

RIVER TAY BIOSECURITY PLAN

2022 – 2026









LOTTERY FUNDED



Scottish Invasive Species Initiative

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ABBREVIATIONS

CNPA	Cairngorms National Park Authority
REIA	River Earn Improvement Association
FLS	Forestry and Land Scotland
GIS	Geographical Information System
INNS	Invasive Non-Native Species
LBAP	Local Biodiversity Action Plan
LLTNP	Loch Lomond & The Trossachs National Park
MS	Marine Scotland
NNSS	Non Native Species Secretariat
NS	NatureScot
SRUC	Scotland's Rural College
SEPA	Scottish Environment Protection Agency
SFCC	Scottish Fisheries Co-ordination Centre
SG	Scottish Government
TDSFB	Tay District Salmon Fisheries Board
TRT	Tay Rivers Trust



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 animal and plant pests and diseases, parasites and non native species".

Solution 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.

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EXECUTIVE SUMMARY

This plan was developed by the Tay Rivers Trust with assistance and funding from the Scottish Invasive Species Initiative, NatureScot and the National Lottery Heritage Fund. It is a continuation from the 2010 – 2015 Tay Fisheries District Biosecurity Plan and presents actions that have been agreed with stakeholders for the prevention, early detection, control and mitigation of the introduction and spread of selected invasive non-native invasive species (INNS), fish diseases and parasites.

The vision of this plan is:

'To maintain and develop a sustainable framework to prevent, detect, control and eradicate invasive non-native species within the Tay fisheries district through the coordination of data collection, management, liaison, and education'

Objective 1: Prevent the introduction and spread of INNS within the Tay fisheries district.

- All key stakeholders aware of;
 - The ecological and economic impacts of INNS
 - Solution and spread of INNS.
 - Solution and spread of INNS.

Objective 2: Maintain and enhance the framework for the detection and surveillance of INNS, linked to a protocol to ensure a rapid management response.

- 'Reporting system' for INNS in district.
- Strategic monitoring of INNS in district.
- Rapid response for new INNS which pose significant threats to local biodiversity and economy.

Objective 3: Continue and expand coordinated control and eradication programmes for INNS.

- Coordinated control, eradication and habitat restoration programmes maintained throughout the Scottish Invasive Species Initiative part of the Tay fisheries district and expand to the rest.
- Coordinate activities with partner organisations to ensure sufficient funding and resources in place to continue Scottish Invasive Species Initiative or replacement project for the control of INNS within the Tay fisheries district.

1. INTRODUCTION

Biosecurity issues are of increasing economic and ecological significance. The extent and complexity of modern trade and travel, assisted by climate change, pollution and habitat disturbance, has led to increased spread of Invasive non-native species (INNS), parasites and diseases into Scotland and the UK. According to <u>CBD (2006)</u>¹, INNS are the second greatest threat to biodiversity. Over the last 400 years, INNS have contributed to 40% of the animal extinctions where the cause of extinction is known.

It has been_estimated that INNS cost the UK economy £1.8 billion per year².Closer to home, a Scottish Government <u>report³</u> estimated the potential Net Economic Value loss to Scotland of the introduction of the salmon parasite *Gyrodactylus salaris* at £633 million.

By 2011 approximately 2,000 non-native species were already present in Britain and rising⁴. Fortunately, the majority exist in small populations with little impact on native ecology. However, a small but significant proportion of those INNS are invasive. Without a coordinated and systematic approach to preventing the introduction and control of the spread of INN species and fish diseases, the adverse consequences and costs will continue to increase.

This plan aims to maintain and expand work that is already underway within the Tay district for selected species and diseases that significantly impact freshwater fisheries and the aquatic environment. It describes biosecurity issues in the Tay Fisheries District and presents agreed actions with partners in line with the **vision**:

'To maintain and develop the framework that will prevent, detect, control and eradicate invasive non-native species within the Tay district through appropriate management, data collection, liaison, and education'.

This vision will be achieved in line with the three key elements of the <u>GB Invasive Non Native</u> <u>Species Framework Strategy</u>⁵:

1. Prevent the introduction and spread of identified INNS in the Tay district.

2. Maintain the framework for the detection and surveillance of, and rapid response to, new INNS.

3. Maintain and expand coordinated control and eradication programmes for identified INNS.

¹<u>http://www.cbd.int/gbo2</u>

² (PDF) The Economic Cost of Invasive Non-Native Species on Great Britain (researchgate.net)

³ <u>https://www.gov.scot/resource/doc/1062/0042434.pdf (webarchive.org.uk)</u>

⁴ <u>GB Non-native Species Information Portal: documenting the arrival of non-native species in Britain | SpringerLink</u>

⁵ <u>https://www.nonnativespecies.org/</u>

2. BACKGROUND TO THE PLAN

This plan is one of a set of biosecurity plans which were produced throughout northern Scotland as part of the Scottish Invasive Species Initiative with backing from NatureScot and the National Lottery Heritage Fund. It builds on a previous plan produced by the Tay Foundation in 2009 which was also part of a national programme of action implemented then through the Rivers and Fisheries Trusts of Scotland (RAFTS).

That initial biosecurity plan provided a platform for local action to address growing biosecurity issues. However, major issues still persist. This updated plan for 2022 – 2026 has been developed as part of an adaptive management process and its outcomes and impacts will, in turn, be reviewed and incorporated into the next generation plan.

The plan was produced using a participatory planning process coordinated by the Tay Rivers Trust, through which, stakeholders identified and agreed the aims, outputs and actions presented in this plan. The plan relies on partnerships to implement the actions required to address the complex issues associated with biosecurity. This plan therefore represents the agreed approach of the TRT, stakeholders and appropriate local regulatory bodies for the prevention, early detection and control of non-native invasive species, fish diseases and parasites.

Invasive non native species (INNS) 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.

3. AREA COVERED BY THE PLAN

The Tay Biosecurity Plan (TBP) covers the management area of the Tay District Salmon Fisheries Board (TDSFB). This comprises of the River Tay and its tributaries and all other watercourses that discharge into the North Sea between the Red Head near Arbroath and Fifeness. The district is split between six Local Authority administrations, Perth and Kinross, Angus, Dundee City, Fife, Stirling and a very small part of Highland. A proportion of the catchment is also within the Cairngorms and Loch Lomond and Trossachs national parks.



Map 1: Tay Fisheries District, with larger rivers and tributaries shown

4. BIOSECURITY: CURRENT AND POTENTIAL THREATS

This section identifies those INNS, translocated⁶ species and fish diseases considered to be significant threats to the Tay district, and focusses on those highest priority species will be the main focus for action. Priority species are those that:

- Already exist within the Tay 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 in the Tay district

Current biosecurity issues are associated with the following INNS, translocated native species and fish parasites that are currently found in the Tay catchment:

American mink (*Mustela vison*) are present throughout the Tay catchment and coastal rivers. Mink spread by migration and kill water fowl, small mammals and juvenile salmon and trout. Mink are particularly linked to the decline of water voles.



Japanese knotweed (Fallopia japonica) and to a lesser extent Himalayan knotweed (Persicaria wallichii), is particularly extensive in parts of the Earn catchment and locally significant in parts of the main Tay catchment. It has spread along rivers by movement of plant fragments by

⁶ **Translocated species** are native species that have been transported outside of their natural range. An example of a translocated species impacting the ecology of Scotland's rivers and lochs is the ruffe (*Gymnocephalus cernuus*), which has decimated the once significant and diverse population of Powan (*Coregonus lavaretus*) in Loch Lomond. In Loch Tay there is now a large population of roach (*Rutilus rutilus*) which has provided an expanded food source for the pike (*Esox lucius*) population which may have increased as a consequence, creating potentially detrimental impacts on native fish species.

water and through the movement of plant debris in soil and on vehicles. It forms dense thickets which can exclude native plants and prohibits regeneration. Dense growth of Japanese knotweed can also hinder access, reduce biodiversity and alter the habitat for wildlife.





Himalayan balsam (Impatiens glandulifera) is also present along all of the mainstem of the Tay and some of the major tributaries, most notably the Earn and Isla. 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.



hogweed Giant (Hercaleum mantegazzianum) widespread is around Perth along the Tay and Almond, part of the Dighty Water near Dundee and in part of the Eden catchment. It has also been spreading on the Tay from a source near Aberfeldy. It 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. North American Signal Crayfish (*Pacifasticus leniusculus*) have been introduced to several locations with the district. They are now spreading particularly rapidly in the River Ericht system from introductions upstream. They are soon likely to spread through the River Isla into the lower Tay. They are also present in sections of the River Earn, River Eden and the Dighty Burn. They may therefore become widespread in the southern / eastern part of the district, but colonisation of the northwestern half should be much more gradual without further introductions. Signal crayfish may exclude salmonids from preferred habitat, and impact on other species including benthic fish, aquatic invertebrates, macrophytes, and invertebrates through their destruction of habitat through extensive burrowing and their highly territorial behaviour.



- Rainbow trout (Oncorhynchus mykiss) are present in several put and take fisheries and reared for restocking or the table market at several sites (Loch Earn, Loch Tay, Kindrochet (Earn), West Mill (Ericht) and College Mill (Almond)). Rainbow trout have been introduced to smaller lochs throughout the area for angling. Such farmed fish are a potential source of viral and bacterial diseases affecting wild salmonids and they also compete for resources with native species if they escape.
- Rhododendron (Rhododendron ponticum & hybrids) is present in many locations throughout the middle and lower Tay and coastal river catchments but is not a significant threat. 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 found through the mainstem Tay and most larger tributaries. This is a translocated species introduced into the Tay 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.



- Other Non-Native Fish (incl. Goldfish, Tench, Ide, Roach, Rudd, Chub, Bream, Crucian Carp). Indiscriminate stocking of some of these fish species has occurred locally in the past and has led to populations of Roach and other species establishing in some lochs and ponds within the catchment. These can compete with existing fish populations for food and habitat. Removal is difficult, although in some small lochans this may be possible.
- Two species of the fish louse Argulus (Argulus coregoni and Argulus foliaceus) have been found in the Tay district. A. coregoni, a riverine species, is now endemic in the lower Tay, lower Earn and lower Isla, while the lacustrine species A. foliaceus has been found in a number of lowland lochs which are or have been stocked with rainbow trout. These ectoparasites can cause significant damage to healthy freshwater fish including, in extreme cases, death. Argulus feed by inserting a long spine-like structure into the skin, which breaks down tissues through the secretion of enzymes. The repeated puncturing of the skin, combined with activity of the parasites' serrated mouth-parts, can cause substantial damage and irritation. Egg-laying only takes place in warmer water, and therefore hot summers can see a population explosion.
- Canadian pondweed (Elodea canadensis) and Nuttall's pondweed (Elodea nutallii) are present in various locations across Scotland, including Tayside. They are spread through careless disposal of plants near waterways, movements via vectors such as bird and animals and escapes from garden ponds during flooding. The plants tend to thrive at the expense of native macrophytes, leading to their extinction and the knock-on effect this has on

invertebrates. They have also been shown to add metals to water bodies, altering the chemical composition and thereby affecting the habitat.

American skunk cabbage (Lysichiton americanus) has been found at several, still relatively restricted, locations within the Tay district, for example, in the Tummel and Earn catchments.



Pacific pink salmon (*Oncorhynchus gorbuscha*) have been observed and caught in unprecedented numbers in Scottish rivers, including the Tay, in 2017, 2019 and, particularly, 2021. Even more so in Norway. These appear to be strays from populations which were introduced to NW Russian rivers several decades ago but have suddenly expanded greatly perhaps as a result of climate change. These pink salmon have spawned in Scottish rivers, but the timing of spawning activity (late summer/early autumn) indicates they are adapted to a sub arctic climate. The offspring of these initial strays may have poor survival, but there are fears that, over time, they will adapt to more temperate climates and become established here. This could have very significant implications for native Atlantic salmon, for example, by enhancing fungal disease following die off of spent adults and competition for resources with native species.

4.2 Potential biosecurity threats

The invasive non-native species listed in Tables 1 & 2 below are <u>not currently present</u> within the Tay district. They have been classified as High or Medium level threats.

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

SPECIES	RISK OF INTRODUCTION	LOCAL IMPACTS
<i>Gyrodactylus salaris</i> (Freshwater external parasite of salmon)	 High - through unintentional introduction from anglers and water sport enthusiasts through: Contaminated fish Clothing/equipment which has been in contact with infected water including canoes Ballast water 	 Projected catastrophic impact on salmon (Salmo salar) populations throughout Scotland. (It has largely exterminated S. salar in 41 Norwegian rivers.)
Australian swamp stonecrop (Crassula helmsii)	 High – through introduction from two existing populations nearby. Other pathways include: Garden trade⁷ Disposal of garden waste Spread by animals and human activity 	 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</i> <i>polymorpha</i>) Freshwater Bivalve	Medium - through unintentional introduction from contaminated boat/canoe hulls and engines and bilge water.	 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

Table 1 High threat level species. Risk of introduction and impacts

⁷ 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.

SPECIES	RISK OF INTRODUCTION	LOCAL IMPACTS
Chinese mitten crab	Medium - through unintentional	Burrowing in high density
(Eriocher sinensis)	introduction from boat hulls and live	populations damages river banks
Resides in	food trade.	Concern over impacts on local
freshwater but		species
migrates to the sea		Intermediate host for the
for breeding.		mammalian lung fluke
		Paragonimus ringer, known to
		infect humans
Curly waterweed	Medium – found in a small number	Capable of forming very dense
(Lagarosiphon	of locations throughout Scotland	infestations in suitable habitats
major)	especially in the central belt area	and occupying the full water
	and spread through:	column in waters up to 6m deep
	Disposal of garden waste	with significant impacts on native
	Animals and human activity	plants, insects and fish.
	Fragmentation by wind dispersal,	It is a serious threat to tourism,
	boat movement, angling	angling, boating and other
	equipment and possibly water fowl	recreational pursuits as well as
		conservation goals
Killer shrimp	Medium - through unintentional	Varied and unpredictable
(Dikerogammarus	introduction from contaminated	ecological impacts including
villosus)	boat/canoe hulls and engines and	changes to freshwater nutrient
	bilge water	cycles, extinction of local species
		and wide scale changes to the
		aquatic ecosystem.

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

SPECIES		RISK OF INTRODUCTION
Ruddy duck (Oxyura jamaicensis)	High	Could migrate from a number of locations in
		eastern Scotland
Various cyprinid fish (e.g. Bream,	High	Could be dispersed though intentional or
Chub, Crucian Carp, Ide, Orfe,		unintentional introductions from existing
Roach, Rudd and Tench)		populations within the Tay catchment or others
		to the south.
Water primrose (Ludwigia	Medium	Unintentional introduction from boat hulls and
grandiflora)		ponds
Water fern (Azolla filiculoides)	Medium	Through intentional/unintentional introduction
		from numerous locations throughout Scotland,
		especially central belt
Slipper limpet (Crepidula fornicate)	Medium	Through unintentional introduction
Didemnum Tunicates / sea squirts	Medium	Unintentional introduction from marine fishing
(Didemnum vexillum)		boat hulls
Wireweed (Sargassum muticum)	Medium	Through unintentional introduction
Ruffe (Gymnocephalus cernuus)	Medium	Currently recorded in central Scotland and
		could be introduced as live bait or in ballast
		water
Bullhead (Cotus gobio)	Medium	Translocated species recorded in central
		Scotland that could be introduced deliberately
		or as live bait
Common cord grass (Spartina	Medium	One location near St Andrews
anglica)		
Large flowered waterweed (Egeria	Low	Only found to date in East Lothian. Possible
densa)		introduction from ponds
Floating pennywort (Hydrocotyle	Low	Currently only in England up to the midlands.
ranunculoides)		Possible introduction from ponds
Parrot's feather (Myriophyllum	Low	Through intentional/unintentional introduction
aquaticum)		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	Low	Currently only recorded in 5 English locations.
(Pseudorasbora parva)		Could be introduced as live bait, in ballast water
		or as releases from aquaria.

From Tables 1 and 2, the most probable means of introduction of both High and Medium Threat level species into the Tay district are:

- Intentional introduction or planting
- Souling and ballast water of marine or freshwater vessels
- Sale from garden and pond centres / escapes from garden ponds
- Sontaminated water sports equipment (e.g. from anglers, canoeists)
- Solution Movement of contaminated soils or vehicles
- S 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.

Invasive plant species

Prior to 2018, there was limited control of invasive plants within the Tay district. Several localised short term initiatives had been undertaken primarily against Japanese knotweed. For example, the Tay Foundation, REIA and LLTNPA initiated control on the River Earn but funding constraints limited the duration of those initiatives and the extent of work undertaken.

In 2018, the Scottish Invasives Species Initiative commenced. This five year project, funded by NatureScot and the National Lottery Heritage Fund, aimed to establish a system of strategic monitoring and control of INNS, which could thereafter be managed by trained volunteers. However, SISI is, at present, a northern Scottish project, and its southern boundary effectively splits the Tay district in two. Only that part of the district within the Angus, Dundee and northeastern half of the Perth and Kinross local authority areas are included.

Within the Scottish Invasive Species Initiative area, which covers such areas as the Isla, Tummel and mainstem Tay, a system for control of INNS has been established and has targeted Japanese and Himalayan knotweed, giant hogweed and skunk cabbage for treatment with glyphosate spray or stem injection. Commencing at identified upstream source areas, these species have been systematically controlled in the Tummel catchment and along the mainstem of the Tay down to the confluence with the River Isla. The focus is now turning to the Ericht and Isla catchments and the lower Tay and Almond.

Funding for the Scottish Invasive Species Initiative is due to end in autumn 2022. It is essential that funding is found to continue control where treated and extend the project or a similar project, into the southern half of the district where INNS pressure is even more extreme.

American mink

Mink are controlled as part of the Scottish Invasive Species Intiative. A network of trained volunteers has been established along the River Tay and tributaries in the project area who now both monitor the presence of and trap mink.

American signal crayfish

American signal crayfish have now been confirmed in five tributaries or rivers within the Tay district. An attempt was made in 2006 to poison crayfish in ponds and a ditch before they escaped into a direct tributary of the River Tay. The other known populations at that time were in the Dighty, Earn and Eden. That attempt was only partially successful but was negated by the discovery of another population in the Ericht catchment. These have now expanded to at least the lower reaches of the Ericht. There would now appear to be no realistic hope of effective control.

6. BIOSECURITY MANAGEMENT STRATEGY

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

- Prevention,
- Surveillance, early detection and rapid response,
- Solution Nitigation, control and eradication.

6.1 Partners

The engagement of key partners is imperative for the success of this plan. Regulatory agencies and bodies associated with other relevant management plans are listed in Table 3:

Table 3 Regulatory agencies and other bodies with an interest in INNS

Po	olicy & Legislation	La	nd Resources	W	ater Resources
•	Scottish Government	•	Cairngorms National Park	•	Tay Local Advisory Group
•	NatureScot		Authority	•	Scottish Water
•	Scottish Environment	•	Loch Lomond and	•	SSE plc
	Protection Agency		Trossachs National Park		
•	Marine Scotland		Authority		
		•	Forest and Land Scotland		
		•	Perth and Kinross Council		
		•	Angus Council		
		•	Dundee City Council		
		•	Fife Council		
		•	Stirling Council		
		•	National Farmers Union of		
			Scotland		
		•	Scottish Land and Estates		

Fisheries Management	Recreation	Conservation and Biodiversity
 All local fisheries Tay DSFB Fisheries Management Scotland Association of Scottish Still Water Fisheries Scottish Anglers National Association Local Angling Associations 	 Scottish Canoe Association Ramblers Association 	 Scottish Wildlife Trust Royal Society for the Protection of Birds Local Biodiversity Action Groups (Tayside, Fife and Stirling) Plant Life Tayside Biological Recording Group The Conservation Volunteers

This plan identifies key actions required to change the behaviour and practices of the above groups so as to reduce the opportunities for the introduction and spread of INNS and fish diseases.

6.2 Prevention

In order to prevent further INNS being introduced it is necessary to continue with awareness raising activities to ensure all key stakeholders aware of:

- i) What local and national priority INNS are and their ecological and economic impacts.
- ii) The potential pathways for their introduction and spread.
- iii) Management best practices to disrupt the pathways of introduction and spread.

The local priorities for awareness will focus on disrupting the pathways for the introduction and spread of INNS in the Tay District. The key pathways of introduction are identified in Table 4 below, along with those stakeholders who can disrupt those pathways, the actions they need to take, and who and how to engage with these stakeholders to enlist their support. The roles and actions of key government agencies and non-government bodies in promoting awareness of INNS issues, partly covered in the last column of Table 4, are further summarised in Table 5.

Table 4 Local priority actions for blocking pathways of INNS introduction and the stakeholders to be targeted to achieve them.

Pathway	Targeted stakeholders	Priority Actions	Mechanism of Delivery
Fouling and ballast water of marine vessels	Port and harbour authorities SEPA	 Avoid pumping out of non sterilised ballast water in harbour Role of hull fouling in the introduction and spread of INNS. 	 Promote implementation of code of practice requiring non-sterilised ballast water to be discharged away from harbour TDSFB / TRT to assist with the supply of posters and other awareness material for display and signage.
Fouling and ballast water of freshwater vessels	Local harbour authorities/SEPA/UK Government; local canoe and water sports organisations	 Avoid discharging non sterilised ballast water in freshwater Role of hull fouling in the introduction and spread of INNS. 	 -Promote implementation of code of practice requiring non-sterilised ballast water to be discharged safely -TDSFB / TRT to assist with the supply of posters and other awareness material for display and signage.
Sale of plants from garden or pond centres	Local garden centres Horticultural Trade Association	 -Promote 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. 	- TDSFB / TRT to work with garden centres to encourage distribution of codes of practice and posters (available from Plantlife).
Sale of fish from pet shops, garden or pond centres	Local aquarium and pond stockists Ornamental fish producers' associations	-Promote code of practice to all pet shops and suppliers of ornamental fish	TDSFB / TRT to work with retailers to encourage distribution of codes and posters.
Contaminated water sports equipment (e.g. from canoeists or sailors)	Water user associations (canoeists, sailing clubs) e.g. Scottish Canoe Association Local canoe/water sports organisations	-Promote awareness to clubs and participants of the dangers arising from INNS	TDSFB / TRT to work with associations to promote disinfection of equipment and provide appropriate facilities to eliminate the risk of accidental transfer of INNS (ensure disinfectant is freshly prepared and active) -RYA campaign - <u>Scottish Invasives Species Initiative</u> website
Escapes from fish farms,	Local Fish Farms Marine Scotland/ SEPA/ Planning Authorities/ Local anglers	 Impact of INNS Use of sufficient screens and other biosecurity measures Dangers of importing stock from contaminated areas Controls on movement of stock and water 	TDSFB AND TRT to work with local industry and trade associations to advise members regularly of best practice in respect of INNS - Enforcement agencies (Marine Scotland & TDSFB) to undertake site visits to discuss and advise on issues involving INNS e.g. rainbow trout.

Escapes from ponds, gardens, and desmesnes. Movement of contaminated soils or vehicles	General Public Local Councils/SEPA/quarries/ building contractors/farmers/landowners	Impact of INNS - Use of sufficient screens and other biosecurity measures - Dangers of importing stock from contaminated areas - Controls on movement of stock and water Promote appropriate working practices to avoid spread of INNS. General awareness of	TDSFB AND TRT to work with local industry and trade associations to advise members regularly of best practice in respect of INNS - Enforcement agencies (Marine Scotland & TDSFB) to undertake site visits to discuss and advise on issues involving INNS e.g. rainbow trout. Promote codes of practice. - Work with TDSFB / TRT to ensure dissemination of best practices
		impacts and measures to prevent/control INNS	- <u>Scottish Invasives Species Initiative</u> website
Improper control and disposal measures e.g. cutting and dumping without treatment	Local councils/SEPA/environmental health/ Plantlife/riparian owners/members of the public Council Services / contract workers / Ground Maintenance Workers	Promote appropriate working practices and waste disposal to avoid spread of INNS. General awareness of impacts and measures to prevent/control INNS	Promote codes of practice Work with TDSFB / TRT to ensure dissemination of best practices - TDSFB / TRT to offer training for "eyes" - <u>Scottish Invasives Species Initiative</u> website
Contaminated angling equipment	Anglers, angling associations, fishery owners and agents and tackle shops.	Promote knowledge of biosecurity issues amongst all members and visiting anglers - Promote the distribution of information and erection of signage in fishing huts and recognised car parks -Recommend suitable members to act as "eyes"	TDSFB / TRT to work with associations to promote disinfection of equipment and provide appropriate facilities to eliminate the risk of accidental transfer of INNS (ensure disinfectant is freshly prepared and active) -Work with TDSFB / TRT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS - TDSFB / TRT to offer training for INNS awareness - <u>Scottish Invasives Species Initiative</u> website
Intentional introduction or planting	Landowners	Promote knowledge of biosecurity issues amongst all tenants and resource users - Identification of suitable persons to act as "eyes"	Work with TDSFB / TRT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS - TDSFB / TRT to offer training for INNS awareness - <u>Scottish Invasives Species Initiative</u> website
	General Public	General awareness of impacts and measures to prevent/control INNS -Promote the Biosecurity Plan to all retail outlets who deal with NNS e.g. pet shops, garden shops	Local Media Campaigns -Use of websites (RAFTS, NNSS) - TDSFB / TRT to develop a leaflet to promote the Biosecurity plan, the dangers arising from INNS and the reporting system - <u>Scottish Invasives Species Initiative</u> website
	Schools	- General awareness of impacts and measures to prevent/control INNS	School visits -Field trips - <u>Scottish Invasives Species Initiative</u> website, <u>Alien Detectives</u> section

Table 5 Roles and/or actions of key government and non government agencies in promoting

 awareness of INNS issues

Organisation	Role and/or action	Delivery Mechanisms
TRT	- Promote awareness to general	 Use social media / website / events /
	water users promoting the	distribute leaflets etc to promote the
	Biosecurity Plan and highlighting	Biosecurity Plan, the dangers of INNS and
	the dangers from INNS	how to report them.
TDSFB	- Continue to promote awareness	- Continue to promote disinfection of
	to anglers and angling clubs of the	equipment and provide appropriate facilities
	dangers arising from INNS.	- Holding of open days, field visits and
		demonstrations
Local	- Promote use of codes of best	- Councils to promote codes of best practice
Councils/Council	practice for construction, haulage,	at every opportunity e.g. including them with
partnerships	horticulture, aquaculture amongst	planning applications and building warrants
	local business and relevant	- Production (by Council's legal department)
	departments particularly	and distribution of information leaflets on all
	construction, garden and pet trade	relevant legislation relevant to INNS
	- Promote awareness of planning,	- Holding of awareness event/open days to
	waste disposal and transport	promote biosecurity issues
	regulations amongst local business	-Distribute leaflets with council tax bills
	- Promote awareness of the GB	
	communications strategy to the	
	general public	
SEPA	- Clarify SEPA responsibilities for	- Maintain page on website with links to
	INNS to both staff and customers	relevant SEPA information and other sites.
	- Incorporate INNS issues into	- Ensure relevant documents available for
	relevant authorisation and	download on SEPA Website
	guidance documents (as they are	
	developed or updated)	
NatureScot	- Promotion of good practice in the	- Holding of Sharing Good Practice events.
	prevention, control and eradication	
	of INNS	- Grant funding may be available for some
	- Provide funding for INNS	projects, for example, continuation of SISI.
	prevention and control initiatives	
Marine Scotland	- Regulates the movement and	- Licensing of fish movements and
	introduction of fish to fish farms	introductions.
	and fisheries.	

Organisation	Role and/or action	Delivery Mechanisms
Loch Lomond &	- Continue to promote awareness	- Posters displayed at campsites, walking
the Trossachs	of INNS issues within the national	trails, angling sites and canoe launching
NP/Cairngorms	parks and threats to the parks	spots.
NP	posed by further introductions of	
	INNS	

6.3 Maintain surveillance systems for early detection and rapid response to INNS

Increased probability of **early detection** of the introduction or spread of INNS is realised through coordinated local surveillance of established populations and sites vulnerable to the introduction and spread of these species combined with a reporting system. The existing SISI system must be maintained and enhanced.

6.3.1 Detecting new threats

The "eyes" of the early warning system are trained members of the public, fisheries officers, ghillies, anglers, canoeists, walkers and land managers who report sightings to TRT. A sighting of a GB or local high priority species (Table 6) will be verified by TRT within 72 hours. If confirmed, it will initiate the appropriate GB or local high priority response. Reports of priority species will be verified as time permits. Wider monitoring of known INNS presence will use agreed national protocols for INNS surveying such as the DAFOR methodology and staff will receive regular training in their use. The locations of all verified sightings are entered onto a GIS system which is compatible with other users and will be shared with SISI and any other relevant organisations.

6.3.2 Rapid response mechanisms for new INNS

This response depends on the severity of the species detected (Table 6) and the level of threat posed. There are three levels of response:

- a GB level response that will be undertaken by national governmental institutions as part of the GB INNS strategy
- a High Priority local rapid response
- a Priority local rapid response

Table 6 Response level for various INNS

GB Response	High Priority Local Response	Priority Local
		Response
Gyrodactylus salaris	American signal crayfish	American mink
Asian topmouth gudgeon	Mitten crab	Canadian pond weed
Ruddy duck	Zebra mussel	Japanese knotweed
Didemnum spp	Australian swamp stonecrop	Himalayan knotweed
Wireweed	Large flowered waterweed	Himalayan balsam
Water primrose	Curly waterweed	Giant hogweed
Dikerogammarus villosus	Argulus foliaceus	Rhododendron
Pink salmon	Ruffe	Rainbow trout
	Bullheaad	Red vent syndrome
	Slipper Limpet	(RVS)
	Orfe	White butterbur
	Nuttal's pondweed	Mimulus
	Water fern	Pirri pirri burr
	Common cord grass	
	Fanwort	
	Floating pennywort	
	Parrot's feather	

The responses to the different priority levels are outlined in Table 7. Note that, although a confirmed sighting of a GB priority species will trigger the GB contingency plan for that species, there is still a need for local level protocols to link with the GB response.

Table 7 Elements of contingency plans or protocols for response to GB priority, local high priority and priority species

GB Response	Local High Priority	Local Priority Response
	Response	
- Report to local and GB	- Report to local and GB	- Report to local and GB
institutions	institutions	institutions
- Determine the extent of	- Determine the extent of	-Determination of the
infestation	infestation	extent of infestation
- Isolation of area where	- Isolation of area where	- Surveys in course of
practicable	practicable	normal work to establish
	Establish source and check	and map distribution
	related sites	- Inclusion of new areas in
	- Closure of all pathways	existing
	-Decision on appropriate	eradication/control
	action	programmes
	eradication/containment.	- Identification and closure
	- Approved eradication	all pathways
	methodology	- Monitor as part of
	-Monitor	planned catchment
		monitoring programme

6.4 Mitigation, control and eradication of INNS

6.4.1. Maintain existing and continue to develop new control and eradication programmes

Within the northern half of the Tay district, Japanese knotweed and giant hogweed and, to a lesser extent, Himalayan knotweed and the emerging North American skunk cabbage, are currently the focus for control and eradication by the SISI project. SISI's approach is to survey, record presence of INNS in a GIS compatible format, and then take a strategic approach to control or eradication. Small pioneer colonies and upstream or source populations of INNS are targeted first and work progresses downstream thereafter. A combination of specialist contractors, volunteers, Tay DSFB fisheries officers, river managers and local estate staff are used depending on the management requirements of the area involved. Annual follow up monitoring determines the requirement for follow up treatments on regrowth or colonisation by other INN species. These key steps are summarised in Box 1. The specific actions required for individual species are summarised in Table 8.

It is **essential** that the work started by SISI **must** be maintained on those areas already treated otherwise the completed work will be quickly undermined and resources wasted. It is highly desirable that the work of the initiative work is expanded both to those areas within the project

area that have yet to be treated and to new priority areas, particularly on the river Earn and Eden, where previous INNS work has been less well coordinated and sporadic. There is also a need to expand onto Himalayan balsam, where possible.

The Scottish Invasive Species Initiative project also targets American mink. This will again continue and be supported and where possible extended.



Table 8 Required INNS control and eradication actions within the Tay District

Species	Action	Treatment / post treatment options
Japanese knotweed	Control / eradication. Identify and close pathways of dispersal	Spraying or stem injecting with glyphosate by SISI staff, trained volunteers or land managers.
		Annual post -treatment re-survey and continuing surveillance for any previously unknown stands.
		Consider habitat restoration, post eradication, if required.
Himalayan knotweed	Control / eradication. Identify and close pathways of dispersal	Spraying or stem injecting with glyphosate by SISI staff, trained volunteers or land managers.
		Annual post -treatment re-survey and continuing surveillance for any previously unknown stands.
		Consider habitat restoration, post eradication, if required.
Giant hogweed	Control / eradication. Identify and close pathways of dispersal	Spraying with glyphosate by SISI staff, trained volunteers or land managers.
		Annual post -treatment re-survey and continuing surveillance for any previously unknown stands.
		Consider habitat restoration, post eradication, if required.
Himalayan balsam	Control / eradication. Identify and close pathways of dispersal	Handpull or cut.
		Annual post -treatment re-survey and continuing surveillance for any previously unknown stands.
		Consider habitat restoration, post eradication, if required.
Rainbow trout	Reporting and eradication.	Raise awareness amongst anglers of the need to report any catches of escapee rainbow trout to TDSFB.
		Identify source of escape.
		Report to MSS.
		Remove, if possible, e.g. by electrofishing.
American mink	Control / eradication	Coordinated monitoring and trapping by volunteers trained by SISI.
American signal	Monitor / block potential pathways of	Monitor presence by licensed trapping.
crayfish	further spread.	Maintain public awareness to reduce risk of translocations.
Argulus	Monitor	Monitor presence by inspecting fish caught by anglers or electrofishing.
		Maintain awareness to reduce risk of translocations.
		Introduce biosecurity measures to prevent spread from affected areas, particularly targeting anglers.

7. MONITORING THE SUCCESS OF THIS PLAN

Biosecurity measures initiated within the Tay district by the TRT, TDSFB and REIA are being coordinated by this plan. To ensure its effectiveness, all work completed under this plan will be monitored and the results evaluated against objectives. SISI has established a fully coordinated monitoring programme to ensure efficacy and sustainable treatment initiatives and includes:

- Search Assessment of efficacy of surveillance and rapid response systems
- Solution of the selected INNS within the district
- Effectiveness of control/eradication programme including:
 - o Application/delivery of effective concentrations of biocides
 - o Checking that treatments have been effective
 - Re-treating immediately where there is doubt
 - o Monitoring any apparent resistance to treatments and investigate
 - o Surveying the area for signs of dormant plants becoming activated
- Searching searching and 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
- Monitoring general activities within the district and assessing them in terms of risk for the introduction of INNS.

The monitoring programme will be undertaken by TRT in conjunction with partners.

8. APPENDIX

Policy and Legislation

The actions presented in this plan conform to, and are supported by, UK and Scottish Government legislation associated with the prevention, management and treatment of invasive non native species, fish diseases and parasites:

- Section 14 of <u>The Wildlife and Countryside Act (1981)</u>⁸ (as amended by the <u>Nature Conservation (Scotland) Act (2004)</u> and the <u>Wildlife and Natural Environment (Scotland)</u> <u>Act 2011</u>) makes it an offence to allow any animal (including hybrids) which is not ordinarily resident in Great Britain, to escape into the wild; or release it into the wild; or to release or to allow to escape from captivity, any animals that is listed on Schedule 9 of the 1981 Act. It is also an offence to plant or otherwise cause to grow in the wild any plant listed on schedule 9 of the 1981 Act.
- Code of Practice on Non-Native Species made in 2012 by Scottish Ministers under S 14C of The Wildlife and Countryside Act (1981).
- Section 179 of the <u>Town and Country Planning (Scotland) Act 1997</u>⁹ 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.
- The <u>Possession of Pesticides (Scotland) Order 2005¹⁰</u> regulates the use of pesticides and herbicides for the control and eradication of INNS.
- Environmental Protection Act 1990¹¹ 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 1994¹² 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".

⁸ Wildlife and Countryside Act 1981 (legislation.gov.uk)

⁹ Town and Country Planning (Scotland) Act 1997 (legislation.gov.uk)

¹⁰ <u>The Possession of Pesticides (Scotland) Order 2005 (legislation.gov.uk)</u>

¹¹ Environmental Protection Act 1990 (legislation.gov.uk)

¹² <u>The Waste Management Licensing Regulations 1994 (legislation.gov.uk)</u>

- Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991¹³ and the Environmental Protection (Duty of Care) Regulations 1991¹⁴ provide guidance for the handling and transfer of controlled waste.
- The Aquaculture and Fisheries (Scotland) Act 2007 and S.33A of the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 regulates the introduction of fish species to Scottish waters.

Further details on legislation pertaining to Scotland can be found at <u>Scotland » NNSS</u> (nonnativespecies.org).

¹³ <u>The Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991</u> (legislation.gov.uk)

¹⁴ The Environmental Protection (Duty of Care) Regulations 1991 (legislation.gov.uk)