

BIOSECURITY MANAGEMENT PLAN

2021-2025



For the
ESK FISHERY DISTRICT, ANGUS &
SOUTH ABERDEENSHIRE

Acknowledgements

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What is Biosecurity?

Scotland's Environmental and Rural Services in their Biosecurity Guidance state that "Good biosecurity practice refers to a way of working that minimises the risk of contamination and the spread of animals and plant pests and diseases, parasites and non-native species".

What are Invasive Non Native Species?

Invasive non-native species are those that have been transported outside of their natural range and that damage our environment, the economy, our health, and the way we live.

ESK RIVERS AND FISHERIES TRUST

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EXECUTIVE SUMMARY

This plan is an update of the [2009 Biosecurity Management Plan](https://eskriversangus.uk/wp-content/uploads/2021/01/Esk-Biosecurity-Plan-Final-1-Sept09.pdf)¹ for the Esk Fisheries District, covering parts of Angus and Aberdeenshire. The plan describes the biosecurity issues of the area and presents actions that have been undertaken since the 2009 plan, as well setting out a framework for future biosecurity. The plan is one of a set of 10 biosecurity plans prepared around the north of Scotland as part of the Scottish Invasive Species Initiative.

This vision of this plan is:

“To maintain the sustainable framework to prevent, detect, control and eradicate invasive non-native species within the Esk Fisheries District through appropriate management, data collection, liaison and education”

This vision will be achieved through the realisation of three objectives:

Objective 1: Reduce the risk of introduction of new INNS within the Esk District.

Objective 2: Establish surveillance, detection, monitoring and rapid response systems for the identified INNS which pose significant threats to local biodiversity and economy.

Objective 3: Develop effective control and eradication programmes for existing INNS which are operational and sustainable.

The implementation of this biosecurity plan will bring many socio-economic and environmental benefits:

- 🌿 The maintenance and enhancement of biodiversity – invasion by non-native species is one of the top five drivers for global biodiversity loss and is increasing with globalisation and tourism,
- 🌿 The visual conservation of local landscapes,
- 🌿 The prevention of the salmon parasite *Gyrodactylus salaris* from entering the Esk district which would avoid catastrophic economic and environmental loss,
- 🌿 A holistic, cost effective control programme of INN plants e.g. Giant hogweed, Japanese knotweed, and Himalayan balsam, the former being a threat to human health, will be founded in partnership with key stakeholder,
- 🌿 The conservation of important natural habitats for native species such as Otter, Atlantic salmon, freshwater pearl mussel, European eel,
- 🌿 Control signal crayfish and eradicate where possible,
- 🌿 The protection of the endangered water vole from predation by the American Mink,
- 🌿 The prevention of species such as Zebra mussel from entering the district watercourse will help to protect vital local businesses such as whisky distilleries from expensive mitigation measures required if this species was to occur and establish, and
- 🌿 Helping to ensure the outcome of INNS management in the Esk District area is more cost effective, strategic and sustainable.

¹ <https://eskriversangus.uk/wp-content/uploads/2021/01/Esk-Biosecurity-Plan-Final-1-Sept09.pdf>

SECTION 1 INTRODUCTION

The purpose of this document is to update the 2009 Esk Fishery District Biosecurity Management Plan, setting out the actions that have taken place since 2009, the lessons that have been learned, and to set out possible future actions.

The primary vision of the Esk Fishery District Biosecurity Management Plan is:

To maintain the sustainable framework developed in the 2009 Biosecurity Management Plan to prevent, detect, control and eradicate invasive non-native species within the Esk Fisheries District through appropriate management, data collection, liaison and education




This vision will be achieved through the realisation of three objectives:

Objective 1: Reduce the risk of introduction of new INNS within the Esk Fisheries District.

Objective 2: Establish surveillance, detection, monitoring and rapid response systems for the identified INNS which pose significant threats to local biodiversity and economy

Objective 3: Develop effective control and eradication programmes for existing INNS which are operational and sustainable.




These objectives are in accordance with established protocols for fish diseases and with the three key elements of the [Invasive Non Native Species Framework Strategy for Great Britain](#)²:

-  Prevention,
-  Early detection, surveillance, monitoring and rapid response,
-  Mitigation, control and eradication

The objectives of this plan will be achieved through a partnership approach to implement the agreed actions.

The ultimate key to the effectiveness of this plan is the building of local awareness, capacity and partnerships to ensure the success and long term sustainability of the presented actions.

The implementation of this biosecurity plan will bring many socio-economic and environmental benefits:

-  The maintenance and enhancement of biodiversity – biotic invasion is one of the top five drivers for global biodiversity loss and is increasing with globalisation and tourism,
-  The visual conservation of local landscapes,
-  The prevention of the salmon parasite *Gyrodactylus salaris* from entering the Esk Fishery District which would avoid catastrophic economic and environmental loss,

² www.nonnativespecies.org

- 🌿 A holistic, cost effective control programme of INN plants e.g. Giant hogweed, Japanese knotweed, and Himalayan balsam, will be founded in partnership with key stakeholders,
- 🌿 The conservation of important natural habitats for native species such as Otter, Atlantic salmon, freshwater pearl mussel, European eel,
- 🌿 Control North American signal crayfish,
- 🌿 The protection of the endangered water vole from predation by the American mink,
- 🌿 The prevention of species such as Zebra mussel from entering the district watercourse will help to protect vital local businesses such as whisky distilleries from expensive mitigation measures required if this species was allowed to occur and establish.

SECTION 2 BACKGROUND

In 2009, rivers and fisheries trusts across Scotland produced Biosecurity Management Plans for their respective fishery districts, led by the Rivers & Fishery Trusts of Scotland (RAFTS). The current plan is being updated as part of the [Scottish Invasives Species Initiative](https://www.invasivespecies.scot/)³ (SISI), which is an ambitious four year project established to tackle invasive non-native species alongside rivers and watercourses in northern Scotland. More details about the project can be found in Section 5.2.

Although prepared by the Esk Rivers and Fisheries Trust for the Esk Salmon Fishery District, this plan is one of a set of 10 biosecurity plans being produced around the north of Scotland as part of a regional programme of action implemented through the Scottish Invasive Species Initiative with backing and support from the National Lottery Heritage Fund (NLHF) and NatureScot (formerly Scottish Natural Heritage – SNH).

There are 4 catchments within the Esk Salmon Fishery District: River Lunan, River South Esk, River North Esk and River Bervie (See figures 1-4), and is the same area for which the ERFT is responsible for. There are at least 22 protected species as well as 13 focus species for Local Biodiversity Action Plans (Table 2) known to be present in the area.

³ <https://www.invasivespecies.scot/>

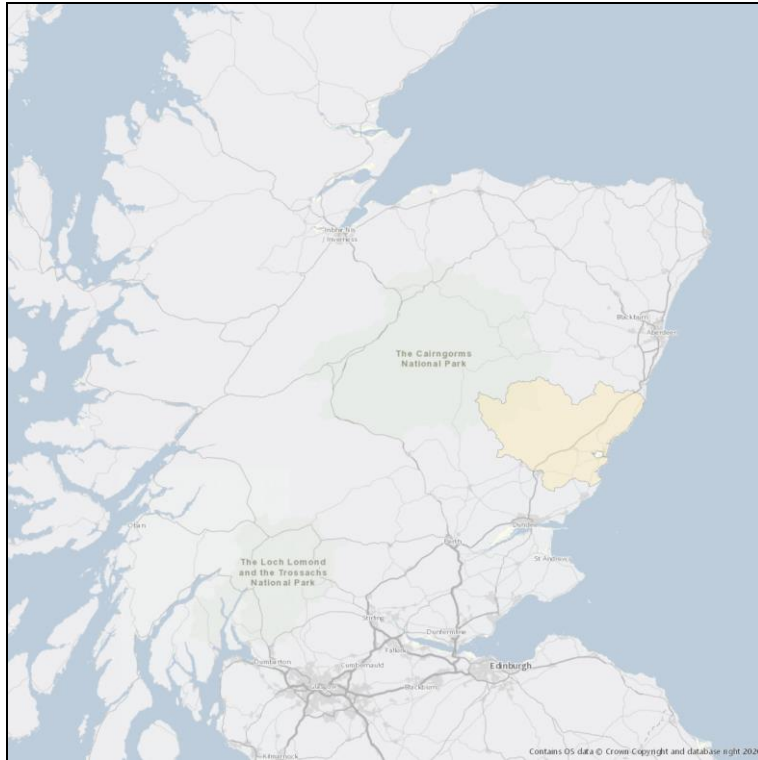


Figure 1. Location of Esk Salmon Fishery District (in yellow) in the East of Scotland

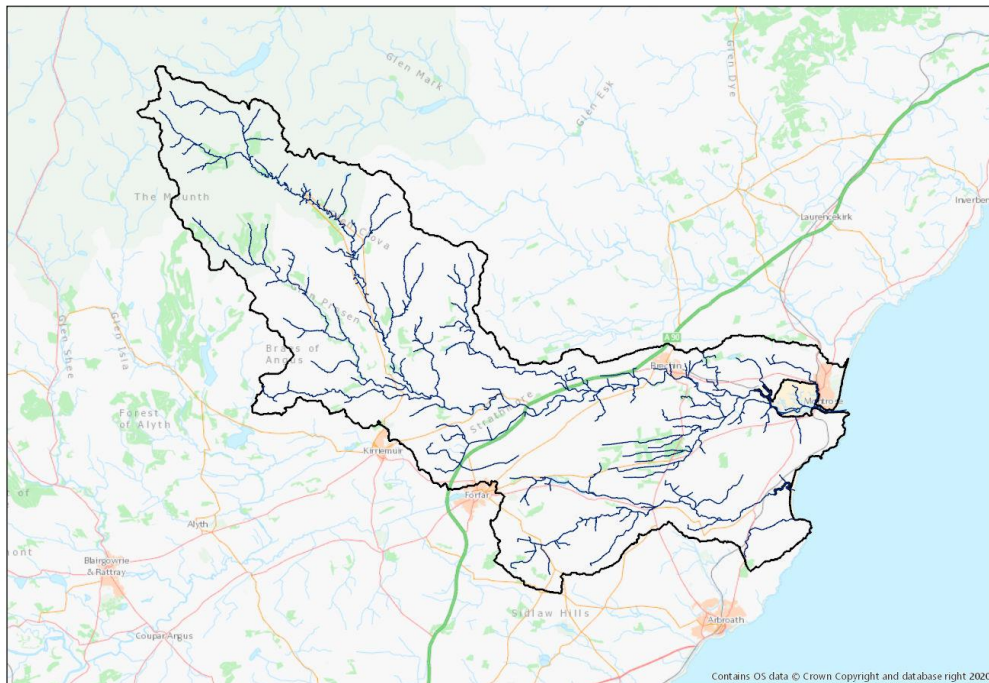


Figure 2. River South Esk and River Lunan catchments

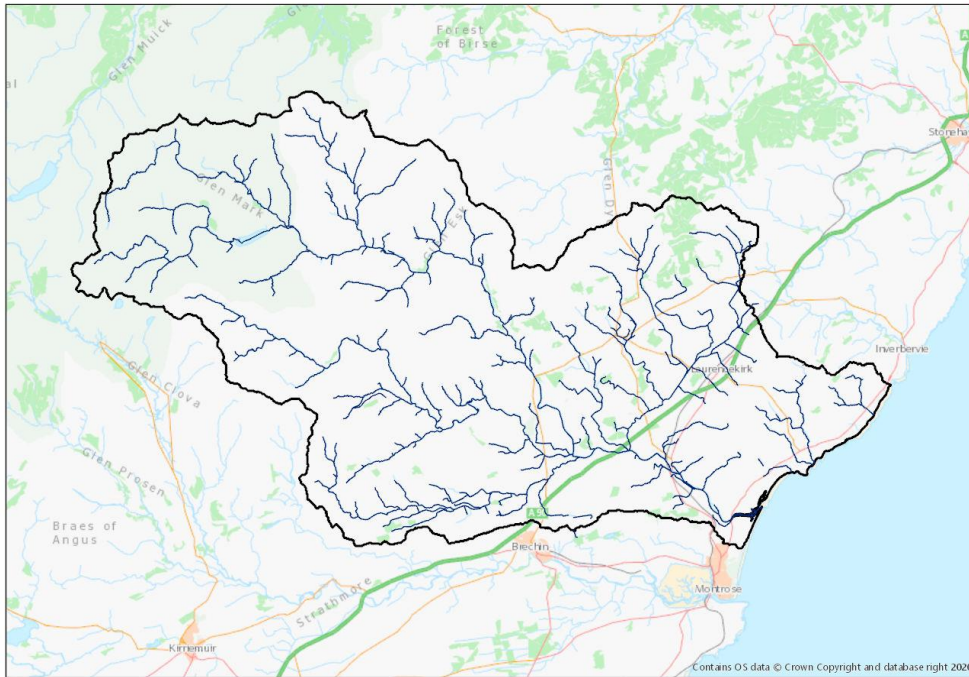


Figure 3. River North Esk catchment.

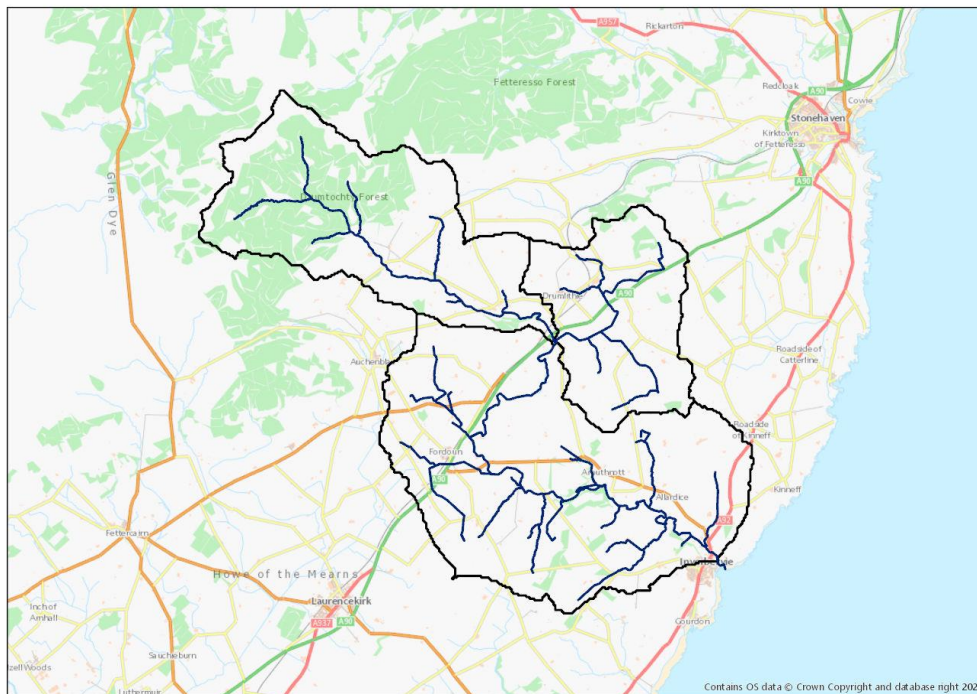


Figure 4. River Bervie catchment.

SECTION 3 THE CONTEXT




3.1 Biosecurity: The Nature of the Problem

Biosecurity issues are of increasing economic and ecological significance. Globalisation has expanded the possibilities, extent and complexity of world trade and the growth of the tourism market has expanded the number of destinations for activity holidays and travellers. These trends have led to the increased probability of the unintentional as well as intentional introduction, establishment and spread of non-native invasive species, parasites and diseases in Scotland and the UK. In the context of this first plan, biosecurity issues in the rivers and lochs of Scotland are considered in relation to the potential introduction and spread of a priority list of INNS and fish diseases.

Invasive non-native species are those that have been transported outside of their natural range and that damage our environment, the economy, our health and the way we live.

Invasive non-native species are the second greatest threat to biodiversity being capable of rapidly colonising a wide range of habitats and excluding the native flora and fauna ([CBD, 2006](#)). Furthermore, over the last 400 years INNS have contributed to 40% of the animal extinctions where the cause of extinction is known. As water is an excellent transport medium for the dispersal of many of these species, rivers and lochs and their banks and shorelines are amongst the most vulnerable areas to the introduction, spread and impact of these species. The ecological changes wrought by INNS can further threaten already endangered native species and reduce the natural productivity and amenity value of riverbanks, shorelines and their waterbodies.

The threat from INNS is growing at an increasing rate assisted by climate change, pollution and habitat disturbance with a correspondingly greater socio-economic, health and ecological cost. Many countries including Scotland are now facing complex and costly problems associated with invasive species for example:

-  [CABI](#)⁴ have estimated that INNS cost the UK economy at around £1.7 billion annually
-  A Scottish Government [report](#)⁵ estimated the potential Net Economic Value loss to Scotland of the introduction of *Gyrodactylus salaris* at £633 million with severe consequences for rural communities.
-  Invasive species have already changed the character of iconic landscapes and waterbodies in Scotland reducing the amenity value of those areas.

There is also a growing recognition of the impacts of **translocated species**. Translocated species are native species that have been transported outside of their natural range and they can also have severe ecological impacts. Examples of translocated species that are impacting the ecology of Scotland's rivers

⁴ <https://www.cabi.org/cabi-publications/demonstrating-the-cost-of-invasive-species-to-great-britain/>

⁵ <https://www.gov.scot/publications/diseases-of-wild-and-farmed-fish/pages/gyrodactylus-salaris/>

and lochs are the minnow (*Phoxinus phoxinus*) and ruffe (*Gymnocephalus cernuus*). The ruffe in particular has decimated the once significant and diverse population of the rare and protected powan (*Coregonus lavaretus*) in Loch Lomond.

Without some form of coordinated and systematic approach to the prevention of introduction and control of the spread of INNS and fish diseases, it is likely that the ecological, social and economic impacts and the costs for mitigation, control and eradication of these species and diseases will continue to increase. This plan is a first attempt to set out and implement such an approach at a local level for selected species that significantly impact freshwater fisheries and the aquatic environment.

3.2 Policy and Legislation

Given the high costs for the mitigation, control and eradication of INNS and fish diseases once they are established this plan emphasises the need for prevention and rapid response to the introduction of INNS **before** they become established. Furthermore, the host of pathways for entry and spread as well as the persistence of many of these species means that a partnership approach to prevent introductions and involving diverse stakeholders is essential. The partnership approach encapsulated in this plan is a key requirement for increased public awareness and engagement, optimisation of the use of resources and the provision of clear guidance for inter-agency working necessary to address the biosecurity issues of the Esk District. These approaches are consistent with the [GB Invasive Non Native Species Framework Strategy](#)⁶ and the [Species Action Framework](#)⁷ both of which have been approved by the Scottish Government.

The actions presented in this plan will also conform to, and be supported by, UK and Scottish Government legislation associated with the prevention, management and treatment of INNS, fish diseases and parasites:

- 🌿 Section 14 of [The Wildlife and Countryside Act \(1981\)](#)⁸, as amended by the Wildlife and Natural Environment (Scotland) Act 2011, makes it an offence to allow any animal (including hybrids) which is not ordinarily resident in Great Britain, to escape into the wild, or to release it into the wild; or to release or allow to escape from captivity, any animals that is listed on Schedule 9 to the 1981 Act. It is also an offence to plant or otherwise cause to grow in the wild any plant listed on Schedule 9 to the 1981 Act.
- 🌿 The Scottish Government issued a [Code of Practice on Non-Native Species](#)⁹ in 2012. The Code sets out guidance on how you should act responsibly within the law to ensure that non-native species under your ownership, care and management do not cause harm to our environment.
- 🌿 Section 179 of the [Town and Country Planning \(Scotland\) Act 1997](#)¹⁰ empowers local authorities to serve notice requiring an occupier to deal with any land whose condition is adversely affecting the amenity of the other land in their area.

⁶ www.nonnativespecies.org

⁷ <https://www.nature.scot/species-action-framework-handbook>

⁸ <https://www.legislation.gov.uk/ukpga/1981/69>

⁹ <https://www.gov.scot/publications/non-native-species-code-practice/>

¹⁰ www.opsi.gov.uk/acts/acts1997/ukpga_19970008_en_1

- 🌿 The [Possession of Pesticides \(Scotland\) Order 2005](#)¹¹ regulates the use of pesticides and herbicides for the control and eradication of INNS.
- 🌿 [Environmental Protection Act 1990](#)¹² contains a number of legal provisions concerning “controlled waste”, which are set out in Part II. Any Japanese knotweed or giant hogweed contaminated soil or plant material discarded is likely to be classified as controlled waste. This means that offences exist with the deposit, treating, keeping or disposing of controlled waste without a licence.
- 🌿 [The Waste Management Licensing Regulations 1994](#)¹³ define the licensing requirements which include “waste relevant objectives”. These require that waste is recovered or disposed of “without endangering human health and without using processes or methods which could harm the environment”.
- 🌿 [Controlled Waste \(Registration of Carriers and Seizure of Vehicles\) Regulations 1991](#)¹⁴ and the [Environmental Protection \(Duty of Care\) Regulations 1991](#)¹⁵ provide guidance for the handling and transfer of controlled waste.
- 🌿 The [Aquaculture & Fisheries \(Scotland\) Act 2007](#)¹⁶ regulates against the unauthorised introduction of fish to inland waters.
- 🌿 The [Prohibition of Keeping or Release of Live Fish \(Specified Species\) Order 2003](#)¹⁷ requires that a licence be obtained for the keeping or release of species listed on Schedules 1 and 2.
- 🌿 The [NetRegs](#)¹⁸ website contains useful guidance on INNS and their control

The procedures for the detection, notification and control of fish diseases procedures are already well defined by fisheries legislation. This stipulates that Marine Scotland acts in respect to the suspicion of the presence of notifiable fish diseases and organises and coordinates the response to that outbreak. As such the actions in this plan will raise awareness and provide mechanisms for the realisation of those procedures at the local level.

¹¹ www.opsi.gov.uk/legislation/scotland/ssi2005/20050066.htm

¹² www.opsi.gov.uk/acts/acts1990/ukpga_19900043_en_1

¹³ http://www.opsi.gov.uk/si/si1994/uksi_19941056_en_1.htm

¹⁴ www.opsi.gov.uk/si/si1991/uksi_19911624_en_1.htm

¹⁵ www.opsi.gov.uk/si/si1991/uksi_19912839_en_1.htm

¹⁶ <https://www.legislation.gov.uk/asp/2007/12/contents>

¹⁷ <https://www.legislation.gov.uk/ssi/2003/560/contents/made>

¹⁸ <https://www.netregs.org.uk/>

3.3 Existing Planning Framework

This Biosecurity Plan links Government-led policy, legislation and strategic action with local actions and reflects, implement and/or supports the provisions and requirements of the following existing plans (see also Table 1):

- the [River Basin Management Plan for the Scotland River Basin District: 2015-2027](https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027)¹⁹,
- the [Tay Area River Basin District Management Plan](https://www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp/area-advisory-groups/tay/)²⁰,
- the [South Esk Catchment Management Plan](http://theriversouthesk.org/)²¹ and
- the [Tayside](https://www.pkc.gov.uk/media/37386/Tayside-Local-Biodiversity-Action-Plan/pdf/Tayside_LBAP_report_GP_10_Web.pdf?m=636123832272230000)²² and [North East of Scotland](https://www.nesbiodiversity.org.uk/)²³ Local Biodiversity Action Plans

SECTION 4: CURRENT INVASIVE NON-NATIVE SPECIES ISSUES

Thirty one INNS and fish diseases have been included in the ERFT Biosecurity Plan of which 20 high priority species will be the main focus for action. These high priority species were identified as those that:

- Already exist within the ERFT area,
- If introduced would have severe consequences for local biodiversity and economy; and/or
- Have a high risk of introduction due to nature of the pathways for their introduction and their current geographic proximity.

4.1 Current biosecurity issues

Current biosecurity issues in the Esk area are associated with nine INNS, one translocated fish species, and one novel potential invasive non-native fish species.

- Giant hogweed (*Heracleum mantegazzianum*) is widespread and is present in large areas of the Esk catchments. Spreads through seed dispersal and the movement of soil contaminated by its seeds. It is a public health hazard due to the toxins in the sap reacting with UV light to blister skin. Dense stands can hinder access. Giant hogweed out competes native vegetation for space and resources, and can result in a loss of plant and invertebrate diversity. Winter dieback exposes soil to erosion with loss of river banks and increased sedimentation.



¹⁹ <https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf>

²⁰ <https://www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp/area-advisory-groups/tay/>

²¹ <http://theriversouthesk.org/>

²² https://www.pkc.gov.uk/media/37386/Tayside-Local-Biodiversity-Action-Plan/pdf/Tayside_LBAP_report_GP_10_Web.pdf?m=636123832272230000

²³ <https://www.nesbiodiversity.org.uk/>



- Himalayan balsam (*Impatiens glandulifera*) is present in scattered populations throughout the Esk catchments and coastal rivers. It spreads through natural dispersion by wind or water from areas in which it has been planted or introduced through the transport of contaminated soil. It forms thick monospecific stands that can shade out low level native plants reducing biodiversity and denuding river banks of understory vegetation. Winter dieback of the plants exposes soil to erosion.

- Japanese knotweed (*Fallopia japonica*) is extensively located throughout the main Esk catchments. It has spread along rivers by movement of plant fragments by water and is found in many other areas through the movement of plant debris in soil and on vehicles. It forms dense thickets which can exclude native plants and prohibit regeneration. Dense stands can also hinder access, reduce biodiversity and alter the habitat for wildlife.



- American signal crayfish (*Pacifastacus leniusculus*) has been deliberately introduced into ponds which connect into the Luther Water on the River North Esk, and there is one record from the Pow Burn on the South Esk. American signal crayfish can feed on aquatic plants, invertebrates, juvenile fish, destabilise river banks by burrowing and exclude salmonids from their preferred habitats.

- American mink (*Mustela vison*) is present mainly in the upper parts of the North and South Esk catchments. Mink spread by migration and kill water fowl, small mammals and juvenile fish. Mink are linked to the decline of water voles in the Cairngorms National Park area with 94% of sites occupied by water voles in the 1950s are now unoccupied.



- Canadian pondweed (*Elodea canadensis*) is present in various locations throughout the Esk district. It is spread by disposal of plants or plant fragments near waterways, escapes from garden ponds during flood episodes and possibly by birds and other animals. Canadian pondweed can dominate native macrophyte communities which can lead to their extinction and thereby impacts local invertebrate communities. It can also increase metal loads within waterbodies which compounds its impacts on native flora and fauna.

- Nuttall's pondweed (*Elodea nuttallii*) is present in one location within the catchment of the Pow Burn, a tributary of the South Esk. It spreads through escapes from garden ponds, through garden waste and by birds and animals. It dominates native macrophyte communities which can lead to their extinction and removes metals from sediments and releases them into the water.



- Rhododendron (*Rhododendron ponticum* & hybrids) is present in many locations throughout the middle and lower Esk and coastal river catchments. It spreads by natural seed and vegetative dispersal after intentional planting in gardens, parks and demesnes. It forms dense thickets and out-

competes native plants for space and resources with impacts on fish and invertebrate communities as well as preventing site access.

- 🌿 Minnow (*Phoxinus phoxinus*) is a translocated species that has been introduced into the Esk district by anglers. Minnows compete for food and territory with native species but they also provide another food resource for kingfishers, herons, sawbill ducks and other larger fish species. Minnows have been caught in all catchments within the ERFT area during salmonid juvenile surveys.



- 🌿 Pink salmon (*Oncorhynchus gorbuscha*) has spread naturally to the area, appearing initially in 2017. The impacts of a spawning pink salmon population on the native species within our waters are currently unknown but may include competition for resources both in freshwater and marine areas. Where animals are caught during routine activities they are dispatched. As of 2021, it is unclear if this species is invasive.

4.2 Potential Biosecurity Issues

The invasive non-native species listed below are not currently present within the Esk district (Tables 1 and 2). They have been classified as High or Medium level threats depending on their likely impact on the local economy and biodiversity in combination with the likelihood of their introduction. The level of risk of introduction was based on the pathways for the introduction of INNS, their current geographic proximity and the uses within the ERFT area.

- High Threat:** Species with **Severe** consequences for local biodiversity and the economy and a **High to Medium** risk of introduction
- Medium Threat:** Species with **Moderate** consequences for local biodiversity and the economy with a **Low to High** risk of introduction

There are five High Threat level species that could be introduced into the Esk District that include the fish parasite *Gyrodactylus salaris*, three freshwater invertebrates and two aquatic plant species (Table 1).

Table 1 High Threat level species their impacts and risk of introduction

SPECIES	RISK OF INTRODUCTION	LOCAL IMPACTS
<i>Gyrodactylus salaris</i> (Freshwater external parasite of salmon)	High- Through unintentional introduction from shipping, anglers, and water sport enthusiasts through: <ul style="list-style-type: none"> contaminated fish clothing/equipment ballast water 	<ul style="list-style-type: none"> Projected catastrophic impact on salmon (<i>Salmo salar</i>) populations throughout Scotland. (It has largely exterminated <i>S. salar</i> in 41 Norwegian rivers)

SPECIES	RISK OF INTRODUCTION	LOCAL IMPACTS
Australian swamp stonecrop (<i>Crassula helmsii</i>)	High – Through introduction from two existing populations nearby other pathways include: <ul style="list-style-type: none"> ▪ Garden trade²⁴ ▪ Disposal of garden waste ▪ Spread by animals and human activity 	<ul style="list-style-type: none"> ▪ Suited to a wide range of slow moving freshwater systems. ▪ Out competes native species. ▪ Forms dense carpets choking ponds and ditches. ▪ Reduced light levels below dense growths can cause die off of waterweeds and algae and reduce water oxygen levels
Zebra mussel (<i>Dreissena polymorpha</i>) Freshwater Bivalve	Medium -through unintentional introduction from contaminated boat hulls and engines and bilge water.	<ul style="list-style-type: none"> ▪ Major economic impact on all subsurface water structures e.g. blocking pipes and impacting upon hydro-electric schemes ▪ Varied and unpredictable ecological impacts including changes to freshwater nutrient cycles, extinction of local mussels and changes to stream substrate affecting spawning areas
Chinese mitten crab (<i>Eriocheir sinensis</i>) Resides in freshwater but migrates to the sea for breeding.	Medium -through unintentional introduction from boat hulls and live food trade.	<ul style="list-style-type: none"> ▪ Burrowing in high density populations damages river banks ▪ Concern over impacts on local species ▪ Intermediate host for the mammalian lung fluke known to infect humans
Curly waterweed (<i>Lagarosiphon major</i>)	Medium – found in a small number of locations throughout Scotland especially in the central belt area and spread through: <ul style="list-style-type: none"> ▪ Disposal of garden waste ▪ Animals and human activity ▪ Fragmentation by wind dispersal, boat movement, angling equipment and possibly water fowl 	<ul style="list-style-type: none"> ▪ Capable of forming very dense infestations in suitable habitats and occupying the full water column in waters up to 6m deep with significant impacts on native plants, insects and fish. ▪ It is a serious threat to tourism, angling, boating and other recreational pursuits as well as conservation goals

There are also 15 Medium Threat level species of which there is a high risk of introduction for two species, a medium risk for eight species and a low risk for five species (see Table 2 below).









Table 2 The risk of introduction of Medium Threat level INNS.

SPECIES	RISK OF INTRODUCTION	
Ruddy duck (<i>Oxyura jamaicensis</i>)	High	Could migrate from a number of locations in eastern Scotland
Orfe (<i>Leuciscus idus</i>)	High	Through intentional/unintentional introduction from an existing population nearby.
Water primrose (<i>Ludwigia grandiflora</i>)	Medium	Unintentional introduction from boat hulls and ponds
Water fern (<i>Azolla filiculoides</i>)	Medium	Through intentional/unintentional introduction from numerous locations throughout Scotland, especially

²⁴ Note that although the sale of species that are or can become invasive is not illegal, garden centres should be made aware of the impacts of known or potential INNS if they are released into the wild.

Slipper limpet (<i>Crepidula fornicate</i>)	Medium	central belt
Didemnum Tunicates / sea squirts (<i>Didemnum vexillum</i>)	Medium	Unintentional introduction from boat hulls
Wireweed (<i>Sargassum muticum</i>)	Medium	Unintentional introduction from marine fishing boat hulls
Ruffe (<i>Gymnocephalus cernuus</i>)	Medium	Currently recorded in central Scotland and could be introduced as live bait or in ballast water
Bullhead (<i>Cottus gobio</i>)	Medium	Translocated species recorded in central Scotland that could be introduced deliberately or as live bait
Common cord grass (<i>Spartina anglica</i>)	Medium	One location near St Andrews
Large flowered waterweed (<i>Egeria densa</i>)	Low	Only found to date in East Lothian. Possible introduction from ponds
Floating pennywort (<i>Hydrocotyle ranunculoides</i>)	Low	Currently only in England up to the midlands. Possible introduction from ponds
Parrot's feather (<i>Myriophyllum aquaticum</i>)	Low	Through intentional/unintentional introduction from two existing populations in the south of Scotland
Fanwort (<i>Cabomba caroliniana</i>)	Low	Only found in one location in southern Scotland possible introduction from ponds
Asian topmouth gudgeon (<i>Pseudorasbora parva</i>)	Low	Currently only recorded from 5 locations in England. Could be introduced as live bait, in ballast water or as releases from aquaria

From Tables 1 and 2, the main pathways or means of introduction of both High and Medium Threat level species into the Esk Fisheries District are:

-  Intentional introduction or planting
-  Fouling and ballast water of marine vessels
-  Fouling and ballast water of freshwater vessels
-  Sale from garden or pond centres
-  Escapes from fish farms, ponds, gardens, demesnes
-  Contaminated water sports equipment (e.g. from anglers, canoeists)
-  Movement of contaminated soils or vehicles
-  Improper control and disposal measures e.g. cutting and dumping without treatment.

To prevent the spread of these INNS and diseases these pathways need to be restricted and where feasible existing populations controlled or eradicated and their impacts mitigated.

4.4 Stakeholders

The engagement of key stakeholders is imperative for the success of this plan. Regulatory agencies and bodies associated with other relevant management plans include the:

-  Scottish Government, Edinburgh

-  Angus and Aberdeenshire Local Councils
-  Scottish Environment Protection Agency
-  Forest and Land Scotland, Dunkeld
-  Nature Scot, Angus and Aberdeenshire Area Offices
-  Angus and North East Scotland SEPA office
 - Tay and North East of Scotland Area Advisory Groups
-  River South Esk Catchment Partnership
-  Esk District Salmon Fishery Board
-  Tayside, Cairngorms National Park and North East Local Biodiversity Action Groups
-  Scottish Wildlife Trust, Montrose Basin
-  Royal Society for the Protection of Birds
-  Scottish Water

SECTION 5 INVASIVE SPECIES CONTROL WITHIN THE ESK FISHERIES DISTRICT

5.1 2010 to 2017

Invasive Plants

Since 2010, extensive treatment of INN plants has taken place throughout the Esk Fisheries District, focussing on Giant hogweed and Japanese knotweed. Control was undertaken annually by ERFT staff, professional contractors, and volunteers from 2010 to 2017. From 2017 control was undertaken as part of the Scottish Invasive Species Initiative.

Mink

The Scottish Mink Initiative was launched in May 2011 and ran until 2015. It covered North Tayside, Aberdeenshire, Cairngorms, Moray and Highland – some 20,000km. This volunteer based initiative used a modified mink raft designed by the Game and Wildlife Conservation Trust which had a two-fold purpose: to monitor for mink and to act as a trapping platform once mink prints have been positively identified.

From 2017, control of mink was undertaken as part of the Scottish Invasive Species Initiative (see section 5.2 below).

Signal Crayfish

Two populations of North American signal crayfish have been identified within the Esk Fisheries District: one in a tributary of the River South Esk and one in a tributary of the River North Esk. Due to their presence in running water and alongside salmonid fish, eradication is extremely difficult and would require poisoning entire stretches of streams.







In an effort to control the spread and signal crayfish and prevent further introductions, the ERFT have engaged in raising awareness of the issues with local community groups, Nature Scot, river proprietors and ghillies. In addition, there were articles in regional newspapers and on national radio initiated by ERFT.

5.2 2017 to 2022 Scottish Invasive Species Initiative






The Scottish Invasive Species Initiative (SISI) is a partnership project which aims to work with local organisations, landowners, volunteers and other stakeholders to control invasive non-native species along riversides in Northern Scotland, for the benefit of our native wildlife and communities.

SISI is led by NatureScot and is funded by the National Lottery Heritage Fund (Scotland), NatureScot and by in-kind support from project partners and volunteers. It is delivered on the ground by staff based with ten Fisheries Trusts/Boards with a focus on recruiting, training, providing equipment, and working with stakeholders on the local level where these INNS are present to ensure meaningful and lasting control/eradication of the target species which are: American mink, Giant hogweed, Japanese knotweed, Himalayan knotweed, American skunk cabbage, White butterbur and Himalayan balsam.

The aspiration of the project is to create a network of people working all along affected catchments in a coordinated manner, and that these people will continue to carry out any needed work after the project has ended, making this a sustainable long-term community-based solution to invasive species control. To this end, SISI focuses on:

-  Stakeholder engagement to bring a broad range of people on board with the project.
-  Training for those interested in undertaking chemical control of invasive plants such as Hogweed and Knotweed.
-  Coordination through surveying and mapping the catchments, identifying problem areas and ensuring coordinated top-down control for lasting results.
-  Providing equipment and chemical in the case of plant control, to take the upfront costs of control away from those who want to undertake control.
-  Providing equipment and training for mink monitoring and control as part of building a volunteer run mink trapping network across the project area.
-  Running community/public events and talks to get people engaged with their local river, aware of the issues and opportunities to get involved.




In addition, SISI has an educational element to inform people more broadly about the problems INNS cause and to raise awareness in communities. SISI has provided:

-  Extensive educational materials and packs on its website - the [Alien Detectives²⁵](https://www.invasivespecies.scot/alien-detectives) resources which school and groups can access for free to learn about INNS and the associated problems they cause.
-  Educational sessions in the classroom and outdoors delivered by Project Officers.
-  Talks and presentations to community/special interest groups delivered by Project Officers.
-  Angling development days for schools to promote an interest in their local rivers delivered by partner staff.
-  Walks and talks on the rivers, open to members of the public who would like to engage with what SISI does on a more informal level.

²⁵ <https://www.invasivespecies.scot/alien-detectives>

SECTION 6 BIOSECURITY MANAGEMENT STRATEGY

The objectives of this plan will be achieved through a partnership approach to implement the following strategic elements:

-  Prevention,
-  Early detection, surveillance, monitoring and rapid response,
-  Mitigation, control and eradication

6.1 Prevention

The most effective method to prevent the introduction of INNS is to raise awareness of the issues with stakeholders and to encourage best practice. Table 3 lists local stakeholders and possible mechanisms to deliver the required actions.

Table 3. Stakeholders and mechanisms of delivery if prevention information.

Stakeholder Group	Priority Area	Mechanism of Delivery
Montrose Port Authority	<ul style="list-style-type: none"> - Avoid pumping out of non-sterilised ballast water in harbour - Role of hull fouling in the introduction and spread of INNS 	<ul style="list-style-type: none"> -Formulate and implement an interim code of practice requiring non-sterilised ballast water to be discharged on the ebb tide and away from harbour area. -Supply posters and other awareness material for display and signage. - invasivespecies.scot/biosecurity²⁶
Local Garden Centres	<ul style="list-style-type: none"> -Promotion of existing codes of practice covering the security and disposal of INNS to all garden centres -Target gardeners to dispose plant material and/or soils in a responsible manner. 	<ul style="list-style-type: none"> -Garden centres to encourage distribution of codes and posters from the Be Plant Wise²⁷ campaign and to advise the general public of INNS issues
Local Aquarium and Pond stockists	<ul style="list-style-type: none"> -Promote code of practice to all pet shops and suppliers of ornamental fish -Target aquarists and pond keepers to dispose of unwanted animals or plants in a responsible manner 	<ul style="list-style-type: none"> -Retailers to encourage distribution of codes of practice and posters (available from Be Plant Wise)
Water User associations (canoeists, sailing clubs)	<ul style="list-style-type: none"> -Promote awareness to clubs and participants of the dangers arising from INNS and <i>Gyrodactylus salaris</i> -Promote the distribution of information and erection of signage in recognised car parks -Identification of suitable persons to act as “eyes” 	<ul style="list-style-type: none"> -Associations to promote disinfection of equipment and provide appropriate facilities to eliminate the risk of accidental transfer of INNS - invasivespecies.scot/biosecurity
Landowners	<ul style="list-style-type: none"> - Promote knowledge of biosecurity issues amongst all tenants and resource users - Identification of suitable persons to act as “eyes” 	<ul style="list-style-type: none"> -Work with ERFT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -ERFT to offer training for “eyes” - invasivespecies.scot/biosecurity

²⁶ <https://www.invasivespecies.scot/biosecurity>






²⁷ <http://www.nonnativespecies.org/beplantwise/>

Stakeholder Group	Priority Area	Mechanism of Delivery
Angling clubs	<ul style="list-style-type: none"> - Promote knowledge of biosecurity issues amongst all members and visiting anglers - Ensure the distribution of information and erection of signage in fishing huts and recognised car parks -Recommend suitable members to act as “eyes” 	<ul style="list-style-type: none"> -Work with ERFT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -ERFT to offer training for “eyes” - invasivespecies.scot/biosecurity
General Public	<ul style="list-style-type: none"> - General awareness of impacts and measures to prevent/control INNS 	<ul style="list-style-type: none"> -Local Media Campaigns -Use of websites (NNSS) -Develop a leaflet to promote the Biosecurity plan, the dangers arising from INNS and the reporting system -Promote the Biosecurity Plan to all retail outlets who deal with NNS e.g. pet shops, garden centres - invasivespecies.scot/biosecurity
Schools	<ul style="list-style-type: none"> - General awareness of impacts and measures to prevent/control INNS 	<ul style="list-style-type: none"> -School visits focusing on ecological clubs and encouraging appropriate field trips -Encourage use of Alien Detectives²⁸ education materials


6.2 Monitoring

Biosecurity planning has been initiated within the Esk Fisheries District by the ERFT through the preparation of this plan. Progress in implementing the plan will be determined by the level of engagement, support and commitment of the stakeholders and partners to deliver action against shared priorities. That is now the challenge for all parties as we seek to deliver the objectives of this plan.

To ensure the effective implementation of this plan, it is vital that the outcomes and impacts of the actions are monitored and reviewed to ensure that the objectives are being met. Thus a coordinated monitoring programme must be established to ensure efficacy and sustainable treatment initiatives. This programme should include:

-  Assessment of efficacy of surveillance and rapid response systems
-  Occurrence and distribution of the selected INNS within the Esk area
-  Effectiveness of control/eradication programme including:
 - Application/delivery of effective concentrations of biocides
 - Checking that treatments have been effective
 - Re-treating immediately where treatment has been ineffective
 - Monitoring and investigation of any apparent resistance to treatments
 - Surveillance of the area for signs of dormant plants becoming activated
-  Assessment of the ability to close established pathways of transmission
-  Monitoring the effectiveness of all legislation and codes of practice especially those which are aimed at restricting/closing pathways

²⁸ <https://www.invasivespecies.scot/alien-detectives>

-  Monitoring general activities within the district and assessing them in terms of risk for the introduction of INNS.

6.3 Control and Eradication

Following identification of INNS, control and, if possible, eradication activities should commence. Best practice should always be followed, with additional lessons learned from current activities. While eradication of INNS is the desired outcome, it is recognised that eradication may result in more serious outcomes, for example treatment of flowing water for signal crayfish would result in extermination of fish and invertebrate populations of the treatment area.

SECTION 7 SUMMARY

In order to have an effective biosecurity management system, it is necessary to prevent the introduction of novel invasive non-native species; to be able to identify new introductions and existing areas with INNS; and to be able to control and, if possible, eradicate INNS. This Biosecurity Management Plan identifies the species currently present within the Esk Fisheries District, along with potential pathways for introduction of novel species to the area. The Plan also lists the main stakeholders who have responsibilities to deal with the INNS issues.

To have an effective biosecurity management system, there must be continuous monitoring and control/eradication. Experience from the original 2009 Biosecurity Management Plan has demonstrated that breaks in monitoring and control allow INNS to recolonise and spread, undoing the good work completed and progress and investments made. These breaks in monitoring and control are mainly due to a lack of funding. Therefore, to have a fully effective and sustainable biosecurity management system, there must be continuity of funding to allow activities to continue.

The Scottish Invasive Species Initiative offers a model for INNS control beyond the life of the current project (2022). SISI is demonstrating that there are many local volunteers willing to carry out INNS control, from monitoring mink rafts to spraying Giant hogweed if supported and coordinated. However, these volunteers require supervision, encouragement, and equipment to allow them to undertake the work. Funding of the supervision and equipment is vital if the work initiated by SISI is to continue and all the good work not put to waste.