

Management plan to prevent invasive alien species

13 March 2018

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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 Regulation on Invasive Alien Species¹, an alien species is regarded as invasive if its 'introduction or spread has been found to threaten or adversely impact upon biodiversity'. 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.

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 and includes 37 invasive alien species (Appendix 1).

Preparation and adoption of the management plan

According to the Act on Managing the Risk Caused by Alien Species², 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 2016-2017 on how widely the invasive alien species listed by the EU 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-HAVI project (The distribution of and control measures against invasive alien species of Union concern). The EU-HAVI project was carried out by the Natural Resources Institute Finland (coordinator), the Finnish Environment Institute SYKE and the Southwest Finland Centre for Economic Development, Transport and the Environment. The project was funded through the Government's analysis,

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 Act on Managing the Risk Caused by Alien Species (1709/2015, 'Alien Species Act'), section 9 ([link 2](#))

assessment and research activities (VN TEAS). A similar study and proposal for a plan concerning the EU's first supplementary list (12 species) will be prepared during 2018.

The ministry requested statements on the proposed plan through the Lausuntopalvelu.fi website between 26 April and 19 June 2017. A total of 33 statements were submitted. The proposed plan was supplemented based on this feedback. A summary of the statements is available on the ministry website at www.mmm.fi.

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

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 number of occurrences of American skunk cabbage in Finland is still so low that its spreading can be prevented by removing these occurrences and providing information about the harmfulness of the species.

The planting and farming of signal crayfish are prohibited, and signal crayfish must not be transferred into new areas within natural bodies of water or into other natural bodies of water.

The Chinese mitten crab is only found as an occasional guest species in Finland, so fishers and anyone else who come across specimens of this species are advised to remove the specimens from natural bodies of water.

In particular, alien species used as ornamental plants, in aquariums and as pets must be prevented from being imported to Finland and being introduced into Finnish natural environments. 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 spreading.

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.³ 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.⁴ 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.⁵ For example, the Finnish Transport Agency is responsible, in addition to its other duties, for maintaining the state road and railway networks and coordinating measures related to these.⁶ 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.⁷

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.

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 will be formed to support the monitoring of alien species.

³ 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.

⁴ Nature Conservation Act (1096/1996), section 6.

⁵ Act on the Administration of Municipal Environmental Protection (64/1986), section 3.

⁶ Act on the Finnish Transport Agency (862/2009), section 2.

⁷ Act on Metsähallitus (234/2016), section 5.

As stated above, the authorities engage in preventing alien species as part of their statutory duties. No separate appropriations are designated for the prevention of alien species. 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 2015–2017, the ministry carried out a study for the plan as part of the VISAKE project (Development of surveillance and early warning system of invasive species and action plan to manage unintentional introduction pathways). The VISAKE project was implemented by the Finnish Museum of Natural History (coordinator), the Finnish Environment Institute SYKE and the Natural Resources Institute Finland. 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.

The ministry requested statements on the proposed action plan through the Lausuntopalvelu.fi website between 26 April and 19 June 2017, at the same time as on the management plan mentioned above. The proposed plan was supplemented based on this feedback. A summary of the statements is available on the ministry website at www.mmm.fi.

II MANAGEMENT PLAN

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

Based on the risk analysis, the 37 species included in the 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 37 species in the list of invasive alien species of Union concern are prohibited. However, signal crayfish can still be caught, kept and transported for own use or sale in accordance with the national management plan. In addition, owners may keep pets acquired before the implementation of the regulation until the end of their lives, provided that the owners ensure that the pets cannot escape or breed.

1.1 Established species

Group 1 consists of the following species: *Sosnowsky's hogweed*, *Persian hogweed*, *giant hogweed*, *American skunk cabbage* and *signal crayfish*.

Sosnowsky's hogweed, Persian hogweed, American skunk cabbage and signal crayfish are found regularly in Finnish nature. The examination also includes giant hogweed, which was not yet included in the list of invasive alien species of Union concern at the time of preparing the plan.

The primary management measures for these species are as follows:

1.1.1 Hogweed (*Sosnowsky's hogweed*, *Persian hogweed*, *giant hogweed*)

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).

- Responsible parties and cooperation partners: ELY Centres, municipalities, Finnish Transport Agency, Senate Properties, Metsähallitus, landowners, organisations.
- Schedule: hogweed will be eradicated from Finland by 2038.

Hogweed will be removed in the order of priority of occurrences:

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

The most effective use of chemical and mechanical prevention methods will be planned specific to each occurrence.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Finnish Transport Agency, Senate Properties, landowners, Metsähallitus, organisations, companies.
- Schedule: hogweed will be eradicated from Finland by 2038.

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 Agency, Senate Properties, Metsähallitus, waste management plants, landowners, Finnish Association of Landscape Industries and other organisations, 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 Agency, Senate Properties, Metsähallitus, landowners, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, other organisations, companies.
- Schedule: hogweed will be eradicated from Finland by 2038.

Herbicides and prevention methods will be examined to replace glyphosate.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Finnish Safety and Chemicals Agency, research institutes, higher education institutions.
- Schedule: immediately.

A national system for monitoring alien species (location: laji.fi) will be implemented, with a clear and consistent way of recording the extent of an occurrence and the prevention measures and their monitoring, and an opportunity to create a list of the newest occurrences and measures implemented in a specific area (e.g. a municipality).

- Responsible parties and cooperation partners: Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Museum of Natural History, ELY Centres, municipalities, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, other organisations, companies.
- Schedule: as of 2018.

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.

- Schedule: in connection with curriculum renewal.

Information about the harmful effects of hogweed, prevention methods, the processing of plant waste and the use of the alien species portal will be provided actively through various media.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Association of Finnish Local and Regional Authorities, Finnish Transport Agency, Metsähallitus, Natural Resources Institute Finland, Finnish Environment Institute SYKE, higher education institutions, Finnish Association of Landscape Industries, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, other organisations.
- Schedule: continuous.

1.1.2 American skunk cabbage

Occurrences will be removed, and an occurrence-specific prevention plan will be prepared, if necessary.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Metsähallitus, landowners
- Schedule: as of 2018.

The monitoring of removed occurrences will continue for three years after the removal for small occurrences, and for 10 years for extensive occurrences.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Metsähallitus, landowners, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors.
- Schedule: 3–10 years after removal.

The provision of information and education on the harmful effects of the species will continue.

- Responsible parties and cooperation partners: ELY Centres, municipalities, research institutes, higher education institutions, Finnish Association of Landscape Industries, other organisations.
- Schedule: as of 2018.

1.1.3 Signal crayfish

Compliance with prohibitions will be monitored:

- The planting and farming of signal crayfish is prohibited.
- The import of **live** signal crayfish is prohibited.
 - However, live signal crayfish may be imported into Finland from another EU Member State in order to be processed into food, provided that the breeding of the imported specimens and their introduction into the natural environment is prevented effectively. These requirements are met when live signal crayfish is processed in accordance with the operational requirements presented in section 4.2 of Guideline 16030/1 of the Finnish Food

Safety Authority ('Monitoring of the processing and sale of crayfish intended to be used as food'). More information about the content of the requirements is available via email from ensisaapumisvalvonta@evira.fi.

- Signal crayfish may not be transferred outside the catching area within the natural body of water in which they are found.
- Holding signal crayfish in a keep net is prohibited in other areas of the natural body of water than the part in which they were caught.
- Responsible parties and cooperation partners: ELY Centres, municipalities, police, Customs, Metsähallitus, fishery regions, owners of water areas, crayfishers.
- Schedule: continuous.

Information will be provided more effectively about the prohibition on planting, spreading and farming signal crayfish and holding signal crayfish in a keep net, and about the reasons behind these prohibitions.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, ELY Centres, Natural Resources Institute Finland, owners of water areas, Finnish Federation for Recreational Fishing, other organisations.
- Schedule: continuous.

The responsible catching, use and retail of signal crayfish will be facilitated.

- Responsible parties and cooperation partners: ELY Centres, fishery regions, owners of water areas, retail, crayfishers, organisations.
- Schedule: continuous.

The following will be ensured in cooperation with owners of water areas in the protection and management areas of signal crayfish:

- New occurrences of signal crayfish will be removed as soon as possible to prevent them from spreading further.
- The growth and spreading of the signal crayfish stock will be prevented systematically and effectively.
- Responsible parties and cooperation partners: ELY Centres, municipalities, Metsähallitus, fishery regions, owners of water areas, organisations.
- Schedule: continuous.

A plan on the management of signal crayfish and the prevention of their spreading will be included in new usage and management plans for fishery regions.

- Responsible parties and cooperation partners: ELY Centres, fishery regions.
- Schedule: as of 2019, once the fishery regions have been established and the preparation of their usage and management plans has begun.

Opportunities and methods to eradicate signal crayfish from natural bodies of water will be examined.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Metsähallitus, fishery regions, owners of water areas, research institutes, higher education institutions, organisations.
- Schedule: 2018–2022.

Relevant methods for managing signal crayfish stocks, as well as factors affecting stock development, will be examined.

- Responsible parties and cooperation partners: Natural Resources Institute Finland, owners of water areas, organisations.
- Schedule: 2018–2022.

The distribution of signal crayfish will be monitored in accordance with the EU Regulation on Invasive Alien Species and alien species strategy.

- Responsible parties and cooperation partners: ELY Centres, Natural Resources Institute Finland, fishery regions, owners of water areas.
- Schedule: continuous collection of information, review of the situation every three years.

The more efficient use, processing and productisation of signal crayfish hauls will be examined and promoted to make the large-scale catching of signal crayfish more profitable.

- Responsible parties and cooperation partners: ELY Centres, municipalities, fishery regions, owners of water areas, research institutes, higher education institutions, processing companies.
- Schedule: as of 2018.

Opportunities to reduce the transport of live signal crayfish will be examined and promoted. Crayfishing methods, storage techniques, collection and logistics will be developed further.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, ELY Centres, research institutes, higher education institutions, companies.
- Schedule: 2018–2020.

Crayfishing opportunities will be increased, the controlled availability of crayfishing permits will be promoted, and commercial crayfishing will be made possible.

- Responsible parties and cooperation partners: ELY Centres, fishery regions, owners of water areas, organisations.
- Schedule: immediately, continuous.

1.2 Aquarium and pet species found in Finland

Group 2 consists of the following species: *fanwort*, *water hyacinth*, *red-eared slider*, *Siberian chipmunk*, *raccoon*, *red swamp crayfish*, *marbled crayfish*, *spiny-cheek crayfish*, *virile crayfish*, *stone moroko* and *Amur sleeper*.

The aquarium species in this group include fanwort, water hyacinth and the red-eared slider, which do not survive in Finnish nature; the red swamp crayfish, marbled crayfish, spiny-cheek crayfish, virile crayfish, stone moroko and Amur sleeper, which are assumed to survive in Finnish nature; and the Siberian chipmunk and raccoon, which are kept as pets. Of these species, the red-eared slider and Siberian chipmunk have occasionally been found as individual escapees in Finnish nature. Human action plays a key role in the spreading of these species into Finland. Only the Amur sleeper is capable of spreading naturally here, but human action further facilitates its spreading. For this reason, in addition to import prohibitions in accordance with the Invasive Alien Species Regulation, key management measures include the provision of education to recreational fishers and pet owners on the possible harmful effects of these species on natural environments, as well as the breeding prohibitions and the importance of managing the risk of escape. However, if specimens of these species are found in nature, measures must be taken to remove them or limit their spreading as soon as possible.

Recreational fishers, as well as aquarium hobbyists and pet owners, will be provided with education on import prohibitions, breeding prohibitions, the prohibition on release, and appropriate disposal.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, ELY Centres, Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Food Safety Authority, Finnish Wildlife Agency, veterinarians, Finnish Federation for Recreational Fishing, other organisations, and aquarium, pet and fishing supply stores.
- Schedule: continuous.

As far as possible, measures will be taken to remove specimens or limit their spreading if specimens of these species are found in nature.

- Responsible parties and cooperation partners: ELY Centres, municipalities, Natural Resources Institute Finland, Finnish Environment Institute SYKE, Finnish Wildlife Agency, game management associations.
- Schedule: continuous.

1.3 Species found occasionally or potentially surviving in Finland

Group 3 consists of the following species: *curly waterweed*, *parrot's feather*, *floating pennywort*, *grey squirrel*, *small Asian mongoose*, *American bullfrog*, *ruddy duck* and *Chinese mitten crab*.

The species in this group have a varied risk of spreading into Finland. The grey squirrel and small Asian mongoose might survive in the Finnish climate, but they do not have a probable pathway of spreading into Finland. Floating pennywort, curly waterweed, parrot's feather, the American bullfrog, the ruddy duck and the Chinese mitten crab do not survive in the Finnish climate. The ruddy duck and Chinese

mitten crab are also capable of spreading naturally into Finland. Both species have been found occasionally in Finland, and specimens of the Chinese mitten crab have been found annually. Due to effective eradication outside Finland, there is now less pressure with regard to the ruddy duck spreading into Finland. Specimens of the Chinese mitten crab arrive in Finland not only naturally, but also through maritime transport. With the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) having come into effect in 2017, the spreading of the species on ships will decrease somewhat. The import of species in this group is prohibited in accordance with the EU Regulation on Invasive Alien Species, and aquarium hobbyists and pet owners need to be educated on this. If specimens of these species are found in Finland, they must be removed. Any observations must be reported to the alien species portal.

Specimens of the species must be removed when detected.

- Responsible parties and cooperation partners: ELY Centres, Finnish Wildlife Agency, fishers (Chinese mitten crab).
- Schedule: continuous.

Aquarium hobbyists and pet owners will be educated on 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 Safety Authority, Finnish Wildlife Agency, aquarium and pet stores.
- Schedule: continuous.

1.4 Species with a low risk of spreading

Group 4 consists of the following species: *Eastern baccharis*, *water-primrose*, *floating primrose-willow*, *whiteweed*, *Asiatic tearthumb*, *kudzu vine*, *Indian house crow*, *sacred ibis*, *Pallas' squirrel*, *coati*, *coypu*, *Muntjac deer*, *fox squirrel* and *Asian hornet*.

This group includes 14 species that have not been found in Finland and do not survive in the Finnish climate. For these species, monitoring their distribution outside Finland through the EU's information system, for example, is currently a sufficient management method.

The development of the distribution area of these species outside Finland will be monitored using the EU's information system, 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, Finnish Wildlife Agency.
- Schedule: continuous.

2 Recommended measures for the general management of alien species

The following measures are needed for the management of generally invasive alien species

Increasing awareness through multichannel communication:

- Communication targeted at municipalities, towns, cities and citizens.
- Targeted communication: e.g. aquarium hobbyists and stores, garden stores, (home) gardeners, pet owners and stores, recreational and sports fishers, tourists.
- 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, municipalities, Association of Finnish Local and Regional Authorities, Metsähallitus, Finnish Advisory Board for Invasive Alien Species, Finnish Wildlife Agency, game management 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.

Alien species information will be centralised in the alien species portal.

- A national system for monitoring alien species (location: laji.fi) will be implemented, with a clear and consistent way of recording the extent of an occurrence and the prevention measures and their monitoring, and an opportunity to create a list of the newest occurrences and measures implemented in a specific area (e.g. a municipality).
- As part of developing the portal information system, the effortless transfer of regional and local alien species information through interfaces into the national system will be ensured.
- The authorities and citizens must be familiarised with using the portal for filing reports.
- The portal includes contact information for the authorities responsible for various groups of species.
- The portal includes a databank containing instructions, common 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, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, various hobby groups (e.g. hunting, fishing, Scouting).
- Schedule: as of 2018.

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, interest groups and advisory organisations in the agriculture, forestry and horticulture sectors, other organisations, companies.
- Schedule: continuous.

The role of each operator and the distribution 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.
- Schedule: immediately.

Sufficient resources will be ensured to secure the continuity of alien species work. Opportunities to continue employment projects in the prevention of alien species will be examined.

- Responsible parties and cooperation partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications.
- 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 on operators using natural resources.
- More detailed information about distribution, concerning the number of exotic pets in particular.
- The prerequisites for the survival of various alien species in the conditions of Finland, including the effects of climate change (concerning species to be added to the list of invasive alien species of Union concern), as well as species with the highest potential to spread into Finland in the near future.
- Factors affecting the stock development of alien species in terms of management.
- 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.
- 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 Analysis of the pathways of unintentional introduction and spread

1.1 Classification of species according to their habitats and pathways of spreading

The analysis of the pathways of unintentional introduction and spreading of invasive alien species relevant to the EU concerns the 37 species on the list of invasive alien species of Union concern, which came into effect on 3 August 2016. To conduct the analysis, these alien species were classified according to their habitats and pathways and ways of spreading. This classification enables us to see which pathways have the highest number of invasive alien species arriving in Finland and through which pathways these species spread within Finland – that is, in which pathways measures should be centralised. The classification is based on the European Alien Species Information Network (EASIN) adopted by the European Commission:

- **ENVIRONMENT** (terrestrial, freshwater, marine, brackish)
- **CONTAMINANT** (trade of contaminated commodities, packaging materials, aquaculture)
- **CORRIDOR** (inland canals, railroads and highways)
- **STOWAWAY** (shipping, aviation, land transport)
- **ESCAPE**
 - Pets, terrarium-aquarium species
 - Zoos, botanical gardens
 - Cultivation and livestock
 - Aquaculture
 - Ornamental planting
 - Use of live food-bait
- **NOT ASSESSED/UNKNOWN**

1.2 Primary pathways to and within Finland

Of the species included in the list, 14 are plants and 23 are animals. Of the species, 13 live in freshwater, and three of these also survive in brackish water or seawater. Six of the species are terrestrial plants that live by brackish water, or freshwater species also found in terrestrial environments (frogs), and 17 species live in terrestrial environments.

There are examples of ways and pathways of intentional and unintentional spreading of all the species on the list from other parts of the world. In other words, no possible pathways of any single species remained completely unknown or unexplained.

The results of the analysis are presented in detail in the table in Appendix 2.

1.2.1 Spreading into Finland

Spreading through a contaminated product:

Of the species included in the list, 10 species (floating pennywort, curly waterweed, water-primrose, floating primrose-willow, parrot's feather, Asiatic tearthumb, kudzu vine, whitetop weed, Asian hornet and stone moroko) are known to spread through ornamental plant material, packaging material and aquacultured fish, meaning that they fall into the category 'spreading through contaminated products'.

Transport:

Of the species included in the list, only two (Sosnowsky's hogweed and Persian hogweed) have spread or are spreading through land transport on railways or roads, and four species (Chinese mitten crab, small Asian mongoose, raccoon, Indian house crow) are capable of spreading through maritime transport, as far as is known.

1.2.2 Spreading within Finland

Escapees:

Most of the species are spreading or have spread into the environment by escaping. A total of 30 species spread by escaping. Of the species included in the list, 12 species that are acquired as ornamental plants may escape from gardens, seven are pets that may escape, five species (four species of crayfish and the American bullfrog) may escape from aquariums, five from aquaculture and four from farms. Five of the species on the list are also used as live food-bait, which increases their opportunities of escaping into the environment.

2 Action plan concerning the pathways of unintentional introduction and spreading of invasive alien species of Union concern

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

2.1.1 Prevention of escaping

Of the pathways of spreading of the species on the EU list, escaping is the most significant not only globally, but also in Finland. Species may escape when they are kept or grown in animal or fur farms or are kept as pets, in an aquarium, in a garden pond or in the garden. The EU and national legislation on alien species prohibits the import, cultivation, breeding, sale and other possession and introduction into a natural environment of the species included in the EU list. However, according to the legislation, owners may keep pets acquired before the implementation of the EU Regulation until the end of their lives, provided that the owners ensure that the pets cannot escape or breed.

2.1.2 Prevention of spreading through a contaminated product

Contaminated products through which invasive alien species included in the EU list are spreading include ornamental plants and aquacultured fish and crayfish, as well as possibly the Asian hornet through packaging material.

Inspections:

Inspections of high-risk materials can be used to prevent or reduce the arrival of species spreading through contamination in the country. The responsibility of sellers/product suppliers must be emphasised, and they should be provided with precisely targeted information and education on invasive alien species.

2.1.3 Prevention of spreading through land transport

The arrival of species spreading through road and rail transport in the country, as well as their spreading within the country, is very difficult to monitor and prevent due to extensive traffic. Nevertheless, this needs to be the goal if the measure is prioritised. Prioritisation depends on species that can spread into Finland through this pathway.

Cleaning of vehicles and trains:

One way to control species spreading through road transport is the careful washing of tyres, wheels, vehicles and trains at the border, as seeds and pieces of plants may get stuck on wheels and the chassis. However, only two of the species (Sosnowsky's hogweed and Persian hogweed) have been proven to spread in this manner. As these species are already widely spread in Finland, the washing of wheels or chassis in road or rail transport is no longer deemed to be cost-effective. These species mainly spread by escaping from gardens.

2.1.4 Prevention of spreading through maritime transport

Through maritime transport, alien species spread in ballast water tanks, stuck on the hull and amidst cargo or otherwise as stowaways. Of the species included in the list, the Chinese mitten crab, raccoon and Indian house crow are known to spread through maritime transport. Aquatic organisms, such as the Chinese mitten crab most likely, spread unintentionally in ballast water tanks: the water is taken into the ship at a port outside the Baltic Sea, and the water – along with the specimens – is released at a port in Finland. The raccoon, small Asian mongoose and Indian house crow probably spread through maritime transport by hiding somewhere amidst goods or structures on the deck of a ship.

Treatment of ballast water:

The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention of the IMO, the International Maritime Organisation of the United Nations) came into effect on 8 September 2017. Measures implemented in accordance with the BWM Convention reduce the spreading of the Chinese mitten crab, as well as aquatic alien species to be added to the EU list, into new areas and into Finland.

The Finnish Transport Agency monitors compliance with the BWM Convention in connection with port state control (PSC) inspections. Such inspections cover the ship's documents, the condition and function of its ballast water treatment equipment and its crew's expertise, as well as sampling the water in the ballast water tank, if necessary.

Cleaning of hulls:

The legislation does not currently require ships to clean their hulls, even though there are international recommendations to this effect. None of the species included in the current alien species list is known to spread by sticking to the hull of a ship.

Anti-fouling paints used on the bottoms of ships prevent organisms from sticking to the hull. Anti-fouling systems are governed by the International Convention on the Control of Harmful Anti-Fouling Systems on Ships (2001) and Regulation (EC) No 782/2003 of the European Parliament and of the Council. The Finnish Transport Agency monitors compliance with the Convention and the EU Regulation.

Inspections:

In preventing the spreading of species entering ships by themselves, inspections on the ships seem to be the only possible prevention measure concerning the pathway in question.

With regard to the goals presented above, only measures that are regarded as primary due to their cost-effectiveness (cost-to-benefit ratio) and that are suggested to be implemented (see section 4: 'Primary measures') have been selected.

2.2 Primary measures

2.2.1 Targeted citizen education and general communication

Provision of information about species that the legislation concerns.

- Targeted at citizens to inform them about the EU Regulation and its implementation by means of the Finnish Alien Species Act, as well as the species that these concern. This would work a long way towards 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.
- Targeted at crews to provide them with information about the introduction and spreading of species that find their way onto ships by themselves and about measures to prevent this problem.

A person in charge of communication will be appointed to coordinate national communication.

Information campaigns will be launched concerning the following:

- The appropriate processing and destruction of garden waste to prevent ornamental plants from spreading into the environment
- The responsible keeping of pets to prevent them from escaping into the environment
- The activities of foreign recreational fishers to prevent them from bringing alien species as live food-bait into Finland.
- 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.

2.2.2 Targeted communication related to contaminated plant material

Targeted communication will be started about contaminated plant and soil material by organising information campaigns and training days, for example.

- Responsible parties and cooperation partners: ELY Centres, municipalities, seedling and garden producers' organisations, companies.

- Schedule: continuous, no later than 2019.

2.2.3 Measures targeted at transport

Measures targeted at transport will be implemented through obligations in line with the BWM Convention of the IMO, the Anti-Fouling Convention and EU Regulation No 782/2003.

- Responsible parties and cooperation partners: Ministry of Transport and Communications, Finnish Transport Agency.
- Schedule: continuous, no later than 2019.

Appendix 1

List of invasive alien species of Union concern (effective as of 3 August 2016):

PLANTS

- [Sosnowsky's hogweed](#) (*Heracleum sosnowskyi* Mandenova)
- [Indian balsam](#) (*Impatiens glandulifera* Royle) (2 August 2017)
- [Common milkweed](#) (*Asclepias syriaca* L.) (2 August 2017)
- [Persian hogweed](#) (*Heracleum persicum* Fischer)
- [Whitetop weed](#) (*Parthenium hysterophorus* L.)
- [Eastern baccharis](#) (*Baccharis halimifolia* L.)
- [Kudzu vine](#) (*Pueraria montana* (Lour.) Merr. var. *lobata* (Willd.) (*Pueraria lobata* (Willd.) Ohwi))
- [Asiatic tearthumb](#) (*Persicaria perfoliata* (L.) H. Gross (*Polygonum perfoliatum* L.))

AQUATIC PLANTS

- [Curly waterweed](#) (*Lagarosiphon major* (Ridley) Moss)
- [Parrot's feather](#) (*Myriophyllum aquaticum* (Vell.) Verdc.)
- [Fanwort](#) (*Cabomba caroliniana* Gray)
- [Water hyacinth](#) (*Eichhornia crassipes* (Martius) Solms)
- [American skunk cabbage](#) (*Lysichiton americanus* Hultén & St. John)
- [Water-primrose](#) (*Ludwigia grandiflora* (Michx.) Greuter & Burdet)
- [Floating primrose-willow](#) (*Ludwigia peploides* (Kunth) P.H. Raven)
- [Floating pennywort](#) (*Hydrocotyle ranunculoides* L. f.)

BIRDS

- [Indian house crow](#) (*Corvus splendens* Vieillot, 1817)
- [Ruddy duck](#) (*Oxyura jamaicensis* Gmelin, 1789)
- [Sacred ibis](#) (*Threskiornis aethiopicus* Latham, 1790)

FISH

- [Amur sleeper](#) (*Percottus glenii* Dybowski, 1877)
- [Stone moroko](#) (*Pseudorasbora parva* Temminck & Schlegel, 1846)

MAMMALS

- [Grey squirrel](#) (*Sciurus carolinensis* Gmelin, 1788)
- [Small Asian mongoose](#) (*Herpestes javanicus* É. Geoffroy Saint-Hilaire, 1818)
- [Fox squirrel](#) (*Sciurus niger* Linnaeus, 1758)
- [Muntjac deer](#) (*Muntiacus reevesii* Ogilby, 1839)
- [Coati](#) (*Nasua nasua* Linnaeus, 1766)
- [Coypu](#) (*Myocastor coypus* Molina, 1782)
- [Pallas' squirrel](#) (*Callosciurus erythraeus* Pallas, 1779)
- [Raccoon](#) (*Procyon lotor* Linnaeus, 1758)
- [Siberian chipmunk](#) (*Tamias sibiricus* Laxmann, 1769)

AMPHIBIANS

- [American bullfrog](#) (*Lithobates (Rana) catesbeianus* Shaw, 1802)

REPTILES

- [Red-eared slider](#) (*Trachemys scripta* Schoepff, 1792)

INSECTS

[Asian hornet](#) (*Vespa velutina nigrithorax* de Buysson, 1905)

OTHER INVERTEBRATES

[Spiny-cheek crayfish](#) (*Orconectes limosus* Rafinesque, 1817)

[Virile crayfish](#) (*Orconectes virilis* Hagen, 1870)

[Marbled crayfish](#) (*Procambarus fallax* (Hagen, 1870) f. *virginalis*)

[Red swamp crayfish](#) (*Procambarus clarkii* Girard, 1852)

[Signal crayfish](#) (*Pacifastacus leniusculus* Dana, 1852)

[Chinese mitten crab](#) (*Eriocheir sinensis* H. Milne Edwards, 1854)

Appendix 2

Pathways of spreading and primary prevention methods for invasive alien species of Union concern.

Species	Habitat	Ways of spreading					Survival in Finland With global warming, many species may survive better than before	Prioritised measure
		Contamination	Pathway	Vector	Escape	Other aspects of spreading		
Fanwort	Freshwater				Ornamental plant	Pieces of plant may spread easily over long distances on flowing and flooding water.	An aquarium plant in Finland. Could possibly survive in standing and flowing water in the southernmost parts of Finland.	Provision of information and education to aquarium hobbyists and sellers
Water hyacinth	Freshwater				Ornamental plant	Spreads into new places through human action and through other materials, also used in packaging material	An aquarium plant in Finland. Not likely to survive in ponds in the Finnish climate.	Provision of information and education to aquarium hobbyists and sellers
Floating pennywort (<i>Hydrocotyle ranunculoides</i>)	Freshwater	Through contaminated products			Ornamental plant	May also spread through pieces of other commercial ornamental plants. Pieces of plant may spread easily over long distances on flowing and flooding water.	Grown in Sweden. Could possibly survive in the climate of southern Finland.	Provision of information and education to aquarium hobbyists and sellers and operators in the garden/ornamental plant sector.
Curly waterweed	Freshwater	Through contaminated products			Ornamental plant	May also spread through pieces of other commercial ornamental plants used in garden ponds and on leisure boats.	An aquarium plant in Finland. Could possibly survive in the climate of southern Finland.	Provision of information and education to aquarium hobbyists and sellers and operators in the garden/ornamental plant sector.
Water-primrose	Terrestrial, freshwater	Through contaminated products			Ornamental plant	May spread through pieces of other commercial ornamental plants. Could theoretically spread into Finland from the nearest occurrence in Germany, but this is highly unlikely. Pieces of the plant, as well as its fruit, which remain viable for a long time, can easily spread over long distances on floating water.	Could possibly survive in the climate of southern Finland.	Provision of information and education to operators in the garden/ornamental plant sector

Floating primrose-willow	Terrestrial, freshwater	Through contaminated products			Ornamental plant	May spread through pieces of other commercial ornamental plants. Can spread into Finland from the nearest occurrence in Germany. Pieces of the plant, as well as its fruit, which remain viable for a long time, can easily spread over long distances on floating water.	Could possibly survive in the climate of southern Finland.	Provision of information and education to operators in the garden/ornamental plant sector
American skunk cabbage	Terrestrial, freshwater				Ornamental plant	Spreads easily from seeds through flowing and flooding water	Found only in around 10 locations in Finland, spreads rapidly in opportune places.	Provision of information and education to operators in the garden/ornamental plant sector
Parrot's feather	Freshwater	Through contaminated products			Ornamental plant	May also spread through other commercial ornamental plants used in garden ponds from pieces of shoot. Also spreads through watercraft and fishing equipment. Pieces of plant may spread easily over long distances on flowing and flooding water.	Grown in Sweden. Not likely to survive in the Finnish climate, with the exception of southern Finland, perhaps.	Provision of information and education to aquarium hobbyists and sellers and operators in the garden plant sector
Asiatic tearthumb	Terrestrial	Through contaminated products				Can spread through the sale of other plants.	Not in Europe.	No prioritised measure. Provision of information and education to operators in the garden/ornamental plant sector
Eastern baccharis	Terrestrial				Ornamental plant	Seeds spread with the wind.	Likely to survive in Finland, at least in the south. An allergenic plant.	Provision of information and education to operators in the garden/ornamental plant sector
Persian hogweed	Terrestrial		Railways and roads	Land transport	Ornamental plant	Seeds also spread through garden waste, with the wind and on flowing water.	Established population in Finland.	Prevention Provision of information and education to operators in the garden/ornamental plant sector
Sosnowsky's hogweed	Terrestrial		Railways and roads	Land transport	Ornamental plant	Seeds also spread through garden waste, with the wind and on flowing water.	Established population in Finland.	Prevention Provision of information and education to operators in the garden/ornamental plant sector
Kudzu vine	Terrestrial	Through contaminated products			Ornamental plant	Seeds may spread through soil and animals.	Grown in Sweden and Finland. Not likely to survive in Finnish nature, now used as a house plant.	Provision of information and education to operators in the garden/ornamental plant sector
Whitetop weed	Terrestrial	Through contaminated products				Seeds have spread among other seeds. Also spreads with the wind, on flowing water and through birds and vehicles.	Would not survive in Finland. Strongly allergenic.	No prioritised measure. Provision of information and education to operators in the garden/ornamental plant sector

Small Asian mon-goose	Terrestrial			Maritime transport		Has been brought at least into the islands of the Adriatic Sea to prevent horned desert vipers. Has also spread unintentionally on ships.	Possibly in southern Finland.	No prioritised measure.
American bullfrog	Terrestrial, freshwater				Aquarium species		As a pet in Finland, not likely to survive winters in Finland	Provision of information and education to pet owners and sellers
Muntjac deer	Terrestrial						No unintentional pathways to Finland. Not likely to survive the Finnish climate.	No prioritised measure.
Coypu	Terrestrial, freshwater				Breeding, may escape from farms	No farms in Finland nowadays, not likely to spread here on its own. No longer found in nature.	Does not survive hard winters.	Provision of information and education to farmers, import must be prevented
Coati	Terrestrial				Pet	The specimens in Mallorca are descendants of abandoned pets.	The nearest population is in Mallorca. Not likely to survive the Finnish climate.	No prioritised measure. Provision of information and education to pet owners and sellers
Raccoon (or raccoon dog)	Terrestrial			Maritime transport	Breeding: may escape from farms; zoos, pets	A few specimens have been liberated or have escaped from animal and fur farms in Germany. The current, immense population of raccoon dogs originates from there. Has also been imported as pets to many countries, and spreads as a stowaway on ships.	Kept as pets in many European countries, but no cases are known in Finland. The nearest increasing natural populations are in Sweden and Denmark. Zoos, including Korkeasaari. Would survive in Finnish nature, at least in the south if the winters are mild. Also survives well in cities. Climate change helps.	Provision of information and education to pet owners and sellers and also to zoos.
Grey squirrel	Terrestrial				Pet	The grey squirrel was originally brought to Europe to be released in parks. Current distribution in nature: Great Britain, Ireland, Italy.	Might survive in the Finnish climate, but does not have a probable pathway of spreading into Finland.	Provision of information and education to pet owners and sellers
Fox squirrel	Terrestrial				Pet	No natural populations in Europe.	Not likely to survive the Finnish climate.	Provision of information and education to pet owners and sellers
Siberian chipmunk	Terrestrial				Pet	Escaped pets have formed many feral populations in Europe, usually in cities. Not likely to spread into Finland on its own. The nearest natural population is in the Northern Dvina region in Russia.	Bred in Finland as a pet, would also survive in nature.	Provision of information and education to pet owners, breeders and sellers
Pallas's squirrel	Terrestrial				Pet	Was originally brought to Europe to be kept in as an ornamental animal in gardens and zoos and as a pet in the 1960s and 1970s. Current natural populations: France, Holland and Italy.	Not known to be kept as a pet in Finland. Has been sold as a pet in Denmark and Sweden, for example.	Provision of information and education to pet owners and sellers

							Not likely to survive the Finnish climate.	
Red-eared slider	Freshwater				Pet		Will not survive Finnish winters.	Provision of information and education to pet owners and sellers
Asian hornet	Terrestrial	Through contaminated products				The most probably pathway is unintentional spreading through international merchandise and packaging material	Would not survive in the Finnish climate.	No prioritised measure
Indian house crow	Terrestrial			Maritime transport	Other: planting		Would not survive in Finland; a tropical species.	No prioritised measure
Ruddy duck	Freshwater, terrestrial				Breeding: may escape from farms.	Kept on bird farms; may escape into the surrounding environment. May stray into Finland from other European countries; is found regularly in Sweden, for example.	Found occasionally in Finland, but not since 2011. However, the conditions here may be suitable for this species.	No prioritised measure Provision of education, to prevent import to bird farms.
Sacred ibis	Terrestrial				May escape from zoos	Kept on bird farms; may escape into the surrounding environment.	Not likely to survive in Finland; originates from Africa.	No prioritised measure
Chinese mitten crab	Seawater, brackish, freshwater		Inland canals	Maritime transport		Also spreads by migrating from the southern Baltic Sea.	Found rarely but annually in Finland, in inland water and the Baltic Sea. Unable to breed here.	No prioritised measure; provision of information to citizens to ensure that they do not put specimens caught in fishing nets back into the sea.
Spiny-cheek crayfish	Freshwater				Aquarium species, aquaculture, live food-bait		The nearest populations are in Lithuania and in Kaliningrad in Russia.	Provision of information and education to aquarium hobbyists and sellers
Signal crayfish	Freshwater, brackish				Aquaculture		Found in more than 500 bodies of water in Finland.	Provision of information/education to crayfishers
Virile crayfish	Freshwater				Aquarium species, aquaculture, live food-bait		Found in France and Great Britain. Would also survive in Finland.	Provision of information and education to aquarium hobbyists and sellers
Red swamp crayfish	Freshwater				Aquarium species, aquaculture, live food-bait		The nearest population is in Denmark. In aquariums in Finland. Would also survive in Finland.	Provision of information and education to aquarium hobbyists and sellers
Marbled crayfish	Freshwater				Aquarium species, aquaculture, live food-bait		Germany, Holland, Great Britain. Only in aquariums in Finland, but would probably also survive in nature.	Provision of information and education to aquarium hobbyists and sellers
Stone moroko	Freshwater	Through aquaculture			Live food-bait	Has also been imported to be used as a pond fish.	Already found in Lithuania, Poland and Denmark. Has not yet been found in Finland, but would survive here.	Provision of information and education to aquarium hobbyists and sellers

Amur sleeper	Freshwater, brackish						Already found in the eastern Gulf of Finland, but has not yet spread into Finland. Probably only a matter of time. Would also survive in Finland.	Provision of information and education to aquarium hobbyists and sellers
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