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REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the review of the application of Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species

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1. INTRODUCTION

Invasive alien species (IAS) are animals and plants that, as a result of human intervention, are introduced accidentally or deliberately into a natural environment where they are not normally found, with serious negative consequences for their new environment.

IAS are one of the five major causes of biodiversity loss in Europe and worldwide[1]. They can also cause significant adverse impacts on human health and the economy. Regulation (EU) No 1143/2014 on the prevention and management of the introduction and spread of invasive alien species (the IAS Regulation) entered into force on 1 January 2015. It aims to: (i) prevent, minimise and mitigate the adverse impacts of IAS on biodiversity and ecosystem services; and (ii) limit social and economic damage.

The adoption of the IAS Regulation was a major step forward in developing the EU's biodiversity policy. Adopting the IAS Regulation fulfilled both: (i) Action 16 of Target 5 of the EU biodiversity strategy to 2020[2]; and (ii) Aichi Target 9 of the strategic plan for biodiversity 2011-2020 under the Convention on Biological Diversity[3].

The present report reviews the application of the IAS Regulation as required under its Article 24(3). This report is primarily based on reports submitted by the Member States[4] that cover the period 1 January 2015 to 31 December 2018. This report goes beyond this period in any areas for which more recent information is available. Information in this report was also drawn from an open public consultation carried out in 2021.

The analysis presented in this report is limited by the short period of application of the Regulation. Although the IAS Regulation entered into force in January 2015, most of its provisions only became effective in August 2016, when the first Union list entered into force.

Moreover, key obligations for the Member States (e.g. setting up a surveillance system and putting in place management measures for widely spread IAS of Union concern) only became applicable in January 2018 (i.e. 18 months after the adoption of the first Union list). Furthermore, the obligation for the Member States to draw up and implement action plans to address the priority pathways of unintentional introduction and spread of IAS of Union concern applied only from July 2019 (i.e. 36 months after the adoption of the first Union list).

Therefore, full implementation of the IAS Regulation only started in July 2019. For this reason, the Commission is not supplementing this report with a legislative proposal for amending the Regulation.

[1] Secretariat of the Convention on Biological Diversity (2020), Global Biodiversity Outlook 5.

[2] *Our life insurance, our natural capital: an EU biodiversity strategy to 2020* (COM(2011) 244).

[3] https://www.cbd.int/decision/cop/?id=12268

[4] All Member States (referring to the EU-28 before the withdrawal of the United Kingdom) except one submitted a report with information covering the period 1 January 2015 to 31 December 2018. The reported information is available at ias.eea.europa.eu.

2. IMPLEMENTATION OF THE IAS REGULATION

2.1. Article 4. The list of IAS of Union concern

The list of IAS of Union concern ('the Union list') is at the core of the IAS Regulation. It contains a list of IAS whose adverse impact has been deemed sufficiently severe to require concerted action at Union level. Listed species are subject to the restrictions and measures set out in the Regulation.

To be included on the Union list, species must meet all the criteria in Article 4(3), with due consideration to: (i) the implementation cost for Member States to take action against the IAS; (ii) the cost of inaction; (iii) the cost-effectiveness of action; and (iv) the socioeconomic aspects (Article 4(6)). Risk assessments underpin this process, and the quality of these risk assessments is verified by the Scientific Forum[5]. The Union list and its updates are adopted by implementing acts, subject to the positive opinion of the Committee on Invasive Alien Species[6].

The first Union list[7] entered into force on 3 August 2016. It contained 37 species. A first[8] and a second update[9] of the list entered into force on 2 August 2017 and on 15 August 2019, respectively. These updates added 12[10] and 17 species respectively. A third update of the Union list is expected by the end of 2021. The total number of IAS of Union concern is currently 66, of which:

- 30 are animal species and 36 are plant species;
- 41 are primarily terrestrial species, 23 are primarily freshwater species, 1 is a brackish-water species and 1 is a marine species.

Species may be taken off the list if they no longer meet one or more criteria, but this has not yet happened. According to Article 4(2), the Union list must be comprehensively reviewed by August 2022, 6 years after the entry into force of the initial list.

The Regulation has made it possible to select the species to list in an objective and scientifically robust way. However, the solid scientific assessment that underpins the listing comes at the price of speed: completing a risk assessment takes at least 2 years. It then takes at least another year until a decision is taken on whether to list the species. Nevertheless, if Member States perceive a new IAS as an imminent threat, they can take emergency measures under Article 10, a provision that has not yet been used.

Recent research[11] indicates that the increase in numbers of newly introduced alien species does not show any sign of saturation and most taxa even show increases in the rate of first records over time. Sooner or later, many of these alien species are likely to become invasive. It is therefore quite likely that more species will have to be included on the Union list in the future. Some publications have suggested the need to list gradually a

[5] Expert group provided by Article 28 of the IAS Regulation.
[6] Committee provided by Article 27 of the IAS Regulation.
[7] Commission Implementing Regulation (EU) 2016/1141 (OJ L 189, 14.7.2016, p. 4).
[8] Commission Implementing Regulation (EU) 2017/1263 (OJ L 182, 13.7.2017, p. 37).
[9] Commission Implementing Regulation (EU) 2019/1262 (OJ L 199, 26.7.2019, p. 1).
[10] The inclusion of the raccoon dog *Nyctereutes procyonoides* applied as of 2 February 2019. Therefore, in 2019, the Member States reported on 48 species.
[11] See e.g. Seebens H. *et al.* (2017), 'No saturation in the accumulation of alien species worldwide', *Nature Communications* 8:14435. doi.org/10.1038/ncomms14435.

few hundred species in order to achieve the objectives of the IAS Regulation[12]. Some stakeholders (for instance those trading in alien species) disagree, arguing that the Union list already includes too many species and that the implementation burden is too heavy.

In any case, the Union list cannot include all possible IAS. This is because the criteria to be met to be included on the list are quite demanding. On the other hand, the IAS Regulation provides quite broad prioritisation criteria. For example, Article 4(6) requires two types of IAS to be prioritised: (i) those that are not yet present, or are at an early stage of invasion and are most likely to have a significant adverse impact; and (ii) those that are already established and have the most significant adverse impact.

Of the 66 listed IAS, 12 are not yet present in the Union's territory, while many are already widely spread and unlikely to be eradicated. Listing species not yet present in the EU has a strong preventive effect, since they cannot be brought into the territory of the Union. However, experience has shown that the evidence necessary to complete a risk assessment for such species is often lacking. When combined with uncertainty about both the dynamics of biological communities and the effects of climate change, this makes it very challenging to predict the potential impacts of a species if it was introduced. As a result, the listing of species not yet present in the EU has proven difficult. However, the Union list still has a preventive effect. All listed species that are already established in the EU, (including species already present in most of the Member States like the pond slider *Trachemys scripta* and the giant hogweed *Heracleum mantegazzianum*), have potential to spread significantly further (see Figures 1 – 4)[13]. Preventing this further spread has been one of the main arguments for including them on the Union list.

[12] See Carboneras C. *et al.* (2017) 'A prioritised list of invasive alien species to assist the effective implementation of EU legislation', *Journal of Applied Ecology* 2017, 1-9. https://doi.org/10.1111/1365-2664.12997; and Nentwig W. *et al.* (2018) 'More than "100 worst" alien species in Europe', *Biological Invasions* (2018) 20:1611-1621. https://doi.org/10.1007/s10530-017-1651-6. However, several of the species suggested for inclusion on the Union list are out of the scope of the IAS Regulation, and in most cases are dealt with under other instruments, mainly EU legislation on plant health.

[13] This is also demonstrated by the underpinning risk assessments.

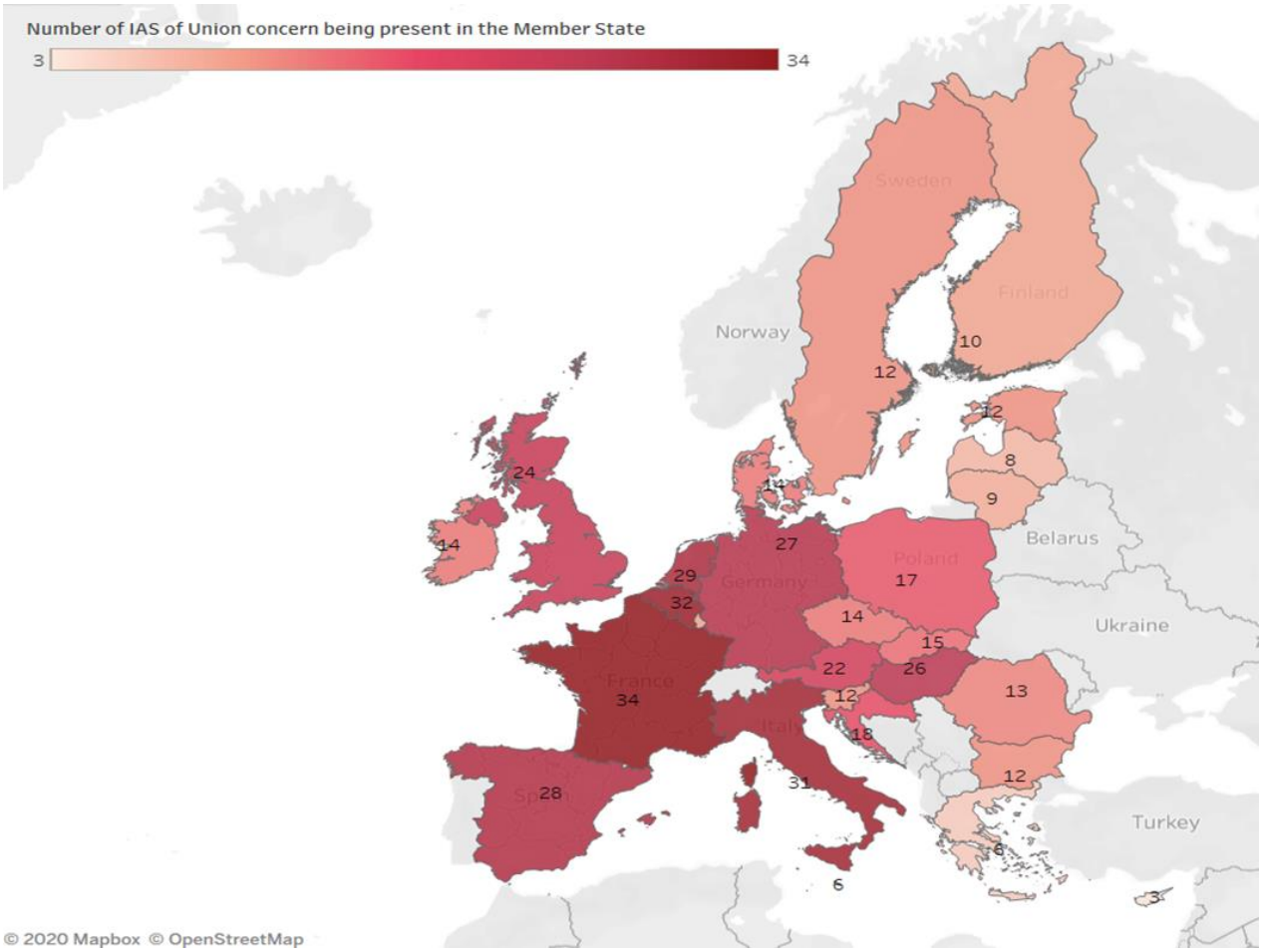


Figure 1: *Number of IAS of Union concern out of the 48 covered by the 2019 reports that were reported as present by each of the Member States. Portugal did not submit a report.*

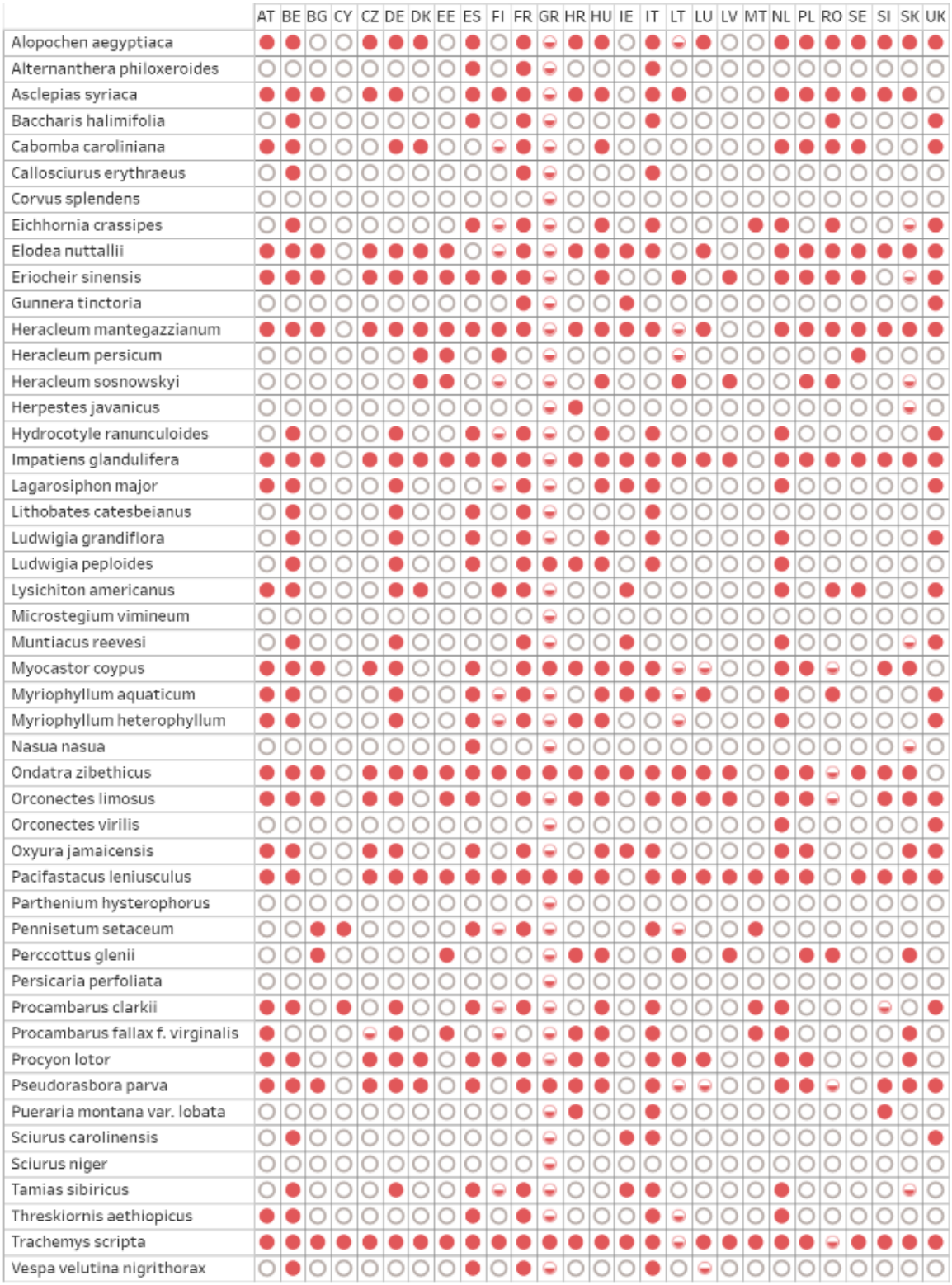


Figure 2: *Status of presence per Member State of the 48 IAS of Union concern covered by the 2019 reports. Portugal did not submit a report.*

The symbols  *indicate respectively that: (i) the species is present in a given Member State; (ii) it is unknown whether it is present in a given Member State; and (iii) it is considered as not present in a given Member State.*

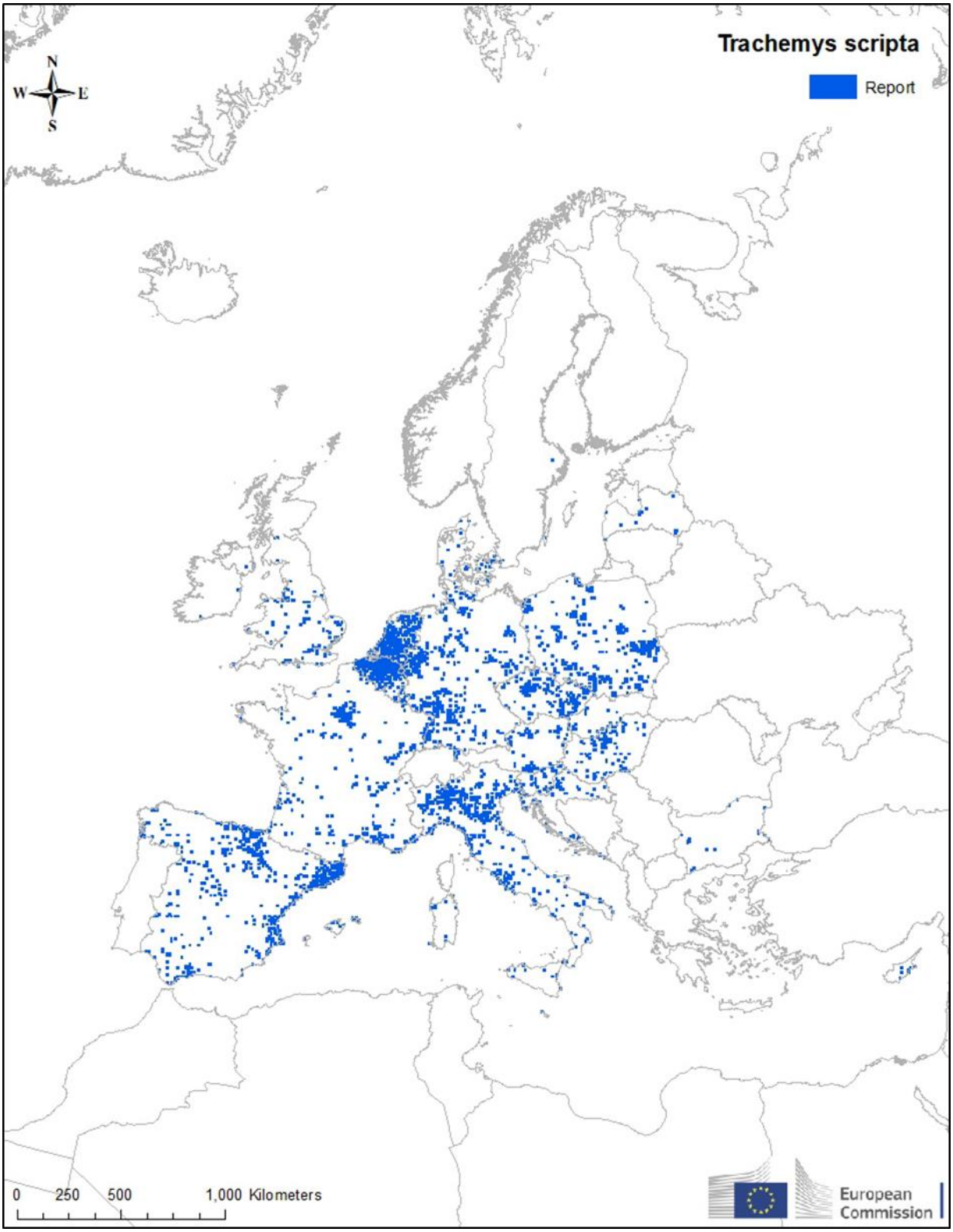


Figure 3: *Distribution of Trachemys scripta (10 x 10 km grids) as reported by the Member States in 2019. The species is also present in Greece, Portugal and Romania, but these Member States did not provide the distribution at grid level.*

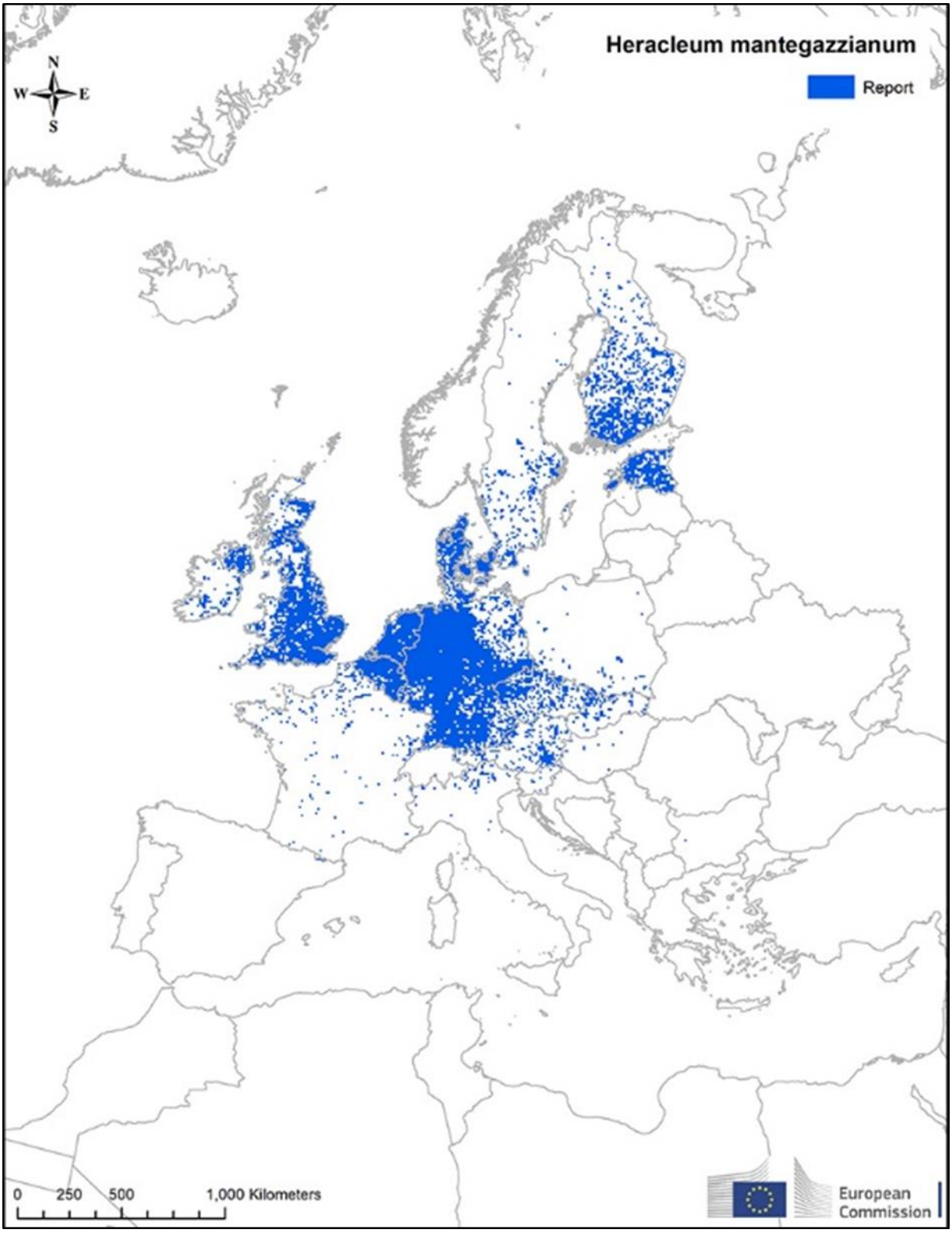


Figure 4: *Distribution of Heracleum mantegazzianum (10 x 10 km grids) as reported by the Member States in 2019.*

An additional challenge arises when a species is added to the Union list. If the IAS added to the Union list is a popularly traded species, it is often replaced on the market by other alien species, which are potentially also invasive. These newly introduced species must in turn be risk assessed and considered for inclusion on the Union list. This problem is mostly seen in the pet trade (e.g. replacement of pond sliders *Trachemys scripta* by other alien turtles) and the horticultural trade (e.g. replacement of the water hyacinth *Eichhornia crassipes* by the water lettuce *Pistia stratiotes*). To address this issue, some stakeholders have suggested drawing up lists of permitted species instead of a list of restricted species. The current legal framework does not provide for this approach at EU level, but some Member States have adopted it in their national legislation, mainly for the pet trade.

The consideration of costs and socioeconomic aspects, as required by Article 4(6), has influenced the listing process. The most characteristic example is the American mink (*Neovison vison*), an IAS with significant adverse impacts on biodiversity. The American mink is bred for fur farming in thousands of mink farms in the EU. This species has not been listed[14]. Including it on the Union list would make its breeding for fur production subject to the authorisation procedure under Article 9 of the IAS Regulation. Several Member States considered the costs of implementing this procedure disproportionate and opposed listing this species. It is important to note that the IAS Regulation provides for alternative solutions to adding a species to the Union list. Firstly, concerned Member States may address such species through national measures. Secondly, the species may be dealt with through greater regional cooperation (see Sections 2.3 and 2.4 below).

Listing marine IAS poses particular challenges[15]. As seen above, only one of the 66 IAS on the Union list, *Plotosus lineatus*, the striped eel catfish, is a marine species. However, several marine species were considered for the first Union list. The main obstacle to including marine species has been the concern that the high environmental connectivity and dispersion capacity of species in the marine environment make it more difficult and costly to survey and control biological invasions. This is especially relevant for species that enter the Mediterranean Sea via the Suez Canal. Yet despite those challenges, surveillance, early detection and rapid eradication of marine species in targeted areas can mitigate their adverse impacts[16]. For pathways of introduction and spread, the spread and impacts of IAS in the marine environment could be significantly reduced by: (i) the full implementation of the International Maritime Organization (IMO)[17] Ballast Water Management Convention[18]; and (ii) enhanced implementation of the IMO Biofouling Guidelines. Several risk assessments for marine IAS have, therefore, been prepared for consideration for the next update of the Union list.

[14] This has been criticised by several stakeholders. See, for example, the public feedback on the proposal for the second update of the Union list: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/2124-Update-of-the-list-of-Invasive-Alien-Species-of-Union-concern.

[15] See Kleitou P. *et al.* (2021) 'The Case of Lionfish (*Pterois miles*) in the Mediterranean Sea Demonstrates Limitations in EU Legislation to Address Marine Biological Invasions', *Journal of Marine Sci*. Engineering 2021, 9, 325. https://doi.org/10.3390/jmse9030325.

[16] See Giakoumi S. *et al.* (2019) 'Management priorities for marine invasive species', *Science of the Total Environment*, 688 (2019) 976-982. https://doi.org/10.1016/j.scitotenv.2019.06.282.

[17] IMO: the International Maritime Organization, the United Nations' specialised agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships.

[18] The Convention entered into force on 8 September 2017, while the deadline for all vessels to comply is 8 September 2024.

2.2. Restrictions and derogations (Articles 7, 8, 9, 31 and 32)

The most direct impact of the IAS Regulation is that listed species are subject to restrictions, including a trade ban (Article 7). Exceptions to most restrictions are possible in exceptional cases: either (i) under a system of permits managed by the Member States (allowing for research or *ex-situ* conservation activities under Article 8) or (ii) authorised by the Commission (in exceptional cases for reasons of compelling public interest under Article 9). Other transitional derogations are possible for owners of companion animals (Article 31) and for commercial stocks (Article 32).

Twelve Member States reported having issued 100 permits in total between the entry into force of the first Union list in August 2016 and December 2018. These permits concerned 32 IAS of Union concern. Of the permits, 87 were for research and 13 for *ex-situ* conservation. The *ex-situ* permits were given to establishments hosting unwanted specimens as part of management measures, an activity that actually does not require a permit.

To date, the Commission has adopted two authorisation decisions under Article 9. These two decisions authorised two Member States to pursue the farming of raccoon dogs (*Nyctereutes procyonoides*) for fur production.

2.3. Article 11. IAS of regional concern and species native to the Union

Article 11 allows Member States to identify, from their lists of IAS of Member State concern (see Section 2.4), species native or non-native to the Union that require enhanced regional cooperation. Such cooperation may lead to applying to those species – and only in the Member States concerned – most of the restrictions that apply to the species included on the Union list. Regional cooperation must be triggered by a Member State, which has not happened yet.

For IAS native to the Union, the Scientific Forum and other consulted experts have confirmed that enhanced regional cooperation would have added value for addressing several such species. However, the Scientific Forum identified an obstacle: the uncertainty over the exact limits between the native and alien range of such species. These limits often fall within the territory of the Member States concerned: species may be native in parts of a Member State but alien and invasive in other parts of the same country. Furthermore, knowledge about these limits often evolves in the light of the most recent research. Such situations also make it particularly difficult to explain to the wider public the need to take measures to manage such species.

Some stakeholders have suggested using Article 11 to regulate at a regional level species that are highly unlikely to establish themselves in large parts of the Union[19], instead of including such species on the Union list. This approach would be especially useful for species of important commercial interest. For instance, ornamental plants that can have a severe impact in the Mediterranean biogeographic region would only be regulated there, while their trade would continue in northern Europe, where it is unlikely to have significant impacts. Relevant discussions at the Committee on Invasive Alien Species indicate that the Member States have not opted for such a solution for the following three reasons:

[19] See, for example, the public feedback on the proposal for the second update of the Union list: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/2124-Update-of-the-list-of-Invasive-Alien-Species-of-Union-concern.

- the IAS Regulation clearly allows the inclusion of such species on the Union list[20];
- inclusion on the Union list is considered as a more effective measure, especially given the resulting trade ban across the Union;
- it is difficult to enforce trade restrictions only in some parts of the EU.

2.4. Article 12. IAS of Member State concern

Article 12 allows Member States to draw up a national list of IAS of Member State concern. By 31 March 2021, 10 Member States had adopted such lists[21]. The number of taxa in each of these lists ranges from 13 to over 200. Some include entire taxonomic groups (genera and families). The listed species and taxonomic groups are subject, at national level, to similar restrictions to those applying at EU level to the IAS of Union concern. Some species have been listed by several countries. These species indicate priorities common to those countries. However, with some exceptions, this has not led to coordinated action.

2.5. Article 13. Action plans on the pathways of IAS

Article 13 requires Member States to identify and prioritise pathways (i.e. routes and mechanisms) of unintentional introduction and spread of IAS of Union concern within 18 months of the adoption or update of the Union list. Article 13 also requires Member States to implement action plans to address the priority pathways within 3 years of the adoption or update of the Union list.

Most Member States have identified the priority pathways relevant to them. As required by the IAS Regulation, prioritisation was based on estimates of the volume of species entering through a pathway and the potential impact of those species. However, Member States followed different methodologies, ranging from quite simple to complex formulas.

The priority pathways identified vary substantially between the Member States, with 36 different pathways having been prioritised. Two pathways were nevertheless prioritised by most Member States: 'Escape from confinement: escape of pet, aquarium and terrarium species' and 'Escape from confinement: horticulture' (see Table 1).

Some Member States included in their analysis additional IAS which are not on the Union list so as to draw up more comprehensive action plans. This indicates that the current Union list is perceived as too limited to prioritise pathways within it. Certain pathways cannot be addressed under Article 13 unless relevant species are included on the Union list. For example, unless species introduced and spread by ballast water are included on the Union list, action to address this pathway cannot be instigated under the IAS Regulation.

Despite progress in the prioritisation of pathways, implementation of Article 13 is lagging in most Member States. By 31 March 2021, only 10[22] Member States had drawn up and communicated to the Commission their pathway action plan(s). In June 2021, the

[20] Article 4(3)(b) and Recital (10) of the IAS Regulation.

[21] The risk assessment area is the Union's territory, excluding the outermost regions. Article 6 of the IAS Regulation lays down specific provisions for the outermost regions, requiring Member States with outermost regions to adopt a list of invasive alien species of concern for each of them.

[22] Including the United Kingdom before its withdrawal from the EU.

Commission initiated procedures against 18 Member States for not having drawn up the action plan(s).

Pathway category/subcategory according to the classification used in the 2019 reports		Number of Member States that have identified the pathway as a priority one	Number of IAS of Union concern corresponding to the pathway
1. RELEASE IN NATURE	1.1 Biological control	-	-
	1.2 Erosion control/dune stabilization (windbreaks, hedges, …)	2	3
	1.3 Fishery in the wild (including game fishing)	6	7
	1.4 Hunting	1	1
	1.5 Landscape/flora/fauna 'improvement' in the wild	4	6
	1.6 Introduction for conservation purposes or wildlife management	-	-
	1.7 Release in nature for use (other than above, e.g. fur, transport, medical use)	2	12
	1.8 Other intentional release	4	11
2. ESCAPE FROM CONFINEMENT	2.1 Agriculture (including biofuel feedstocks)	2	2
	2.2 Aquaculture/mariculture	6	18
	2.3 Botanical garden/zoo/aquaria (excluding domestic aquaria)	5	39
	2.4 Pet/aquarium/terrarium species (including live food for such species)	13	33
	2.5 Farmed animals (including animals left under limited control)	1	2
	2.6 Forestry (including afforestation or reforestation)	2	4
	2.7 Fur farms	1	3
	2.8 Horticulture	11	23
	2.9 Ornamental purpose other than horticulture	9	26
	2.10 Research and *ex-situ* breeding (in facilities)	-	-
	2.11 Live food and live bait	8	9
	2.12 Other escape from confinement	2	11
3. TRANSPORT – CONTAMINANT	3.1 Contaminant nursery material	2	16
	3.2 Contaminated bait	-	-
	3.3 Food contaminant (including of live food)	1	2
	3.4 Contaminant on animals (except parasites, species transported by host/vector)	3	15
	3.5 Parasites on animals (including species transported by host and vector)	-	-
	3.6 Contaminant on plants (except parasites, species transported by host/vector)	3	14
	3.7 Parasites on plants (including species transported by host and vector)	-	-
	3.8 Seed contaminant	1	3
	3.9 Timber trade	-	-
	3.10 Transportation of habitat material (soil, vegetation, etc.)	8	23
4. TRANSPORT - STOWAWAY	4.1 Angling/fishing equipment	6	20
	4.2 Container/bulk	2	3
	4.3 Hitchhikers in or on airplane	1	1
	4.4 Hitchhikers on ship/boat (excluding ballast water and hull fouling)	3	14
	4.5 Machinery/equipment	3	17
	4.6 People and their luggage/equipment (in particular tourism)	1	7
	4.7 Organic packing material, in particular wood packaging	1	1
	4.8 Ship/boat ballast water	5	7
	4.9 Ship/boat hull fouling	4	8
	4.10 Vehicles (cars, train, …)	4	12
	4.11 Other means of transport	1	1
5. CORRIDOR	5.1 Interconnected waterways/basins/seas	6	35
	5.2 Tunnels and land bridges	-	-
6. UNAIDED	5.3 Natural dispersal across borders of invasive alien species that have been introduced through pathways 1 to 5	8	45

Table 1: *Categorisation of pathways used in the reporting, number of Member States that have identified each pathway as a priority and number of IAS of Union concern identified relevant to each of the pathways.*

2.6. Article 14. Surveillance system

Article 14 requires Member States to set up a surveillance system that collects and records data on the occurrence in the environment of IAS of Union concern.

By 31 March 2021, 24 Member States had set up such a system, often building on existing systems, including systems deriving from other pieces of EU legislation. In very few cases, a new surveillance system was set up. The systems of several Member States are linked to citizen science, and a few systems rely almost exclusively on citizen science. Some Member States also incorporate information from stakeholders (farmers, foresters, hunters, fishermen, nature conservation NGOs, etc.). In June 2021, the Commission initiated procedures against three Member States for not having set up a surveillance system.

Some gaps and inconsistencies were observed in the reported distribution of IAS of Union concern. Reports showed marked differences in the number of species recorded in border regions by neighbouring Member States (see Figure 5). This indicates that: (i) the actual distribution of some IAS of Union concern is still not fully known; and (ii) surveillance systems were, at least until 2018 when these records were collected, not covering adequately all IAS of Union concern or all national territories.

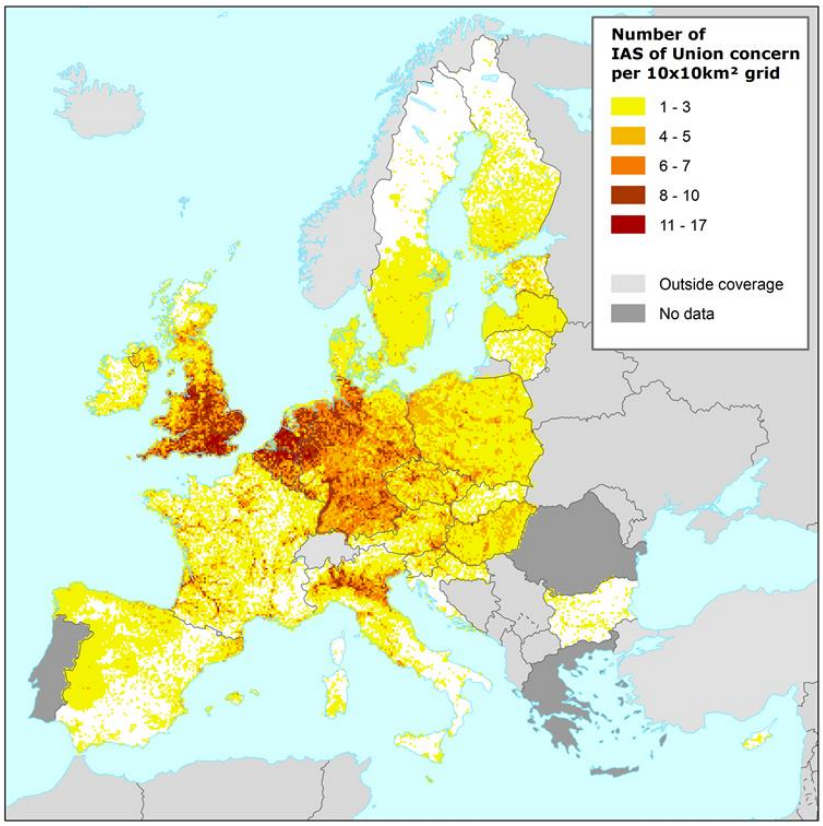


Figure 5: *Number of IAS of Union concern out of the 48 covered by the 2019 reports per 10 x 10 km grid.*

2.7. Article 15. Official controls

Article 15 required Member States to have in place by 2 January 2016 fully functioning structures to carry out the official controls necessary to prevent the intentional introduction of IAS of Union concern.

By 31 March 2021, 25 Member States had such structures in place. These structures involve the customs and/or phytosanitary/veterinary services. Member States reported only a few interceptions of IAS following official controls at borders.

The completeness of the official control structures varies between the Member States. Integrating the Union list in TARIC[23] and TRACES[24] has facilitated documentary checks. However, only a few Member States appear to carry out dedicated risk analyses and physical checks. Many Member States will need to better clarify the division of responsibilities between the various authorities involved, including in cooperation, information exchange and training programmes. In June 2021, the Commission initiated procedures against two Member States for not having implemented Article 15.

2.8. Articles 16 and 17. Early-detection notifications and rapid eradication at an early stage of invasion

Under Article 16, Member States must notify the Commission of the appearance of IAS of Union concern whose presence was previously unknown or of the re-appearance of IAS of Union concern after they have been reported as eradicated. Under Article 17, these Member States must: (i) take rapid eradication measures; (ii) notify those measures to the Commission; and (iii) inform the other Member States.

Since the adoption of the first Union list in July 2016, and up to 31 March 2021, 19 Member States (including the United Kingdom until it withdrew from the EU) notified the Commission via the dedicated notification system[25] of 135 cases of early detection, concerning 34 of the 66 IAS of Union concern. For 57 of these cases, the notifications confirmed rapid eradication; for 42, the effort was ongoing; for 5, no measures had been decided yet; and for 1, the Member State decided to apply management measures in line with Article 18 (derogations from the obligation of rapid eradication). In 30 cases, the Member States considered that rapid eradication was not achieved. The species for which most notifications of an early detection were submitted – 43 in total – is the Asian hornet (*Vespa velutina nigrithorax*).

[23] The integrated tariff of the European Union.
[24] Trade Control and Expert System.
[25] NOTSYS: https://easin.jrc.ec.europa.eu/notsys/.

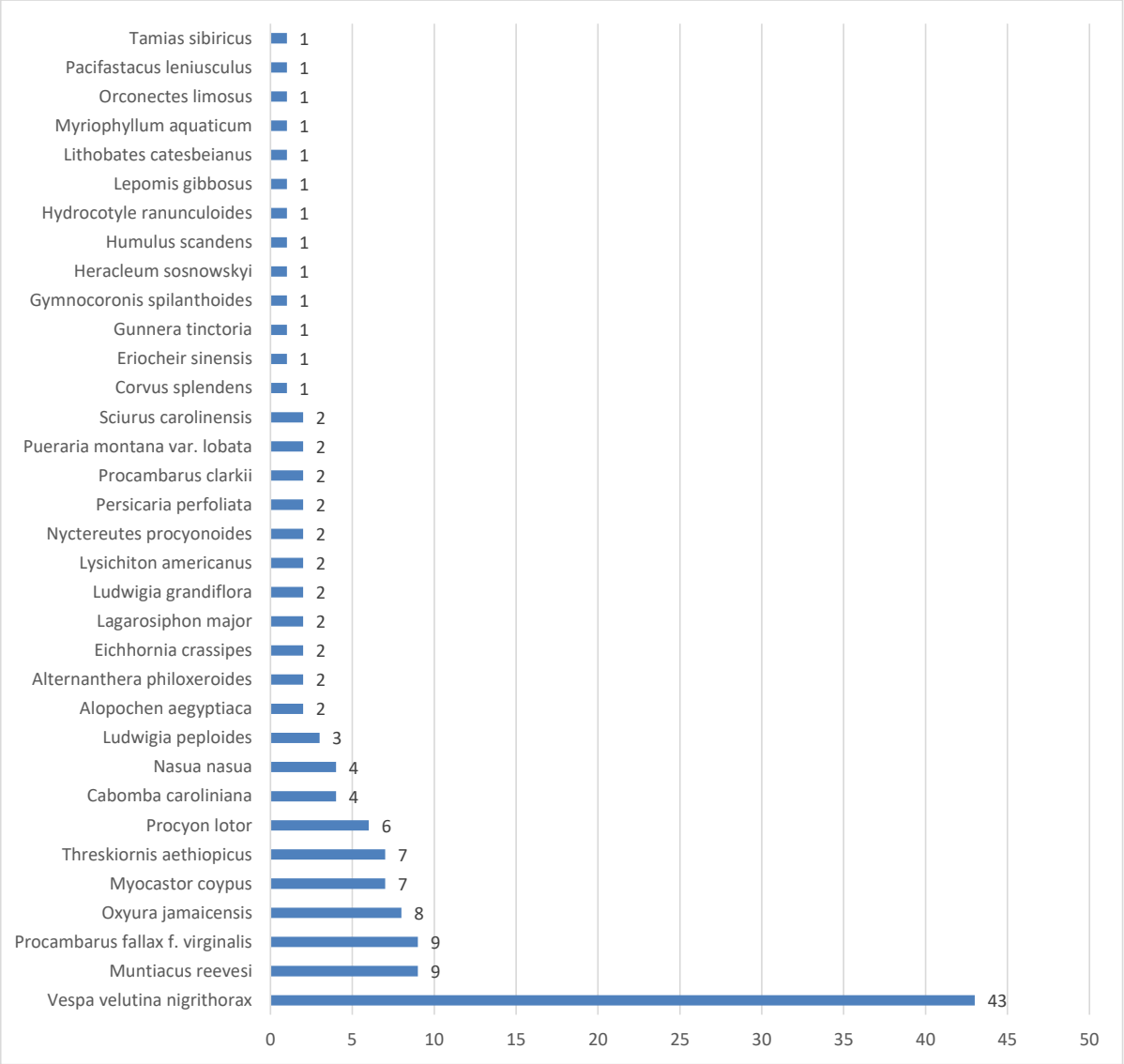


Figure 6: *Early-detection notifications per IAS of Union concern over the period July 2016 - March 2021. Numbers include multiple notifications for the same species per Member State.*

2.9. Article 19. Management measures

Article 19 requires Member States to apply effective management measures for IAS of Union concern widely spread in their territory. Such measures must aim at the eradication, population control or containment of the IAS.

23 Member States reported having applied management measures for IAS of Union concern present in their territory between July 2016 and December 2018. They reported 634 distinct management measures, covering 41 of the 43 IAS included on the Union list over that period and present in the Union. Some Member States drew up measures for each specific population of species across their territory, while others took measures at the total population across their territory.

According to the reports, 6% of the management measures resulted in eradication; 21% led to a decrease of the targeted population; 14% led to no change in the targeted population; 17% saw an increase in the targeted population despite the management measures; and 42% led to unclear results. Reports also indicate significant efforts to

understand and mitigate the impacts of the management measures on non-targeted species.

2.10. Article 25. Information support system

The information support system set up by the Commission to help in implementing the IAS Regulation comprises:

- the European Alien Species Information Network[26], enabling easy access to scientific information and spatial data on about 14 000 alien species occurring in Europe;

- the European Alien Species Notification System[27], allowing Member States to notify the Commission and inform the other Member States of the early detections of IAS of Union concern and the rapid eradication measures taken for these.

2.11. Awareness raising

Most Member States have made efforts to inform the public about the impacts of IAS and the need to address them, mainly by creating or improving dedicated websites. Member States also carried out awareness campaigns for the general public or specific segments of the public (stakeholders, young people, schools, etc.) through various means (newspaper and magazine articles, press releases, newsletters, radio and television programmes, museum exhibitions, conferences, public surveys, citizen-science mobile-phone applications, and the promotion of codes of conduct). In many Member States, the public was also informed by NGOs, the private sector, educational institutions, and other associations affected by – or working on – IAS.

The Commission raises awareness on IAS through a dedicated webpage[28] (the EASIN platform including science dissemination, online education and social media contents) and the citizen-science smartphone application Invasive Alien Species in Europe[29]. Ongoing projects aim to: (i) improve understanding and communication among the key sectors and competent authorities dealing with IAS[30]; and (ii) promote the humane management of vertebrate IAS[31]. The Commission has also developed material to help Member States implement the IAS Regulation (e.g. guides to support the identification of IAS of Union concern by official controls or surveillance systems, and a guide to interpret the categories of pathways for the introduction of alien species as defined by the Convention on Biological Diversity).

2.12. Implementation costs, benefits and funding

19 Member States provided some estimate of the cost of complying with the IAS Regulation over 2015-2018. Those costs range from EUR 17 000 to EUR 40 million per Member State. The total estimated costs across all Member States amount to around EUR 75 million over the four-year period. Most estimates cover management and awareness-raising measures, but some also include personnel and other costs. Since these

[26] EASIN: https://easin.jrc.ec.europa.eu/easin.
[27] NOTSYS : https://easin.jrc.ec.europa.eu/notsys.
[28] https://ec.europa.eu/environment/nature/invasivealien/index_en.htm
[29] https://easin.jrc.ec.europa.eu/easin/CitizenScience/BecomeACitizen
[30] https://www.adelphi.de/en/project/invasive-alien-species-improving-understanding-and-communication
[31] https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/invasive-alien-species/humane-management-vertebrate-ias

estimates do not cover the same cost categories and have various limitations, comparisons are not meaningful.

Most Member States considered that reported costs are an underestimation of true costs. Member States were mostly unable to quantify the overall costs, since implementation activities are carried out by public bodies as part of their existing work or capacity (e.g. for official controls and surveillance systems). In addition, some activities are undertaken by many different players at national, regional, and local levels, making it difficult to collate all the costs. Management measures are often part of activities that go beyond the listed IAS and address IAS or nature restoration in general, making the identification of costs related to implementing the IAS Regulation alone very difficult.

Costs are also borne by economic sectors that have to adapt their activities (e.g. pet and horticultural traders who must stop trading IAS of Union concern, and zoos that must take measures to ensure that specimens do not escape and do not reproduce).

Estimating benefits is difficult, at least in monetary terms. Benefits include the avoided adverse impacts on biodiversity, human health (e.g. skin burns caused by the giant hogweed *Heracleum mantegazzianum*) and the economy (e.g. damage to infrastructure), as a result of preventing new introductions and of managing existing populations of IAS of Union concern. Recent studies[32] confirm the assumption made in the impact assessment for the IAS Regulation[33] that the cost of addressing IAS as early as possible is clearly outweighed by the costs of inaction or action taken with significant delay. This is because damage costs and management costs tend to increase substantially over time.

Although some success has been reported in eradicating or containing IAS of Union concern (see Sections 2.8 and 2.9 above), it is premature to evaluate the overall impact of the IAS Regulation in this regard. A baseline distribution for listed species corresponding to the time of adoption of the Union list was created in 2013[34]. The first distribution reported by the Member States corresponds to the best available knowledge as close as possible to 31 December 2018. However, the management obligations only applied from February 2018 and February 2019 for the first Union list and its first update, respectively. Predictably, a comparison between the baseline and the reported distributions did not reveal any significant change[35]. A more meaningful comparison can be carried out based on the second reported distribution, due in 2025. A further measure of success would be a noticeable reduction in the pressure exerted by IAS on protected species and habitats. Such trends are, however, very slow and they are not expected to be measured before 2030.

Member States reported that action taken was funded by both national/local sources and EU funding, mainly the LIFE programme and the EU Cohesion Fund. Many Member States, especially those relying most on EU funding, invoked the lack of sufficient resources as one of the main reasons for delays in implementing certain provisions.

2.13. Implementation challenges

This review has identified some challenges and areas for improvement, set out below.

[32] See Cuthbert R.N. *et al.* 'Global economics of aquatic invasive alien species' *Science of the Total Environment* 775 (2021) 145238. https://doi.org/10.1016/j.scitotenv.2021.145238; Ahmed D.A. *et al.* 'Managing biological invasions: the cost of inaction', *Biological invasions* (2021) In review. DOI: 10.21203/rs.3.rs-300416/v1.

[33] SWD(2013) 321 final.

[34] https://easin.jrc.ec.europa.eu/easin/Documentation/Baseline.

[35] https://publications.jrc.ec.europa.eu/repository/handle/JRC123170.

- Full implementation of the IAS Regulation has still not been achieved, as most Member States have not yet implemented the action plans to address the priority pathways. Furthermore, there is scope to improve both the comprehensiveness of the coverage of surveillance systems and the official control structures in many Member States.
- Uncertainty about potential impacts or the economic significance of certain species may hinder their inclusion on the Union list, thus reducing the impact of the IAS Regulation. Nevertheless, the IAS Regulation includes provisions (emergency measures and enhanced regional cooperation) that could address species presenting imminent risks and species of economic relevance. However, the Member States have not used these provisions, while the IAS Regulation does not give the Commission the right to initiate them.
- There is scope for greater coordination between the Member States, since: (i) the lists of IAS of national concern contain some common species; (ii) priorities of management measures and effort differ between neighbouring countries; and (iii) the Member States have identified very diverse priorities in the pathways to address.
- The fact that the Union list is a priority list to which species can only be added once sufficient evidence is available means that by its nature, it cannot include all IAS.
- Lack of sufficient funding to address IAS continues to be an obstacle for many Member States. Therefore, EU funding remains important to complement national funding under various sources (e.g. the European Maritime Fisheries and Aquaculture Fund for IAS in the marine environment; Horizon Europe for relevant research; the common agricultural policy for the management of relevant IAS, etc.) to achieve full and effective implementation.
- Lack of administrative capacity, especially at the local and regional levels, is another significant challenge in several Member States. This ranges from the ability to run sufficient surveillance systems to the capacity to prioritise and carry out interventions (including: (i) preparing and implementing action plans; (ii) managing the necessary public consultations and managing conflict where it arises (e.g. with stakeholder groups opposing the listing or the management measures)).
- There are knowledge gaps, particularly in: (i) methods to document the costs and benefits of addressing IAS; (ii) the implications of climate change for the establishment and spread of IAS; and (iii) novel methods for IAS management, in particular measures addressing a broad range of IAS taxa at pathway level.

3. CONCLUSION

Given that the deadlines for implementing the various obligations of the IAS Regulation applied gradually between the adoption of the first Union list in July 2016 and July 2019, it is premature to draw conclusions on most aspects of the IAS Regulation. For this reason, the Commission did not supplement this report with a legislative proposal for amending the IAS Regulation. Further information to decide on the necessity of such a proposal will be collected via the next reports from the Member States, due in 2025.

Although the implementation of the IAS Regulation is proving challenging in several respects, it is already starting to deliver on its objectives. This first review identifies some significant achievements, set out in the bullet points below.

- The IAS Regulation has created a coherent framework for addressing IAS at EU level. It has led most of the Member States to set up a surveillance system and carry out official controls for such species. Despite the very short period of actual full implementation, there are indications that restrictions (e.g. removal of species from trade), early detection/rapid eradication and management of widely spread species deliver benefits.
- The provisions on the list of IAS of Union concern have proven to be effective and have allowed for regular updates of the list. The number of early-detection notifications and of management measures taken indicate that the listed IAS are relevant to most of the Member States.
- Information on the IAS present in Europe is now centralised and more complete than ever before. New mechanisms are in place for reporting and warning of new sightings.
- The IAS Regulation has led to increased awareness of the problem of invasive alien species, including among the general public.

The IAS Regulation is a timely piece of legislation. The projected increase in global trade and travel, together with climate change, are expected to increase the introduction and establishment of IAS. This may lead to increased adverse impacts on biodiversity and ecosystems, human health and the economy. It may also lead to an increase in related costs[36]. The full implementation of the IAS Regulation, as well as that of other relevant legislation and international agreements, must be stepped up. This is a commitment made under the EU biodiversity strategy for 2030[37].

[36] See e.g. Diagne C. *et al.* (2021), 'High and rising economic costs of biological invasions worldwide', *Nature*. https://doi.org/10.1038/s41586-021-03405-6.

[37] COM(2020)380.