

MANAGEMENT PLAN TO PREVENT INVASIVE ALIEN SPECIES SUPPLEMENT TO THE MANAGEMENT PLAN APPROVED ON 13 MARCH 2018

Contents

| | |
|--|----|
| Management plan to prevent invasive alien species Supplement to the management plan approved on 13 March 2018..... | 1 |
| Contents | 1 |
| I BACKGROUND..... | 2 |
| Invasive alien species..... | 2 |
| Preparation and adoption of the management plan | 3 |
| Key content of the management plan | 3 |
| Examples from the plan | 3 |
| Implementation of the management plan and funding for the measures..... | 4 |
| Pathways of unintentional introduction and spread | 5 |
| II MANAGEMENT PLAN | 6 |
| 1 Classification of measures, and species-specific measures and targeting..... | 6 |
| 1.1 Established species | 6 |
| 1.2 Ornamental plants found in Finland | 9 |
| 1.3 Established species in Finland’s neighbouring areas | 9 |
| 1.4 Species with a low risk of spreading | 9 |
| 2 Recommended measures for the general management of alien species | 10 |
| III ANALYSIS AND ACTION PLAN CONCERNING THE PATHWAYS OF UNINTENTIONAL INTRODUCTION AND SPREADING | 13 |
| 1 Classification of pathways of spreading..... | 13 |
| 2 Results..... | 13 |
| 2.1 Detected pathways of spreading | 13 |
| 2.2 Potential pathways of spreading | 13 |
| 3 Goals for the management of primary pathways and the prevention of spreading | 14 |
| 3.1 Prevention of escaping | 14 |
| 3.2 Spreading through contaminated products or through vectors..... | 14 |
| 4 Primary measures | 15 |
| 4.1 Targeted communication and general provision of information..... | 15 |
| 4.2 Targeted communication related to contaminated plant material and vectors | 15 |
| Table 1. Study on pathways of spreading. Pathways of spreading detected in Finland are marked with an x, and potential pathways of spreading are marked with an (x)..... | 16 |
| Appendix 1..... | 17 |

I BACKGROUND

Invasive alien species

Alien species are species introduced by human action into a natural environment where they are not normally found. According to the EU Regulation¹ on Invasive Alien Species, an alien species is regarded as invasive if its 'introduction or spread has been found to threaten or adversely impact upon biodiversity and related ecosystem services'. The risks caused by alien species may increase with climate change. On the other hand, alien species thrive in heavily disturbed and modified environments, so the good state of natural habitats reduces the spreading of alien species.

Invasive alien species must not be brought into the territory of the European Union, transferred from one Member State to another, bred, cultivated, sold, held in possession or released into the environment. Finland and the other EU Member States must seek to eradicate invasive alien species already found in their area or prevent them from spreading.

Eradicating invasive alien species and preventing them from spreading will hereinafter be referred to as the 'prevention of alien species'. The purpose of the prevention of alien species is to safeguard biodiversity and the function of ecosystems, as well as the benefits of these for human well-being.

The EU Regulation on Invasive Alien Species requires the Member States to implement effective management measures to prevent widely spread alien species. Each Member State decides on such measures independently. According to the Invasive Alien Species Regulation, these measures must not unreasonably burden the environment and their benefits must outweigh their costs. In addition, the Member States must prioritise the measures according to the size of the risk caused by the species to be prevented and the cost-efficiency of the measures.

In accordance with the EU Regulation, the management measures must not have adverse effects on the environment or human health. The measures to eradicate invasive alien animal species, control their populations and limit their spreading must be implemented in a manner that will save the animals from any avoidable pain, distress or suffering.

The invasive alien species to be prevented are specified in the list of invasive alien species of Union concern. The list is approved by the European Commission. The first list came into effect on 3 August 2016.² The list was supplemented with 12 species on 2 August 2017 (first updated list, Appendix 1).³

On 5 December 2018, the Government issued its proposal on the amendment of the Alien Species Act and the Hunting Act (HE 286/2018). The amendments will come into effect on 1 June 2019. The purpose of the amendments is to support the implementation of the proposed management plan and the management of alien bird and mammal species. Due to the schedule, however, it was not possible to take the amendments into account in more detail when preparing the proposed plan.

The Alien Species Act has been amended to enable specimens of alien bird and mammal species to be caught and killed using the same methods that can be used for unprotected animals. Government decrees can be used to provide more specific regulations concerning hunting equipment and methods, as well as limiting them with regard to specific alien bird or mammal species. The Alien Species Act also prescribes the duties of

¹ Regulation (EU) No 1143/2014 of the European Parliament and of the Council on the prevention and management of the introduction and spread of invasive alien species ([link 1](#)).

² Commission Implementing Regulation (EU) 2016/1141 of 13 July 2016 adopting a list of invasive alien species of Union concern pursuant to Regulation (EU) No 1143/2014 of the European Parliament and of the Council ([link 2](#)).

³ Commission Implementing Regulation (EU) 2017/1263 of 12 July 2017 updating the list of invasive alien species of Union concern established by Implementing Regulation (EU) 2016/1141 pursuant to Regulation (EU) No 1143/2014 of the European Parliament and of the Council ([link 3](#)).

the Finnish Wildlife Agency concerning the prevention alien species. The Hunting Act has been amended to remove the raccoon, muskrat, coypu, raccoon dog and American mink from game species and the scope of the related hunting limitations. Along with other predatory alien mammal species, the American mink is regarded by law as an invasive alien species in Finland. The other species mentioned above are included in the list of invasive alien species of Union concern.

Preparation and adoption of the management plan

According to the Act on Managing the Risk Caused by Alien Species⁴, the Ministry of Agriculture and Forestry approves the alien species management plan to determine and control prevention measures. To serve this purpose,

the ministry carried out a study in 2018 on how widely the invasive alien species included in the first updated list of invasive alien species of Union concern are found in Finland and what is the most cost-effective way to prevent them.

The study and the related proposal for a plan to prevent invasive alien species were prepared as part of the EU-HAVI2 project (Proposal for management measures and pathways of invasive alien species). The EU-HAVI2 project was carried out by the Natural Resources Institute Finland (coordinator) and the Finnish Environment Institute SYKE.

Key content of the management plan

The primary management measures in which Finland should invest were selected based on the risk arising from alien species and the costs and benefits of the prevention measures. The risk assessment is based on the typical qualities of the species, their harmful effects, their opportunities to spread and thrive in our climate, the current stage of their spreading, their current distribution and the prevention measures available.

Invasive alien species at different stages of spreading require different prevention measures. The most effective option is to completely prevent a species from being brought into or spreading in a new area, if possible. If a species is widely spread and its prevention or eradication is not technically possible or financially sensible, minimising the harmful effects by limiting the population or preventing the species from spreading into new areas can be set as the goal.

Examples from the plan

The prevention of Indian balsam must be centralised in areas of the highest natural value: conservation areas and their surrounding areas, as well as various waterside areas, such as waterside groves and along brooks and rivers. Special attention to preventing Indian balsam from spreading must be paid in areas where the species is still in low numbers.

Giant hogweed and other hogweed should be eradicated from residential, recreational and conservation areas in particular. The most cost-effective option is to begin the prevention with occurrences from which hogweed can easily spread into the surrounding environment, and with new occurrences that have not yet developed seeds.

The muskrat population in Finland has decreased naturally over the past few decades. It is recommended that its hunting continues, but there are no particular targeting needs at the moment. However, the current distribution of the muskrat needs more research.

The hunting of the raccoon dog must be prioritised in the most important bird wetlands and in the archipelago, where the species may be the most harmful for birds, as well as Lapland, to prevent the species from spreading into the neighbouring countries. Rabies vaccinations are also recommended to be continued.

⁴ Act on Managing the Risk Caused by Alien Species (1709/2015, *Alien Species Act*), section 9 ([link 4](#)).

It is particularly important to prevent the import of invasive alien species included in the EU list that are used as ornamental plants, as well as their introduction into Finnish nature. The key measure here is the effective provision of information about the risks related to alien species.

Similarly, the primary measure in preventing the unintentional spreading of alien species is the provision of information about possible pathways of spread.

Implementation of the management plan and funding for the measures

According to the Alien Species Act, the Centre for Economic Development, Transport and the Environment (ELY Centre) monitors compliance with the prohibitions and obligations included in the EU Regulation on Invasive Alien Species and the national law.⁵ The prohibitions and obligations, as well as the statutory means to enhance compliance, facilitate the prevention of invasive alien species. Prohibitions and obligations may be used when the party responsible for the spreading of an invasive alien species can be expressly identified. However, most of the prevention of invasive alien species is targeted at occurrences whose origin and method of spreading are not known and there is no party responsible for prevention. The management plan addresses the prevention of such occurrences of alien species in particular.

The Alien Species Act does not prescribe who is responsible for implementing the management plan. The authorities are responsible for the prevention of alien species in accordance with their jurisdiction based on other laws. The ELY Centres and municipalities are responsible for promoting environmental protection in their respective areas.⁶ Municipalities must monitor and promote environmental protection in their areas in order to ensure a healthy, pleasant, stimulating and environmentally sustainable living environment for their residents by protecting, maintaining and developing natural and other environments.⁷ For example, the Finnish Transport Infrastructure Agency is responsible, in addition to its other duties, for maintaining the state road and railway networks and coordinating measures related to these.⁸ The public administrative duties of Metsähallitus include, for example, the maintenance and use of the national network of conservation areas and the maintenance of other land and water areas and assets intended for the fulfilment of these duties.⁹ According to government proposal HE 286/2018, which is being processed by the parliament, the duties of the Finnish Wildlife Agency and their funding in terms of the prevention of certain invasive alien species would remain unchanged, even though the regulation of the animal species related to these duties would be transferred from the Hunting Act to the Alien Species Act.

The EU Regulation on Invasive Alien Species and the national legislation do not require the prevention of all occurrences of alien species. In the planning and implementation of management measures, attention must be paid to the damage caused by the invasive alien species and the probability of such damage, as well as the cost of the measures in relation to their benefits. Based on the study carried out for the management plan, it can be stated that the current prevention measures – such as the work carried out by the ELY Centres and municipalities, voluntary measures and the provision of information and advice – also meet the requirements of the alien species legislation.

The management plan describes the responsible parties and cooperation partners for the implementation of the measures, as well as presenting a schedule for the implementation. The purpose is for the authorities and other operators to make use of the management plan in their prevention of alien species, so the measures and the necessary resources can be allocated as effectively as possible. Responsible parties and cooperation partners for measures can be specified if additional funding is allocated to the implementation of the management plan.

⁵ The embargo on import into the EU area is monitored by Customs. The Southern Finland Regional State Administrative Agency monitors compliance with the permits it grants for the use of alien species.

⁶ Nature Conservation Act (1096/1996), section 6.

⁷ Act on the Administration of Municipal Environmental Protection (64/1986), section 3.

⁸ Act on the Finnish Transport Infrastructure Agency (862/2009), section 2.

⁹ Act on Metsähallitus (234/2016), section 5.

The Natural Resources Institute Finland coordinates the measures presented in the management plan and their monitoring. Under the supervision of the Natural Resources Institute Finland, a national network of experts in alien species supports the monitoring of alien species.

As stated above, the authorities engage in preventing alien species as part of their statutory duties. For the time being, the prevention of alien species has been promoted without additional funding by retargeting resources. Due to new needs that have emerged during the implementation of the alien species legislation, the Ministry of Agriculture and Forestry intends to allocate additional funding for measures if appropriations are allocated for this purpose in future state budgets.

Separate project funding for research, analysis and development projects that improve the prevention of alien species can be applied for, on a case-by-case basis and according to need, through the Government's analysis, assessment and research (VN TEAS) activities, or from the EU as funding for Life+ projects, for example.

Pathways of unintentional introduction and spread

According to the Alien Species Act, the Ministry of Agriculture and Forestry also approves the action plan on the pathways of unintentional spread of invasive alien species. The plan is intended to help with the management and steering of measures to prevent the species included in the EU list of alien species from spreading in Finland unintentionally, on imported goods or vehicles, for example.

In 2018, the ministry carried out a study concerning the plan as part of the EU-HAVI2 project mentioned above. Based on the study, the pathways of unintentional introduction and spread of invasive alien species in the EU were analysed, and a proposal was prepared for primary measures to limit and prevent the spreading of invasive alien species through these pathways.

II MANAGEMENT PLAN

1 Classification of measures, and species-specific measures and targeting

Based on the risk analysis, the 12 species included in the first updated list of invasive alien species of Union concern can be divided into four groups based on their current distribution, risk of spreading and the necessary management measures. The management measures are presented in their order of priority for each group.

It should be noted that the import, cultivation, breeding, sale and other possession, and introduction into a natural environment of all the species included in the list of invasive alien species of Union concern are prohibited.

It will be ensured that the benefits of the measures to remove specimens of alien animal species generally outweigh their harmful effects. In other words, attention will be paid to birds' nesting and resting periods in bird wetlands in the overall consideration.

1.1 Established species

Group 1 consists of the following species: *Indian balsam*, *giant hogweed*, *muskrat* and *raccoon dog*.

Indian balsam, giant hogweed, the muskrat and the raccoon dog are established species in Finnish nature. Indian balsam is found across the country, with the exception of the northernmost parts of Lapland. As far as possible, giant hogweed must be eradicated from Finland. The raccoon dog is found across the country, with the exception of the northernmost parts of Lapland. As far as is known, the muskrat is found across the country, but its population in Finland has decreased naturally over the past few decades.

The primary management measures for these species are as follows:

1.1.1. *Indian balsam*

Prevention measures in conservation areas and their surrounding areas will be prioritised

- Prevention in southern Finland, the area with highest number of occurrences, will be centralised in the most valuable sites: conservation areas and their surrounding areas, waterside areas and waterside groves in particular, as well as along brooks and rivers.
- Prevention measures will be implemented more actively near residential areas, particularly in population centres with the highest numbers of occurrences.
- Attention will also be paid to the prevention and slowing of spreading in areas where Indian balsam is still low in numbers, such as Lapland and Kainuu.
- Responsible parties and cooperation partners: ELY Centres, municipalities, Metsähallitus.
- Schedule: continuous.

Cost-effective prevention

- Occurrences will be removed one by one by means of weeding: during the first summer, measures will be implemented several times to ensure that no specimen can produce seeds. After this, the areas will be monitored and maintained for several years.
- The prevention measures will be started along watercourses, from the first occurrence in the upper reaches. The location of any channels and sub-channels in the upper reaches of natural bodies of water will be established first.

- Combinations of areas with multiple occurrences will be treated at the same time (e.g. villages, residential areas, riverside areas, islands).
- Cost-effective prevention methods, as well as primary prevention sites and areas in road and railway areas, will be studied.
- Responsible parties and cooperation partners: municipalities, ELY Centres, Metsähallitus, Finnish Transport Infrastructure Agency, interest groups and non-governmental organisations.
- Schedule: continuous.

1.1.2 Giant hogweed (hogweeds)

In accordance with the management measures recommended by the EU-HAVI project (Huusela-Veistola et al., 2017) and the management plan approved on 20 March 2018:

Hogweed will be eradicated from Finland within 20 years, taking into account the order of priority of the occurrences of hogweed to be removed (below).

1. Occurrences in residential and recreational areas
2. New occurrences
3. Occurrences from which hogweed easily spreads into the surrounding environment
4. Occurrences threatening endangered species and habitat types
5. Occurrences in conservation or landscape conservation areas
6. Occurrences in valuable cultural environments and biotopes
7. Occurrences further away from residential areas and access routes
8. Occurrences whose spreading into the surrounding environment is not probable due to an obstacle
 - Responsible parties and cooperation partners: ELY Centres, municipalities, Finnish Transport Infrastructure Agency, Senate Properties, Metsähallitus, landowners, interest groups and non-governmental organisations.
 - Schedule: hogweed will be eradicated from Finland by 2038.

The most effective use of chemical, mechanical and physical¹⁰ prevention methods will be planned specific to each occurrence. Herbicides and prevention methods will be examined to replace glyphosate. Guidelines on the methods mentioned above will be prepared to facilitate the prevention work.

- Responsible parties and cooperation partners: Natural Resources Institute Finland, ELY Centres, municipalities, Finnish Transport Infrastructure Agency, Finnish Safety and Chemicals Agency, Metsähallitus, Senate Properties, landowners, interest groups and non-governmental organisations, companies, research institutes, higher education institutions.
- Schedule: immediately.

Hogweed waste and soil containing hogweed will be disposed of appropriately; the processing of alien species waste and soil will be developed further; and the number of reception sites will be increased, and information about the reception sites will be provided actively.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Finnish Transport Infrastructure Agency, Senate Properties, Metsähallitus, waste management plants, landowners, Finnish Association of Landscape Industries and other interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, companies.
- Schedule: continuous.

Monitoring will continue for several years after the occurrence seems to have disappeared.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Finnish Transport Infrastructure Agency, Senate Properties, Metsähallitus, landowners, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, other interest groups and non-governmental organisations, companies.
- Schedule: monitoring will begin as occurrences are eradicated.

¹⁰ In this context, physical prevention includes hot-water treatment and flaming, for example.

1.1.3 Muskrat

The distribution of the population will continue to be studied by means of calls for observations and other observation efficiency measures, such as more active observation by citizens. Suitable monitoring methods will be developed.

- Responsible parties and cooperation partners: Natural Resources Institute Finland, Finnish Wildlife Agency, Finnish Museum of Natural History, universities.
- Schedule: 2019–.

The hunting of the species will continue. The growth of the population will be addressed, if necessary.

- Responsible parties and cooperation partners: Finnish Wildlife Agency, Metsähallitus, hunters, interest groups and non-governmental organisations.
- Schedule: 2019–.

1.1.4 Raccoon dog

The hunting of the raccoon dog will be enhanced primarily in wetland areas important for birds¹¹; in the archipelago; in the nesting areas and sites of endangered birds that are important for the protection of species; in the nesting habitats of game birds with declined populations; and in Lapland.

- Responsible parties and cooperation partners: Finnish Wildlife Agency, Metsähallitus, ELY Centres, municipalities, hunters, interest groups and non-governmental organisations.
- Schedule: continuous.

The hunting of the raccoon dog will be enhanced in late winter and spring in particular to ensure that the raccoon dog population is as small as possible during birds' nesting period.

- Responsible parties and cooperation partners: Finnish Wildlife Agency, Metsähallitus, ELY Centres, hunters, interest groups and non-governmental organisations.
- Schedule: continuous.

The spreading of the raccoon dog into Sweden and Norway will be prevented as far as possible in cooperation with these countries.

- The export of Judas raccoon dogs¹² to Sweden will be enabled if the recipient so wishes.
- Responsible parties and cooperation partners: Finnish Wildlife Agency, Metsähallitus, hunters, interest groups and non-governmental organisations.
- Schedule: continuous.

The provision of information will be increased to ensure the effective and appropriate hunting of the raccoon dog.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Natural Resources Institute Finland, Finnish Wildlife Agency, Finnish Food Authority, Metsähallitus, ELY Centres, Finnish Environment Institute SYKE, hunting associations, municipalities, interest groups and non-governmental organisations.
- Schedule: continuous.

Rabies vaccinations will be continued along the south-eastern border of Finland.

- Responsible parties and cooperation partners: Finnish Food Authority, Finnish Wildlife Agency, hunters.
- Schedule: continuous (once a year).

¹¹ E.g. special protection areas (SPA) within the Natura network for the conservation of birds and areas covered by the protection programme for bird waters.

¹² The Judas technique has been tested successfully in Sweden. In areas with sparse raccoon dog populations, individual raccoon dogs will be equipped with GPS transmitters, and these individuals make it possible to locate other raccoon dogs ([link 5](#)).

1.2 Ornamental plants found in Finland

Group 2 consists of the following species: *crimson fountaingrass* and *common milkweed*.

Crimson fountaingrass and common milkweed have both been used as ornamental plants in Finland. Crimson fountaingrass will not overwinter in the Finnish climate, unlike common milkweed. The existing occurrences of common milkweed must be eradicated. Garden retailers and hobbyists must be informed about the prohibition on the import and sale of these species.

Occurrences of common milkweed must be removed mechanically when detected.

- Responsible parties and cooperation partners: ELY Centres, municipalities, landowners.
- Schedule: continuous.

Garden hobbyists will be informed about the import prohibition.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, Finnish Environment Institute SYKE, ELY Centres, Customs, Finnish Food Authority, Finnish Association of Landscape Industries, Finnish Association of Nurserymen, Finnish Glasshouse Growers' Association, Union of Fruit and Berry Farmers in Finland, other interest groups and non-governmental organisations.
- Schedule: continuous.

1.3 Established species in Finland's neighbouring areas

Group 3 consists of the following species: *Nuttall's waterweed* and *the Egyptian goose*.

Nuttall's waterweed has an established and extensive population in Sweden, which is why there is a high risk of this species spreading into Finland, a country with similar climate conditions. Specimens of this species must be eradicated when detected.

The nearest Egyptian goose population is probably in Denmark. In Sweden, based on individual observations, this species is concentrated in the southern coast, but observations have also been made north of Stockholm. Two observations of the Egyptian goose have been made in Finland (in 1968 and 1977), and individual birds may also fly to Finland in the future. Specimens of this species must be eradicated when detected.

Information will be provided about the spreading opportunities and harmful effects of Nuttall's waterweed, and guidance will be provided on recognising the species and eradicating it immediately when detected.

- Responsible parties and cooperation partners: ELY Centres, interest groups and non-governmental organisations.
- Schedule: continuous.

The Egyptian goose will be prevented from creating established populations in Finland.

- Responsible parties and cooperation partners: Finnish Wildlife Agency, ELY Centres, BirdLife Finland, other interest groups and non-governmental organisations.
- Schedule: continuous.

1.4 Species with a low risk of spreading

Group 4 consists of the following species: *broadleaf watermilfoil*, *Japanese stiltgrass*, *alligator weed* and *Chilean rhubarb*.

These species have not been found in Finland. Broadleaf watermilfoil and Japanese stiltgrass are relatively likely to survive in the Finnish climate, but their spreading into Finland is unlikely. Alligator weed and Chilean rhubarb do not survive in Finland's climate conditions. Alligator weed is probably not imported to Finland. Chilean rhubarb is an ornamental plant, and there might be interest in importing specimens of the species to

Finland when the climate becomes more favourable in the future. For these species, monitoring their distribution outside Finland and providing information about the prohibition on importing them to Finland are currently sufficient management methods.

The development of the distribution area of these species outside Finland will be monitored using the EU's information support system¹³, for example.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Museum of Natural History, ELY Centres.
- Schedule: continuous.

Garden hobbyists will be informed about the import prohibition.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, Finnish Environment Institute SYKE, ELY Centres, Customs, Finnish Food Authority, Finnish Association of Landscape Industries, Finnish Association of Nurserymen, Finnish Glasshouse Growers' Association, Union of Fruit and Berry Farmers in Finland, other interest groups and non-governmental organisations.
- Schedule: continuous.

2 Recommended measures for the general management of alien species

The reception and appropriate processing of waste and soil containing alien plant material will be developed to be effective. The need for new reception sites for alien species material will be examined to create a regionally sufficient and comprehensive network, and new reception sites will be established and information about these will be provided actively.

- Responsible parties and cooperation partners: ELY Centres, Regional State Administrative Agencies, municipalities, Finnish Transport Infrastructure Agency, Senate Properties, Metsähallitus, waste management plants, landowners, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, other organisations, companies, research institutes.
- Schedule: 2019–.

Increasing awareness of alien species through multichannel communication.

- Communication targeted at municipalities and citizens will be enhanced, as well as communication targeted at operators in various sectors: e.g. aquarium hobbyists and stores, garden stores, home and commercial gardeners, pet owners and stores, recreational and sports fishers, tourists.
- Through communication, citizens will be encouraged to report their observations to the alien species portal and participate in prevention and its organisation.
- Through communication, landowners and municipalities will be encouraged and guided to fulfil their obligations concerning the prevention of alien species found in their area.
- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications, research institutes, higher education institutions, ELY Centres, Finnish Food Authority, municipalities, Association of Finnish Local and Regional Authorities, Metsähallitus, Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Advisory Board for Invasive Alien Species, Finnish Wildlife Agency, game management associations, Federation of Finnish Fisheries Associations, Finnish Federation for Recreational Fishing, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, local operators (e.g. local heritage, sports and exercise, recreational, nature and youth organisations), aquarium and pet stores, other companies.
- Schedule: continuous.

¹³ EU Regulation on Invasive Alien Species, Article 25.

Information about observations of alien species will be centralised in the alien species portal, and a monitoring system for prevention measures will be developed and implemented.

- Information about observations of alien species and their distribution will be reported to the national alien species portal more effectively than before.
 - In the alien species portal, the accuracy of the observation location will be improved by adding a recommendation to further specify the observation location at an accuracy of one metre.
 - The national monitoring system for alien species will be developed further, and a form with prevention methods will be introduced. A clear and consistent way of recording the extent of an occurrence and the prevention measures and their monitoring will be implemented, and an opportunity to create a list of the newest observations and measures implemented in a specific area (e.g. a municipality) will be ensured.
 - As part of developing the information system of the portal, it will be ensured that regional and local information about alien species, as well as information collected by various organisations, is transferred effortlessly through interfaces into the national system and that the competent supervisory authorities are also informed about observations reported by citizens. It will be ensured that the people in charge of projects have easy, reliable and timely access to occurrence information in the portal for planning and implementing prevention.
 - The authorities and citizens will be familiarised with using the portal for filing reports.
 - It will be ensured that the portal includes contact information for the authorities responsible for various groups of species.
 - It will be ensured that the portal includes a databank containing instructions, advisory and information material, good practical experiences and images.
- Responsible parties and cooperation partners: Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Museum of Natural History, ELY Centres, municipalities, Finnish Wildlife Agency, Metsähallitus, Federation of Finnish Fisheries Associations, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, various hobby groups (e.g. hunting, fishing, Scouting).
 - Schedule: 2019–.

The topic of alien species will be added to curricula in the field of natural resources, particularly in vocational education.

- Responsible parties and cooperation partners: Ministry of Education and Culture, Finnish National Agency for Education, universities of applied sciences providing education in the field of natural resources.
- Schedule: in connection with the renewal of national curricula and the curricula of universities of applied sciences.

Cooperation with various operators will be increased by organising, for example, seminars and workshops on alien species on a regular basis for sharing experiences and updating knowledge.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications, ELY Centres, municipalities, Finnish Advisory Board for Invasive Alien Species, Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Wildlife Agency, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, other interest groups and non-governmental organisations, companies.
- Schedule: continuous.

The role of each operator and the division of responsibilities between various operators will be further specified as needed.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications, ELY Centres, municipalities, Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Wildlife Agency.
- Schedule: immediately.

Sufficient resources will be ensured to secure the continuity of alien species work. Opportunities to prevent alien species through employment projects will be examined. The prevention of alien species as voluntary work will be supported.

- As far as possible, the resources available for prevention work will be improved, and funding will be arranged for alien species prevention projects and the coordinators of voluntary work.
 - The resources of Metsähallitus for nature management services will be safeguarded to ensure that the work to prevent alien species in conservation areas is not jeopardised.
 - Municipalities will be encouraged to target funding at the prevention of alien species. Municipalities will be encouraged to participate in prevention and in supporting voluntary work. Municipalities will be encouraged to appoint a person in charge of the prevention of alien species, implement prevention measures through employment projects, support voluntary activities, organise waste management and provide tools.
 - The prevention of alien species will be enhanced in road areas.
 - Additional funding will be sought for alien species work (Life projects and other projects covered by EU funding, as well as projects channelled through various organisations).
 - An operating model will be developed to create business operations specialising in prevention, as well as association activities and workshops.
- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications, ELY Centres, Finnish Wildlife Agency, municipalities, Metsähallitus, Finnish Transport Infrastructure Agency, interest groups and non-governmental organisations, associations.
 - Schedule: continuous.

Studies will be produced to improve predictability in the prevention of invasive alien species, addressing at least the following information needs:

- Financial losses caused by alien species, the effects of alien species on biodiversity, the function of ecosystems and habitats (valuation), as well as their effects on the sustainable use of natural resources and the users of natural resources.
 - More detailed information about distribution, concerning the number of specimens of alien species as pets in particular.
 - Factors affecting the population development of alien species in terms of management and other prerequisites for survival in the conditions of Finland, including the effects of climate change (concerning species intended to be added to the list of invasive alien species of Union concern in particular), as well as species with the highest potential to spread into Finland in the near future.
 - New management methods, such as prevention methods to replace the use of glyphosate and opportunities and methods to eradicate signal crayfish from natural bodies of water.
 - The most effective prevention methods in terms of alien animal species welfare will be examined.
- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, research institutes, higher education institutions, operators providing funding for research.
 - Schedule: continuous.

III ANALYSIS AND ACTION PLAN CONCERNING THE PATHWAYS OF UNINTENTIONAL INTRODUCTION AND SPREADING

1 Classification of pathways of spreading

The pathways of spreading of the 12 species added to the list of invasive alien species of Union concern (first updated list) were examined by dividing them into categories in accordance with the UN Convention of Biological Diversity (CBD) (Harrower et al., 2018). In this CBD classification, the pathways of spreading are divided into six categories and further into 44 subcategories (Table 1). The six categories can be divided into intentional (release into the environment or escaping control) and unintentional (spreading through contaminated organisms or through vectors) pathways of spreading, and into categories that describe spreading (pathway of spreading or spreading without help) (Table 1). A species may have several pathways of spreading. In the study, pathways of spreading detected in Finland were separated from the potential pathways of spreading of the species.

2 Results

2.1 Detected pathways of spreading

The muskrat was the only species for which being released into the environment was a pathway of spreading. Muskrats were released intentionally into the environment when the species was brought to Finland. This is no longer the case.

Escaping control was a pathway of spreading for all plant species. Within this category, usage as an ornamental plant was a pathway of spreading detected in Finland (crimson fountaingrass, Indian balsam, giant hogweed and common milkweed). The spreading of the raccoon dog through fur farming also fell into this category.

Only plants fell into the category 'spreading through contaminated organisms'. In Finland, Indian balsam has been detected to spread through animals, and Indian balsam and giant hogweed have been detected to spread through environmental material, such as soil transferred from their habitat.

Only plants fell into the category 'spreading through vectors'. Indian balsam has been detected to spread through machines, equipment and vehicles in Finland.

Natural waterways are a potential pathway of spreading for several plant species. Indian balsam has been detected to spread through natural waterways in Finland.

Species classified as alien species also spread into Finland across land and water borders on their own. Of the alien species addressed in this management plan, this concerns giant hogweed, the Egyptian goose, the muskrat and the raccoon dog. Of these species, spreading across the national border is only significant for the raccoon dog.

2.2 Potential pathways of spreading

Established species in Finland do not have significant potential pathways of spreading into Finland. However, giant hogweed may spread into Finland through cars and trains, particularly from Russia. Usage as an ornamental plant is the most significant pathway of spreading for species not yet found in Finland. The highest risk of spreading is related to the Chilean rhubarb, which people may try to import to be used as an

ornamental plant in Finland when the climate becomes warmer. Broadleaf watermilfoil, alligator weed and Nuttall's waterweed have been used elsewhere as ornamental plants in ponds and as aquarium plants, but their spreading into Finland through this pathway is unlikely. Transport is another possible pathway for these species to spread into Finland. Nuttall's waterweed could spread into Finland through maritime transport, but is more likely to be spread through waterbirds. Other species could spread unintentionally through passenger transport, but this risk is assumed to be low. Of the other potential pathways of spreading, many are largely related to the local spreading of the species. Japanese stiltgrass was previously used as packaging material, which caused it to spread, but this is no longer the case.

3 Goals for the management of primary pathways and the prevention of spreading

3.1 Prevention of escaping

The prevention of escaping is a key measure in terms of preventing alien species in the possession of people from spreading. In Finland, fur farms using raccoon dogs implement measures adopted by the European Commission to prevent animals from escaping. The introduction of species or their fertile specimens into the environment is not a significant risk in raccoon dog farming or in other operations that have been granted permits in accordance with the EU Regulation on Invasive Alien Species.¹⁴ The escape of alien species kept as pets that their owners are allowed to keep until the end of their lifetime in accordance with the EU Regulation on Invasive Alien Species can be regarded as a risk to some extent.

The unintentional spreading of invasive alien plant species is common in natural environments. According to the Alien Species Act, the owner or holder of a property must eradicate intentionally grown invasive alien plant species from their property. However, invasive alien species spread from nature are found in unattended properties in particular. In such cases, the statutory requirements to order the owner or holder to eradicate the occurrence or limit its spreading are not necessarily met or the execution of orders is difficult. Indian balsam and giant hogweed are widely-spread species, and occurrences that make their unintentional spreading possible are very common. However, crimson fountaingrass and common milkweed are rare ornamental plants in Finland, and their number of such occurrences is quite low.

3.2 Spreading through contaminated products or through vectors

Spreading through contaminated products or through vectors may occur both from abroad to Finland and within Finland. In spreading from abroad to Finland, significant contaminated products may include the seeds of permitted ornamental plants that accidentally contain seeds of an invasive alien plant species. However, with regard to the species included in the list of invasive alien species of Union concern, spreading through this channel is unlikely. Through vectors, the most likely species to spread into our country are Nuttall's waterweed, through waterbirds and possibly also maritime transport, and giant hogweed, through cars and trains. Spreading within Finland may occur through vehicles and transferred soil. Spreading through contaminated products and through vectors is difficult to monitor and prevent due to the high number of products and large volume of transport. The provision of information and education is the most significant measure to prevent unintentional spreading. Education can be used to facilitate the prevention of local spreading through garden waste, for example.

¹⁴ According to the EU Regulation on Invasive Alien Species, invasive alien species may, for example, be used for research purposes under separate permits, and permits can also be granted on special grounds for using an invasive alien species in other economic activities. Keeping invasive alien animal species in zoos is also allowed without a separate permit.

4 Primary measures

4.1 Targeted communication and general provision of information

Provision of information about species that the legislation concerns.

Information will be provided to citizens about the EU Regulation and its implementation through the Alien Species Act, as well as the species that the legislation concerns. This provision of information is aimed at preventing the intentional and unintentional sale, purchase, breeding and cultivation of the species included in the list, as well as their escaping into the environment. Of the species included in the list, special attention could be paid to preventing the import of crimson fountaingrass and common milkweed to Finland.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Wildlife Agency, ELY Centres, municipalities, hobby organisations, companies.
- Schedule: continuous, no later than 2019.

Other information campaigns will be launched.

Information will be provided about the appropriate processing and disposal of ornamental plant species to prevent them from spreading. Special attention could be paid to the prevention of Indian balsam and the disposal of prevention waste.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, Finnish Environment Institute SYKE, ELY Centres, municipalities, Finnish Museum of Natural History, hobby organisations, companies.
- Schedule: continuous, no later than 2019.

4.2 Targeted communication related to contaminated plant material and vectors

Information campaigns will be launched and a training day will be organised about the processing of soil and about alien species spreading through transport (work machines in particular).

- Responsible parties and cooperation partners: ELY Centres, municipalities, seedling and garden producers' organisations, companies.
- Schedule: continuous, no later than 2020.

Table 1. Study on pathways of spreading. Pathways of spreading detected in Finland are marked with an x, and potential pathways of spreading are marked with an (x).

| | | | PLANTS | | | | | | | | BIRDS | MAMMALS | | |
|--------------------------------|---|---|-----------------------|---------------|------------------------|---------------|---------------------|-----------------|---------------------|----------------|-----------------|----------------|----------|-------------|
| | | | Crimson fountaingrass | Indian balsam | Broadleaf watermilfoil | Giant hogweed | Nuttall's waterweed | Common milkweed | Japanese stiltgrass | Alligator weed | Chilean rhubarb | Egyptian goose | Muskkrat | Raccoon dog |
| INTENTIONAL | | | | | | | | | | | | | | |
| | THROUGH MERCHANDISE | | | | | | | | | | | | | |
| | RELEASE INTO NATURE | | | | | | | | | | | | | |
| | | Biological prevention | | | | | | | | | | | | |
| | | Prevention of erosion | | | | | | | | | | | | |
| | | Fish planting | | | | | | | | | | | | |
| | | Introduction of game animals | | | | | | | | | | | x | |
| | | Using alien species to 'improve' the landscape/flora/fauna | | | | | | | | | | | | |
| | | Planting/introduction for protection or population management purposes | | | | | | | | | | | | |
| | | Release into nature in other purposes of use (fur, transport, medical use) | | | | | | | | | | | | |
| | | Other intentional release | | | | | | | | | | | | |
| | ESCAPING CONTROL | | | | | | | | | | | | | |
| | | Agriculture (incl. bioenergy) | | | | | | | | | | | | |
| | | Aquaculture | | | | | | | | | | | | |
| | | Botanical garden/zoo/aquarium (excl. home aquariums) | | | | (x) | | (x) | (x) | | (x) | (x) | | |
| | | Pets, aquarium and terrarium species and their natural food organisms | | | (x) | | (x) | | | | | | | |
| | | Production animals (incl. animals under poor monitoring) | | | | | | | | | | | | |
| | | Forest industry (incl. reforestation) | | | | | | | | | | | | |
| | | Fur farming | | | | | | | | | | | | x |
| | | Horticulture | | | | | | | | | | | | |
| | | Ornamental use (other than horticulture) | x | x | (x) | x | (x) | x | | (x) | (x) | | | |
| | | Research and ex-situ breeding | | | | (x) | | (x) | | | | | | |
| | | Live food and live food-bait | | | | | | | | | | | | |
| | | Other escape from control | | | | | | | | | | | | |
| UNINTENTIONAL | | | | | | | | | | | | | | |
| | SPREADING THROUGH CONTAMINATED ORGANISMS | | | | | | | | | | | | | |
| | | Nursery material | | | | | | | (x) | | | | | |
| | | Bait | | | | | | | | | | | | |
| | | Food (incl. live food) | | | | | | | | | | | | |
| | | Spreading through animals (excl. parasites, species spreading through host species/vectors) | (x) | x | (x) | | (x) | | (x) | | (x) | | | |
| | | Spreading as parasites in animals (incl. species spreading through host species/vectors) | | | | | | | | | | | | |
| | | Spreading through plants (excl. species spreading through host species/vectors) | | | (x) | | | | (x) | (x) | | | | |
| | | Spreading as parasites in plants (incl. species spreading through host species/vectors) | | | | | | | | | | | | |
| | | Spreading through seeds | | | | | | | | (x) | | | | |
| | | Wood trade | | | | | | | (x) | | | | | |
| | | Transfer of material from habitat | (x) | x | | x | | (x) | (x) | | (x) | | | |
| | VECTOR | | | | | | | | | | | | | |
| | SPREADING THROUGH VECTORS | | | | | | | | | | | | | |
| | | Fishing supplies | | | | | | | | | | | | |
| | | Container/cargo | | | | | | | | | | | | |
| | | Stowaway on a plane | | | | | | | | | | | | |
| | | Stowaway on a ship (incl. ballast water and species sticking to the hull) | | | | | | | | (x) | | | | |
| | | Machines and equipment | (x) | x | | (x) | | (x) | (x) | | (x) | | | |
| | | People and luggage/devices (travel in particular) | | | | (x) | | | | | | | | |
| | | Organic packaging materials (wood in particular) | | | | | | (x) | (x) | | | | | |
| | | Ballast water on ships | | | | | | | | | | | | |
| | | Sticking to the hulls of ships | | | | | | | | | | | | |
| | | Other means of transportation | (x) | x | | (x) | | (x) | (x) | | | | | |
| | | Other transport | | | | | | | | | | | | |
| PATHWAY & SPREADING | | | | | | | | | | | | | | |
| | SPREADING | | | | | | | | | | | | | |
| | PATHWAY OF SPREADING | | | | | | | | | | | | | |
| | | Natural waterways | x | (x) | (x) | (x) | | (x) | (x) | (x) | | | | |
| | | Tunnels and bridges | | | | | | | | | | | | |
| | SPREADING WITHOUT HELP | | | | | | | | | | | | | |
| | | Spreading of an alien species across the border on its own | | | | x | (x) | | | | | x | x | x |

Appendix 1.

First updated list of invasive alien species of Union concern, 2 August 2017.

PLANTS

Crimson fountaingrass (*Pennisetum setaceum* (Forssk.) Morrone)

Indian balsam (*Impatiens glandulifera* Royle)

Giant hogweed (*Heracleum mantegazzianum* Sommier & Levier)

Common milkweed (*Asclepias syriaca* L.)

Japanese stiltgrass (*Microstegium vimineum* (Trin.) A. Camus)

Chilean rhubarb (*Gunnera tinctoria* (Molina) Mirb.) (

AQUATIC PLANTS

Broadleaf watermilfoil (*Myriophyllum heterophyllum* Michx.)

Nuttall's waterweed (*Elodea nuttallii* (Planch.) H. St. John)

Alligator weed (*Alternanthera philoxeroides* (Mart.) Griseb.)

BIRDS

Egyptian goose (*Alopochen aegyptiacus* L.)

MAMMALS

Muskrat (*Ondatra zibethicus* L., 1766)

Raccoon dog (*Nyctereutes procyonoides* (Gray, 1834))