

MANAGEMENT PLAN TO PREVENT INVASIVE ALIEN SPECIES

SUPPLEMENTING MANAGEMENT PLANS APPROVED ON 13 March 2018, 23 May 2019, 27 October 2020 and 2 June 2021

Adopted by decision of the Ministry of Agriculture and Forestry on 25 April 2024

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1 Background

1.1 Invasive alien species

Alien species are species that have spread outside their natural distribution due to human activity. 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 posed by alien species may increase as climate change progresses, and alien species will generally succeed anyway in strongly disturbed and changed habitats. On the other hand, the good status of natural habitats will reduce and may prevent the spread 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, grown, sold, kept or released into the environment. Finland and the other EU Member States must seek to eradicate invasive alien species already found in their territories 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 wellbeing.

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 target species 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 EU Manual for the management of vertebrate invasive alien species² highlights additional information, practical methods and guidance to support eradication from the point of view of animal welfare.

The invasive alien species to be prevented are specified in the list of invasive alien species of Union concern which is adopted by the European Commission. The first list of alien species of union concerns entered into force on 3 August 2016³. The list was updated with 12 species on 2 August 2017 (1st updated list)⁴, 17 species on 15 August 2019 (2nd updated list)⁵ and 22 species on 2 August 2022 (3rd

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 EU [Manual for the management of vertebrate invasive alien species of Union concern – incorporating animal welfare](#)

³ Commission Implementing Regulation (EU) 2016/1141 of 13 July 2016, of Union concern ([link 2](#)).

⁴ 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](#)).

⁵ Commission Implementing Regulation (EU) 2019/1262 of 25 July 2019 on the amendment of Implementing Regulation (EU) 2016/1141 to update the list of invasive alien species of Union concern ([link 4](#)).

updated list)⁶. A two-year transition period has been set for the African clawed frog, Water lettuce and the Mummichog and their bans will enter into force on 2 August 2024. The transitional period for the Oriental bittersweet is five years, so its sales, import and other restrictions will apply from 2 August 2027.

1.2 Preparation and adoption of the management plan

According to the Act on Managing the Risk Caused by Alien Species⁷, 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 2022-2023 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 third update to the list of alien species of union concerns (Appendix 1) includes:

- four plant species: Water lettuce, Oriental bittersweet, Needle bush, Himalayan knotweed
- 17 animal species:
 - fish: Mummichog, White perch, Black bullhead, Northern snakehead, Western mosquitofish, Eastern mosquitofish
 - Mammals: Axis deer, Finlayson's squirrel
 - Birds: Red-vented bulbul
 - Reptiles: Common kingsnake
 - amphibians: African clawed frog
 - Insects: Tropical fire ant, Red imported fire ant, Black imported fire ant, Little fire ant
 - crayfish: Rusty crayfish
 - Other invertebrates: Golden mussel
- one brown algae species: Okamura's brown alga / *Rugulopteryx okamurae*

The report and the plan for preventing invasive alien species based on it were prepared at Natural Resources Institute Finland (Luke) in the so-called EU-HAVI4 project (Invasive Alien Species Project: Proposal for a management plan for invasive alien species for species included in the third update of the list on invasive alien species of Union concern).

1.3 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 characteristics, harmful effects, current distribution and current stage of spread of the species, their opportunities to spread and thrive in our climate, and the prevention measures available.

Invasive alien species at different stages of spread require different prevention measures. The most effective option is to completely prevent a species from being introduced or spreading into a new area, if possible. If a species is widely spread and its prevention or eradication is not technically

⁶ Commission Implementing Regulation (EU) 2022/1203 of 12 July 2022 on the amendment of Implementing Regulation (EU) 2016/1141 to update the list of invasive alien species of Union concern ([link 5](#)).

⁷ Act on Managing the Risk Caused by Alien Species (1709/2015, Alien Species Act), section 9 ([link 6](#)).

possible or financially sensible, minimising its harmful effects by controlling the population or preventing the species from spreading into new areas can be set as the goal.

Examples from the plan

- The Oriental bittersweet has been used as a garden plant in Finland, and it may become established in Finnish nature. The eradication of the Oriental bittersweet from yards and gardens is recommended to limit its spread to the environment already during the transition period. After the transition period, the cultivation of the Oriental bittersweet will be completely banned.
- Water lettuce is used as an aquarium and garden plant and was observed in one pond in Finland in summer 2023. Water lettuce vegetation must be destroyed from nature and, in accordance with the cultivation ban, also from aquariums, yard ponds and vases by 2 August 2024 at the latest.
- Under no circumstances must pet and aquarium species be released into the environment. Individuals who have escaped must be removed from nature immediately. If an owner has had an Common kingsnake or an African clawed frog as a pet before the species was included on the List of invasive alien species of Union concern, they may keep the animal until the end of its natural life.
- It is also important to educate, in particular, gardening, pet and aquarium enthusiasts on the adverse effects of the species included on the list of invasive alien species of Union concern and to inform them of the bans applicable to these, in particular the ban on their release into the environment and on their import, appropriate eradication and reporting of findings.

There is still a need to increase public awareness of alien species through multi-channel communication to prevent the spread of invasive alien species.

1.4 Implementation of the management plan and funding for the measures

According to the Invasive Alien Species Act, the Centre for Economic Development, Transport and the Environment (ELY Centre) monitors compliance with the bans and obligations included in the EU Regulation on Invasive Alien Species and the national law. The ban on import into the EU area is supervised by Customs. The Southern Finland Regional State Administrative Agency supervises compliance with the permits it grants for the use of invasive alien species. The bans and obligations, as well as the statutory means to enhance compliance, facilitate the prevention of invasive alien species. Bans and obligations may be used when the party responsible for the spread of an invasive alien species can be expressly identified. However, prevention of invasive alien species mostly concerns populations whose origin and method of spread are not known and there is no party responsible for prevention. The management plan addresses the prevention of such populations of invasive alien species in particular.

The Invasive Alien Species Act does not impose the task of implementing the management plan on any specific party. 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 areas⁸. Local authorities must monitor and promote environmental protection in their areas in order to ensure a healthy, pleasant, stimulating

⁸ Nature Conservation Act (1096/1996), section 6.

and ecologically sustainable living environment for municipal residents by protecting, maintaining and developing natural and other environments⁹. 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 these¹⁰. 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 duties¹¹. The Finnish Wildlife Agency is tasked with permit administration related to game animal species, the monitoring of game animal populations, the prevention of damage, the promotion of sustainable hunting, and communication and provision of information¹². The task of Natural Resources Institute Finland is to monitor invasive alien species and produce information for the prevention of invasive alien species¹³. Under the supervision of the Natural Resources Institute Finland, a national network of experts in alien species supports the monitoring of alien species.

The EU Regulation on Invasive Alien Species and the national legislation do not require the prevention of all occurrences of alien species. Management measures must be planned and implemented paying attention to the damage caused by the invasive alien species and its likelihood, as well as to the costs of the measures relative to their benefits. Based on the study carried out for the management plan, it is fair to say that the current prevention measures – such as the work carried out by the ELY Centres and local authorities, voluntary measures and 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 implementation. The management plan is intended for use by the authorities and other operators in their efforts to prevent invasive alien species, with a view to allocating the measures and the necessary resources as effectively as possible.

As noted above, the authorities carry out their respective measures to prevent invasive alien species as part of their statutory duties. In order to improve the effectiveness of the prevention of invasive alien species in accordance with the Government Programme 2019, budget appropriations were granted to the Ministry of Agriculture and Forestry for 2020, from which one additional person-year was permanently transferred to the operating expenditure item of the Centre for Economic Development, Transport and the Environment (ELY Centre) and in order to improve the efficiency of communications and management of invasive alien species risks two person-years were added permanently to the expenditure item of Natural Resources Institute Finland. In 2019, the duties of the Finnish Wildlife Agency and their funding remained unchanged, even though the control of the raccoon dog and certain other previous game species was transferred from the Hunting Act (615/1993) to the Invasive Alien Species Act with amendments to both. It's possible to apply for separate project funding for research, analysis and development projects on a case-by-case basis and according to need for example as an EU Life+ project.

The prevention of alien species and their removal from the environment must be carried out using the best possible methods for animal welfare, avoiding distress, pain and suffering. The new Animal

⁹ Act on the Administration of Municipal Environmental Protection (64/1986), section 3.

¹⁰ Act on the Finnish Transport Infrastructure Agency (862/2009), section 2.

¹¹ Act on Metsähallitus (234/2016), section 5.

¹² Wildlife and Game Administration Act (158/2011), section 2.

¹³ Government decree on Natural Resources Institute Finland 715/2014, section 1.

Welfare Act also entered into force on 1 January 2024. It is now recommended that EU-level instructions be followed in the control of invasive alien vertebrate species.¹⁴

1.5 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 2022-2023, the Ministry of Agriculture and Forestry carried out a study concerning the plan as part of the EU-HAVI4 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.

2 Management plan

2.1 Classification of measures; species-specific measures and targeting

Based on a risk analysis, three groups can be distinguished from the 22 additional species on list of invasive alien species of Union concern based on their current distribution, risk of spread and the required primary management measures.

1. Pets, garden and aquarium plants found in Finland – communication and eradication:

Group 1 comprises four species: *Water lettuce*, *Oriental bittersweet*, *Common kingsnake*, *African clawed frog*

The species in this group have been used as garden or aquarium plants and as pets in Finland. Of these species, only Water lettuce has been observed in Finland's nature, and only the Oriental bittersweet can become established in Finland. It is recommended that Oriental bittersweet and Water lettuce vegetation be disposed of as a management measure. Under the EU Regulation, the owner of a pet animal has the right to keep their pet until the natural death of the animal if it has been a pet before the species was added to the list of invasive alien species of Union concern. A precondition for keeping a pet, which has been designated as an invasive alien species in the EU, is that the animal is kept in a sealed container and that all appropriate measures have been taken to ensure that individuals cannot reproduce or escape. However, if the individuals of a pet species¹⁵ are found in nature, they must be removed, and if there is reason to suspect that the animal is a pet that has escaped, it must be delivered to the municipal animal shelter operator¹⁶, who will make an effort to find the pet's owner and to determine whether the owner has the above-mentioned right to keep the pet. If the right to keep a pet under the EU Regulation cannot be verified or ascertained, the operator will see to it that

¹⁴ EU [Manual for the management of vertebrate invasive alien species of Union concern – incorporating animal welfare](#)

¹⁵ [Pets and hobby animals - Finnish Food Authority](#)

¹⁶ Animal Welfare Act, section 26.

the found individual is destroyed. It is also important to educate e.g. gardening, pet and aquarium enthusiasts on the adverse effects of the species included on the list of invasive alien species of Union concern and to inform them of all the bans applicable to these, in particular the ban on their release into the environment and on their import, appropriate eradication and reporting of findings. A two-year transition period was granted to the Water lettuce and the African clawed frog and a five-year transition period for the Oriental bittersweet. Information must be disseminated on the transition period and its end, but it would be best to begin the eradication of the Water lettuce and the Oriental bittersweet immediately.

Information will be provided to horticulture sector professionals, gardening, aquarium and pet retailers, municipal shelter operators and gardening, pet and aquarium enthusiasts on the adverse effects of the species, and their transition periods, import bans and bans on release into the environment.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, the Finnish Environment Institute, Centres for Economic Development, Transport and the Environment, Customs, the Finnish Food Authority, gardening retailers and enthusiasts, pet retailers and enthusiasts, aquarium retailers and enthusiasts, organisations and associations.
- Schedule: continuous.

Aquarium, pet and garden enthusiasts to be instructed on the appropriate eradication of species.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, the Finnish Environment Institute, Centres for Economic Development, Transport and the Environment, the Finnish Food Authority, municipal animal shelter operators, gardening retailers and enthusiasts, pet retailers and enthusiasts, aquarium retailers and enthusiasts, organisations and associations.
- Schedule: continuous.

Oriental bittersweet and Water lettuce vegetation to be removed

- Responsible parties and cooperation partners: Centres for Economic Development, Transport and the Environment, municipalities, landowners, gardening retailers and enthusiasts, aquarium retailers and enthusiasts, organisations and associations.
- Schedule: continuous.

Release of pets and aquarium plants into the environment to be prevented through communication.

- Responsible and cooperation parties: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, the Finnish Environment Institute, Centres for Economic Development, Transport and the Environment, the Finnish Food Authority, municipal animal shelter operators, pet retailers and enthusiasts, aquarium retailers and enthusiasts, organisations and associations.
- Schedule: continuous.

If a Common kingsnake or African clawed frog is found in nature, they are delivered to a municipal animal shelter operator and, if necessary, measures are taken to remove them.¹⁷

- Responsible parties and cooperation partners: Centres for Economic Development, Transport and the Environment, municipalities, municipal animal shelter operators, landowners, pet retailers and enthusiasts, aquarium retailers and enthusiasts, organisations and associations.
- Schedule: continuous.

2. Non-native species that may potentially thrive in Finland - immediate removal measures and communication:

The species comprising Group 2 are: *Himalayan knotweed, Mummichog, White perch, Black bullhead, Northern snakehead, Rusty crayfish, Golden mussel*

Management measures recommended for the species in this group include communication to raise awareness on the species' important base and the ban on releasing it into the environment. In addition, it is recommended that individuals be removed if the species is observed in Finland. The occurrence of species in neighbouring areas must also be monitored. A two-year transition period has been set for the Mummichog and the bans that apply to it will enter into force on 2 August 2024. It will be necessary to communicate information on the transition period and its end.

Individuals of the species will be removed if encountered.

- Responsible parties and partners: Centres for Economic Development, Transport and the Environment, municipalities, landowners, regional fisheries centres and fishermen's associations, fisheries regions, water area owners, organisations and associations.
- Schedule: continuous.

Information will be communicated to aquarium and gardening enthusiasts about the import ban and the ban on release into the environment.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, Finnish Environment Institute, Centres for Economic Development, Transport and the Environment, Finnish Customs, the Finnish Food Authority, aquarium and pet retailers, fisheries areas, gardening retailers and enthusiasts, organisations and associations.
- Schedule: continuous.

¹⁷ Under the EU Regulation, the owner of a pet animal has the right to keep their pet until the natural death of the animal if it has been a pet before the species was added to the list of invasive alien species of Union concern. A precondition for keeping a pet, which has been designated as an invasive alien species in the EU, is that the animal is kept in a sealed container and that all appropriate measures have been taken to ensure that individuals cannot reproduce or escape. However, if the individuals of a pet species are found in nature, they must be delivered to a municipal animal shelter operator, who will make an effort to find the pet's owner and to determine whether the owner has the above-mentioned right to keep the pet. If the right does not exist, the animal shelter operator will see to the found individual's disposal.

3. Species of low risk of spreading – monitoring and communication on distribution:

Group 3 species include: *Needle bush, Western mosquitofish, Eastern mosquitofish, Axis deer, Finlayson's squirrel, Red-vented bulbul, Tropical fire ant, Red imported fire ant, Black imported fire ant, Little fire ant, Okamura's brown alga / Rugulopteryx okamurae*

The 11 species in this group have not been found in Finland and in areas adjacent to Finland. None of the group's species would thrive or would be very unlikely to thrive in Finland's climate conditions. For these species, it is currently sufficient to monitor their distribution outside Finland and provide information on their import ban to Finland.

The development of the distribution area of these species outside Finland will be monitored using the EU's information support system, for example. Using the EASIN early warning system, utilising the development in the spread of species outside Finland.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Natural Resources Institute Finland, Finnish Environment Institute, Finnish Museum of Natural History Luomus, Centres for Economic Development, Transport and the Environment.
- Schedule: continuous.

Information will be disseminated on import bans.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, the Finnish Environment Institute, Centres for Economic Development, Transport and the Environment, Customs, the Finnish Food Authority, gardening retailers and enthusiasts, aquarium retailers and enthusiasts, organisations and associations.
- Schedule: continuous.

2.2 Recommended measures for the general management of alien species

The measures listed below are needed for the general management of invasive alien species.

Awareness about alien species will be raised through multichannel communication.

- Targeted communication to municipalities and citizens and the following actors in different sectors will be enhanced: aquarium retailers and enthusiasts, garden retailers, horticulture professionals, home gardeners, pet retailers and enthusiasts, recreational and professional fishermen, tourists, property managers and property maintenance.
- By means of communication, citizens will be activated to report their observations to the Vieraslajit.fi website and to participate in prevention and in the organisation of voluntary work.
- Communication measures will also be used to encourage landowners and local authorities to be aware of their obligations concerning the prevention of invasive alien species found on their lands.

- More training will be provided on different means and methods of controlling alien species, including the eradication of alien species.
 - Responsible parties and cooperation partners: Ministry of Agriculture and Forestry; Ministry of the Environment; Ministry of Transport and Communications; research institutes; higher education institutions; Centres for Economic Development, Transport and the Environment; local authorities; parishes; Metsähallitus; Natural Resources Institute Finland; Finnish Environment Institute; Finnish Food Authority; Finnish Advisory Board for Invasive Alien Species; Finnish Wildlife Agency; game management associations; Association of Finnish Local and Regional Authorities; Finnish Federation for Recreational Fishing; fisheries areas, interest groups, advisory organisations and educational institutions in the agriculture, forestry and horticultural sectors; local operators (e.g. local heritage, sports and exercise, recreational, nature and youth organisations); aquarium and pet stores; other companies.
 - Schedule: continuous.

Measures and observation data on all invasive alien species will be reported to the Vieraslajit.fi website in a uniform manner. A monitoring system for prevention measures and its implementation will be developed.

- Responsible parties and cooperation partners: Natural Resources Institute Finland, Finnish Environment Institute, Finnish Museum of Natural Sciences Luomus, Centres for Economic Development, Transport and the Environment, municipalities, Finnish Wildlife Agency, Metsähallitus, BirdLife Finland
- Schedule: continuous.

Sufficient resources will be ensured to maintain the continuity of the management of alien species and rapid response measures will be promoted, for example, by developing the necessary permit practices and processes and by improving cooperation between different parties.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications, Centres for Economic Development, Transport and the Environment, Regional State Administrative Agency
- Schedule: continuous.

Research funding will be ensured and additional research will be produced on the impacts, occurrence and prerequisites for success of alien species in Finnish conditions (including the impacts of climate change) and on effective management methods.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Ministry of the Environment, universities and research institutes
- Schedule: continuous.

3 Analysis and Action Plan for pathways of spread

3.1 Analysis of pathways of spread

3.1.1 Pathways of spread classification

The pathways for the spread of 22 species in the third update to the list of invasive alien species of Union concern were examined by classifying them in the classes defined in the UN Convention on Biological Diversity CBD (Harrower et al. 2018). The CBD classification divides the introduction pathways into six categories and further into 44 subcategories (Table 8.1). The six categories can be divided into intentional (release in nature or escape from confinement) and unintentional (transport by contaminated organisms or by vectors) pathways, and into categories that describe both the pathway and spread (corridor or unaided dispersal) (Table 8.1). A species may have several pathways of spread. The study distinguished the pathways of spread detected in Finland from the potential pathways of spread of the species.

3.1.2 Results

Detected pathways of spread

Escape from human control was a pathway for the spread of four species that are used in recreational activities in Finland. The Common kingsnake or the African clawed frog are occasional pets in Finland. Water lettuce has been imported as an aquarium plant and the Oriental bittersweet has been imported for gardening. In addition, Water lettuce has been observed in a single pond in Southwest Finland, to which it has likely to been deliberately released from an aquarium.

Potential pathways of spread

Plant species have several potential pathways for spreading in all categories of pathways. The most important potential pathway is their use as a garden or aquarium plant and the resulting outbreak. An outbreak may also occur from other plant use in gardening. At least North America has deliberately released the Oriental bittersweet into nature to combat erosion. Plant species may spread to Finland in a contaminated product with animals, other plants, plant material or habitat material and soil. Water lettuce can spread from one place to another, e.g. with fishing gear, and the Oriental bittersweet, the Himalayan knotweed and the Needle bush can spread with machinery, equipment and luggage. Plant species can spread shorter distances along waterways. However, this is not a likely pathway of spread for these species.

In the case of fish that are invasive alien species, potential pathways include deliberate release, possible use in aquariums and ponds, natural spread along waterways and with ships' ballast waters. Western mosquitofish and Eastern mosquitofish have also been used elsewhere as bait and in biological control.

Potential pathways of spread for the Axis deer include planting as a game species and escaping from farming. The pathway of spread to Finland of Finlayson's squirrel is as a pet imported by humans and which has then escaped or been released.

The African clawed frog and the Common kingsnake are pets with a long lifespan that may be deliberately released into nature. The African clawed frog may also spread, for example, with fish

restocking and plants and along waterways. The Common kingsnake may also spread when plant, sapling or habitat material are moved as well as with cargo or other transports.

The potential pathway for the spread of the Red-vented bulbul to Finland is natural spreading, but it is highly unlikely. It could also come to Finland as a stowaway on a ship or as a pet deliberately imported by a person, and still end up in the wild.

Fire ants may spread inadvertently with sapling material and plants or in luggage. It is also possible that they have been acquired and, despite the prohibitions, are still acquired from abroad as pets.

The Rusty crayfish can be spread by humans, either intentionally or if they escape from an aquarium, or unintentionally, for example, with fishing gear or boats. The Okamura's brown alga (*Rugulopteryx okamurae*) can spread along waterways, and with fishing gear, ballast waters and ships, and as a result of aquaculture. The most likely pathway for the spread of the Golden mussel to new areas is ships' ballast water. It can also move to new areas by attaching to hulls of ships or to fishing gear.

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

	PLANTS	FISH	MAMMALS	BIRDS	REPTILES AND FROGS	INSECTS	OTHER INVERTEBRATES
	Oriental bitterweed Water lettuce Finnish knotweed Burry needlewood White perch Northern snakehead Eastern mosquitofish Moaquifish Black bullhead Mummichog Axis deer Finnish squirrel				Red-vented bulbul African clawed frog Eastern King snake Black imported fire ant Little fire ant Red imported fire ant Tropical fire ant	Rusky crayfish Rugulopteryx okamurae Golden mussel	
INTENTIONAL							
MOVEMENT OF COMMODITY							
RELEASE IN NATURE							
Biological control		(x) (x)					
Erosion control	(x)						
Fish stocking		(x)					
Game stocking			(x)				
Landscape/flora/fauna 'improvement' with alien species			(x)				
Introduction for conservation or population management purposes							
Release to nature in other uses (furs, transport, pharmaceutical use)							(x)
Other intentional release	x	(x) (x)	(x) (x)	(x) (x)	(x) (x)	(x) (x)	(x) (x)
ESCAPE FROM CONFINEMENT							
Agriculture (incl. bioenergy)							
Aquaculture		(x)					(x)
Botanical garden/zoo/aquarium (excl. home aquariums)	x (x) (x) (x)			(x)			
Pet, aquarium and terrarium species and live food for such species ³	x	(x) (x) (x) (x)	(x)	(x)	x x	(x) (x) (x) (x)	(x)
Livestock (incl. animals left under poor supervision)			(x)				
Forestry (incl. reforestation)							
Fur farming							
Horticulture	(x) (x) (x) (x)						
Ornamental purpose (other than horticulture)	x (x) (x) (x)						
Research and ex-situ breeding			(x)		(x)		
Live food and live bait		(x) (x)					(x)
Other escape from confinement							(x)
UNINTENTIONAL							
TRANSPORT BY CONTAMINATED ORGANISMS							
Nursery material	(x) (x) (x)				(x)	(x) (x) (x) (x)	
Bait		(x) (x) (x)					
Food (incl. live food) species	(x) (x)				(x)		
species/vector species							
Dispersion with plants (excl. species that spread with the host species/vector species)	(x) (x) (x) (x)				(x) (x)		
Dispersion as parasites in or on plants (incl. host species/vector species)							
Dispersal with seeds							
Timber trade							
Transportation of habitat material	(x) (x) (x)				(x) (x)		
VECTOR							
TRANSPORT BY VECTORS							
Fishing equipment	(x)						(x) (x) (x)
Container/bulk					(x)		
Stowaway in or on an airplane							
Stowaway on board a ship (excluding ballast water and species attached to the hull)				(x)			
Machinery and equipment	(x) (x) (x)						
People and their luggage/equipment (in particular tourism)	(x) (x) (x)					(x) (x) (x) (x)	
Organic packaging material (in particular wood packaging)							
Ship ballast water		(x)	(x)		(x)		(x) (x)
Attaching to the hull of a ship							(x) (x)
Other vehicles							
Other means of transport					(x) (x)		
PATHWAY AND SPREAD							
SPREAD							
PATHWAY							
Interconnected waterways	(x) (x) (x)	(x) (x) (x) (x)			(x)		(x) (x)
Tunnels and land bridges							
UNAIDED							
Natural dispersal of an alien species across borders				(x)			

3.2 Action plan

3.2.1 Goals for management of primary pathways and prevention of spread

Deliberate spread/release into nature will be prevented.

It is particularly important to prevent the deliberate spreading and release into nature of fish, aquarium plants and pets to prevent the spread of the species.

Preventing escape.

Escape prevention is a key measure in terms of preventing the spread of alien species under human control. The species covered by this measure include Oriental bittersweet and Water lettuce, which are used as aquarium plants, and the Common kingsnake and the African clawed frog, which are kept as pets. It is also important to disseminate information on the import ban for these species. Although, in the case of Oriental bittersweet, bans will enter into force on 2 August 2027 after a five-year transition period, and the Water lettuce and the African clawed frog on 2 August 2024 after a two-year transition period, the adverse effects of the species must be communicated so that no more of these species can be acquired during the transition period.

Prevention of spread in contaminated products.

Transport by contaminated products or by vectors may occur both from abroad to Finland and within Finland. It could be possible to spread to Finland from abroad with a contaminated plant, sapling and habitat material. In addition, certain plant species may spread with animals and fish and crayfish species as baits.

Preventing transport by vector

Species may be transported unintentionally with fishing gear, machinery and equipment, deliveries and luggage. Of the aquatic species, the White perch, the Mummichog, the Okamura's brown alga (*Rugulopteryx okamurae*) and the Golden mussel can spread with ballast waters.

3.2.2 Primary measures

Targeted communication

Information will be communicated on legislation on invasive alien species and related bans.

Information will be communicated directly to actors and citizens so that they are aware of the EU regulation, Finland's Alien Species Act of Finland that implements the Regulation, and the species these apply to. This will likely help to prevent the deliberate and unintentional sale, purchase and breeding of species on the list and their escape into the environment. The dissemination of information on the species on the list should focus particularly on the Oriental bittersweet, the Himalayan knotweed and Water lettuce, to ensure that these are not imported to Finland as garden or aquarium plants.

Information will be communicated directly to horticultural operators and gardening enthusiasts.

The dissemination of information should focus in particular on the adverse effects of the Oriental bittersweet, the ban of the Oriental bittersweet and the related transition period. Although the ban of the Oriental bittersweet will enter into force on 2 August 2027 after a five-year transition period, the adverse effects of this species must be communicated so that no more of this species would be acquired during the transition period. In addition, instructions will be provided on how to start eradicating the Oriental bittersweet before the end of the transition period in order to prevent the possible spread of the species. Information that will be disseminated on the Himalayan knotweed and Bush needlewood will include in particular its import ban.

Information will be communicated directly to aquarium and pet retailers and enthusiasts.

Information will be disseminated on the adverse effects caused by the species and on the bans and transition periods applicable to them. Water lettuce, the African clawed frog and the Mummichog all have a two year transition period. In particular, pet and aquarium enthusiasts must be informed on the ban on the release of these species into the environment and be given instructions for the correct eradication of the species. **Water lettuce is a common aquarium plant and, at the end of the transitional period, information that will need to be communicated in particular includes the ban on its import, sale and cultivation.**

Communication on transition times for species.

Although, in the case of Oriental bittersweet, bans will enter into force on 2 August 2027 after a five-year transition period, and for Water lettuce, the African clawed frog and the Mummichog on 2 August 2024 after a two-year transition period, the adverse effects of the species must be communicated so that no more of these species can be acquired during the transition period. Information will also be provided about transition times and their end.

- Responsible parties and partners: Ministry of Agriculture and Forestry, Ministry of the Environment, Natural Resources Institute Finland, the Finnish Environment Institute, the Finnish Food Authority, Centres for Economic Development, Transport and the Environment, Finland's Customs, municipalities, organisations and associations, companies.
- Schedule: continuous.

Sources and background material

Harrower, CA., Scalera R., Pagad, S., Schönrogge, K. & Roy, HE. 2018. Guidance for interpretation of CBD categories on introduction pathways. <https://circabc.europa.eu/sd/a/738e82a8-f0a6-47c6-8f3b-aeddb535b83b/TSSR-2016-010%20CBD%20categories%20on%20pathways%20Final.pdf>

Appendix 1. The third update to the list of alien species of union concerns* (effective 2 August 2022 with the exception of the transition periods specifically mentioned below)

PLANTS

[Staff vine](#) (*Celastrus orbiculatus*) (Thunberg) (transition period ends on 2 August 2027)

[Himalayan knotweed](#) (*Koenigia polystachya*)

[Needle bush](#) (*Hakea sericea*)

AQUATIC PLANTS

[Water lettuce](#) (*Pistia stratiotes*) (Linnaeus) (transition period ends on 2 August 2024)

ALGAE

[Okamura's brown alga](#) / [Rugulopteryx okamurae](#) (*Rugulopteryx okamurae*)

BIRDS

[Red-vented Bulbul](#) (*Pycnonotus cafer*) (Linnaeus)

FISH

[White perch](#) (*Morone americana*)

[Northern snakehead](#) (*Channa argus*) (Cantor)

[Eastern mosquitofish](#) (*Gambusia holbrooki*) (Girard)

[Western mosquitofish](#) (*Gambusia affinis*) (Baird & Girard)

[Black bullhead](#) (*Ameiurus melas*) (Rafinesque)

[Mummichog](#) (*Fundulus heteroclitus*) (transition period ends on 2 August 2024)

MAMMALS

[Axis deer](#) (*Axis axis*)

[Finlayson's squirrel](#) (*Callosciurus finlaysonii*) (Horsfield)

AMPHIBIANS

[African clawed frog](#) (*Xenopus laevis*) (Daudin) (transition period ends on 2 August 2024)

REPTILES

[Common kingsnake](#) (*Lampropeltis getula*)

CRAYFISH

[Rusty crayfish](#) (*Faxonius rusticus*) (Girard)

INSECTS

[Black imported fire ant](#) (*Solenopsis richteri*) (Forel)

[Little fire ant](#) (*Wasmannia auropunctata*) (Roger)

[Red imported fire ant](#) (*Solenopsis invicta*) (Buren)

[Tropical fire ant](#) (*Solenopsis geminata*) (Fabricius)

OTHER INVERTEBRATES

[Golden mussel](#) (*Limnoperna fortunei*) (Dunker)

Original source: 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 The list has been updated with the [Commission Implementing Regulation \(EU\) 2017/1263](#) of 12 July 2017 with [Implementing Regulation \(EU\) 2019/1262](#) of 25 July 2019 and by [Implementing Regulation \(EU\) 2022/1203*](#) of 12 July 2022.