain ecological and climatic conditions, creating a complex mosaic in the EU.

Because of the complexity of the picture and the impossibility to predict how many new invasions may occur in time, it is impossible to quantify the exact nature of the distributional impacts in the EU. At any given moment, a certain IAS may affect certain Member States more than it does others, but in other cases other Member States would be affected by a different IAS. So if we consider a single IAS, the impacts will be different in different areas, but if we consider the problem has a whole, i.e. all of the IAS that are established and spread or that may invade in the future, all Member States will be affected albeit perhaps in different moments, and by different species. It can be assumed that countries with higher trade volumes and numerous entry points are likely to suffer more introductions of IAS. It is not

[197] SEBI-list: list of 167 IAS threatening biodiversity in Europe, recognised as being particularly harmful in Europe, across ecosystems and major taxonomic groups produced in the framework of SEBI (Streamlining European Biodiversity Indicators), see http://www.eea.europa.eu/publications/technical_report_2007_11

[198] Scalera, 2010

possible to ascertain the magnitude or concentration of intra-EU movements as there are no internal checks for commodities or monitoring of aliens species moving in the wild across the borders. Overall, therefore, it was found that given the variety of distributional impacts that characterise this issue, it was not possible to note particularly strong imbalances between different regions or Member States. It is also to be considered that where countries may suffer more from certain species, they will face a larger burden in terms of action to be taken, but would also be the ones benefitting more from an EU approach to the issue.

Certain species are problematic in warmer areas of the EU and cannot establish or spread in such a way to cause a problem in northern parts of the EU, such as the prickly pear cactus, the silver wattle, the Asian tiger mosquito. On the other hand other species are problematic in northern Europe, but not for countries in southern Europe protected by ecological barriers, such as the Alps or the Pyrenees, such as the giant hogweed.

Furthermore, islands are likely to be more vulnerable to invasive alien species due to their small size, isolated evolution and fragility. Species whose impact may be mitigated in the mainland may exert enormous pressure on native species on islands.

As regards the impact of the proposed legislation, Member States will be at times victims of an invasion and would benefit from action taken by other Member States. However, in other occasions, the same Member States may be called to take actions for the benefit of other Member States. Besides the geographic and climatic conditions, the impacts of legislation will also vary depending on the nature and structure of Member States' economies and businesses.

Depending on what species will be considered as IAS of EU concern, some sectors may be impacted negatively or, on the contrary benefit, from the proposed measures. Assuming that an IAS important for the horticultural sector were banned from the EU, this would have more of an impact in countries with a thriving horticultural sector. On the contrary certain countries may benefit from EU action on certain IAS: assuming that one IAS very detrimental to the forestry sector were banned, then the benefit would be felt particularly strongly by those Member States with a stronger forestry sector.

It was therefore impossible to detect any particularly strong imbalances in the burden, or in the benefits, that the proposed measures would bring about.

7.1.2. SMEs and microenterprises

IAS affect businesses, including SMEs and micro enterprises.

In particular, primary producers in agriculture, animal husbandry, fisheries, aquaculture and forestry are often affected by IAS and suffer considerable economic damage. For example, coypu causes crop losses and disruption to irrigation systems to agricultural crops, while black cherry negatively impacts forestry by hindering the natural regeneration of trees and impeding forest management measures. Businesses linked to tourism and recreational activities, which rely on pristine landscapes, clean water bodies and healthy ecosystems are often also affected. For example, water hyacinth creates dense floating mats on water bodies, interfering with recreational activities, such as boating or fishing. These businesses are currently suffering from the lack of coordinated action on IAS and would thus benefit from legislation

In addition, these businesses are burdened by the management costs of keeping damaging IAS in check, although the majority of these costs are usually faced by the public authorities.

On the other hand, other SMEs, such as pet traders and the horticultural sector, draw benefits from IAS as they focus largely on alien species trade and may be negatively impacted by certain measures proposed that could put restrictions on the import and sale of certain species.

Despite significant efforts, through contacts with the sectors involved and research, the data found on the structure of these sectors were scarce. From consultations with stakeholders, however, it was possible to infer that the sectors with a commercial interest in certain alien species are likely to include several retailers (thought to include several microenterprises) trading alien species directly with the public and sourcing their products from larger players, importing such species into the EU. The larger players are thought to be a heterogeneous group, including a proportion of SMEs. Some of the proposed measures would be relevant to these larger players, rather than to the microenterprises in the retail sector.

The Commission is concerned about the impact of legislation on small and microenterprises and has a policy of minimising the burden on these businesses; however, they would be expected to fall under the scope of the legislation.

Indeed, trade in pets and horticultural species are important pathways of introduction of IAS and excluding these players would undermine the effectiveness of the instrument in achieving the proposed goals. The system envisaged, however, focuses only on invasive alien species - and primarily on those listed as IAS of EU concern - and it also caters for some flexibility to tackle these sectors, while keeping the impact on small and microenterprises to a minimum.

7.2. The basic legislative instrument

7.2.1. Calculation of costs

In order to compare the cost of the basic legislative instrument with the baseline option (option 0), the cost of the latter is summarised in Table A9.

Table A9: Estimated cost of action for options 0 and 1[199]*, based in so far as possible on current expenditure*

	Cost per Member State	**Costs by others**	**Total cost**	**Expected trend in costs**
A - Risk Assessments	€117,900/yr/MS[200]	0	€3 mio/yr	=
B - Pathway management	Few initiatives, primarily raising awareness	Ballast water treatment: € 109 mio/yr[201] Biofouling treatment: min. €13,700/vessel/event[202]	Ballast water treatment: € 109 mio/yr[203]	↑↑ When Ballast Water Convention enters into force ↓↓ as the technologies for ballast water treatment evolve and become more efficient and cheaper
C - Release into the environment	Existing systems, difficult to quantify	Existing burden difficult to quantify	No quantification	=

[199] The additional costs of option 1 are thought to be very limited in comparison with option 0 (policy management including additional guidelines, voluntary codes of conduct and awareness rising), therefore the cost of action of these two options has been estimated to be similar.

[200] Shine *et al*. 2010

[201] €8,000/year/vessel (based on http://globallast.imo.org/Monograph_19_Economic_Assesment_web.pdf) x 13,616 vessels in the EU (based on http://www.ecsa.eu/images/files/downloads_annualreports/Rapport%202010-2011.pdf)

[202] Shine et al. 2010

[203] Pending Ballast water Convention

D – Surveillance	€260,000/yr/MS[204]	EEA: Nature Watch - pilot project on IAS	€7 mio/yr	=
D - Rapid eradication	Variety of costs[205]: €1.309 bio/yr[206] (see Annex VII)		€1.309 bio/yr	=
E - Management of IAS				↑↑ (see 2.5)
Information system	€122,000/yr/MS[207] NOBANIS: €120,000-140,000/year[208]	JRC: €230,000/year[209]	€3.4 mio/yr[210]	=
Policy management	Strategy development, policy development and coordination and policy support (studies): €74,000/year	0	€2 mio/yr	=
TOTAL			€ 1.433 bio/yr	↑↑

The cost of the current management measures (including rows D and E of Table A9) has been calculated following the steps described below:

1. Table A10 gives an overview of the current costs of management of certain IAS in EU Member States.
2. On the basis of the information collected by Table A10, an average current cost of management per group of IAS was estimated (see first column Table A10)
3. On the basis of Table A6 (Annex V), which summarises the IAS on which Member States are taking action at the national level, the number of Member States addressing each IAS was counted and species were grouped according to taxon. The number of Member States, acting on each IAS, was summed up for every group of species. Finally, these figures were multiplied by the average current cost of management (last column of Table A11).
4. The results (number of Member States acting on species belonging to a group multiplied by the average current cost of management) were summed, and this provided a rough estimate of the current cost of management by the Member States in the EU: € 1.309 billion/year. This is an underestimate as many very local measures on IAS are not included (e.g. municipalities and NGOs).

Table A10: Cost of management measures under the policy baseline (option 0)

IAS managed by Member States Estimated average management cost/IAS/MS/year	**Available management costs**
Mammals	-Italy - coypu (1995-2000) - removal of over 220,000 coypus: €2.6 million (Bertolino,

[204] Shine *et al.* 2010
[205] Those costs are currently borne by public authorities (EU (LIFE), Member State and local level) and private operators
[206] Based on data on current management costs, an average cost per acting MS per addressed IAS per year was estimated for a series of species groups (Table A10, Annex VII). Next, building on the overview of IAS which MS are currently managing at the MS-level (Table A6, Annex V) and on the cost estimates in Table A10, the total current management cost was estimated per species group (Table A11, Annex VII), leading to an estimated total current IAS management cost of €1.309 bio/yr. See Annex VII for further details.
[207] Shine *et al.* 2010: current average of €122,000/year/Member State
[208] Estimated investment in NOBANIS, has been funded by some Member States
[209] Estimated investment by the Joint Research Centre: €690,000 in 3 years = €230,000/year
[210] (27 MS x €122,000/year) + €120,000-140,000/year + €230,000/year

€1 million/IAS/MS/year	2009) -UK – coypu eradication: €5 mio/11 yrs (Baker, 2006) -Germany - muskrat: €4 million/year (Reinhardt *et al.*, 2003) -Wallonia - muskrat: €0.7 million/year (Sonigo *et al.*, 2011) -Germany - American mink: €5 million/year (Reinhardt *et al.*, 2003)
Birds €1 million/IAS/MS/year	- UK - ruddy duck eradication: €4.4 mio/5 yrs (Shine *et al.* 2010)
Amphibians €1 million/IAS/MS/year	-UK - American bullfrog eradication: €36,000 (Lorvelec and Détaint 2009)
Aquatic organisms €3 million/IAS/MS/year	- UK - crayfish in the UK: €3.3 mio/year (Williams *et al.*, 2010)
Aquatic weeds €4 million/IAS/MS/year	-Great Britain - New Zealand pigmyweed: €1.45 to 3 million over a period of 2-3 years (Leach and Dawson, 1999) -Great Britain - IAS in waterways: €24.5 million/year (Williams *et al.*, 2010) -Netherlands - floating pennyworth: €2-4 million/year (van der Wijden *et al.*, 2007) -Flanders - invasive alien aquatic plants: €1 million/year for 108 km of river (Van Gossum, *pers. comm*.) -Spain - removing water hyacinth from the Guadiana river (for around 75 km of river): €14.7 million for 2005 to 2008 (EPPO, 2008)
Trees €5 million/IAS/MS/year	Management cost of black cherry -Germany: €3.4 million/year for tree removal in conservation areas and €20.7 million/year for Management measures in forestry (Reinhardt *et al.*, 2003) -Flanders: 4.6 million (1994-2010) for Management measures in forestry (Buysse, 2012)
Shrubs €5 million/IAS/MS/year	-Germany: €6.2 million/year (Reinhardt *et al.*, 2003)
Other plants €5 million/IAS/MS/year	Costs of hogweed management: -Germany: €12 million/year (Reinhardt *et al.*, 2003) -Denmark: €3.25 million/year + 39,900 working hours (IEEP, 2009) -Latvia: up to €3.5 million/year; Great Britain: €1.1 million/year; Wallonia: €0.5 million/year; Estonia: €472,000/year (Sonigo *et al.* 2011) Costs of ragweed control: -EU: €179 million/year (Bullock, 2012)

Table A11: Assessment of total current management cost

	Average management costs for type of species/year/MS	**Number of species of a certain taxa currently subject to management**	**Sum of Member States acting on that type of species**	**Current expenditure on management per taxa for EU27 in**

		measures in EU27		**€/year**
Mammals	€1 million	30 mammals	104 MS	104 million
Birds	€1 million	17 birds	32 MS	32 million
Amphibians and reptiles	€1 million	11 amphibians or reptiles	35 MS	35 million
Aquatic organisms	€3 million	41 aquatic organisms	73 MS	219 million
Aquatic weeds	€4 million	22 Aquatic weeds	41 MS	164 million
Plants (including trees)	€5 million	52 plants	151 MS	755 million
TOTAL **Management cost for all IAS (except terrestrial invertebrates)**				**1.309** billion

After having estimated the costs of the baseline option, Table A12 provides an overview of the additional costs that the basic legislative instrument (option 2) would entail.

Table A12: Costs of the basic legislative instrument and add-ons (option 2) in comparison with options 0 and 1 (+ stands for additional costs, = stands for no extra costs)

	Options 0 and 1	**Option 2: Changes in comparison to options 0 and 1**			**Option 2**
		Member States	Economic operators	European Commission	
A – List of IAS of EU concern	0	See policy management (see second last row below)	Opportunity costs (see 6.2.1)	See policy management (see second last row below)	Opportunity costs
A - Risk assessments	€3 mio[211]/year	From €3 mio to €1.4 mio/year [212] SAVING: €1.6 mio/year	0	C3: See policy management (see 6.2.1)	€1.4 mio/year C3: additional administrative costs
A - Border control on intentional introductions	0	Limited operational costs[213], thanks to integration in current controls on live animals and plants for planting (see 6.2.1)	0	0	Limited operational costs

[211] Shine *et al*. 2010: based on current average of €117,900/year/MS

[212] Shine *et al.* 2010: current cost of EU-level risk assessment is €42,000 per assessment. Assuming that all 167 IAS on the SEBI-list would be assessed during the next 5 year, this would make 33 risk assessments/year or 1.4 mio/year. The cost per risk assessment could be higher, in particular when adding more economic information, but potentially replacing 27 risk assessments by one risk assessment will lead to considerable cost savings.

[213] Thanks to integration in current controls on live animals and plants for planting. Based on the costs of similar exercises coordinated by the services in charge of customs and taxation of the Commission, it was estimated that a small project to develop guidelines for customs on IAS consisting of 3-4 meetings of 10 experts would costs €20,000-30,000 in total, using Commission facilities and excluding translation costs

B - Pathway management, incl. border control on unintentional introductions	Ballast water treatment: € 109 mio/yr[214]	+ €26 mio/yr[215] + € 0.5mio/yr[216], optionally + €14.6 mio[217]/yr or even more (over time)	Operational costs (traders and transporters, see 6.2.1)	See policy management	€135.5 to 150.1 mio/year, or possibly more (over time)
C - Release into the environment	Existing systems, difficult to quantify	C2: Permitting system (see 6.2.1): +€100,000-1mio/yr[218]	Opportunity costs (producers, see 6.2.1) C2: + C3: ++	C3: Managing EU list of species approved for release (see 6.2.1)	Administrative and opportunity costs C2: additional administrative costs: +€100,000-1mio/yr C3: significant additional administrative and opportunity costs
D - Surveillance	€7 mio[219]/year	=	=	=	€7 mio/year
D – Rapid eradication **E - Management of IAS**	€1.309 bio/year[220]	Shift from ad hoc reactive to targeted rapid response approach, cost <u>expected to decrease</u> over time D3: stronger shift to rapid eradication (see 6.2.1)	Ad hoc management costs, difficult to estimate	Coordination and risk-based prioritisation of current support	Current management costs will decrease over time: €1.309 bio/year could decrease to € 0.922 bio/yr[221] D3: stronger shift to rapid eradication
Information system	€3.4 mio[222]/year	<u>Expected to decrease</u> over time as EU-system develops	0	+ €170,000[223]/year, <u>expected to increase</u> over time	€3.6 mio/year
Policy management	€2 mio[224]/year	=	0	+ €80,000[225]/year (steering group)	€2.1 mio/year

[214] Pending Ballast Water Convention – expected to come into force in 2013 (see Annex IV). These costs would be part of the baseline as they would not derive from this proposal.

[215] Current costs for border control in plant health: €26 mio/yr (Food Chain Evaluation Consortium (FCEC), 2010). As harmful organisms are never introduced intentionally, the total plant health border control cost can be considered as border control on unintentional introductions.

[216] Costs of pathway management are extremely difficult to estimate as this area of work is not yet developed. One example of is the UK "check clean dry" campaign, costing roughly €50,000/year over 2 years. Assuming all MS organise one such campaign in the next 5 years (or several smaller campaigns), this would make €20,000/MS/year, in total €540,000/year.

[217] Current costs of regulatory pathway management within the plant health regime: €14,574,239/year (Food Chain Evaluation Consortium (FCEC), 2010)

[218] 0.1 to 1 FTE/yr for 27 MS at €23.2/hr x 1600hrs/yr = €100,224 to 1,002,240/yr

[219] Shine *et al.* 2010: current average of €260,000/year/MS

[220] Based on data on current management costs, an average cost per acting MS per addressed IAS per year was estimated for a series of species groups (Table A10, Annex VII). Next, building on the overview of IAS which MS are currently managing at the MS-level (Table A6, Annex V) and on the cost estimates in Table A10, the total current management cost was estimated per species group (Table A11, Annex VII), leading to an estimated total current IAS management cost of €1.309 bio/yr

[221] Out of the 173 IAS that are currently contributing to the control cost (see Table A11 in Annex VII), 74 are listed in SEBI. We used this as an indication of the number of IAS contributing to the control cost that might be listed. Assuming that the concerted action towards those IAS could lead to a reduction of their future control costs by 50 %, and taking into account the control cost in Table A11 in Annex VII, this would lead to a cost saving of € 387 mio/yr.

[222] Shine *et al.* 2010: current average of €122,000/year/MS

[223] Estimate for the continuation of the current work by JRC: €400,000/year, which is €170,000/year more than the baseline

[224] Shine *et al.* 2010: (1) current average for "IAS policy development and coordination" of €40,000/year/MS (together €1 million/year) + (2) "development of strategies for the MS" that do not yet have them and strategy revisions (current

				Managing list of IAS of EU concern	
TOTAL	**€1.433 bio/yr**				**€1.459-1.473 bio/yr, expected to decrease to 1.072-1.086 bio/yr** C2: +€100,000-1mio/yr C3: ++ D3: +

7.2.2. Calculation of benefits

A quantification of the benefits of the legislative package is very difficult as the benefits – or the avoided costs – will depend on which invasive alien species will threaten the EU and will, through legislation, be prevented from entering, spreading and causing excessive damage. If the proposed legislation prevented 30 invasions similar to the current 30 invasions most addressed by the Member States, as described in Table A13 (based on Table A6 in Annex V), and using as a proxy of the damage caused, the data on damage of the species listed in Table 3, section 2.3 of the main text, it was estimated that the avoided damage costs would amount to €3.86 billion/year, with an average of €130 million/IAS/year[226], a rough figure which can nevertheless provide an estimation of the order or magnitude of avoided damage. This means that, assuming a rather stable cost of action, the avoided costs would cumulate as every year more invasions would be prevented: avoiding €0.5 billion per year in the long term after preventing 4 IAS in year 1, avoiding €1 billion per year in the long term after preventing an additional 4 IAS in year 2, €1.5 billion per year in the long term after preventing another 4 IAS in year 3, €2 billion per year in the long term after preventing another 4 IAS in year 4, etc

Table A13: Assessment of avoided damage under the legislative option (option 2), assuming future similar invasions of new IAS would be prevented

IAS Management led by more than 4 MS (number of MS acting)	**Available damage costs**	**Assessment of damage cost assuming future similar invasions of new IAS**
Mammals: American mink (12), raccoon dog (11), muskrat (10), rat (8) , raccoon (6), coypu (6), fallow deer (5), North American beaver (4), wild rabbit (4), mouflon (4)	American mink: predates free ranging chickens, reared game birds, farmed salmon Germany: €4.2 million/year (Bonesi, 2009) Musk rat: undermines riverbanks, railroads, dams and fences, irrigation structures and aquaculture + transmits echinococcosis Netherlands: €23 million/year (Van der Wijden *et al.*, 2007) Germany: additional expenditure for	Assuming an average damage of €5 million/year/IAS/MS Total: €350 million/year

average of €130,000 to 1.5 million/strategy) and "policy assessment and support" assuming one study (current average of €50,000/study) every 3 years (all together roughly another €1 million/year), thus cost of (1) and (2) = €2 million/year

[225] Based on costs Wildlife Trade Regulation, assuming 3 meetings/year and 1 representative/MS, assuming a maximum travel and subsistence cost of €800 euro/MS/meeting and €426/translation/i-slot for 6 languages, this would bring the cost for the Commission to €80,000/year

[226] €3.860 bio/year for 30 IAS makes 130 mio/year/IAS

	waterway maintenance €2.3 million/year (Reinhardt *et al.* 2003) and for maintenance of aquaculture facilities €1.6 million/year Public health: Germany: medical treatment costs of €4.6 million/year (Reinhardt *et al.*, 2003) Coypu: undermines river banks and increases the risk and severity of floods Italy: exceeded €10 million riverbank damage and exceeded €0.9 million impact on agriculture (Bertolino, 2009)	
Birds: ruddy duck (WTR), Canada goose (5)	Canada goose: displaces native waterfowl, causes habitat modification, disturbs ecosystem functioning Ruddy duck: threatens white-headed duck through hybridisation	Total: more native species would be threatened
Amphibians: American bullfrog (WTR), common slider (5)	American bullfrog: feeds excessively on many native species	Total: more native species would be threatened
Aquatic organisms: signal crayfish (7), zebra mussel (4), red swamp crayfish (4), stone moroko (4)	Comb jelly: drastic decline in pelagic fish catch Black sea: several €100 million in total (Shiganova and Panov, 2009) Zebra mussel: interference with fishing gear, alteration of fish communities, fouling aquaculture equipment, clogging water intake pipes, fouling the ship hulls and navigational constructions, sharp shells cause injuries North America: annual multimillion losses (Zaiko and Olenin, 2009) US and Canadian water users: €370 million/year (Millennium Ecosystems Assessment, 2005)	Assuming an average cost of €10 million/year/IAS/MS Total: €190 million/year
Insects	Tiger mosquito: vector of at least 22 arboviruses including Chikungunya and Dengue, often fatal to children Harlequin ladybird: displaces native ladybirds, causes decline in native biodiversity, could impact on the resilience of ecosystems and severely diminish the services they deliver (Roy *et al.* 2012)	Total: more fatalities and more native species would be threatened
Aquatic weeds: primrose (6), pennywort (4), parrot feather (4)	Blocking canals and rivers, affecting transport, drainage, recreation, biodiversity, angling.	Total: more disturbances
Trees: tree of heaven (6), black cherry (4)	Black cherry: hinders natural regeneration of trees, impedes forest management measures such as thinning, timber harvesting or	Assuming an average cost of €2 million/year/IAS/MS

	planting Germany: additional expenditures for thinning and timber harvesting at least €1.4 million/year, manifest additional expenses for planting not included (Reinhardt *et al.* 2003)	Total: €20 million/year
Shrubs: Japanese knotweed (10)	Japanese knotweed: leads to loss of property value, refusal of mortgages Great Britain: €205 million/year (Williams *et al.*, 2010) Germany: €7 million/year for embankment repair and €16.7 million/year for embankment reinforcement	Assuming an average cost of €20 million/year/IAS/MS Total: €200 million/year
Other plants: hogweed (15), Himalayan balsam (11), ragweed (8), iceplant (6), goldenrod (6), pampas grass (4), Jerusalem artichoke (4), Japanese rose (4), cord grass (4)	Ragweed: yield reduction (its resistance to herbicides and the germination capacity of its seeds of more than 30 years makes it difficult to control) + allergic asthma and allergic rhinitis Hungary: yield losses of €130 million/year (Kőmíves *et al.* 2006) Germany: medical costs (prescribed medication) of €17-47 million/year (Reinhardt *et al.*, 2003) EU: agricultural damage of €1.302 to 3.307 billion/year, medical costs of €118 to 763 million/year and workforce productivity loss of €0.049 to 1.361 billion/year: TOTAL: 1.469 to 5.431 billion/year (Bullock 2012) Giant hogweed: severe skin burning, tens of thousands of people affected every year, in the worst case being fatal Germany: medical treatment costs of €1 million/year (Reinhardt *et al.*, 2003)	Assuming an average cost of €50 million/year/IAS/MS Total: €3.1 billion/year
TOTAL		Total: €3.86 billion/year

7.2.3. Introduction of a single list of invasive alien species of EU concern, banned from trade/import/marketing/transport (component A2) and banned from being released into the environment (component C1)

This list would include alien species proven to be invasive by risk assessment[227] based on criteria that would include environmental as well as socio-economic considerations. **Risk assessments** would continue to be performed, as it is the case presently, by Member States, consortia of Member States or other organisations (e.g. EPPO[228]). However, a technical

[227] It is not yet known what and how many species would need to be included in the EU list of banned IAS as the list would be built on the basis of risk assessment and discussions with Member States.

[228] The European and Mediterranean Plant Protection Organisation (EPPO) is currently performing risk assessments for invasive alien plants.

process would be established with Member States to decide on minimum standards to perform those risk assessments, in order to ensure sufficient coherence for them to be mutually recognized among Member States.

The validation would be done via a dedicated Standing Committee or expert group, which will be assisting the Commission in developing the list of IAS of EU concern and keeping it up-to-date. Once a species is listed this would trigger a complete ban throughout the EU, including from trade/marketing./transport/holding and release into the environment. For unlisted species and when the risk has not yet been assessed emergency trade bans could be established, while a risk assessment is being performed, similar to the provisions of the plant health regime. This provisional ban would be subject to the available evidence and periodic review. The introduction of a single list of IAS of EU concern, triggering EU-wide bans and obligations will have **costs as well as benefits**.

Member States and public authorities

When it comes to **public authorities the list will be beneficial in that** it provides a harmonised and transparent approach to managing IAS at EU level. This will first and foremost avoid efforts being undermined by lack of action in neighbouring countries. For example, the Walloon region of Belgium is attempting to eradicate giant hogweed with a budget of €0.5 million/year. At the same time France is taking no action on this invasive alien plant, with a high probability of reinvasion in the Walloon region.

Furthermore, Member States are currently applying a variety of bans on import, trade and/or marketing of IAS that have already been established in 13 Member States, creating a regulatory patchwork. The single list of IAS of EU concern would enable uniform conditions across the EU, thus ensuring the effectiveness of actions taken and arming the Member States that have not yet undertaken similar bans with a new tool to combat invasive alien species.

Currently, risk assessments are performed in an isolated manner by Member States. Current expenditure on risk assessment is estimated to range from €10,000 to 225,000 a year per Member State, with an average of €117,900 a year per Member State[229]. That represents a total current expenditure, mainly for the public authorities, of €3 million/year for the EU[230] on species risk assessments. A harmonised way of listing would facilitate prioritisation and coordination of the work on risk assessments, thus avoiding duplication and leading to economies of scale as there would be an incentive for Member States to develop risk assessments in consortia with other Member States. EPPO has concluded 9 risks assessments on invasive alien plants and based on its estimates, it was calculated that risks-assessments costs around €42,000 per assessment[231]. If in the next five years, risk assessments were carried out for 167 species, taking the size of the SEBI list as reference, at a pace of 33 species per year, this would cost approximately **€1.4 million/year.** Compared to the current expenditure of €3 million/year in the EU, a harmonised system would bring about **€1.6 million/year of cost savings in total** and considerably reduce the **administrative burden** involved in the elaboration of these assessments.

There is currently no dedicated **standing committee.** Based on costs of existing similar structures supporting the implementation of the Wildlife Trade Regulation, a dedicated structure could cost the **European Commission** around €80,000/year, assuming three yearly meetings. This Committee would decide upon the listing or unlisting of species and on

[229] Based on an analysis of current costs of risk assessment frameworks and risk assessments within the EU
[230] Shine *et al*., 2010
[231] Shine *et al*., 2010

emergency measures and provide guidance on the implementation of the IAS-policy in Member States.

To avoid intentional introductions in the EU, **border controls** on IAS of EU concern will have to be performed. To maximise synergies and avoid the creations of parallel systems, border controls on the intentional introduction of species would be integrated within existing systems. At Designated Entry Points, border controls for live animals and plants are being carried out in support of animal and plant health[232]. Checks to establish whether the imported plants or animals are banned by the IAS legislation could be performed at the same entry points. The Food Chain Evaluation Consortium (2011) estimated that the cost of adding border control on IAS-plants to the current plant health checks to be negligible, as no adaptation to current practices is required (e.g. no special detection methods or diagnostics required, visual inspection of trained and informed inspectors appears to be sufficient). It seems reasonable to assume that this will also be the case for IAS-animals. Moderate extra costs would include special training to enable designated entry points staff to detect IAS. Other border controls would occur at any EU entry point to detect other intentional and unlawful introductions of banned species. This would be carried out by the customs authorities. Also in this case there would be a need to develop trainings and guidelines on how to spot hidden IAS or on risk profiling. Moreover, cooperation agreements would be put in place to ensure taxonomic expertise from the IAS competent authority could be provided to customs when needed. Once inside the EU, IAS of EU concern would be traced through surveillance.

To support the measures proposed, Member States would be required to share information with the EU and with the other Member States through a **centralised repository of information**, which could be gradually built up on the basis of existing systems. There is currently a variety of information systems in place at the international, EU, regional and Member States level. The average Member States' current expenditure, on collecting (excluding on surveillance on the ground), managing and sharing information, amounts to €120,000/year per Member State (roughly €3 million/year in total)[233] and on top of this some Member States are already investing in a common early warning system NOBANIS, while the Joint Research Centre is working on the integration of information on IAS in Europe. Developing a central repository within the work presently undertaken would lead to a certain **shift in costs from Member States to the EU,** but costs are **not expected to increase substantially.**

Besides the benefits of a uniform approach, which would support the effectiveness of the actions proposed, **public authorities** will benefit substantially in terms of **damage and cost avoidance**. Some example to illustrate the large savings that could be made through cost avoidance are provided in Table A14. The scheme would lead to a reduced likelihood of invasive alien species establishing and spreading into the environment, causing substantial environmental, economic and social damage. This would also allow Member States to contribute to the EU biodiversity targets, by preventing the entry into the EU of species known to have detrimental effects on biodiversity and ecosystem services. It would also contribute to the achievement of the environmental objectives of several EU pieces of legislation such as the Habitats and Birds Directive, the Water Framework Directive and the Marine Strategy Framework Directive. When it comes to the damage on society, some IAS are recognised as having a very significant negative effect on **public health**. Member States

[232] See impact assessment revision Regulation 882/2004 on Official Control
[233] Shine *et al*,. 2010

will benefit as a ban on such species would avoid extra strain being placed on their public health systems – besides being beneficial for the well-being of citizens - as the most hazardous species would be banned uniformly across the EU. For example, a uniform approach across the EU could help in preventing the entry into the EU of parthenium weed, which is native to the subtropics of North and South America. This species, still absent in the EU, has established in Australia, US, India, Ethiopia and several other countries, including Israel. All other Mediterranean countries are considered at risk from this plant. Besides causing major negative impacts on pastures and crops, this species can produce serious allergenic reactions, such as dermatitis, hay fever and asthma in humans and livestock (horses in particular)[234].

Table A14: Damage costs which could be avoided or reduced with effective preventive actions

Aquatic plants	Blocks waterways: Management of New Zealand pigmyweed in Great Britain has cost EUR 1.45 to 3 million over a period of 2-3 years (Leach and Dawson, 1999), management of IAS in waterways costs EUR 24.5 million/year in Great Britain (Williams et al., 2010), management of floating pennyworth in the Netherlands is costing EUR 2-4 million/year (van der Wijden et al., 2007), Flanders is spending approximately EUR 1 million/year on the management of invasive alien aquatic plants (Sonigo et al., 2011), in Spain, removing water hyacinth from the Guadiana river (for around 75 km of river) was EUR 14.7 million for 2005 to 2008 (EPPO, 2008)
Japanese knotweed (most of the EU)	Damages construction and infrastructure: costs EUR 205 million per year to the British economy (Williams et al., 2010) and between EUR 24 and 46 million/year in Germany
Coypu (most of the EU)	Damages river banks and increases the risk and severity of floods in many central and southern European countries: in Italy (1995-2000), the removal of over 220,000 coypus cost EUR 2.6 million whilst riverbank damage exceeded EUR 10 million and impact on agriculture exceeded 0.9 million (Bertolino, 2009)
Musk rat (most of the EU)	Damages riverbanks, railroads, dams and fences, irrigation structures and aquaculture: in the Netherlands causing damage of EUR 23 million/year (Van der Wijden et al., 2007), Wallonia is spending EUR 0.7 million per year on the management of musk rat (Sonigo et al., 2011), in Germany, annual damage costs are estimated at EUR 12.4 million (Genovesi, 2009)

International and intra-EU trade

The introduction of a single list of IAS of EU concern could negatively affect **import volumes**, as it would ban certain species from being traded and exported by some third countries. This disruption was, however, not considered excessively negative as, according to the input from stakeholders, including traders, the type of species likely to be listed would a) not necessarily be in trade, b) some of the species are traded in relatively small volumes, and b) several of the species trade, with few exceptions, would not be highly valuable commodities. Furthermore, the introduction of a single list of IAS of EU concern would have the advantage of being underpinned by risk assessment, based on minimum EU standards, and thus be fully **WTO and SPS agreement compatible.** The system will thus be harmonised and transparent, fully in line with the systems regulating the plant and animal health regimes and not unfamiliar to the EU trading partners.

Furthermore, the list of IAS of EU concern would ensure the smooth functioning of the **internal market** by **setting a harmonised and transparent approach** to risk assessment, representing a substantial improvement compared to the current situation where Member

[234] EPPO Alert List *Parthenium hysterophorus* RS 2011/068

States are introducing non harmonised trade/marketing/transport bans. This would also provide legal certainty to users and traders on alien species.

Users/traders and breeders/primary producers

Because certain species may be banned for trade, marketing, holding, as well as being banned from release into the environment, some **traders, users of IAS and primary producers** - forestry, agriculture, animal husbandry and aquaculture - will be affected and may bear some economic losses, at least until a suitable substitute species is found. For most of the species, it is thought that non-invasive or native substitute species would be readily available, with some exceptions. However, for some other cases such as **scientific research or ex-situ conservation**, substitution may not be an option. For those cases where an overriding interest is demonstrated, a system of derogation with a permit (safety conditions to avoid release into the environment) could be envisaged. This would entail some administrative burden in terms of permitting requirements but may allow researchers in the EU to be allowed to use the necessary species for their research.

As regards the sectors of **forestry and agriculture**, the banning of certain species in the EU may have a negative impact, although based on an assessment of the species included in the SEBI list, it was estimated that this impact should remain moderate. No species of agricultural interest was identified in the SEBI-list and only one species with forestry interest was identified therein (black locust).

When it comes to **traders and breeders/growers** of ornamental species, the situation vary according to the nature of those ornamental species trade. Taking the SEBI-list as reference, out of the 167 species, according to information provided by the European Pet Organisation, the Sustainable Users Network, an organisation with close links to the pets and ornamental species industry, and Ornamental Fish International (OFI), there are 27 animals traded, including two fish: the sunfish and the koi. Moreover, according to information collected through the horticultural industry, the SEBI list includes 11 plants which are used for horticultural purposes. This means that 38 species out of 167 have a commercial interest, that is around 25%.

As regards trade in pets, the impact of banning trade, sale and holding of certain species is not easily quantifiable, nevertheless, thanks to qualitative information provided by the European Pet Organisation (EPO) it is possible to assess that a trade ban on certain species may indeed affect the sector. Nevertheless, the majority of the **pet species** in the SEBI-list are bred inside the EU in relatively low volumes by hobbyists and are rarely imported. Thus the disruption to international trade of these species would be limited. Furthermore, EPO clarified that these species rarely even enter the regular pet trade, but are rather exchanged by hobbyists: quantities of such species in retail trade have been reported by EPO as negligible, except for **turtles, clawed toad and ring-necked parakeet**, which are commonly sold in pet shops. However, the assessment in the previous paragraph shows that roughly 75% of the species in the SEBI-list would rather be introduced in the EU without commercial intentions and their ban would thus not bring about losses for the economic sectors.

Most of the traded species in the SEBI-list are not very high value commodities with two exceptions: the koi and the American mink. According to EPO, the **koi** represents an industry worth tens of millions of euro with millions of specimens being imported, which creates employment. A ban on such species would have a very negative effect on the industry. EPO also stressed that the likelihood of koi being released or escaping is unlikely given these are valuable specimens, which suggests that continuing trade and keeping may be justified. The **American mink** is reared for its fur and it accounts for 92% of the stock of fur farmed

animals in Europe. American minks are high value animals are meant to be kept in captivity but there have been and continue to be incidents with large numbers of American minks being illegally released into the environment. American mink negatively impacts free ranging chickens, reared game birds, salmon farming and the eco-tourism industry, through predation on ground nesting birds. Damage by American mink in Germany alone is estimated to be €4.2 million euro a year[235]. However, a ban on the mink or similar species with a high economic value could have a **serious economic impact** on a sector which produces pelts for a value of around €1.5 billion euro a year[236], with Denmark being the biggest producers of mink furs in the world, followed by the Netherlands. This would also lead to a **negative effect on employment**: there are 7,200 fur-farmers in the EU, and this generates up to 60,000 full-time jobs[237]. All these environmental and economic aspects will need to be duly taken into account by the policy-makers when establishing the list of IAS of EU concern.

Worth mentioning is also the case of some plants used for **biomass production** which usually are selected for their fast growth and adaptability, characteristics that can make an alien species invasive. This is particularly the case of black locust, which, besides being appreciated in soil rehabilitation for its pioneer characteristics and nitrogen fixing capacity, produces wood which is much appreciated for its hardness, durability and resistance to rot, as well as having high energy content. This was, however, the only species with a **forestry** commercial interest that was identified in the SEBI list. As the situation stand, disruption to trade, and hence profitability and employment, would seem to be limited when it comes to biomass and energy production.

When it comes to the **horticultural sector**, the situation may be somewhat different as their business relies substantially on trading, growing, marketing ornamental plants, which are often alien to Europe and are intended to be planted in gardens and parks, with the consequences that seeds can spread and the plant species may establish and spread into the environment. It is not simple to quantify the impacts to the horticultural sector, but an example from Belgium may be useful. According to the Alter-IAS project[238], 53% of the IAS-plants present in Belgium is offered for sale in the horticultural sector and 93% is available in nurseries. Thus a ban on certain invasive plant species would have a negative impact on the horticultural sector. However, when the economic value of the single species was considered, it was found that only a minority of the nursery owners considered some of those species as species of economic value (see Figure A4). Furthermore, alternative plant species are readily available[239], including native species and therefore the impact on these businesses, and the employment they generate, is estimated to be fairly moderate.

[235] Bonesi, 2009
[236] European Fur Breeders' Association
[237] European Fur Breeders' Association
[238] Project Alter- IAS: http://www.alterias.be/
[239] See for example the list of alternative plants produced by the project Alter-IAS: http://www.alterias.be/en/list-of-invasive-and-alternative-plants/alternative-plants

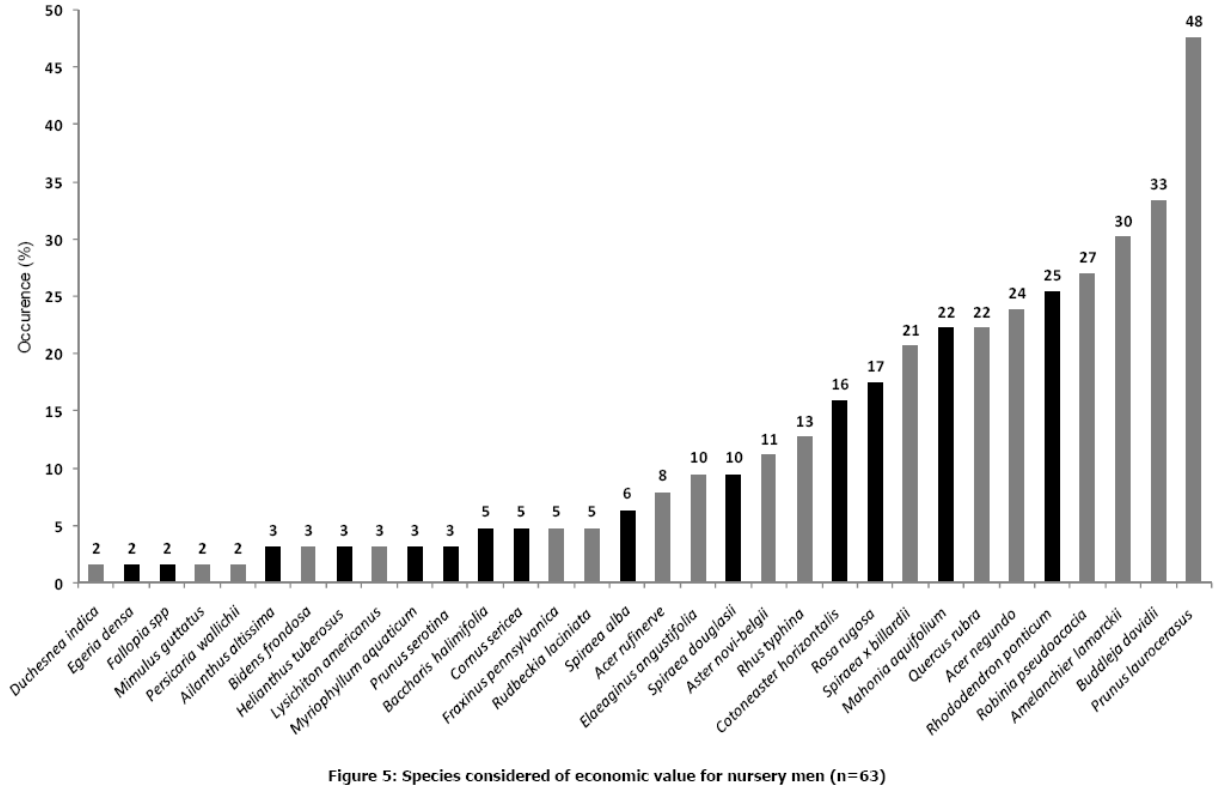


Figure 5: Species considered of economic value for nursery men (n=63)

Figure A4: IAS-plants considered of economic value by nursery owners in Belgium (Halford et al. 2011).

The aquaculture sector is already addressed by Regulation 708/2007 on the use of alien and locally absent species in aquaculture and will not, therefore, be further discussed here.

In conclusion, given that some few species have a high economic interest, it can be expected that the economic value benefits of alien species will also be assessed, were such species to be considered for inclusion in the single list of IAS of EU concern.

However, it needs to be highlighted that in particular these sectors (forestry, agriculture, animal husbandry and aquaculture) are the ones which are going to be **benefitting the most from a harmonised EU approach** to the introduction of IAS given the losses they suffer from IAS invasions. That is the case for instance of a highly invasive alien plant, black cherry that negatively impacts cultivations and that is already causing damage and management costs in the EU forestry sector. The table below (Table A15) shows some examples of the damage and management costs that certain species may entail for primary producers.

Table A15: damage and management costs of certain species

Black cherry (present in most of the EU)	Forestry sector and biodiversity: Hinders natural regeneration of trees, impedes forest management measures such as thinning, timber harvesting or planting: overall loss to the German economy through yield reduction and management costs was estimated at 25 million euro per year (Reinhardt et al. 2003), a similar figure was estimated for the Netherlands (Olsthoorn and van Hees 2002), various management methods cost between 150 and 1,500 euro per ha per year (Spaeth *et al.* 1994) (Starfinger, 2010)
Rhododendron (UK, IE, BE,	Forestry sector: Hinders natural regeneration and outcompetes native trees and shrubs, very difficult to control: estimated to cost EUR 10.3 million/year to the British economy

NL, FR)	(Williams *et al*., 2010)
Ragweed (most of the EU)	Agriculture: Reduces yields in the cultivation of maize, wheat, sunflowers, millet, peanuts, soybeans and potatoes: its resistance to herbicides and the germination capacity of its seeds of more than 30 years makes it difficult to control. Agricultural costs in the EU amount to €1.302-3.307 billion/year (Bullock 2012).

As discussed, if certain sectors were to suffer from the ban of certain IAS, this would have negative repercussions on **employment**. However, since the substitution of banned species with other non-invasive of native species, is expected to be possible for most species, the negative effect should be moderate. Furthermore, certain IAS can have dramatic consequences on the livelihood of certain sectors and measures to prevent their introduction would thus prove beneficial to preserve existing jobs: for example, the comb jelly inflicted significant economic losses for the Black sea and Caspian sea coastal countries due to the drastic decline in pelagic fish catch (estimated to several 100 million euros for the Black sea[240]) and causing significant loss of employment. Taking all the above factors it seems that the number of jobs possibly affected by IAS is higher than the number of jobs that can be affected by measures to combat IAS.

Citizens

Citizens will **particularly benefit** from a ban on the introduction of IAS, when these species have negative repercussion on health as these IAS would be uniformly banned across the EU. Bans on IAS will also prove beneficial to **land owners**: some of these species negatively affect their properties, both the landscapes and housing. Indeed the presence of Japanese knotweed in properties leads sometimes in the UK to the refusal of bank loans and losses in property value[241]. Small businesses linked to some **recreational activities** such as angling, hunting and tourism may be affected by the introduction of new rules on invasive alien species. The introduction of a ban on the species included in the list of IAS of EU concern may have an indirect effect on these industries, not so much because of the ban on trade/marketing/holding, but mostly because of the ban on release into the environment. Should angling in certain areas suffer from the ban of certain prized species, it is possible that the small business flourishing around lakes and rivers used by anglers may suffer a negative impact as well. The same argument could apply to businesses ancillary to hunting activities. However this possible negative effect would be dependent on the disruption of angling and hunting activities. This is considered highly unlikely as, even if some species may be banned from release, fishing or hunting activities could simply focus on other non-invasive (and therefore non-banned) species and native species.

At the same time **many other recreational activities will benefit** from a ban on certain species. It would avoid for instance by preventing that boating or fishing activities are disrupted in waterways invaded by invasive aquatic plants, or recreational areas are not accessible due to some other invasive species, or marine aquatic areas are not suitable anymore for diving purposes. Preventing the introduction of IAS would have avoided very serious damages to ecological and **cultural patrimony** such as the on-going destruction of more than 4.000 ancient trees, dying due to the presence of a US native invasive parasite along the Canal du Midi, a very popular tourist destination in France for which the tree landscape has caused that the UNESCO designated the area patrimony of Humanity. Thus the positive impacts on recreational values and services clearly outweigh the negative impacts. Finally, the banning of certain species may have an effect on the choices of some **citizens**,

[240] Shiganova & Panov, 2009

[241] https://consultations.rics.org/gf2.ti/f/275138/6179845.1/pdf/-/Japanese%20Knotweed%20and%20residential%20property.pdf

such as pet owners and hobbyists, but given the ready availability of alternative species this impact may be considered negligible.

7.2.4. Obligation to manage pathways to prevent the unintentional introduction in the EU and the unintentional release into the environment (component B2)

Member States would be required to **identify pathways of introduction of alien species, to develop measures to tackle those pathways and implement them, thus Member States will have the freedom and the responsibility to take stock of their own national situation and take action where needed.** The common attention to pathways would be a first step towards a coherent approach towards pathways at the EU level. Currently, limited initiatives have been taken at Member State level to tackle pathways of introduction and they mostly consist of awareness raising campaigns, guidelines and voluntary codes of conduct developed together with certain sectors, thus focusing on soft law approaches. Exception to that is the management and treatment of Ballast water and measures taken under the plant and animal health regimes, i.e. existing legally binding provisions. However, these are part of the baseline option and would be taking place even if no action was taken in terms of designing a dedicated legal instrument on IAS.

Member States and public authorities

Pathway management is probably one of the most necessary measures to be taken to prevent the introduction of IAS, since it deals with the large proportion of IAS entering the EU unintentionally and since it allows going beyond the list of IAS of EU concern, by potentially capturing in the system other IAS that are not listed. It is one area requiring substantial resources, both human and financial. A decision needs to be made on how impermeable to IAS the EU wants to make its borders and its environment. The more the EU aims for a closed system the higher the control expenses but those would need to be balanced against **a higher protection of the EU's biodiversity and ecosystem services and lower damage costs**. Other benefits of pathway management would be felt in **public health** as IAS negatively impacting human health often are brought unintentionally. For example, through pathway management, further spread of ragweed could be avoided, or the further introduction of tiger mosquito into the EU could be addressed.

Costs for pathway management are likely to be substantial: under the plant health regime border control currently reaches €26 million/year. However, significant costs can be spared by doing an efficient and targeted identification of pathways and using already existing controls systems which will allow focusing on those constituting major routes of introduction of IAS. As those pathways are extremely diverse, currently there are little measures on pathways and we have no indication of which measures Member States are going to take, the cost of pathway management for public authorities is **very difficult to quantify.** As the measures are not yet developed, the cost will probably be limited at the beginning, but might increase as priority pathways and the appropriate measures are identified. Currently limited initiatives have been taken and mostly consist of the development of awareness-raising campaigns and voluntary codes of conduct developed with certain sectors. Initiatives are therefore already being taken, although the obligation to manage pathways would be expected to stimulate further similar initiatives across the EU. This could also be reflected in the impact on employment: assuming a trend towards the introduction of more pathway management requirements, the impact on **employment** may be mixed, evolving from negligible to negative, although in some cases **job opportunities** may also be linked to growing pathway management.

Measures may, for example, include certain **biosecurity measures** on traded commodities (or their means of transportation) if identified as a pathway of introduction (e.g. animal feed with ragweed seeds). To avoid the **unintentional release into the environment**, many measures can be taken. We can rely on examples to provide an idea of the magnitude of the costs involved in managing certain pathways of release in the environment. One such example is the UK "Check-clean-dry" campaign[242], which tackles pathways of aquatic invasive alien species. Its impact is limited to the local level and it takes the form of requirements for operators and users to clean their equipment and be alert of the danger of possible transfer of organisms to separate water bodies. The UK foresees to spend approximately €50,000/year on this campaign for the next two years (pers. comm.).

If all Member States organised one such campaign during the next five years (or several smaller campaigns) this would entail costs for the public authorities organising such campaigns of around €20,000/year per Member State, in total €540,000/year. However, these measures are expected to yield substantial benefits in terms of avoiding unintentional releases and escapes into the environment, thus leading to avoidance of substantial eradication, control or containment costs.

In a more developed system of pathway management, certification systems could be applied. The current system of plant passports under the plant health regime is costing €14,574,239/year[243].

Private sector/primary producers/citizens

The obligation to manage pathways may lead to the introduction of requirements for the traders or the shipping companies, as it is the case with the provisions of Ballast Water Convention. Similarly citizens may be required to comply with certain basic biosecurity measures when they engage in certain recreational activities (e.g. cleaning boating/water sports equipment). However, as discussed in previous sections, businesses/primary producers and citizens alike are expected to benefit from a preventive approach to IAS and therefore the burden or inconvenience would be outweighed by the benefits in terms of avoided damage costs, public health, maintained recreational and land/property values.

7.2.5. Obligation to eradicate, contain or control new IAS detected in the environment – early warning and rapid response (component D2)

Member States would have an obligation to **rapidly respond** when a new species listed on the single list of IAS of EU concern is found in the environment. They may select the most appropriate course of action to eradicate, contain or control the species, but would be required to notify the measures taken and their results to the Commission, which may provide guidance where needed. An EU-wide obligation to act will avoid any effort being undermined by lack of action in neighbouring countries.

Member States and public authorities

Requirements linked to **early warning** include the costs of surveillance and of notification to the Commission and other Member States. The surveillance requirement will rely in so far as possible on existing systems, thus additional surveillance costs should be avoided. It is extremely difficult to quantify the costs of the rapid **response requirement** as this will largely depend on what species each Member States will detect on its national territory and also on the feasibility of the eradication, but it could run into millions of euro per year.

[242] https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=98
[243] Current costs of registration and certification within the plant health regime

Current costs of eradication vary from **€50,000 to 14 million per invasion per Member State**[244], depending on the invasion stage of the IAS. However, if the eradication costs rise quickly, Member States might soon resort to containment and control, to avoid the eradication costs which initially may be higher. Rapid response will necessarily have implications for **public authorities** which will be largely responsible for organising and financing these actions, although **EU** funding mechanisms could be involved to support them (LIFE, ERDF, EAFRD). There will also be administrative costs involved, i.e. sharing information on the rapid response with the EU and the other Member States.

Wherever an IAS could be completely eradicated, ALL long term damage or management costs would be avoided. Those avoided costs are very difficult to estimate and are expected to rise over time if containment cannot be guaranteed. FCEC (2011) estimated, in support of the plant health impact assessment, the eradication and containment of established IAS plants to cost **€3 million per IAS**, if the IAS is widely spread amounting to **€10 to 30 million per IAS**, not including damage costs. For example, if ragweed could have been eradicated every time it was first observed (its negative impacts were known from the US), damage costs of **€1.469-5.431 billion/year** could have been avoided[245]. If IAS were not eradicated, but just controlled and contained, those costs would not be avoided, but at least the increase would be reduced. If eradication were to be attempted at a later stage, costs would be significantly higher (see Table A16). Benefits would also accrue in terms of **biodiversity and ecosystem services preservation**, as well as in terms of **public health**, given as the aim would be to remove or contain and control noxious species.

These **significant benefits of rapid response** are expected to **easily outweigh the short term costs**.

Table A16: Eradication costs in earlier and later invasion stages in the UK[246]. Invasion stage varies according to the species life cycle

IAS	**Eradication costs (euro)**	
	Earlier invasion stage	**Later invasion stage**
Asian long horned beetle	39,000	1,524,974,000
Carpet sea squirt	2,728,000	1,074,173,000
Water primrose	85,000	280,129,000
Grey squirrel	510,000	985,216,000
Coypu	5,443,000	21,776,000

Private sector/primary producers and citizens

Businesses and citizens would not normally bear the costs of the rapid response obligation, unless it was possible to prove (and this is rarely the case) that they were responsible for the release. Indeed, in very rare cases, when the polluter could be identified, costs of rapid response could be recovered from the polluter.

On the contrary some **benefits** would be expected for the private sector. The removal of certain species is extremely labour intensive and requires specialised skills as well as

[244] FCEC, 2011
[245] Bullock (2012)
[246] Williams *et al.*, 2010

equipment, and business specialising in this type of work could emerge, with the creation of **new employment opportunities**. This is already happening in several Member States. In the UK, for example, a flourishing business has emerged specialising in the eradication of Japanese knotweed, for example: a quick internet search reveals several companies specialising in the control and removal of this invasive plant. The removal of water hyacinth from the Guadiana River in Spain employed a mixture of techniques including mechanical and manual removal. The eradication programmes lasted from 2005 until 2009 and maintenance activities as well as awareness raising campaigns are on-going. The campaign employed about 125 people in 2006 and 95 in 2007, with labour costs amounting to respectively 1,000,000 euro and 760,000 euro[247].

Furthermore, the benefit of avoided damage and management costs will be felt by **primary producers, as well as by business that are affected by the presence of IAS (e.g. electricity producers).** Also **citizens** might be positively affected in terms of avoided damage costs, e.g. invasive alien species that may negatively affect recreational opportunities or devalue their properties.

7.2.6. Obligation to manage (eradicate, contain or control) established IAS (component E2)

Member States would have the freedom and responsibility to select the appropriate measures for the management (eradication, containment or control) of established IAS, with the obligation to notify the measures they intend to take to the Commission. The measures could be discussed at transboundary level to improve coordination.

Member States and public authorities

The obligation to manage established populations of IAS of EU concern will entail **substantial costs for public authorities**, although the exact impact is impossible to calculate as it will largely depend on which and how many species will be established in Member States, as well as on the methods available and selected to manage a species. The cost of management of IAS through LIFE-projects can give some indication of the order of magnitude of the cost of managing species (or one species) usually in one site: the expenditure through LIFE-projects currently ranges between €**30,000 and 360,000 per year per Member State** (roughly €**3-12 million per year**), but many other management programmes and efforts are being carried out at national level independently from LIFE. FCEC (2011) estimated, in a study to support the plant health impact assessment, that the eradication and containment of established IAS plants could cost **€3 million euro**, and, if widely spread could amount to **€10-30 million/year per IAS.** Some examples of management activities already taking place are summarised in Table A17 and include efforts to control IAS in waterways in the UK, costing **€24.5 million/year**; the control of floating pennyworth in the Netherlands, costing **€2-4 million/ year**; the removal of water hyacinth from the Guadiana river in Spain took **3 years and has cost €14.7 million**; the removal of coypus in Italy has already cost **€2.6 million**; the control of hogweed in Latvia costs **€3.5 million/year.**

Table A17: Examples of costs to manage IAS

IAS	Control or eradication costs
Aquatic plants	-Great Britain - New Zealand pigmyweed: €1.45 to 3 million over a period of 2-3 years (Leach and Dawson, 1999)

[247] http://archives.eppo.int/MEETINGS/2008_conferences/eichhornia_files/06_cifuentes/cifuentes42.HTM

	-Great Britain - IAS in waterways: €24.5 million/year (Williams *et al*., 2010) -Netherlands - floating pennyworth: €2-4 million/year (van der Wijden *et al*., 2007) -Flanders - invasive alien aquatic plants: €1 million/year (Sonigo *et al.*, 2011) -Spain - removing water hyacinth from the Guadiana river (for around 75 km of river): €14.7 million for 2005 to 2008 (EPPO, 2008)
Japanese knotweed (most of the EU)	-Germany: €6.2 million/year (Reinhardt *et al*., 2003)
Black cherry (most of the EU)	-Germany: €3.4 million/year for tree removal in conservation areas and €20.7 million/year for management measures in forestry (Reinhardt *et al*., 2003) - Flanders: 4.6 million (1994-2010) for management measures in forestry (Buysse 2012)
Giant hogweed (most of the EU)	-Germany: € 12 million/year (Reinhardt *et al*., 2003) -Latvia: up to €3.5 million/year -Great Britain: €1.1 million/year -Wallonia: €0.5 million/year -Estonia: €472,000/year (Sonigo *et al*. 2011)
Coypu (most of the EU)	-Italy (1995-2000) - removal of over 220,000 coypus: €2.6 million (Bertolino, 2009)
Ruddy duck (UK, IE, ES, FR, BE, SE)	-UK – eradication: €4.4 million over 4-6 years (Shirley, 2009)
Musk rat (most of the EU)	-Germany: €4 million/year (Reinhardt *et al*., 2003) -Wallonia: €0.7 million/year (Sonigo *et al.*, 2011)
American mink (most of the EU)	-Germany: €5 million/year (Reinhardt *et al.*, 2003)

The total current cost, while difficult to estimate (see 7.2.1 for a rough estimate), is **expected to rise exponentially** due to the rising numbers of IAS and their increasing damage over time (see chapter 2.5 and Table 2), therefore the magnitude of the cost will also depend largely on the effectiveness of the measures taken to prevent the introduction into the EU and the establishment in the environment of IAS. Administrative costs for Member States would be limited to periodically informing the Commission of the measures taken and uploading information on the measures in the centralised information system.

However, public authorities are also expected to reap the **benefits** of management in terms of **avoided damage and costs.** Such benefits would be more pronounced in case eradication was achieved, but if a species were to be effectively controlled, damage and consequent costs could be kept to a minimum. For example, the on-going ruddy duck eradication programme carried out in the UK is expected to cost €4.4 million over 4-6 years. Success in eradicating this species would avoid the need to continuously spend to keep the species under control to avoid the extinction of the native white headed duck.

Efforts to eradicate, contain or manage established species will mitigate the negative consequences that IAS can have on native biodiversity and the functioning of ecosystems. One relevant example of a species already present in the EU is that of the killer shrimp**:** a voracious predator of native shrimp and a wide range of other native fauna, the killer shrimp disrupts ecosystems through direct predation and also indirect effects across trophic levels. Changes in trophic interactions could alter distributions of fish, whilst parasites carried by killer shrimp could reduce fish stocks. Furthermore, loss of diversity can affect assessments of water quality.

Further, the requirement to manage established species is expected to be particularly beneficial when it comes to public health. Some of the IAS of EU concern with a negative impact on public health will indeed already be present in the EU, with the consequent medical expenses, lost work days and suffering. One important example which is very relevant in the EU is that of ragweed, a common aeroallergen, already well-established in Eastern Europe, Northern Italy, and the Rhone river valley. In studies performed in Europe and North America, approximately 10-15% of the population is sensitive to the pollen of common ragweed (Bohren, 2006) causing rhinitis, oculorhinits, asthma, and dermatitis (Bass *et al.* 2000). Costs of ragweed allergies in North America are estimated to run up to millions of dollars every year in health care costs and lost labour hours (Bohren, 2006). The problem is of similar magnitude in the EU: studies carried out in Germany estimated that the medical cost (prescribed medication) incurred by ragweed infestation is **€17-47 million/year** (Reinhardt et al. 2003). For the EU as a whole, this cost was estimated to amount to **118-763 million/year** (Bullock, 2012). Another plant with significant impact on public health is giant hogweed: direct skin contact with the plant induces extreme photosensitivity, which in turn can lead to severe, slow-to-heal burns and scarring. An estimate found that medical costs linked to giant hogweed in Germany may amount to over **€1 million a year**.

Private sector/primary producers and citizens

Traders and users of IAS as well as primary producers – forestry, agriculture and animal husbandry) – will be unlikely to be directly affected and bear the costs of management measures, unless it was proven, and this happens very rarely, that they were directly responsible for the release of the IAS of EU concern.

Primary producers will benefit from initiatives to eradicate or control IAS as they are often the victims of IAS invasions and they would suffer less damage costs and in some case less management costs. For example, in Germany **€20.7 million/year** are being spent to control black cherry in forestry[248]. Management at EU level of IAS can control the numbers of IAS, thus leading to fewer costs to private operators.

Furthermore, new private businesses may flourish, thanks to the need of specialised skills and machinery and new employment opportunities could be created.

Citizens are expected to derive benefits from the obligation to manage IAS: where, for example, **tourism and recreational activities** are hindered by the presence of IAS. For example the presence of Zebra mussels can interfere with fishing gear, floating mats of aquatic plants may hinder the availability of water courses for boating or angling activities.

[248] Reinhardt et al., 2003

7.3. Optional add-ons for release into the environment

When it comes to **release into the environment** (operational objective C) the basic legislative instrument, which focuses exclusively on the species listed in the list of IAS of EU concern, could be made more ambitious and with a higher level of EU intervention:

- either by introducing provisions on permits for release of IAS that are not listed in the EU list of IAS of EU concern but that are considered by Member State to be of concern for them (add-on C2)
- or by introducing an EU list of species approved for release (add-on C3) in parallel to the list of IAS of EU concern

7.3.1. Permitting requirements for releasing IAS of Member States concern (add-on C2)

Add-on C2 proposes a more pre-cautionary approach to achieve operational objective C on preventing the intentional release of IAS in the environment. Besides banning the release of species listed on the list of IAS of EU concern (i.e. demonstrated to be invasive), this sub-option would have a broader focus on preventing or controlling the release of IAS for which the damage of their release has not yet been ascertained but cannot be assumed to be non-existent.

Member States would have the freedom and responsibility to identify such species relevant for their territories and develop catalogues of species for which they have reasons to believe they may become invasive, for example because they have shown invasive behaviour in similar ecological conditions. These species would not be allowed to be released into the environment unless they obtained a permit from the Member State competent authorities.

Member States and public authorities

Regulating the release into the environment would represent a **cost for public authorities,** although part of these costs could be recovered by charging the operator or sector with an interest in releasing a particular species and thus benefitting from such release. It is not possible to provide an estimate of total costs as this will depend on the IAS to be identified as of Member State concern and on the level of interest for releasing these species. Member States authorities will also face the cost of drafting the national catalogues of IAS of Member State concern and **to evaluate the risks of such release.** Similar systems are already in place in France and UK for selected IAS and Regulation 708/2007 on the use of alien species for aquaculture is based on a permitting system: these schemes involve some administrative costs for the competent authorities and for the economic operators that need to apply for a permit to release those alien species, but there is no indication that the costs of the existing systems are disproportionate.

While managing such system would entail costs, these could be outweighed by **the benefits of adopting this more precautionary approach**. IAS for which the damage of release has not yet been ascertained but cannot be assumed to be non-existent would indeed still be allowed to be traded, but their release would be regulated. This would contribute to avoiding new invasions and **bring about benefits in terms of damage avoidance.** For example, the musk rat, which undermines riverbanks, railroads, dams and fences, irrigation structures and aquaculture, is causing damages of **€23 million/year** in the Netherlands[249] and **€2.3 million/year** in Germany for additional waterway maintenance[250]. Minimising the risk of new invasions would also avoid the management costs ensuing from IAS establishing and

[249] Van der Weijden *et al.*, 2007
[250] Reinhardt *et al*., 2003

causing damage: current costs of IAS eradication range from **€50,000 to 14 million euro per invasion per Member State**[251], depending on the invasion stage of the IAS.

Such precautionary approach would also yield benefits in terms of public health: an example of a species, whose introduction might have been avoided, had some form of preliminary judgement been made ahead of release, is that of giant hogweed, which was introduced and released in Europe for ornamental purposes and which costs millions of euros, e.g. in Germany **giant hogweed** costs €1 million/year in medical costs. Similarly, the **musk rat**, which can transmit echinococcosis, costs €4.6 million/year in medical costs[252]. The broader focus will contribute to avoiding the growing problems caused by certain noxious species being introduced and allowed to spread. The more proactive approach would be beneficial for biodiversity and ecosystem services while, at the same time, avoiding the negative consequences of listing a species on the single list of IAS of EU concern. For example, a broader focus on regulating or restricting the release into the environment for certain species may bring about a situation where certain species may be allowed to be traded (i.e. would not be listed), thus avoiding the negative economic impact that a ban for the EU would entail (e.g. American mink). It would however enable the restriction or prohibition of release into the environment of such species, with positive repercussions on biodiversity. A prohibition to release, unless in possession of a permit, would provide tools to public authorities to effectively prohibit releases, by not granting a permit. Releases would thus be illegal and tools could be developed to control such unauthorised releases.

Private sector/primary producers/citizens

Some **primary producers** (agriculture, forestry) as well as the **traders of ornamental species** (horticultural sector) or of **biological control agents** may be facing administrative costs, to seek a permit to release certain species in the environment, and may be charged to obtain a permit or authorisation, in case a cost recovery scheme was put in place. The exact magnitude of such costs will depend however, on the number of IAS intended for release into the environment which are considered of Member State concern. It is thought unlikely that species used for **agricultural purposes** (fruits and crops) may fit this description as these species usually need intensive management and require constant input in order to thrive. The situation may be different for species used in **forestry or biomass production** as species are selected also for their growth rate and ability to grow even in difficult conditions, the characteristics that can make a species invasive. It was however estimated that about 100 alien species have been introduced in European forestry over the past century, so an average of 1 new species every year, a relatively limited burden for the sector, also considering that such new species may not fit the description of species for which the damage of release cannot be assumed to be non-existent.

When it comes to **users of IAS and primary producers** interested in releasing species into the environment – e.g. forestry, agriculture – it is to be stressed that they are often suffering from the consequences of an invasion of certain species (e.g. weeds for farmers) and would thus also benefit from a more proactive approach. An example already mentioned is that of black cherry, which hinders natural regeneration of trees and hinders forest management measures such as thinning, timber harvesting or planting. Thus the **benefits of a proactive approach** can counterbalance the negative impacts.

The **horticultural sector** imports large number of ornamental species: it has been estimated that in Europe there are at least 55,000 woody plants and perennials available for sale[253].

[251] Shine *et al*, 2010
[252] Reinhardt *et al.*, 2003
[253] http://www.alterias.be/en/list-of-invasive-and-alternative-plants/alternative-plants

Beside house plants, these plants are intended to be planted outdoors, i.e. to be released. The system however, would not ban the release of all alien species, but would seek to regulate at Member State level the release of those for which the damage of release has not yet been ascertained but cannot be assumed to be non-existent, thus limiting the negative impact of a permitting system.

When it comes to the **biological pest control sector**, the system may entail costs. The species employed for biological pest control are either predators or have characteristics that allow them to control other species. This could lead to the conclusion that extra precaution should be taken to assess whether the release of such species may cause damage. The need of a more cautious approach in this sector is, however, more commonly accepted and Member States are gradually introducing obligations in this regard (e.g. France).

This system is expected to place **some constraints on the choice** of species that can be released in the environment or brought onto the market. However, the impact on the **competitiveness and profitability of business** for these sectors will remain limited to **the subset of IAS** that would be of Member State concern. Consequently, the negative consequences that this system could have on employment were also considered moderate, even offset by the benefits that these sectors would derive from a more precautionary approach. Furthermore, as it was argued also in previous sections, IAS may lead to employment losses (e.g. collapse of fisheries due to comb jelly in the Caspian and Black Sea) and a more precautionary approach to releases into the environment may contribute to avoid similar situations from occurring.

Other private sector players would be not be affected as long as the species they trade are meant to be kept in contained holding. Pet traders would therefore be unlikely to be affected. Similarly, the system would not affect the sector of **animal husbandry** (e.g. fur breeders) as also their animals are not meant to be released in the environment.

In some cases, a system to regulate species for which the damage of release has not yet been ascertained, but cannot be assumed to be non-existent, may hinder the release of species prized for certain activities, such as **hunting and angling**. However, this **impact was considered moderate** because even if release into the environment was restricted, fishing or hunting activities could focus on other non-invasive alien species or native species.

Furthermore, in general **citizens would benefit** from a more precautionary approach to the release of alien species in the environment as this would more proactively try to avoid the onset of further invasion which may have negative consequences for example for land or property owners amenities and recreational activities.

7.3.2. Introducing a single EU list of species approved for release into the environment (add-on C3)

Add-on C3 also proposes a more proactive and pre-cautionary approach to achieve operational objective C on preventing the intentional release of IAS in the environment. Alien species not yet present would not be allowed to be released into the environment unless proven harmless by risk assessment. This add-on would introduce the concept of an EU list of species approved for release, beside the single list of IAS of EU concern which would of course be automatically banned from release, having been risk assessed and found invasive.

Member States and public authorities

Add-on C3 which limits the ability to release species into the environment only to some authorised species in the EU would provide the highest level of environmental protection and guarantee a uniform approach at EU level, but this would entail **substantial costs** for **public**

authorities to develop the numerous assessments needed to establish the list of species approved for release. This add-on would also entail **considerable enforcement efforts and costs**. Being the most stringent approach to release into the environment, this add-on will also yield benefits in terms of **public health** and on **environment and biodiversity**.

Private sector/primary producers/citizens

Primary producers (agriculture, forestry) as well as the **traders of ornamental species** (horticultural sector) or of **biological control agents** are expected to face negative impacts as their business and activities would be **disrupted**, while the necessary risk assessments are being carried out. This option would not simply restrict the choice of new species for release, but would rather determine the limited choices available, seriously hampering business and negatively affecting the **competitiveness and profitability of these sectors,** as the possibility to bring in new species would depend on a positive risk assessment. Such constraints may be particularly felt by the sectors dealing with plant species, considering the volume of plant species that are traded (it has been estimated that in Europe there are at least 55,000 woody and perennial plant species available for sale[254]). This may in turn have **negative consequences on employment**. It is also to be said that since primary producers often suffer the consequences of an invasion, they would also **benefit from a more proactive** approach, but at the cost of serious disruption of certain activities.

7.4. Optional alternative action for rapid response

When it comes to **early warning and rapid response** (operational objective D), the basic legislative instrument could be made more stringent and ambitious with a higher level of EU intervention, by introducing the obligation for Member States to eradicate new IAS, unless a derogation was granted by the Commission (alternative action D3).

7.4.1. Obligation to eradicate newly establishing IAS

While the basic legislative instrument left the choice between eradication, control and containment, with alternative action D3, Member States would have **an obligation to rapidly eradicate** newly establishing IAS of EU concern. Since eradication is not always possible or feasible, and in those cases when it is ascertained that a newly detected species is actually well established in a territory, Member States would have the possibility to apply for a derogation from the obligation, with the approval of the Commission, and resort to other management measures. The Commission would have a limited time to provide its decision. Pending the decision from the Commission the Member State would be required to take measures to contain the IAS and prevent its spread.

Member States and public authorities

It is extremely difficult to quantify the costs of the rapid **eradication requirement** as this will largely depend on what species Member States will detect on their national territories. The Member States will also have to assess whether: 1) the species detected is newly establishing, or if it is actually well-established, but was not detected before and 2) eradication is actually feasible. Having established that eradication is feasible, Member States will have the legal obligation to proceed with it and this will entail at first higher costs than with the basic legislative instrument, which leaves to the Member States the possibility to select whether to eradicate, contain or control a species (containment and control measures tend to be cheaper than eradication at first). **Public authorities** will be largely responsible for the higher upstream costs, although with possible EU funding (LIFE, ERDF, EAFRD).

[254] http://www.alterias.be/en/list-of-invasive-and-alternative-plants/alternative-plants

The **derogation mechanism** will entail additional administrative costs for Member States that will need to prepare and motivate their application for derogation and for the Commission, which will have to examine all dossiers submitted and approve or reject the applications for derogation.

However, such high initial investment would yield substantial benefits: wherever an IAS could be completely eradicated, ALL long term damage or management costs would be avoided, costs that may easily go into millions of euro per IAS per year. The greater focus of this action on early eradication is expected to lead to the eradication of more species than it would be the case under the basic legislative instrument, where Member States are left with the choice between eradication and other (cheaper) measures, such as containment and control. The benefits of quickly solving the problem for good are thus expected to be more pronounced than with the basic legislative instrument. Substantial benefits will also accrue in terms of **public health** and **environmental protection**. It can be estimated that those additional **benefits** will **counterbalance the additional short term costs.**

Private sector/primary producers/citizens

When it comes to the obligation to rapidly eradicate IAS of EU concern, the private sector would normally not bear the costs of the rapid response obligation, unless it was possible to prove (and this is rarely the case) that they were responsible for the release. In very rare cases, when the polluter could be identified, costs of rapid response could be recovered. On the contrary, considering that **primary operators** and **citizens** are often the victims of IAS invasions, then a greater focus on early eradication could yield substantial benefits in terms of damage avoidance, public health and environmental protection.

8. ANNEX VIII - GLOSSARY

The following definitions are working terminology to enable a better understanding of the Impact Assessment report. They should not be taken to be legal definitions.

Alien species - a species, subspecies or lower taxon, introduced outside its natural past or present distribution, including any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce

Invasive alien species (IAS) - means an alien species whose introduction or spread has been found, through risk assessment, to threaten biodiversity and ecosystem services, or to have a negative impact on the environment, society and the economy.

IAS of EU concern – these species will be the ones proven to be invasive by risk assessment, based on criteria that would include environmental as well as socio-economic considerations, and which are deemed by the Commission and Member States to be the ones on which action at EU level should focus, given their impact. The recognition of an alien species as an IAS of EU concern will trigger obligations for the Member States to tackle them.

IAS of MS concern - IAS not included in the list of IAS of EU concern, but for which Member States consider that the damage deriving from their release, while not fully ascertained, could be of significance. The decision on whether an alien species can be considered of MS concern will rest with each Member State. The only obligation that this will imply is that the Member States introduce a permitting system for the release into the environment of the species they consider of their concern (MS concern).

Eradication - means the complete and permanent removal by physical, chemical or biological means of a population of an invasive alien species.

Control – means any action aimed at keeping the numbers of individuals of an IAS in check and avoiding excessive proliferation.

Containment – means any action aimed at keeping an IAS within a certain geographical area and avoid their spatial spread.

Management - shall consist of any physical, chemical or biological action aimed at the eradication, control or containment of a population of an invasive alien species so that it no longer poses any significant risk to biodiversity and ecosystem services, as well as to plant, animal and human health, society and the economy

Pathway management – any action aimed at addressing the unintentional introduction into the EU as well as the release into the environment of IAS through managing their routes of biological invasions, i.e. the mechanisms and vectors that allow the introduction and spread of IAS. Pathway management actions may range from awareness raising and voluntary measures to, possibly, regulatory measures, including border checks on cargoes and commodities or other biosecurity measures.

9. ANNEX IX: REFERENCES

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