

Forth Fisheries District Biosecurity Plan

2010-2015



Prepared by

The River Forth Fisheries Trust

(2010)

Scottish Charity (SC040311)

What is Biosecurity?

Scotland's Environmental and Rural Services in their Biosecurity Guidance state "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".

What are Invasive Non-Native Species?

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.

Abbreviations

Abbreviation	Organisation or Acronym		
ASSG	Association of Scottish Shellfish Growers	RLAC	River Leven Angling Club
		SAC	Scottish Agricultural College
		SEPA	Scottish Environment Protection Agency
AWAIA	Allan Water Angling Association	SFCC	Scottish Fisheries Co-ordination Centre
BWS	British Waterways Scotland	SG	Scottish Government
CAC	Cramond Angling Club	SLAC	Slamannan Angling Club
CATCA	Communities along the Carron Association	SNH	Scottish Natural Heritage
CBD	Convention on Biological Diversity	SSPO	Scottish Salmon Producers' Organisation
CSET	Clackmannanshire and Stirling Environment Trust	SW	Scottish Water
DAC	Devon Angling Club	TWG	Tripartite Working Group
ELAA	East Lothian Angling Association	TWVRP	Trossachs Water Vole Reintroduction Programme
EVT	Esk Valley Trust		
FCS	Forestry Commission Scotland	UKTAG	UK Technical Advisory Group
FEF	Forth Estuary Forum	WOLCT	Water of Leith Conservation Trust
FDSFB	Forth District Salmon Fisheries Board		
Forth AAG	Forth Area Advisory Group		
FWAG	Farming & Wildlife Advisory Group		
GH	Giant hogweed		
GIS	Geographical Information System		
HB	Himalayan balsam		
IMO	International Maritime Organisation		
INNS	Invasive Non-Native Species		
JK	Japanese knotweed		
LBAP	Local Biodiversity Action Plan		
LLTNP	Loch Lomond & The Trossachs National Park		
LSAC	Larbert & Stenhousemuir Angling Club		
MDAC	Musselburgh & District Angling Club		
MS	Marine Scotland		
NNSS	Non Native Species Secretariat		
OLP	Ochils Landscape Partnership		
RAF	River Avon Federation		
RAFTS	Rivers and Fisheries Trusts of Scotland		
RCFMG	River Carron Fisheries management group		
RFFT	River Forth Fisheries Trust		

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Executive Summary

This plan describes the biosecurity issues of the Forth Fisheries District 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 species (INNS), fish diseases and parasites. The vision of this plan is:

‘To establish a sustainable framework which will prevent, detect, control and eradicate invasive non-native species within the Forth fisheries district through appropriate management, data collection, liaison, and education’

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

Objective 1: Establish a local management framework in the Forth District for the effective and sustainable management of INNS issues.



Output 1.1 - Coordinate activities with Forth Invasive Species Forum and Forth AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the RFFT area.

Objective 2: Reduce the risk of introduction and spread of INNS within the Forth fisheries district.



Output 2.1 – All key stakeholders aware of:

- i) The ecological and economic impacts of INNS
- ii) The potential pathways for introduction and spread of INNS.
- iii) Management best practices to prevent introduction and spread of INNS

Objective 3: Establish a framework for the detection and surveillance of INNS, linked to a protocol to activate a rapid management response.



Output 3.1 - ‘Reporting system’ established for INNS in district.



Output 3.2 – Develop strategic monitoring of INNS in district.



Output 3.3 – Rapid response mechanism established for new INNS, which pose significant threats to local biodiversity and economy.

Objective 4: Develop coordinated and sustainable control and eradication programmes for INNS.



Output 4.1 – Coordinated control, eradication and habitat restoration programmes established and operational

The actions required to realise the above objectives and outputs along with the lead agency, key partners and timeframe required for their implementation are presented in the table below.

Table 1 Timeframes and actions

Key:  Solid line indicates discrete action  Dotted line indicates ongoing / wide timescale effort

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Objective 1: Establish a local management framework in the Forth District for the effective and sustainable management of INNS issues.											
Output 1.1 - Coordinate activities with Forth Invasive Species Forum and Forth AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the RFFT area.											
Complete draft biosecurity plan	RFFT										
Consultation with all stakeholders to agree biosecurity plan	RFFT										
Establish Forth Invasives Species Forum	RFFT	AAG, FEF, Local Authorities ¹									
Establish biosecurity officer post within RFFT	RFFT	Local Authorities ¹									
Objective 2: Reduce the risk of the introduction and spread of INNS within the Forth fisheries district.											
Output 2.2 – All key stakeholders aware of: i) The ecological and economic impacts of INNS. ii) The potential pathways for introduction and spread of INNS. iii) Management best practices to prevent introduction and spread.											
Launch of Forth Fisheries District biosecurity plan through national and local press release and SEPA website	RFFT	FEF SEPA									
Link on RAFTS invasive species Scotland website on legislation relating to waste management & planning regulations	Local Authorities ¹	AAG, SNH									

¹ Fife, Clackmannanshire, Stirling, Falkirk, North Lanarkshire, West Lothian, Midlothian, City of Edinburgh, East Lothian Council and Scottish Borders Councils

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Produce leaflet on biosecurity risks and the reporting system. Launch of facebook page or page on RFFT website, linked to RAFTS	RFFT /RAFTS	AAG, SNH		—							
Produce posters on biosecurity risks and distribute to the general public	RAFTS	RFFT AAG Local Authorities ¹		.....							
Continue to promote and install disinfection facilities for anglers at all angling proprietors fishing huts/parking points	FDSFB & RFFT		.....								
Distribute codes and posters to relevant retail outlets and clubs at open days and events such as agricultural shows	Local Authorities	RFFT AAG members BWS			.....						
Engage with landowners and angling clubs to promote awareness of measures to tenants, resource – users, members and visitors	RFFT & FDSFB	SEPA SNH Angling clubs ²		—							
Work with environmental groups and local schools to enhance awareness of INNS	LBAP groups /Rangers services/Biodiversity partnerships	RFFT BTCV Local Authorities' Ranger Services ¹ CSET EVT OLP CATCA WOLCT			.....						
Objective 3: Establish framework for the detection and surveillance of INNS, linked to a protocol to ensure a rapid management response.											
Output 3.1 - 'Reporting system' established for INNS in district.											
Train at least two RFFT personnel and FDSFB bailiff(s) in the identification of INNS	FDSFB/RFFT /RAFTS	SEPA		—	—						
Train RFFT personnel as trainers	RFFT/RAFTS	SEPA		—							

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Work with user and interest groups to identify "reporting network"	RFFT	Local Authorities ¹ AAG Angling clubs ² SEPA FEF BWS TWVRP		—	—						
"Reporting network" in the district identified and familiarised with standardised INNS reporting and mapping protocols	RFFT	RAFTS Local Authorities ¹ WOLCT OLP EVT CATCA CSET Angling clubs ² BWS		—	—		—	—	—	—	—
Establish, test and refine communication mechanisms within 'early warning' system	RFFT	RAFTS Local Authorities ¹		—	—						
Produce database to record and manage INNS sightings	SFCC			—							
Monitor and periodically evaluate efficacy of system	RFFT	Local Authorities ¹ WOLCT OLP EVT CATCA CSET BWS		.....	.....	.....	.....	.....	.....	.....	.....
Output 3.2 – Develop strategic monitoring of INN species in district.											
Develop and agree survey protocols	Fisheries Trusts	SEPA (national)/SNH	—	—							
Produce database to manage INNS survey data	SFCC	SEPA (national) SNH		—							
Training of Trust and other agency staff in monitoring methods	RFFT	SFCC/RAFTS, SEPA Local Authorities ¹		.....	.....	.....	.....	.....	.....	.....	.....
Develop monitoring manual	SFCC	RAFTS SEPA(National)	—	—							
Output 3.3 – Rapid response mechanism established for new INNS that pose significant threats to local biodiversity and economy.											

² MDAC, AWAIA, DAC, CAC, LSAC, RAF, SLAC, ELAA, RLAC

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Formulate contingency plans for key high level threat species	RAFTS	Local Authorities ¹ , SEPA, SNH, RFFT		—							
Identification of personnel for response teams	RFFT	Local Authorities ¹ , SEPA and SNH		—							
Training of personnel to execute contingency plans	RFFT	Local Authorities ¹ , SEPA and SNH,		—							
Identification of funding resources	RFFT	Local Authorities ¹ , RAFTS		.....							
Refresher training	RFFT	RAFTS, SNH					—	—	—	—	—
Monitor populations/treated areas	RFFT	SNH, SEPA		.....							
Objective 4: Develop coordinated control and eradication programmes for INNS											
Output 4.1 – Coordinated control, eradication and habitat restoration programmes established and operational											
Initiate and complete surveys of non surveyed areas by trained personnel	RFFT	SFCC		—							
Develop GIS database for recording and mapping INNS within Forth district	RFFT	SFCC		—							
Continuation and extension of mink eradication, supporting mink trapping carried out by angling clubs	RFFT	Trossachs water vole reintroduction programme Angling clubs ²	—	—	—	—	—	—	—	—	—
Implementation of phase 1 of control/eradication programme see table 13 for details of proposed works	RFFT	BTCV SEPA ³ Local Authorities BWS AAG members		—	—	—	—	—	—	—	—
Implement habitat restoration scheme within successful control areas taking into account all relevant species	RFFT	BTCV, Local Authorities, SEPA ⁴			—	—	—	—	—	—	—
Monitor the effectiveness of control programmes	RFFT	SEPA		—	—	—	—	—	—	—	—

³ May be eligible for funding from the Water Environment Restoration Fund

⁴ May be eligible for funding from the Water Environment Restoration Fund

Action	Lead	Partners	Early 2010	Late 2010	TIMEFRAME						
					2011	2011	2012	2013	2014	2015	2016
Marine Scotland Science monitoring Red vent syndrome	Marine Scotland Science										

1. Scope and Purpose

This plan describes the biosecurity issues of the Forth Fisheries District 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 species (INNS), fish diseases and parasites. The vision of this plan is:

‘To establish a sustainable management framework which will prevent, detect, control and eradicate invasive non-native species within the Forth Fisheries district through appropriate management, data collection, liaison, education and legislation.’

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

-  **Objective 1:** Establish a local management framework in the Forth District for the effective and sustainable management of INNS issues.
-  **Objective 2:** Reduce the risk of introduction and spread of INNS within the Forth Fisheries District.
-  **Objective 3:** Establish a framework for the detection and surveillance of INNS, linked to a protocol to initiate a rapid management response.
-  **Objective 4:** Develop coordinated and sustainable control and eradication programmes for INNS

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](#)⁵:

-  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 and a summary of these are described below:

-  The prevention of the deadly salmon parasite *Gyrodactylus salaris* from entering the Forth district, which would cause catastrophic economic and environmental loss upon entry.
-  A co-ordinated and planned strategy for the control of invasive weeds such as giant hogweed, incorporating aspects of Integrated Weed Management (IWM) and catchment management objectives throughout the Forth District.
-  Monitoring the spread of North American signal crayfish, which are established in a number of rivers in the district and who prey on invertebrate species and juvenile fish as well as destabilise banks by burrowing activities.
-  Maintenance of biodiversity and the conservation of important natural habitats for native species such as Otter, Atlantic salmon, European eel and Freshwater pearl mussel.
-  The visual conservation and increased amenity value of local landscapes – especially with respect to the improved control of invasive weeds where for example these currently impede access and/or degrade visual impact.
-  The protection of the endangered water vole from American mink and the rare stonefly (*Brachyptera putata*) from siltation.
-  Reducing the impact of mink predation on natural fauna, particularly fish and birds.
-  Monitoring and preventing the potential spread Zebra mussel (*Dreissena polymorpha*) which has been recorded from the Forth & Clyde canal.
-  This plan will also contribute to the two key aims of the WFD and the RBMPs. These aims are to improve water bodies to good status where required, for example where INNS are present, and to prevent any deterioration in water bodies, for example those not affected by INNS
-  The outcomes of the work outlined in the Forth biosecurity plan to produce a database to manage INNS survey data will help SEPA refine the way the characterisation and classification of water bodies in relation to INNS, particularly the riparian plants that will be incorporated into the morphology classification. It will then help RAFTS and individual fisheries trusts target practical action on the ground to areas most in need of control measures.

In summary, information held by the RFFT with regard to alien species in the district will be improved, and through liaison with SNH, SEPA and local authorities a coherent plan for the monitoring, control and possible eventual eradication of invasive alien species can be put in place.

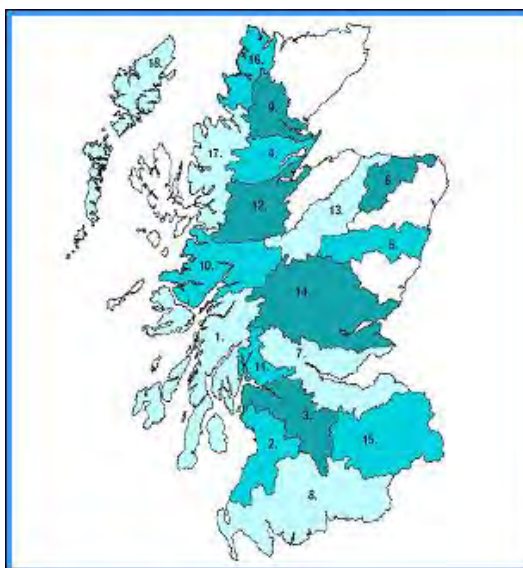
2. Background

Although prepared by the River Forth Fisheries Trust (RFFT), this plan is one of a set of 20 biosecurity plans being produced throughout Scotland as part of a national programme of action implemented through the Rivers and Fisheries Trusts of Scotland (RAFTS) with backing and support from the Scottish Government (SG), Scottish Natural Heritage (SNH), Scottish Environment Protection Agency (SEPA) and the Esmeé Fairburn Foundation (EFF).

⁵ www.nonnativespecies.org

The Trust is a member of [Rivers and Fisheries Trusts of Scotland](#) (RAFTS) which represents all of Scotland's Fisheries Trusts covering in excess of 80% of Scotland's rivers (Map 1). The objectives of the trust are as follows:

- 🌿 Gaining an understanding of the composition of all fish populations, their distribution and trends in abundance.
- 🌿 Identifying, protecting and improving wild fish populations throughout the Forth and other catchments.
- 🌿 Understanding, protecting and enhancing the physical environment for wild fish.
- 🌿 Educating all sectors of the community on their role in caring for the freshwater environment.
- 🌿 To advance for public benefit environmental protection and improvement by conserving and enhancing all species of freshwater fish and their environments primarily but not limited to the inland and coastal waters of the River Forth District including all waters which enter the Forth Estuary and Firth of Forth.
- 🌿 To use an 'Evidence based approach' to inform its management plan.



Map 1: Fisheries Trusts & Biosecurity plan areas

The Trust advises the Forth District Salmon Fishery Board and works in partnership with a number of other organisations e.g. Stirling Council, West Lothian Council and SEPA in furtherance of its objectives.

The RFFT considers the preparation and implementation of this biosecurity plan as an essential component in the protection and enhancement of the physical environment, which will help to conserve biodiversity in the area and, ultimately, improve conditions for wild fish and the ecosystems that support them.

The need for action on biosecurity issues has been identified in the Trust's Fisheries Management Plan: Forth District Fisheries Management Plan⁶. In addition, invasive non-native species have been highlighted as a significant water management issue for Scotland's water environment and the River Basin Management Plan for the Scotland river basin district and Forth Area Management Plan 2009-2015⁷ outline the requirement for key actions to be delivered to address the problem.

In addition, SEPA are currently co-ordinating the preparation of an INNS supplementary plan with input from Scottish Natural Heritage (SNH), Scottish Government, Scottish Environment LINK (LINK) and Rivers and Fisheries Trusts of Scotland (RAFTS). The purpose of this plan is to improve transparency and clarify links between existing work (and working groups) on invasive non-native species (INNS) relevant to the Water Framework Directive (WFD), identify current gaps in delivery and propose solutions to ensure effective delivery of the [river basin management plan](#) for Scotland.

The Forth Fisheries District biosecurity plan has a lifespan of five years and as part of an adaptive management cycle its outcomes and impacts will be reviewed and incorporated in the next generation plan. Although this plan is not a legal instrument in itself, it utilises existing legal and regulatory instruments to support the implementation of its actions and in pursuance of the realisation of its objectives. As such the successful implementation of this plan will rely on the formation of strong local partnerships founded on solid legal and policy principles by a range of interested parties.

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

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 INNS, 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.

A [survey](#)⁸, commissioned by Scottish Natural Heritage in 2000, shows there are approximately 1000 non-native species present in Scotland, the majority of which exist in small populations with little impact on

⁶<http://www.fishforth.co.uk/rfft/images/stories/reports/Forth%20Fisheries%20Management%20Plan%202009.pdf>

⁷ http://www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/forth.aspx

⁸ www.snh.org.uk/pdfs/publications/review/139.pdf

native flora and fauna. However, a small - but significant - proportion of these non-native species are invasive.

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

According to the [Convention for Biodiversity \(2006\)](#)⁹, **invasive non-native species** (INNS) are the second greatest threat to biodiversity, being capable of rapidly colonising a wide range of habitats and excluding the native flora and fauna. 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, the Firth of Forth and coastal waters 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 water bodies and increase the risk of bank instability and flooding.

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:

-  [DEFRA](#)¹⁰ have estimated that INNS cost the UK economy £2 billion per year
-  In the UK Japanese Knotweed is thought to affect an area roughly the size of London and the [Review of Non-Native Species Policy \(2003\)](#)¹¹ has estimated the total cost of its removal using current techniques at £1.56bn.
-  A Scottish Government [report](#)¹² estimated the potential Net Economic Value loss to Scotland of the introduction of *Gyrodactylus salaris* at £633 million with severe consequences for rural communities.
-  A Forestry Research [Report](#)¹³ estimates the current cost of clearing the invasive *Rhododendron ponticum* from Argyll and Bute as £9.3m that could rise to £64m in the next 50 years.
-  INNS have already changed the character of iconic landscapes and water bodies in Scotland reducing the amenity and biodiversity value of those areas.

There is also a growing recognition of the impacts of **translocated native species**. Translocated species are native species that have been transported outside their natural range and they can also have severe

⁹ <http://www.cbd.int/gbo2>

¹⁰ <http://www.defra.gov.uk/wildlife-countryside/wildlife-manage/non-native/index.htm>

¹¹ <http://www.defra.gov.uk/wildlife-countryside/pdf/wildlife-manage/non-native/review-report.pdf>

¹² www.scotland.gov.uk/resource/doc/1062/0042434.pdf

¹³ [http://www.forestresearch.gov.uk/pdf/Argyll_Bute_rhododendron_2008_costs.pdf/\\$FILE/Argyll_Bute_rhododendron_2008_costs.pdf](http://www.forestresearch.gov.uk/pdf/Argyll_Bute_rhododendron_2008_costs.pdf/$FILE/Argyll_Bute_rhododendron_2008_costs.pdf)

ecological impacts. Examples of translocated species that are impacting the ecology of Scotland's rivers 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 a 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 the first step to set out and implement such an approach at a local level for selected species and diseases that significantly impact freshwater fisheries and the aquatic environment. This local plan and its implementation is also part of a strategic and coordinated approach to INNS management being undertaken across Scotland by RAFTS members. In the Districts immediately adjacent to the Forth District, biosecurity management plans and initiatives are being put in place by the Tay and Tweed Forum and the Clyde River Foundation.

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 Forth Fisheries District. These approaches are consistent with, and support, the [GB Invasive Non Native Species Framework Strategy](#)¹⁴ and the [Species Action Framework](#)¹⁵ 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 \(1981\)](#)¹⁶ 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.
-  Local Authorities have powers to take action against giant hogweed and Japanese knotweed where they are a threat to the local amenity of an area or if it is considered a statutory nuisance.

¹⁴ www.nonnativespecies.org

¹⁵ www.sng.org.uk/speciesactionframework

¹⁶ www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1981/cukpga_19810069_en_1

-  Section 179 of the [Town and Country Planning \(Scotland\) Act 1997](#)¹⁷ empowers local authorities to serve notice requiring an occupier to deal with any land the condition of which is adversely affecting the amenity of the other land in their area.
-  The [Possession of Pesticides \(Scotland\) Order 2005](#)¹⁸ regulates the use of pesticides and herbicides for the control and eradication of INNS.
-  [Environmental Protection Act 1990](#)¹⁹ contains a number of legal provisions concerning “controlled waste”, which is 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](#)²⁰ 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](#)²¹ and the [Environmental Protection \(Duty of Care\) Regulations 1991](#)²² provide guidance for the handling and transfer of controlled waste.
-  [Salmon and Freshwater Fisheries \(Consolidation\) \(Scotland\) Act 2003. Section 33A](#)

Makes it an offence for any person to intentionally introduce any live fish or spawn of any fish into inland waters.
-  [The Aquaculture & Fisheries \(Scotland\) Act 2007](#)²³ that regulates against the unauthorised introduction of fish to inland waters.
-  The [Prohibition of Keeping or Release of Live Fish \(Specified Species\) Order 2003](#)²⁴ requires that a licence be obtained for the keeping or release of species listed on Schedules 1 and 2.
-  The [International Convention for the Control and Management of Ships' Ballast Water and Sediments \(BWM\)](#)²⁵ aims to prevent the spread of aquatic organisms carried by ships ballast water.

¹⁷ www.opsi.gov.uk/acts/acts1997/ukpga_19970008_en_1

¹⁸ www.opsi.gov.uk/legislation/scotland/ssi2005/20050066.htm

¹⁹ www.opsi.gov.uk/acts/acts1990/ukpga_19900043_en_1

²⁰ http://www.opsi.gov.uk/si/si1994/uksi_19941056_en_1.htm

²¹ www.opsi.gov.uk/si/si1991/uksi_19911624_en_1.htm

²² www.opsi.gov.uk/si/si1991/uksi_19912839_en_1.htm

²³ http://www.opsi.gov.uk/legislation/scotland/acts2007/asp_20070012_en_1

²⁴ <http://www.scotland.gov.uk/resource/doc/47133/0009766.pdf>

²⁵ <http://www.imo.org/About/Conventions/Listofconventions>

-  Although not legislation, The government [NetRegs](http://www.netregs.gov.uk/netregs/default.aspx)²⁶ website contains useful guidance on INNS and their control
-  The **Wildlife and Natural Environment Bill**²⁷ is currently progressing through the Scottish Parliament. The bill includes provisions relating to non-native species. The new legislation is intended to strengthen the protection of native wildlife in Scotland. The bill seeks to strengthen and consolidate current legislation on invasive species. Among other provisions such as the setting up of control orders for invasive species, the bill would ban the release of animals and plants outside of their native range and prohibit the keeping of invasive animals or plants.

In addition, a code of conduct²⁸ now exists for the control of Japanese Knotweed and powers under the Wildlife & Countryside Act 1981 and the Environmental Protection Act 1990. Local authorities, building contractors and householders all risk prosecution if they fail to prevent knotweed from spreading to neighbouring property. It is the landowner's responsibility to control the spread of the weed.

The procedures for the detection, notification and control of fish diseases procedures are already well defined by fisheries legislation. This stipulates that Marine Scotland²⁹ acts on behalf of the Government 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.

The National Planning Framework 2 for Scotland (published in 2009) has designated the Central Scotland Green Network (CSGN) as a national development and is thus considered by Ministers to be an essential element of the strategy for Scotland's long term development. The area covered by the Forth Catchment Biosecurity Management Plan is included within the CSGN area, which covers central Scotland from Ayrshire, Inverclyde and Dunbartonshire in the West to Fife and East Lothian in the East. The aim of CSGN is to transform the environment of central Scotland into a valued economic and social asset and to make a significant contribution to the conservation and enhancement of biodiversity.

3.3 Existing Planning Framework

This Biosecurity Plan links Government policy, legislation and strategic action with local actions, and reflects the provisions and requirements of the following existing plans (see also Table 2):

-  The Forth Fisheries District Management Plan 2008-2012.
-  Local Fisheries Management plans for the Carron, Almond, Avon & Allan
-  The 2010 – 2015 River Carron Fisheries Management Plan
-  The Scotland River Basin Management Plan 2009 – 2015.

²⁶ <http://www.netregs.gov.uk/netregs/default.aspx>

²⁷ <http://www.scottish.parliament.uk/business/research/briefings-10/SB10-39.pdf>

²⁸ <http://www.scotland.gov.uk/invasivespecies>

²⁹ <http://www.scotland.gov.uk/Topics/marine/Fish-Shellfish/18610/diseases/notifiableDisease/Q/editmode/on/forceupdate/on.p.p.p.p>

-  The River Basin Management Plan for the Scotland river basin district
-  Existing Local Biodiversity Action Plans for: Fife, Clackmannanshire, Stirling, Falkirk, North Lanarkshire, West Lothian, Edinburgh, Midlothian and East Lothian.
-  Water of Leith Management Plan.
-  Ochils Landscape Partnership Plan
-  The Central Scotland Green Network Action plan.

Furthermore, it supports the conservation objectives of designated conservation areas (SAC, SSSI) in the Forth area.

Table 2: Identified actions in the Forth Fisheries District Biosecurity Plan supporting provisions or requirements of other relevant plans

Provision or Requirement of Existing Plan	Action in FFD Biosecurity Plan
Plan: Central Scotland Green Network Action Plan ³⁰ Provision/s: Undertake non-native invasive species mapping and monitoring across the CSGN area, review options for eradication and control, and support pilot projects	The Key actions of this plan include compiling a central mapping database of invasive species in the Forth District and implementing eradication & control projects in each of the 11 subcatchments within the Forth District.
Plan: The Forth Fisheries District Management Plan ³¹ 2008-2012. Provision/s: Produce and implement a biosecurity plan for the district.	This plan fulfils the requirement of the Forth District FMP to produce a biosecurity plan. Its key elements are to prevent introduction of new high impact INNS as well as the control and where possible eradication of existing populations.
Plan: <i>Gyrodactylus salaris</i> (Gs) Contingency Plan ³² : Provision/s: A strategy to rapidly contain and eradicate Gs if introduced to Scotland.	Formulate rapid response protocols for new INNS which pose significant threats to local biodiversity and economy
Plan: Fife Local Biodiversity Action Plan ³³ Provision/s: i) Maintain and enhance current distribution and population of Water Vole in Fife through North American Mink control.	Control & eradication of giant hogweed (GH), Himalayan balsam (HB) and Japanese knotweed (JK) in the River Leven and Black Devon. Identify and close pathways to dispersal.
Plan: Clackmannanshire Local Biodiversity Action Plan 2003 – 2008 (under review) ³⁴ Provisions/s: i) WW5: Rivers and Streams Action Plan; 2.2 – Establish the extent of colonization of alien species (notably giant hogweed, Japanese knotweed, Himalayan balsam and pink purslane) 2.3 – Adopt policies to control alien species if necessary.	Control & eradication of GH, HB and JK in the River Devon and Black Devon. Identify and close pathways to dispersal.

³⁰ http://www.centralscotlandgreennetwork.org/index.php?option=com_content&view=article&id=3&Itemid=7

³¹ www.rafts.org.uk/projects/fisheriesmanagementplanning.asp

³² www.scotland.gov.uk/Topics/Fisheries/Fish-Shellfish/18610/diseases/g-salaris/GsCGrev

³³ <http://www.fifecoastandcountrysidetrust.co.uk/biodiversity>

³⁴ <http://biodiversity.clacksweb.org.uk/docs/bio.pdf>

Provision or Requirement of Existing Plan	Action in FFD Biosecurity Plan
Plan: The Stirling Council Area Local Biodiversity Action Plan (Rivers and Burns Habitat Action Plan F&WH1)³⁵ Provision/s: i) 07B3: Remove all invasive, non-native plant species from river and stream habitats. ii) F&WH1 T3A1: Through annual spraying of alien species - spot spraying on roadside verges, all of the Allan Water from Greenloaning to the Forth, sections of the Forth in the Flanders Moss NNR area, Blane and Endrick from Strathblane upwards to its confluence with the SNH nature reserve. 2. Monitoring its effectiveness. 3. Liaison with other agencies eg. Network Rail and private landowners, Scottish Water. iii) 07D2: Suppress the abundance of American mink (where they threaten water vole populations or bird reserves) and signal crayfish, relative to initial population sizes.	Control & eradication of GH, HB and JK in the River Teith, Forth and Allan water. Identify and close pathways to dispersal. Monitoring and control/eradication of North American skunk cabbage. Monitor population of North American signal crayfish in Row burn, Teith. Monitoring and control of mink along the River Teith.
Plan – Falkirk Area Local Biodiversity Action Plan 2010 – 2013 (draft consultation stage) Provision/s: Undertake invasive species (in particular Japanese knotweed) monitoring and management along part of the River Carron (Water & wetland action plan). Aspirational project: Agree Council policy on invasive species monitoring and control and promote awareness of this within relevant sections of the Council. (Water and wetland and urban action plans).	Control and eradication of GH, HB and JK on River Carron and Avon. Identify and close pathways to dispersal.
Plan – North Lanarkshire Local Biodiversity Action Plan³⁶ Provision/s: Rivers and Burns Action plan 1.1 - Develop policies to control alien plant species and favour establishment of appropriate native species adjacent to rivers and especially Council owned land.	Control and eradication of GH, HB and JK on River Almond. Identify and close pathways to dispersal.
Plan – West Lothian Local Biodiversity Action Plan³⁷ Provision/s: Support reporting of invasive species to Lothians Wildlife information centre.	Control and eradication of GH, HB and JK on River Almond River Avon, Water of Leith and Union Canal. Identify and close pathways to dispersal.
Plans supporting designated conservation areas (SPAs, SACs and SSSIs). Scotland's Biodiversity: A strategy for the conservation and enhancement of biodiversity in Scotland³⁸	Supports the conservation of biodiversity target species through the control and eradication of INNS detrimental to their ecology

³⁵ http://www.ukbap-reporting.org.uk/plans/map_actions.asp

³⁶ <http://www.northlanarkshire.gov.uk/CHttpHandler/ashx?id=1808&p=0>

³⁷ http://www.westlothian.gov.uk/media/downloadoc/1799514/1842967/Biodiversity_action_plan

³⁸ www.scotland.gov.uk/Publications/2004/05/19366/37239

Provision or Requirement of Existing Plan	Action in FFD Biosecurity Plan
Plan – Edinburgh Local Biodiversity Action Plan Provision/s³⁹: i) S-WV2.1; Identify resources for further survey and assessment of impact of mink predation on water voles. ii) ISO 1 Continue survey and treatment of giant hogweed, Japanese knotweed and Himalayan balsam in association with flood prevention schemes on Water of Leith and Braid burn. iii) ISO 2 Review the control of invasive plants on Council land as part of the review of pesticide use. iv) ISO 3 Control some invasive plant species on Countryside Ranger-managed sites using volunteers. v) ISO 4 Produce a comprehensive map of the three target invasive plant species across Edinburgh. vi) ISO 5 Seek advice on potential conflicts between the treatment of invasive species and protected species – e.g. riparian habitats and otters. vi) ISO6 Continue to record giant hogweed reports and notify landowners as required.	Control and eradication of GH, HB and JK on River Almond, Water of Leith and Union Canal. Identify and close pathways to dispersal. Ensure that any new infestation/introduction of Japanese knotweed on Water of Leith is reported promptly.
Plan – Water of Leith management plan⁴⁰ Provision/s: A20: Remove, monitor and prevent the spread of invasive plant species (include control measures implemented under the flood defence scheme and use of volunteers for handpulling of Himalayan balsam (B10, B11)). A77: Promote a project to explore the impact of bullhead and/or grayling on trout populations. A83: Establish a coordinated framework for the management of invasive species.	Control & eradication of GH and HB on Water of Leith. Identify and close pathways to dispersal. Ensure that any new infestation of Japanese knotweed on Water of Leith is reported promptly.
Plan – Midlothian Local Biodiversity Action Plan⁴¹ Provision/s: 5.10 Greenspaces Habitat Action Plan: Control invasive species on Council owned sites. 11.12 General: Collate existing information on non – native invasive species and new records where they arise. 12.5 Rivers & burns: Determine for each site, the action needed to get rid or control non-native invasive plant species where appropriate.	Control & eradication of GH, HB and JK on Esks, & Tyne. Identify and close pathways to dispersal.

³⁹

http://www.edinburgh.gov.uk/internet/Attachments/Internet/Environment/Planning_and_buildings/Planning_hidden/Built%20and%20natural%20heritage/Natural_heritage/2010-2015/EBAP_Other_APs_2010.pdf

⁴⁰ <http://www.waterofleith.org.uk/management>

Provision or Requirement of Existing Plan	Action in FFD Biosecurity Plan
Plan – East Lothian Local Biodiversity Action Plan⁴² Provision/s: Control invasive species on Council owned land.	Control and eradication of GH, HB and JK on Rivers Esk, Tyne and Beil Water. Identify and close pathways to dispersal.
Plan – Borders Local Biodiversity Action Plan⁴³ Provision/s: 2. Site and species Safeguard and Managment - Ensure continued invasives control by river champions following Tweed Invasives Project. 5. Communications and publicity – Continue to highlight the threats posed by invasive plants through the invasives project.	Control & eradication of GH, BH and JK on Rivers Esk. I Identify and close pathways to dispersal. Launch of Forth Fisheries Dsitrect biosecurity plan.
Plan – Tayside Biodiversity Local Action Plan⁴⁴ Provision/s: WW2: Seek to develop and promote policies to control alien species and favour establishment of appropriate native species.	Control & eradication of GH, BH and JK on Allan Water. Identify and close pathways to dispersal.
Plan: The 2010 – 2015 River Carron Fisheries Management Plan Provision/s: 4.32. Alien fish surveys 5.58. Encourage anglers to report any sightings of alien fish species and retain any non-native fish captures. 5.59. Raise awareness of the <i>Gyrodactylus Salaris</i> threat and inform anglers and fisheries of the methods for preventing GS infection within Scottish waters. Educate and advise anglers and fishery staff through newsletters and distribution of Code of Practice. Encourage stronger controls on anglers including the disinfection of tackle, clothing, etc when they visit locations. 5.60. Mitigate fish disease outbreaks. 6.61. Stocking practices and fish transportation. 7.67. Map invasive plant species.	Record and monotor sightings of rainbow trout. Eradication where desirable or feasible. This plan will establish a local surveillance system that will feed into the national response protocols as well as formulate rapid response protocols for “new” INNS which pose significant threats to local species and biodiversity. The Actions required to set up a monitoring system are detailed in section 5.2. Control and eradication of GH, HB and JK in the River Carron including ‘Compile and update existing Falkirk Council INNS and CGI/CATCA weeds mapping data. Ensure all data is SEPA compatible.
Plan: Fisheries Management Plan for the River Avon Provision/s: Aim 7.2 – Produce a detailed river map showing locations of invasive weed species 7.3. - Identify the presence and estimated population of Mink using Mink Rafts. 8.11. - Control and eventual eradication, of the North American mink population.	For the River Avon: Compile and update existing West Lothian invasive weed mapping data through further survey work and liaison with The Wildlife Information Centre for the Lothians and borders (TWIC). Ensure all data is SEPA compatible. Monitoring and control of American mink. In the River Avon.

⁴¹ http://www.ukbap-reporting.org.uk/plans/map_county.asp?X=%7B565E6119%2D29E2%2D4067%2D9228%2D814E4931880C%7D&CTRY=%7BC5ACF6E0%2D0A56%2D4DD4%2DB263%2D752AB8182823%7D&WES=

⁴² <http://www.eastlothian.gov.uk/downloads/ELBAPweb.pdf>

⁴³ <http://www.scottishborders.gov.uk/life/environment/naturalheritage/2717.html>

⁴⁴ http://www.taysidebiodiversity.co.uk/Section2_water_Action.html

Provision or Requirement of Existing Plan	Action in FFD Biosecurity Plan
Plan: The River Almond 5 Year Management Plan (consultation draft) Identify areas where invasive plants and poor farming or forestry practices are contributory factors and seek remedial actions Identify bio-security issues other than INNS including awareness of Gs and other fish diseases 5.3. Hogweed, Himalayan Balsam and Japanese Knotweed eradication 6.1. Threats to biosecurity: Implementation required to prevent further establishment of alien fish	Control and eradication of GH, HB and JK in River Almond. Identify and close pathways to dispersal. Record and monitor sightings of rainbow trout in River Almond. Eradication where desirable or feasible.
Plan: Ochils Landscape Partnership: Environmental Conservation Plan⁴⁵ Provision/s: Project B2.3 - To undertake systematic control of invasive non native plant species (including Japanese knotweed, Himalayan balsam and giant hogweed) and American Mink along the River Devon corridor. River Devon reinstatement of natural wetland – Restore riparian vegetation to aid in the long term stability of the river. Eradicate invasives.	Control & eradication of GH, HB and JK on River Devon and Black Devon. Identify and close pathways to dispersal.
The River Allan Five Year Management Plan Provision.s: Erosion and Transport of Soils 3.1: Hogweed eradication & monitoring programme. Biosecurity 4.1- Improve Biosecurity measures at rainbow and coarse sport fisheries on the River Allan	Control & eradication of GH, HB and JK on the River Allan. Identify and close pathways. Record and monitor sightings of rainbow trout and coarse fish as part of early warning system. Eradication where desirable or feasible

⁴⁵ <http://www.ochils->

[lp.com/component/option,com_docman/task,cat_view/gid,105/dir,DESC/order,name/Itemid,92/limit,5/limitstart,0/](http://www.ochils-lp.com/component/option,com_docman/task,cat_view/gid,105/dir,DESC/order,name/Itemid,92/limit,5/limitstart,0/)

Provision or Requirement of Existing Plan	Action in FFD Biosecurity Plan
Plan: River Basin Management Plan for the Scotland river basin district and the Forth Area Management Plan SEPA - river basin planning. Provisions: The RBMP for the Scotland river basin district contains the following measures relating to biosecurity: • identification of appropriate actions to manage species that threaten high and good status sites, together with identification of potential sources of re-infestation in the surrounding area; • establishment of detection/surveillance/ control strategies for problem species; • risk assessment of pathways for entry of problem species into the Scotland river basin district; • research and development to define species causing deterioration of good ecological status/potential and to identify new methods of control; and • development of biosecurity plans to prevent movement of species between catchments and respond quickly to new infestations • The Forth Area Management Plan highlights the importance of recording the presence of invasive non-native species, particularly riparian species, and recommends that a program of eradication is undertaken by working in partnership.	This plan will assist with the delivery of all the measures relating to biosecurity outlined in the RBMP for the Scotland river basin district and key actions highlighted in the Forth Area Management Plan which are required to both prevent the water environment of the river basin district from deterioration and restore it to good ecological status/potential.

4. Scope of the Plan

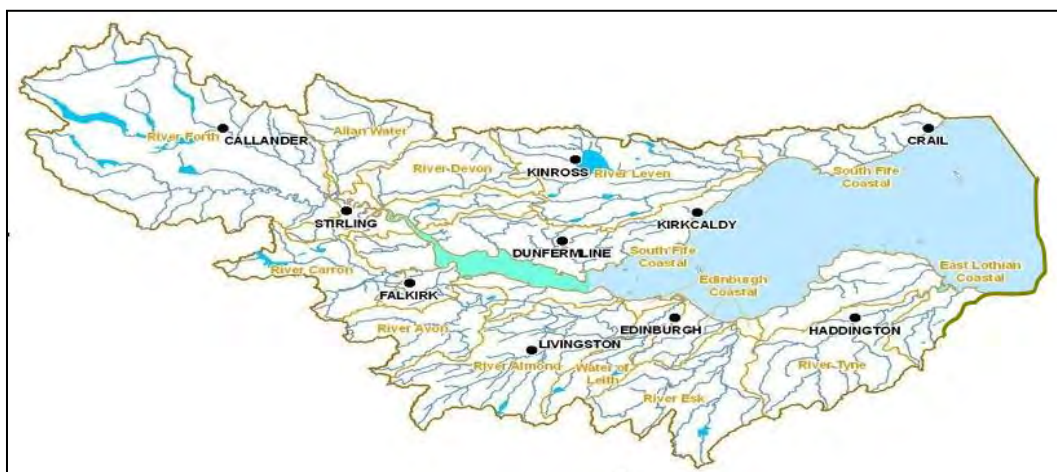
4.1 Forth Fisheries District

The Forth Fisheries District Biosecurity Plan covers the area overseen by the River Forth District Salmon Fisheries Board, which crosses parts of eleven local authorities: Fife, Perth and Kinross, Clackmannanshire, Stirling, Falkirk, North Lanarkshire, West Lothian, City of Edinburgh, Midlothian, East Lothian and Borders. It is also a very similar area to the Forth Area Advisory Group which has been set-up to assist with the co-ordination of river basin planning activities at the sub-basin level.

Covering more than 3,600 km² of water, the district includes the river catchments which drain into the Forth Estuary and Firth of Forth. These include, but are not limited to: Allan, Almond, Avon, Carron, Devon, Esks, Forth, Leven, Teith, Tyne, and Water of Leith (see Table 1 for summary descriptions).

It is an area which is slowly recovering from centuries of detrimental human impact; the major legacies of which are point and diffuse sources of pollution, obstructions to fish migration, alterations to natural water flow and physical alterations to river banks and beds. These degraded and disturbed environments are susceptible to invasion by INNS.

The district supports ecologically and commercially valuable fisheries for salmon, trout, grayling and coarse fish.



Map 2: Forth Fisheries District

The District covers more than 3,600 km² of water; the area not only includes the main stem of the River Forth, the estuary and coast, but also the tributaries. These include, but are not limited to: Allan, Almond, Avon, Carron, Devon, Esks, Leven, Teith, Tyne, and Water of Leith (see Table 1 for summary descriptions). This Plan covers the entire catchment of the River Forth drainage basin and additionally, those sub-catchments that drain directly into the Firth of Forth.

Table 3 Descriptions of river catchment in the Forth District

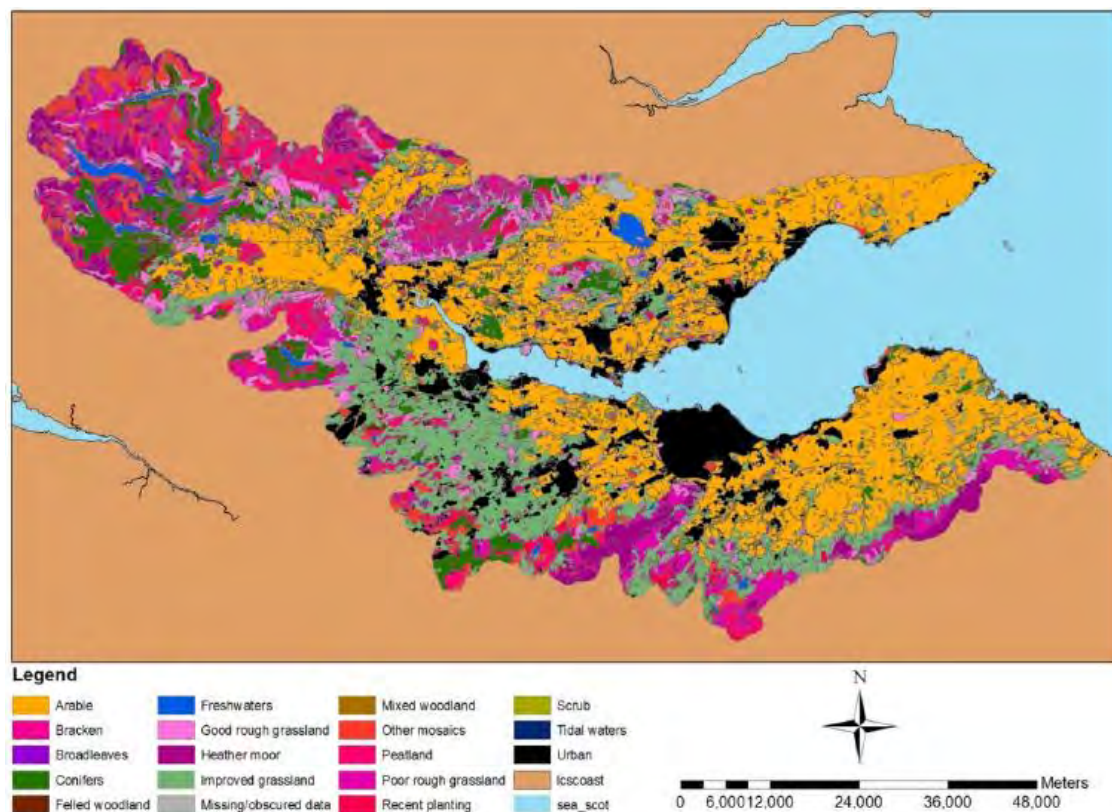
River	Approx. Length	Description
Forth	72km	Meets River Teith at Stirling. Slow, muddy and meandering in mid and lower sections and supports a migratory fishery.
Teith/Leny/Venachar system	50km	Formed by the joining of the River Leny & Venachar and flows in a generally Easterly direction to meet the Forth at Stirling. The Teith supports a prolific salmonid fishery.
Allan Water	28km	A major tributary of the Forth, the Allan has over the years been extensively modified by man. Downstream of Bridge of Allan the substrate is gravel and this forms ideal juvenile salmonid habitat right down to the point where the tidal section of the river is reached.
River Devon	32km	The river Devon rises high up on the north eastern slopes of Blairdenon Hill round the highest of the Ochil Hills. Almost all of the Devon comes from these hills, which form a dissected plateau about 600m above sea level. This upland area of rough grazing contains five reservoirs used for drinking water for Fife and compensation water for the Devon.
Black Devon	24 km	The Black Devon is a river of Fife and Clackmannan that rises on Outh Muir in the Cleish Hills to the North of Dunfermline. Water is diverted into the Gartmorn Dam Reservoir.
River Leven	31km	Much of the Leven's 292km watercourses are upstream of various Lochs. The sluices at Loch Leven control the flow of the River and for the first 5 km downstream of the loch the river is canalised.

River	Approx. Length	Description
River Carron	35km	The headwaters of the Carron are effectively compensation waters from a series of reservoirs which have been built on the system to harness water for the population of much of the eastern central belt of Scotland. The largest of these is Carron Valley Reservoir. In its upper reaches the Carron is an attractive moorland stream with good gravels and fairly stable banks.
River Avon	20km	The River Avon rises south east of Cumbernauld and flows in a generally north-easterly direction to the Forth Estuary at Kinneil. It drains a relatively well-populated catchment with an area of about 200km ² . There are 12 municipal wastewater treatment works serving a population of around 50,000 people.
River Almond	50km	The River Almond rises among the moors of the Cant Hills at an altitude of 275m approximately 5km southwest of Harthill in Lanarkshire. It flows in a north-easterly direction and reaches the Forth estuary at Cramond where it discharges on to the intertidal Drum Sands. It drains an area of approximately 175km ² .
Water of Leith	38km	The Water of Leith is formed by several burns among the Pentlands at altitudes of 420 to 470m above sea-level. Compensation reservoirs in the Pentland Hills also form part of this system, regulating the flow in these burns and Water of Leith. Eventually, the Water of Leith falls into the Firth of Forth between the heads of the E and W piers of Leith harbour. Its chief tributary is Bavelaw Burn, flowing into it at Balerno; and its other tributaries are small but numerous mostly from the Pentlands. Its volume varies, according to the weather, with its flows regulated by the reservoirs in response to the weather eg. to maintain flows in dry weather or to reduce flows during periods of heavy rainfall. Historically, its water-power was harvested, for the driving of corn, paper, and other mills.
Rivers Esk	35km	The North Esk rises in the Pentland Hills above the N. Esk Reservoir and, after a brief course through barren moorland it is joined by the Carlops burn and other small tributaries. There are numerous dams on the North Esk. The South Esk rises on the western slopes of Blackhope Scar (651m), the highest of the Moorfoot Hills. Below the confluence of the two streams, the Esk winds for 6km in a north-easterly direction and reaches the sea at Musselburgh.
River Tyne & Beil Water	25 & 15km	The River Tyne rises to the west of Pencaitland and flows in an easterly direction towards Haddington. Water quality appears slightly diminished at Pencaitland due to effluent from the malt works. Approximately 5km to the east of the Tyne, there is a small river called the Beil Water. It is believed that historically this was once a fairly prolific stream which carried a good head of sea trout but which has for more than a century been blocked by a dam immediately downstream of the railway culvert.
Forth and Clyde and Union Canals	56km & 51km	The Forth and Clyde Canal runs eastwards directly through the Forth District, whilst the Union Canal starts in Edinburgh and joins the Forth/Clyde system at Falkirk. These canals have two sampling points under the Freshwater Fisheries Directive and are the only cyprinid waters in Scotland that are monitored under the Directive. They are not designated as Fisheries Management Units as they run through different catchments. The two canals join at the Falkirk wheel.

4.2 Summary of land and economic uses

Land use

Arable farming occupies nearly 45% of the Forth catchment and as such is the dominant land use. It is particularly concentrated in and around the lowlands of Stirlingshire, Fife, and East Lothian. This part of Scotland contains some of the most fertile agricultural land in Scotland. The next most abundant land-use is improved grassland (26.8%), with urban areas, good rough grassland, heather moor, peat land and conifers being the other significant groups. Loch Lomond and the Trossachs National park to the east is an important conservation area for Scotland. Large parts of the intertidal and coastal habitat around the Firth of Forth have been reclaimed initially for agricultural and later for industrial land uses.



Map 3: Forth Catchment Land Use (LCS88, MLURI 1993)

Industry & Settlement

Historically, Forthside has always been a major centre of industry in Scotland. The Carron Iron Works in Falkirk were one of the largest iron works in Scotland throughout the 19th century. There are important commercial docks at Leith, a ship breaking facility at Inverkeithling, a coal fired power station at Longannet and a naval dockyard at Rosyth. Coal mining was a major industry on the Forth until recent

years with several deep mines on the shores of the Firth including seafield and Frances near Kirkaldy. Oil shale mining was for many years a major economic activity in West Lothian.

The Forth bridgehead area is home to the industrial areas of Burntisland, Kirkaldy, Bo'ness and Kirkcaldy. Grangemouth, on the western end of the Firth is home to one of the largest petrochemical plants in Europe. As part of the central belt, it is highly urbanized with a high population density when compared with other parts of Scotland. Major towns and cities include Edinburgh, Stirling, Falkirk and Dunfermline.

Transportation

As part of the central belt of Scotland, the Forth District is a major transport hub with road and rail connections to the rest of Scotland. The Firth itself is also a transportation route for local traffic and international trade with many harbours of various sizes built alongside the Forth. The Port of Grangemouth is the largest container port in Scotland and other ports include the Port of Rosyth and the marine terminals at Hound Point and Braefoot.

Forth Ports PLC⁴⁶ as a Harbour Authority controls the navigable waters inside a line from Fife Ness to Tantal Castle (in the outer Firth) to Stirling

Tourism and Leisure

Tourism and leisure activities that are dependent upon the quality of the aquatic and riparian environments to enhance the visitor experience include walking, golf, bird watching, canoeing and angling. The Forth District itself is a famous and prolific salmon, sea trout and brown trout fishery and in terms of catches has the fifth highest in Scotland. Commercial rainbow trout fisheries exist throughout the area. Their economic value is not known but must be considerable. Trout fisheries in the district include but are not limited to:

- Allandale Tarn
- Avonbank Fishing Club
- Ballancreiff Fishery
- Bowden Springs Fishery
- Burnhouse Lochan Fishery
- Crosswood Fishery
- Dooks Fishery
- Drumain Reservoir
- Finglas Fishery
- Frandy Fishery
- Gartmore Dam
- Harperleas Reservoir
- Harperrig Reservoir
- Heatheryford Trout Fishery
- Holl Reservoir
- Hopes Reservoir
- Linlithgow Loch
- Loganlea fishery
- Parkley Fishery
- Pottishaw Fly fishery
- Roseberry Reservoir
- Selmuir Fishery
- Swanswater
- Theirpmuir and Harlaw
- Bangour Reservoir Trout Fishery, Bathgate
- Wellsfield Trout Fishery, Denny
- Markle Fisheries, Haddington
- Morton Fishery, Mid Calder
- Millenium Fishery, Haddington
- Orchill Loch Trout Fisheries, Braco
- Beecraigs Trout Farm
- North Third Trout Fishery, Stirling
- Lake of Menteith Fisheries, Callander

⁴⁶ www.forthports.co.uk

- Rosslynlee Trout Fishery, Penicuik
- Glensherup Fisheries, Dollar
- Carron Valley Trout Fishery
- Cloybank Fishery, Banknock
- Burnhouse Fishery, Bonnybridge
- Buckieburn Reservoir
- Drumbowie Reservoir
- Little Denny Reservoir

Business directly linked with the sport of angling is an important local economic driver and is one of the main, but not the only sector, this plan seeks to enhance and protect. There is a plethora of publications detailing the importance of freshwater fisheries to the Scottish economy but relatively few with any substantial detail on the economics of fishing the Forth District's rivers and lochs. The most recent and comprehensive review of the economic impact of angling in Scotland was carried out in 2004⁴⁷. It grouped the Forth District together with the Clyde, Fife and Ayrshire into a region described as "Central Scotland". Central Scotland was noted to be one of the three most important regions for angler effort (the others being "Highlands" and "North-East"). A total of 473,233 angler-days were estimated annually for Central Scotland. It is reasonable to assume that a significant proportion of this effort was concentrated within the Forth District, signaling the importance of fish and fishery management issues to the region.

Table 4 Angler expenditure table (£ 000s) for Central Scotland

Fishery	Value (£ 000s)
Salmon & sea trout	£3,386
Brown trout	£ 5,234
Rainbow trout	£ 10,963
Coarse fish	£ 1,930
Total	£ 21,514

4.3 Biosecurity: Current and potential threats

This section identifies 32 INNS and fish diseases for inclusion in the RFFT Biosecurity Plan of which 19 high priority species will be the main focus for action. The priority species were identified as those that:

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

4.3.1 Current biosecurity issues

At least 27 INNS are present in the Forth District. This list is not exhaustive and includes those deemed to pose the highest threat to the Forth's aquatic environment⁴⁸:

-  North American mink (*Mustela vison*) is present throughout the Forth District and is also likely to be present on coastal rivers. North American Mink spread by migration and kill waterfowl, small mammals and juvenile salmon and trout. North American Mink are linked to the decline of water

⁴⁷ <http://www.scotland.gov.uk/Publications/2004/03/19079/34369>

⁴⁸ <http://www.nbngateway.com/>

voles in the Cairngorms National Park area where 94% of sites occupied by water voles in the 1950s are now unoccupied.

 Canadian pondweed (*Elodea Canadensis*) is present in various locations throughout the Forth District with high densities occurring in West Lothian. The following water bodies have been downgraded from high to good status due to the presence of Canadian pondweed⁴⁹:

- Lake of Mentieth
- Loch Lubnaig
- Ballo Reservoir
- Loch Leven
- Loch Glow
- Gartmorn dam
- Loch Fitty
- Threipmuir Reservoir
- Gladhouse reservoir

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. It is found within the Forth – Clyde canal network. Canadian pondweed dominates native macrophyte communities which can lead to their extinction and thereby impacts local invertebrate communities. It can also increase metal loads within water bodies that compounds its impacts on native flora and fauna. High metal loading in Central Scotland rivers may make this more pronounced.

 North American skunk cabbage (*Lysichiton americanus*) is present in the Forth District in small scattered populations (including the Allan Water near Bridge of Allan, the East end of Loch Ard, on the River around Renagour just East of Loch Ard and three locations in East and Midlothian) making it a prime candidate for eradication. *L. americanus* is able to build dense stands, particularly in wetlands where it dominates smaller plants. Vegetation studies in Germany have shown it is able to displace mosses, orchids and other plants. Its impacts in this country are unknown.

 Rhododendron (*Rhododendron ponticum & hybrids*) is present in many locations throughout the Forth District. It spreads by natural seed and vegetative dispersal after intentional planting in gardens, parks and demesnes. It forms dense thickets and dominates native plants for space and resources with impacts on fish and invertebrate communities as well as preventing site access. The Kippenrair Glen Special Area of Conservation is currently in unfavourable status due to rhododendron.

 Japanese knotweed (*Fallopia japonica*) is located throughout the Forth District. 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 prohibits regeneration. Dense growth of Japanese knotweed can also hinder access, reduce biodiversity and alter the habitat for wildlife.

 Himalayan balsam (*Impatiens glandulifera*) is present throughout the Forth catchment and coastal rivers. It spreads through natural dispersion by wind or water through the transport of

⁴⁹ McConnell, S. (2010). Draft River Forth catchment profile, SEPA.

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.

-  Giant hogweed (*Heracleum mantegazzianum*) is widespread and is present in large areas of the Forth District. 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 riverbanks and increased sedimentation.
-  Rainbow trout (*Oncorhynchus mykiss*) are farmed in the Forth District. Although there are no complete records of distribution, Rainbow trout have been introduced to ponds/fisheries throughout the area for angling. Farmed fish are a potential source of viral and bacterial diseases affecting wild salmonids and they also compete for resources with native species if allowed to escape.
-  Minnow (*Phoxinus phoxinus*) is a translocated species that has been introduced into the Forth district and is present in scattered populations. 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.
-  Anisakis sp. is a nematode worm that causes Red Vent Syndrome (RVS). RVS has been found in salmon in over 50 Scottish rivers since June 2007. It has been recorded in the Tweed, Forth, Teith and Allan Water⁵⁰. It can cause varying degrees of bleeding and swelling to salmon vents and may also affect humans who become infected from eating raw meat for example sushi.
-  Sea buckthorn (*Hippophae rhamnoides*) is present along the Forth estuary and is a particular problem along the coast of East Lothian. Previously only native to the coastal region of Eastern England it is spreading on many dune systems in Great Britain and Ireland following introductions, chiefly for dune stabilisation. It is a serious threat to native dune flora and fauna.
-  North American signal crayfish (*Pacifastacus leniusculus*) has been introduced into the district and is present in scattered populations, in particular the Tiel Burn (Fife), River Teith (Row Burn), Peffer Burn (East Lothian) and in a Rainbow trout fishery in East Lothian (Tweeddale Millennium Fishery). The Tiel burn has been downgraded to moderate status due to the established population of crayfish and those water bodies adjacent to the Tiel burn are identified as at 'risk' of introduction of crayfish by SEPA. The Tiel burn is projected to remain in less than good ecological status beyond 2027 due to the difficulties in eradicating established populations. The affects of crayfish on Scottish freshwater ecology and fisheries need to be monitored, studied and further investigated.

⁵⁰ Noguera et al(2009). Red vent syndrome in wild Atlantic salmon *Salmo salar* in Scotland is associated with *Anisakis simplex*, *Dis. Aquatic Org.* **87**, pp. 199 – 215.

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Curly waterweed (*Lagarosiphon major*) is found in a small number of locations throughout the central belt. In the Forth District there are small and scattered populations in the Lothians and Fife. It is spread through: 1) Disposal of garden waste 2) Animals and human activity 3) Fragmentation by wind dispersal, boat movement, angling equipment and possibly water fowl. It is 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 biodiversity targets.

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New Zealand pigmyweed (*Crassula helmsii*) is present in several locations in Edinburgh, one location each in and/or around Dunbar, Dalkeith and Linlithgow⁵¹, Muirhouses and Drunshoreland, Pumpherston. Also thought to be present in a pond in Stenhousemuir. It is suited to a wide range of slow moving freshwater systems and outcompetes 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.

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Rocky Mountain raspberry (*Rubus deliciosus*) has been recorded in Mugdock country park, Stirlingshire. Its effects are not well documented in the UK but it is known to outcompete native vegetation out-with its native range in the US.

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Few flowered leek (*Allium paradoxum*) is an invasive woodland and riverbank plant which competes with native spring flowers. It is widespread in the Lothians and is infesting large sections of the lower River Almond.

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Orfe (*Leuciscus idus*) is present in a single location on the River Almond, Newbridge, City of Edinburgh. Its impacts are not recorded so the species is classified as medium impact by the UKTAG.

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Pirri piri burr (*Acaena aserinifolia*) is present at one coastal location in West Lothian and at coastal dune sites in East Lothian. It has also been reported around forest edges near Aberfoyle and at Cambusbarron quarry, Stirling. This plant is a problem in Southern England and covers sand dunes, occupying niches of native plants.

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Water fern (*Azolla filiculoides*) has been confirmed in the district, particularly in and around the Linlithgow area of West Lothian. It is also present in the Forth- Clyde canal network and there is a widespread infestation at Stirling University. Water fern forms dense rafts and dominates native species. Reduced light levels below the rafts can cause die off of waterweeds and algae and reduce water oxygenation levels.

⁵¹ Botanical society of the British Isles.

-  Parrot's feather (*Myriophyllum aquaticum*), present in a SUDS pond in Larbert. This plant out competes native macrophytes, reducing species diversity. It also Clogs waterways leading to problems for drainage and access
-  Zebra mussel (*Dreissena polymorpha*) unintentionally introduced by contaminated boat hulls, engines and bilge water, Zebra mussels were confirmed by British waterways in the Forth – Clyde canal as of 2010. They can have a severe economic impact on all subsurface water structures e.g. by blocking pipes and impacting upon hydro-electric schemes. They are also the cause of varied and unpredictable ecological impacts including changes to freshwater nutrient cycles, extinction of local mussels and changes to stream substrate affecting spawning areas.
-  Ruffe (*Gymnocephalus cernuus*) is present in the River Almond and the Union Canal, West of Edinburgh. It has become invasive due to its reproductive ability, wide habitat range and aggressive feeding habits. The introduction of ruffe to Loch Lomond has had disastrous consequences for native poan and significantly altered the ecology of the loch.
-  Bullhead (*Cotus gobio*) is present in the River Almond, Water of Leith and the Union Canal, West of Edinburgh. The impacts are not documented, but this species competes for invertebrates with Brown trout.
-  Pike (*Esox lucius*) is present in the Venachar system of the Teith. Pike can become invasive in water bodies where prey species have been unable to adapt defences to their predatory tactics.

4.3.2 Potential biosecurity issues

The INNS listed below are not currently present within the Forth district. 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 Forth district.

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

There are four High Threat level species that could be introduced into the Forth district and they include one fish parasite and three freshwater invertebrates (Table 5).

Table 5 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 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 (<i>Salmo salar</i>) populations throughout Scotland. (It has largely exterminated <i>S. salar</i> in 41 Norwegian rivers)
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.	- Burrowing in high density populations damages river banks - Concern over impacts on local species - Intermediate host for the mammalian lung fluke <i>Paragonimus ringer</i>, known to infect humans
Killer shrimp (<i>Dikerogammarus villosus</i>)	Medium -through unintentional introduction from boat hulls and or from unintentional introduction from anglers and water sports enthusiasts. At present found in Grafham water in Cambridgeshire.	- Displacement and/or local extinction of native gammarid species <i>D. Villosus</i> has been observed attacking small fish which, raises concerns over whether vulnerable life stages (eggs, larvae & juveniles) of vertebrates may also be at risk. - May be an intermediate host of acanthocephalan worms (a parasite of birds and fish)

There are also 9 medium & low threat level species of which there is a high risk of introduction for three species, a medium risk of introduction for four species and a low risk for one species (see Table 4 below).

Table 6 The risk of introduction of Medium and Low Threat level INNS.

SPECIES	RISK of introduction	
Didemnum tunicates / sea squirts (<i>Didemnum vexillum</i>)	High	Unintentional introduction from marine boat hulls. Currently affecting West coast marinas.
Common cord grass (<i>Spartina anglica</i>)	High	Nearest location; near St Andrews
Large flowered waterweed (<i>Egeria densa</i>)	High	Only found to date in Borders, near Kelso. Possible introduction from ponds
Water primrose (<i>Ludwigia grandiflora</i>)	Medium	Unintentional introduction from boat hulls and ponds
Wireweed (<i>Sargassum muticum</i>)	Medium	Through unintentional introduction by marine users
Asian topmouth gudgeon (<i>Pseudorasbora parva</i>)	Medium	Currently only recorded from 25 locations in England. Could be introduced as live bait, in ballast water or as releases from aquaria. Populations known to be increasing and if it becomes established in the Trent and Severn it may traverse all of the UK using the canal system.
Fanwort (<i>Cabomba caroliniana</i>)	Medium	One location outside of Glasgow. possible introduction from ponds
Floating pennywort (<i>Hydrocotyle ranunculoides</i>)	Low	Currently only in England up to the midlands. Possible introduction from ponds

From Tables 3 and 4, the main pathways or means of introduction of both High and Medium Threat level species into the Forth district are:

- 🌱 Intentional introduction or planting
- 🌱 Fouling and ballast water of marine vessels
- 🌱 Fouling and ballast water of freshwater vessels
- 🌱 Escapes from garden ponds
- 🌱 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.

4.3.3 Fish Health and Genetic Issues

There are a number of diseases and parasites that have potential to cause catastrophic or significant impacts on fish health and affect the fishery resource. Similarly, the introduction of non-native genotypes of species already present may undermine productivity of native species and act as a vector for the spread of fish diseases. The influence of fishery management and aquaculture activities on the productivity of native fish communities and fisheries is of growing concern as the potential biological and ecological impacts are becoming better understood.

Fish diseases and parasites have potential to impact on the productivity of fish populations by reducing growth and survival of infected fish to the point where fishery performance is affected. The introduction and spread of **non-native genotypes, diseases and parasites** from aquaculture and fishery activities are understood to be the most significant factors.

Parasites & diseases

Restrictions on the import into the UK of live fish have played a major part in preventing the introduction and spread of serious fish diseases. Health conditions of aquaculture animals are today governed by the Fish Health Regulations 1997 legislation that have three categories of [Notifiable ⁵²Diseases in Fish](#) depending on their potential impact on the Scottish aquaculture industry and wild fish stocks.

List I diseases are those which have a serious economic impact and are exotic to the EU, including:

Infectious Salmon Anaemia (ISA)

List II diseases are those which, are present in the EU, but approved zones and approved farms in non-approved zones can be distinguished. These include:

Viral Haemorrhagic Septicaemia (VHS)

⁵² http://www.marlab.ac.uk/Delivery/Information_resources/information_resources_view_document.aspx

Infectious Haematopoietic Necrosis (IHN)

List III diseases are those for which individual Member States can decide whether to put control measures in place or not, including:

- Infectious Pancreatic Necrosis (IPN)
- Bacterial Kidney Disease (BKD)
- Furunculosis
- Spring Viraemia of Carp (SVC)
- Gyrodactylus salaris (Gs)
- Enteric Redmouth Disease (ERM)

The biggest current threat to Atlantic salmon populations and the fisheries they support is the parasite ***Gyrodactylus salaris* (Gs)**. The potentially catastrophic consequences of its introduction mean that it is a priority for fisheries and aquaculture industries to identify and mitigate potential vectors.

Non-native genotypes

Fishery and aquaculture activities utilise non-native genotypes of Atlantic salmon, brown trout and the non-native species rainbow trout for angling amenity and production of fish for the table market. It is now well understood that as well as being a potential vector for disease, stocking of fish from non-native sources can undermine the short and long-term productivity of fisheries. Breeding and competitive interaction between native and introduced fish is likely to produce offspring that have reduced survival and lower reproductive success⁵³. Preventing release of non-native genotypes likely to interact with wild populations is essential to avoid biosecurity issues and short and long term biological (genetic) and ecological (competition) impacts on wild fish populations. Currently, there is no provision for RFFT to be notified of the release of non-native genotypes into stocked fisheries.

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:

Policy and Legislation	Land Resources	Water Resources
Scottish Government, Edinburgh Scottish Natural Heritage SEPA Marine Scotland Association of Salmon Fishery Boards Rivers and Fisheries Trusts Scotland	Forestry Commission Scotland Local Authorities ⁵⁴ National Farmers Union Landowners Association Fishery proprietors Network rail	Forth Area Advisory Group Scottish Water Scottish and Southern Energy Forth Estuary forum British Waterways Scotland
Fisheries Management	Recreation	Conservation and Biodiversity
Forth District Salmon Fishery Board River Forth Fisheries Trust	Forth Canoe Club Stirling Canoe Club	Scottish Wildlife Trust Royal Society for the Protection of Birds

⁵³ McGinnity et al. 2003. Fitness reduction and potential extinction of wild populations of Atlantic salmon, *Salmo salar*, as a result of interactions with escaped farm salmon. Proc Biol Sci. 270 (1532)

⁵⁴ Fife, Clackmannashire, Perth & Kinross, Stirling, Falkirk, North Lanarkshire, West Lothian, City of Edinburgh, Midlothian, East Lothian, Scottish Borders.

Association of Still Water Fisheries Ghillies and bailiffs	Scottish canoe association Ramblers Association Angling clubs RYA	Scottish Native Woods Local biodiversity action groups Plant Life British Trust for Conservation Volunteers BTCV Scotland Lothians & Fife Green Network Partnership Central Scotland Green Network partnership Esk Valley Trust Community Green Initiative Scotland The Wildlife Information Centre Water of Leith Conservation Trust Clackmannanshire & Stirling Environment Trust Falkirk Environment Trust Ochils Landscape Partnership Fife Coast & Countryside Trust Loch Lomond and the Trossachs National Park
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Other groups that are also important for the prevention of introduction and spread of INNS were identified from an analysis of the pathways presented in Table 5.

Table 7 Pathways and stakeholder groups in the Forth District

Pathway	Stakeholders
Intentional introduction or planting	Plantlife, riparian landowners, members of the public, Marine Scotland, Local Authorities
Fouling and ballast water of marine vessels	Local Port authorities (legislated by IMO)/SEPA/Marine Scotland/BWS
Fouling and ballast water of freshwater vessels	SEPA/BWS/UK Government; local canoe and water sports organisations
Sale from garden or pond centres	Horticultural Trade Association/Ornamental Fish Producers
Contaminated water sports equipment (e.g. from anglers, canoeists)	FDSFB, local canoe/water sports organisations, anglers, angling associations, fishing agents and tackle shops.
Escapes from fish farms, ponds, gardens, and demesnes.	Marine Scotland/ SEPA/ Planning Authorities/ Plantlife/ riparian owners/ members of the public
Introduction of live fish, contamination of water used to transport live fish.	FDSFB/Marine Scotland/Still Water Fisheries/Angling Associations
Movement of contaminated soils or vehicles	Local Authorities/SEPA/quarries/ building contractors
Improper control and disposal measures e.g. cutting and dumping without treatment	Local Authorities/SEPA/environmental health/ Plantlife/riparian owners/members of the public

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.

4.5 Existing INNS mapping & control activities

This plan will include and support ongoing existing INNS control programmes.

SEPA

SEPA record the presence of INNS in relation to Water Framework Directive monitoring and also in relation to the diffuse pollution priority catchment work. SEPA ecologists record riparian INNS at all routine ecology monitoring sites and other alien species on the UKTAG high-impact list when they are found. The riparian monitoring involves recording density and extent of Rhododendron, Japanese knotweed, Himalayan balsam and giant hogweed at planned monitoring sites. This information is recorded in a format which can be used to generate spatial maps.

Communities Along the Carron Association (CATCA)

Falkirk Council Ranger Service produced a survey of invasive species in Carron Glen and Carron Valley Reservoir for CATCA, Communities along the Carron Association, a volunteer environmental organization in Dunipace, Denny & District⁵⁵. The survey was requested in response to local concerns regarding the distribution and abundance of invasive species on the River Carron, in particular Japanese Knotweed. Both Himalayan balsam and Japanese knotweed were found to be present on the Carron and its tributaries.

The survey⁵⁶ identified a low estimate of 2800/m² and high estimate of 6000/m² of knotweed from source to sea in the River Carron. One of the recommendations arising from the report was that groups already involved in Japanese knotweed work together to pursue phase II (eradication) on the Carron.

Trossachs Mink Control & Forestry commission Scotland & Cowal & Trossachs Forest Conservation Team

The Trossachs Water Vole Re-introduction Trial⁵⁷ is a partnership between Forestry Commission Scotland, Scottish Natural Heritage, Loch Lomond and the Trossachs National Park, Royal Zoological Society of Scotland, and Derek Gow Associates. Mink monitoring and control is an important part of the project carried out by project staff supported by Forestry Commission Scotland and National Park staff and volunteers. Currently, over 60 mink rafts are deployed, mostly on Forestry Commission land in Loch Ard Forest (Duchray Water, Kelty Water and tributaries) as well as some rafts on the Forth and Kelty around Aberfoyle and Gartmore, East Loch Lomond, and Lochs Lubnaig, Katrine, Arklet, Achray and Venachar or their associated waterways. The project has also supported mink monitoring by the Lake of Menteith Fisheries and by Scottish Natural Heritage National Nature Reserve staff at Endrick Mouth. The current project is due to end in April 2011 but it is hoped that a new partnership will be formed for 2011-2013. Forestry Commission Scotland have committed to maintaining mink control around the re-introduced water vole population on their land beyond the life of the project."

⁵⁵ Wishart, W. 2010. *Invasive Species Survey, River Carron, Falkirk*. Falkirk Council Ranger Service.

⁵⁶ Japanese Knotweed Mapping Project, results of Mapping by Community Green Initiative Volunteers along the River Carron Corridor from May 2009 through November 2010.

⁵⁷ <http://www.snh.gov.uk/protecting-scotlands-nature/species-action-framework/species-action-list/water-vole/update/>

Forestry Commission Scotland (C&T District Conservation Team) are also carrying out the following control activities: Mapping and treating Pirri pirri burr found on FCS land in district, Mapping and attempting treatment of Skunk Cabbage (source is on private land), all Rhododendron is mapped and there is an ongoing control programme (source is on private land).

Stirling Council Area

Stirling Council as part of routine maintenance carries out spraying of giant hogweed and Japanese knotweed on council owned land.

Clackmannanshire & Stirling Environment Trust since 1998, have lead and implemented the Stirling Invasive weeds Project. There are three main strands to the project

1. An initial Council wide survey in 2000 (focussing on Giant hogweed but also recording Japanese knotweed and Himalayan balsam) mapped the extent of invasive weed infestation in the district⁵⁸. This data is stored electronically on GIS and updated on an annual basis. The data is available to the council, SNH and SEPA and is used to inform the council and other landowners of new areas that require treatment and which are out with the current CSET treatment areas.
2. Chemical control of JK, GH and HB on a catchment basin approach primarily along the River Allan, sections of the River Forth (and works on the Blane and Endrick) Works have been carried out annually since 2002. Hogweed control by chemical application on the Allan Water was carried out in 2001⁵⁹, 2002⁶⁰ and 2003⁶¹. Random monitoring of works has highlighted the need for a sustained effort, particularly in the head waters as well as the problems of the continued persistence of the seed bank.
3. A campaign to raise awareness of INNS amongst the general public, other key stake holders and landowners including Cowan Trust and schools through talks, productions of leaflets and press releases. Further CSET has highlighted the need for more support and coordination to help with invasives control and has been responsible for raising the profile of invasives in the District with organisations such as SEPA. CSET has also worked with groups in neighbouring council areas.

CSET is the main funder of this project but has successfully applied for funds from SNH, SEPA, Her majesties Prison Service, Loch Lomond and Trossachs LEADER Fund, Stirling council and Loch lomond National Park .

⁵⁸ Barrett, G. & Bates, M.A. 2000. *Giant Hogweed Survey in Stirling Council Area*. A Report for Stirling Council Area by Heritage Environmental Ltd.

⁵⁹ Bates, M.A. 2001, *Stirling Council Area: Giant Hogweed Control Programme 2001 – Allan Water*. A Report for Stirling Council Area by Heritage Environmental Ltd.

⁶⁰ Bates, M.A. 2003, *Stirling Council Area: Giant Hogweed Control Programme 2002 – Allan Water*. A Report for Stirling Council Area by Heritage Environmental Ltd.

⁶¹ Black, D.J. and Bates, M.A. 2003, *Stirling Council Area: Giant Hogweed Control Programme 2003 – Allan Water*. A Report for Stirling Council/Stirling Council Landfill Tax Trust by Heritage Environmental Ltd.

Clackmannanshire Council area

The only formally adopted plan relating to the control of invasive species is the Clackmannanshire Biodiversity Action Plan (2003 – 2008)⁶². This document is currently under review but is still being used for the time being. Several habitat action plans have action plans relating to the control of invasive species under the section in 'Site Safeguard and Management'.

Work to control invasive species is ongoing, particularly in relation to eradicating Himalayan balsam, from the top of the River Devon. The Countryside Rangers also run conservation volunteer days to clear Rhododendron. The Council has recently received funding approved from the Heritage Lottery fund to take forward the 22 projects that were submitted under the Ochils Landscape Partnership scheme. Projects submitted as part of the overall scheme include: *B2.3 Control of alien species*. This project aims to undertake '...systematic control of invasive non – native plant species (including Japanese knotweed, Himalayan balsam & Giant hogweed), grey squirrel and American mink along the River Devon corridor. Himalayan balsam has been cleared from the River Devon on volunteers days run by CSET which also holds data on invasives along the Devon & Black Devon on GIS maps.

Midlothian Council

As part of its LBAP⁶³ for ponds and lochs, Midlothian Council seeks to raise awareness of the issue surrounding non-native species in garden centres. As part of its LBAP for rivers and burns, the Council seeks to improve biodiversity by reducing non-native invasive pressures. Midlothian Council also controls invasive species where they occur on Council owned land.

Members of the public can download invasive species recording forms on the Midlothian website⁶⁴, sightings are then submitted to The Wildlife Information Centre (TWIC) for Lothians, Fife and Borders. Midlothian Council Ranger service has previously undertaken Giant Hogweed and Japanese Knotweed control work on Council owned stretches of the River Esk.

East Lothian Council

Outbreaks of Japanese knotweed, Himalayan balsam and Giant hogweed have in the past been mapped and known locations compiled in a Invasive Weed Locations document⁶⁵.

Where these locations fall on council-owned or managed land, specialist contractors are employed to undertake an intensive control programme. When plants are found on privately-owned land, the landowner is contacted by Environmental Health Officers and guidance is offered to help landowners try to kill the plants off completely and ensure they are stopped from spreading.

The following species are controlled by East Lothian Council:

⁶² <http://biodiversity.clackweb.org.uk/docs/bio.pdf>

⁶³ <http://www.midlothian.gov.uk/Article.aspx?TopicID=0&ArticleID=19620>

⁶⁴ <http://www.midlothian.gov.uk/Article.aspx?TopicID=0&ArticleID=21887>

⁶⁵ http://www.eastlothian.gov.uk/downloads/Invasive_Weed_Locations_Download.pdf

- Himalayan balsam
- Japanese Knotweed
- Giant hogweed
- Sea buckthorn
- Piri piri burr

Japanese knotweed and Giant hogweed are controlled through an East Lothian council strategy based partly on environmental health grounds and partly on being responsible landowners. This action is only taken on Council – owned or managed sites.

City of Edinburgh Council

The Edinburgh Local Biodiversity Action Plan 2010-2015 was launched in March 2010. The new plan continues with a focus on habitat conservation, with six broad Habitat Action Plans. The objectives of the non-native species action plan are to:

- Undertake control work where required
- Raise awareness of invasive species and their impact on biodiversity

In Edinburgh, control of invasive species has mainly focused on giant hogweed, Japanese knotweed and Himalayan balsam⁶⁶. Treatment has mainly been on land owned by the City of Edinburgh Council, or carried out as part of preparations for the flood prevention schemes on the Water of Leith or Braid burn. Millennium funding was secured for treatment of the Water of Leith corridor, which was carried out over a 3-year period.

The Environmental Health department in CEC has records of some species on private and public land and is responsible for notifying landowners of the presence of certain species. While a lot of work is ongoing, there is no coordinated framework for action at present in the city. A recent attempt by Scottish Natural Heritage to coordinate a strategic approach to invasive species has now been dropped due to the changes in funding for local authorities. There are problem areas and known sites, particularly for giant hogweed, which are presently untreated due a lack of both resources and enforceable powers on private land. During the life of this plan, the Edinburgh Biodiversity Partnership will seek to develop such a management framework for invasive species control in Edinburgh.

Water of Leith Conservation Trust

For a number of years, annual work has been carried out by volunteers from the Water of Leith Conservation Trust on the Water of Leith to pull out Himalayan balsam and other invasive species by hand.

In conjunction with PLANTLIFE Scotland a management plan for giant hogweed, Himalayan balsam and Japanese knotweed was compiled⁶⁷. The major output of this report was a standardised mapping procedure for these three invasive plants where they occur on the Water of Leith and the Water of Leith Conservation Trust Community & Volunteers Officer maintains an invasive species database. Site visits and removal of Himalayan balsam are coordinated by the trust.

⁶⁶http://www.edinburgh.gov.uk/internet/Attachments/Internet/Environment/Planning_and_buildings/Planning_hidden/Built%20and%20natural%20heritage/Natural_heritage/2010-2015/EBAP_Intro_2010.pdf

A new Water of Leith Management Plan was published in 2010 with actions to continue their monitoring and removal of invasive species along the river.

Perth and Kinross Council

The Council controls giant hogweed (but not Himalayan balsam or Japanese knotweed) on an ad hoc basis where they occur on land owned and managed by the Council.

Fife Council

Countryside services for Fife have been handed over to the charity the Fife Coast & Countryside trust (FCCT) which handles delivery of services. A water vole project has been run in Fife for ten years and control of mink control is carried out by private contractors; Noblecastle Environmental consultants. A mink trapping programme involving local land owners has increased in its scope over the last ten years, however funds for the coordination of this project have now run out. FCCT will seek further funding from November onwards. Under a LBAP provision for red squirrels, trapping of grey squirrels is carried out at two sites - Devilla Forest near Kincardine and Lady Bank forest near Bow of Fife, two of the nine 'key sites' for red squirrels listed in the Fife LBAP. Much of this scheme relies on voluntary trapping by local landowners. Landowners within a 3 km zone around each 'key site' are invited to take part in a trap-loan scheme and receive training on safe and humane dispatch of animals. Funding has run out for these two programmes. However numerous landowners are using their own resources to continue with the grey squirrel control.

Funding has recently been awarded for a three-year, Fife-wide red squirrel conservation project which will enable grey squirrel control programmes (run as above) to take place around all of the 'key sites' for red squirrels in Fife. The project is likely to commence at the end of 2010/start of 2011. The Fife Red Squirrel Project supports a number of householders, landowners (particularly in the East Neuk of Fife) and volunteers across Fife who wish to carry out grey squirrel control in their gardens, on their farm or estate, or in their local area. Localised clearance of the following non-native plant species is also taking place: Giant hogweed, Rhododendron, *Spartina anglica*, Japanese knotweed and Himalayan balsam

West Lothian Council

West Lothian Council is now approaching the end of a three-year programme of control of Japanese knotweed on the Brox Burn (River Almond tributary). This was originally a West Lothian Council, City of Edinburgh Council, FWAG, SAC and SNH partnership. The initial driver for the project was to eradicate the species in those areas to be affected by the construction of the Broxburn Flood Prevention Scheme, however with the support of Planning Services and with assistance from SNH, the project was extended to include the riparian corridors of both the Brox and Beugh burns. The Flood Risk Management team has coordinated the treatment of invasive non-native plant species. Other services of the council also have a remit, namely NETS & Land Services and the Country Parks team. West Lothian Council has recently been funded to prepare bids for four projects for future funding from the Central Scotland

⁶⁷ Sommerville, F (2000). Invasive Species Report for the Water of Leith 2008 – 2009.

Green Network. One of the projects is to produce a River Almond Alien Species Action Plan. The study will focus on a workable management strategy, which could equally be applied to other catchments in West Lothian and beyond. Working with the River Forth Fisheries Trust it is hoped that the work done on the River Almond will at least provide a blueprint for similar activities elsewhere in the Forth catchment.

Falkirk Council

Following recent Japanese Knotweed mapping along the River Carron Corridor and the development of several active community/interest groups associated with the river, the Council and LBAP have identified the Carron as a priority for INNS control over the next 5 years.

The Falkirk LBAP has also identified that it would like to undertake a project to “Agree Council policy on invasive species monitoring and control and promote awareness of this within relevant sections of the Council”, although implementation of this is resource dependant.

Angling clubs

Mink are currently being trapped by the Larbert & Stenhousemuir (River Carron), Slamannan (River Avon) and Devon angling clubs. Slamannan is currently suffering from a lack of resources to control mink and the Secretary has expressed the desire for some provision of training in mink control.

Cramond Angling Club (CAC) has started to trap mink as of 2011 with 4 traps deployed. CAC has also carried out surveys and removal of invasive weeds.

The Allan Water Improvement Association (AWAIA) has in the past sprayed GH on the Allan and two club members are trained as sprayers. The AWAIA propose to take charge of spraying from April, not June as has occurred in the past.

The River Avon Federation has started surveying of riparian INNS and will continue this in summer 2011. In the past the RAF has sprayed giant hogweed, Japanese knotweed and Himalayan balsam on one bank of the Avon Gorge SSSI.

Network rail

Network rail removes invasive and injurious plants in and around railtrack. Disposal of the waste from these plants is handled by licensed, contained landfill sites so that accidentally spread does not occur. Network rail works within the requirements of the Weeds ACT 1959. Network rail are also involved in a four year project to naturally control Japanese knotweed⁶⁸.

Loch Lomond & the Trossachs National Park

An audit⁶⁹ of *Rhododendron ponticum* and Japanese knotweed was undertaken in 2007 by the Scottish Agricultural College (SAC) and found *Rhododendron ponticum* covered 2% of the park while Japanese

⁶⁸ <http://www.networkrail.co.uk/aspx/1041.aspx>

⁶⁹ www.lochlomond-trossachs.org/images/stories/Looking%20After/PDF/publication%20pdfs/invasives.pdf

knotweed was present in scattered populations. As a result of the audit, a Rhododendron officer has been appointed and some eradication work has been carried out on knotweed on the Endrick tributary of the Teith. However, LLTNP is currently formulating a sustainable strategy to tackle invasives⁷⁰.

British Waterways Scotland

Has been involved in joint activities with SEPA and SNH to manage the next steps following the discovery of zebra mussels on the Forth and Clyde Canal. BWS produced Zebra mussel posters in 2010 in response to finding live mussels on a boat at Carron sea lock. A Zebra mussel rapid response group has been formed with SNH and SEPA.

Other control efforts & private landowners

Across the District, any other control efforts and particularly those carried out by private landowners must be identified and integrated into any control programme. For example, Japanese knotweed was the subject of a project in the Biel Water and a number of landowners worked together to control the weed, however the outcome of these efforts is unknown (East Lothian Council, pers comm.). Grey squirrel control is carried out by numerous landowners in the District and signal crayfish are trapped by a farmer on the Peffer burn in East Lothian.

5. Biosecurity management strategy

The objectives of this plan will be achieved through a partnership approach and by implement the following principles in tackling invasives across the District:



Prevention,



Early detection, surveillance, monitoring and rapid response,



Mitigation, control and eradication

5.1 Objectives and outputs of Forth Fisheries District biosecurity plan

This section describes the expected outputs from implementation of the three plan objectives and the actions required for their realisation. Agreed actions for **prevention** are focussed on the disruption of the pathways for the introduction and spread of INNS, translocated species and fish diseases and include a mixture of awareness-raising and practical measures. Awareness activities take note of the GB Awareness and Communication Strategy. Increased probability of **early detection** of the introduction or spread of INNS is realised through surveys to establish the location of existing populations, establishment of a coordinated local surveillance and supported by routine **monitoring** of established populations or sites vulnerable to the introduction and spread of these species.

⁷⁰ Bell, A. 2010, Natural Resources Manager, LLTNP, personal communication.

Objective 1: Establish a local management framework in the Forth District for the effective and sustainable management of INNS issues.

Output 1.1 - Coordinate activities with Forth Invasive Species Forum and Forth AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the RFFT area.

Any progress made in the control of INNS can be quickly undermined and resources wasted if continued, long-term commitment is not present as has been demonstrated throughout this plan. There are many organisations with a remit and desire to control INNS and stakeholders in the District (see Figure 1). The success of catchment-wide invasives control rests on the ability of all stakeholders to cooperate and implement actions in a systematic manner across the whole of the Forth District.

A Forth Invasive Species forum, coordinated by the RFFT, will be formed from selected representatives of the SEPA Forth AAGs as well as other organisations involved in INNS management (see Figure 1). This forum will be linked to the Area Advisory Group of the River Basin Management Plan process and Local Authorities. The remit of the Forum would be the implementation of this Biosecurity Plan for the Forth district. The work of the forum will be facilitated by

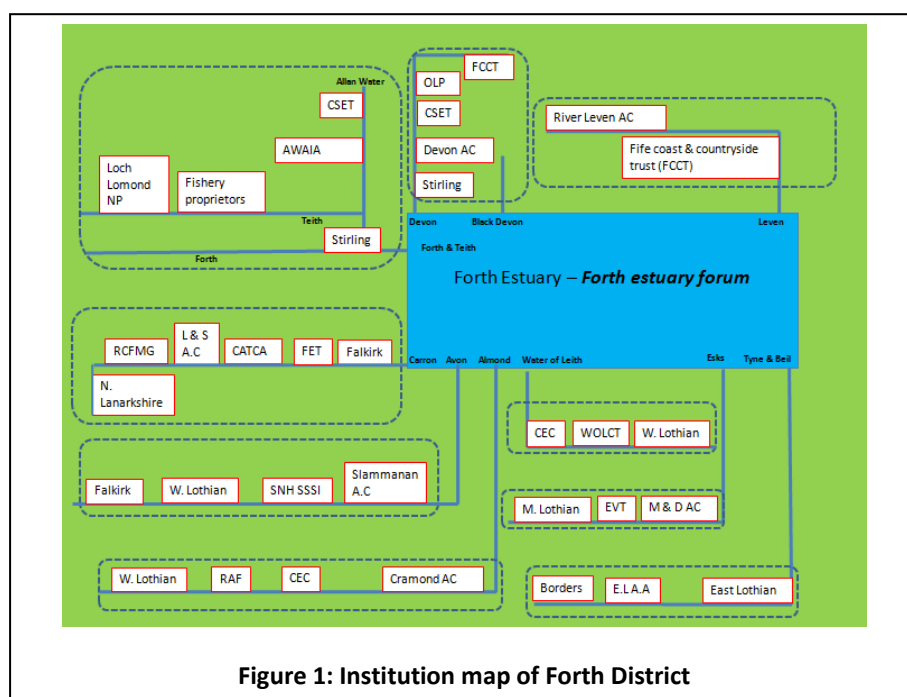


Figure 1: Institution map of Forth District

the appointment of a Biosecurity Officer who will be based in the RFFT. This biosecurity officer will be a point of contact and support for project coordinators within sub catchments and links local authorities and environment trusts with SEPA AAG, funding bodies and other government agencies.

Objective 2: Reduce the risk of the introduction and spread of INNS within the Forth fisheries district

Output 2.1 – All key stakeholders aware of:

- The ecological and economic impacts of INNS.*
- The potential pathways for introduction and spread of INNS.*
- Management best practices to prevent introduction and spread.*

Awareness activities will be focussed on addressing the identified local priorities as well as supporting the GB Awareness and Communication strategy and its key messages to the general public:

 INNS are any non-native animal or plant species that has the ability to spread causing damage to the environment, the economy, or health and the way we live

-  INNS damage our environment, the economy, our health and the way we live
-  We require the support of stakeholders to increase awareness and better understanding of INNS issues and impacts
-  INNS:
 - Threaten our native plants, animals and habitats
 - Cost the British economy between £2 and £6 billion pounds each year
 - Can threaten our health

The local priorities for awareness will focus on disrupting the pathways for the introduction and spread of INNS in the Forth District. The key stakeholders, the identified areas of priority and the proposed mechanisms for delivery are presented in Table 8 below. The roles and actions of key government agencies and non-government bodies in promoting awareness of INNS issues are presented in Table 9.

Table 8 Priority areas for awareness and delivery mechanisms according to stakeholder group

Stakeholder Group	Priority Area	Mechanism of Delivery
Local fish farms	- 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	- RFFT to work with local industry and trade associations to advise members regularly of best practice in respect of INNS - Enforcement agencies (Marine Scotland & FDSFB) to undertake site visits to discuss and advise on issues involving INNS e.g. rainbow trout - Invasive Species Scotland⁷¹ website
Port Authorities	-Adherence to international regulations for ballast water set by the <u>International Maritime Organization (IMO)</u>	-RFFT to assist with the supply of posters and other awareness material for display and signage. -Invasive Species Scotland website
Canals (operators & users)	-Risks of introduction of INNS through overland boat transport -Cleaning of fouled hulls -Introduction of INNS from sea through sea locks	-BWS Zebra mussel posters -RFFT to assist with the supply of posters and other awareness material for display and signage. -Invasive Species Scotland website
Local garden centres	-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.	-RFFT to work with garden centres to encourage distribution of codes of practice and posters (available from Plantlife).
Council services / contract workers	-Promote appropriate working practices and waste disposal to avoid spread of INNS	-Formulate and promote codes of practice.
Local aquarium and pond stockists	-Promote code of practice to all pet shops and suppliers of ornamental fish	-RFFT to work with retailers to encourage distribution of codes and posters (available from Plantlife)
Water user associations (canoeists, sailing clubs)	-Promote awareness to clubs and participants of the dangers arising from INNS	-RFFT 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 -FACT campaign and web site -Invasive Species Scotland website

⁷¹ www.invasivespecies.scot.nhs.uk

Stakeholder Group	Priority Area	Mechanism of Delivery
Landowners	- Promote knowledge of biosecurity issues amongst all tenants and resource users - Identification of suitable persons to act as “eyes” for the RFFT	-Work with RFFT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -RFFT to offer training for “eyes” -Invasive Species Scotland website
Angling clubs	- 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”	-RFFT 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 RFFT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -RFFT to offer training for “eyes” -Invasive Species Scotland website
General public	-General awareness of impacts and measures to prevent/control INNS -Raise awareness of key biosecurity issues to all retail outlets who deal with NNS e.g. pet shops, garden shops	-Local Media Campaigns -Use of websites (RAFTS, NNSS) -RFFT to develop a leaflet to promote key biosecurity issues Biosecurity, the dangers arising from INNS and the reporting system. - Link to RFFT website and invasives section containing the Forth Fisheries District biosecurity plan. -Invasive Species Scotland website
Schools	- General awareness of impacts and measures to prevent/control INNS	-School visits -Field trips -Invasive Species Scotland website
Contractors / ground maintenance workers	- General awareness of impacts and measures to prevent/control INNS	- Work with RFFT to ensure dissemination of best practices - RFFT to offer training for “eyes” -Invasive Species Scotland website

Table 9 Roles and/or actions of key government and non government agencies in promoting awareness of INNS issues

Organisation	Role and/or action	Delivery Mechanisms
RFFT	- Promote awareness to general water users by raising awareness of biosecurity issues and highlighting the dangers from INNS	- Promote and launch of Biosecurity plan to coincide with National Biosecurity Action Day -Develop a leaflet to promote the Biosecurity plan, the dangers arising from INNS and the reporting system and ensure appropriate distribution to stakeholders (see section 4.4) -See actions for RFFT above (Table 6)
FDSFB	-Continue to promote awareness to anglers and angling clubs of the dangers arising from INNS.	-Continue to promote disinfection of equipment and provide appropriate facilities - Holding of open days, field visits and demonstrations

Organisation	Role and/or action	Delivery Mechanisms
Local Authorities/Council partnerships	- Promote use of codes of best practice for construction, haulage, horticulture, aquaculture amongst local business and relevant departments particularly construction, garden and pet trade - Promote awareness of planning, waste disposal and transport regulations amongst local business - Promote awareness of the GB communications strategy to the general public	- Councils to promote codes of best practice at every opportunity e.g. including them with planning applications and building warrants - Production (by Council's relevant environmental unit) and distribution of information leaflets on all relevant legislation relevant to INNS -Holding of awareness event/open days to promote biosecurity issues -Distribute leaflets with Council tax bills - Display posters (produced by RAFTS) in Council offices, development planning, libraries and other public places
British Waterways Scotland	- Promote awareness of INNS issues within the canal network and threats to posed by further introductions of INNS - Raise awareness of INNS with canal users i.e. boaters, anglers, walkers, canoeists etc.	- Posters displayed at locks, docking points and canal paths. - Information on BWS website.
SEPA	- Clarify SEPA responsibilities for INNS to both staff and customers internally⁷² - Incorporate INNS issues into relevant guidance documents (as they are developed or updated) - Promote INNS measures linked to WFD water bodies	- Page on SEPA website with links to relevant SEPA information⁷³ and other sites e.g. Non-Native Species Secretariat, RAFTS, invasive species Scotland and Scottish Canoe Association. - Digital documents available for download on SEPA Website
SNH	-National: Promotion of good practice in the prevention, control and eradication of INNS -Local: SNH will continue to support and advise the River Forth Fisheries Trust.	- Holding of SNH Sharing Good Practice events. - Grant funding may be available for some projects.
Marine Scotland	-Fish Health Inspectorate part of Marine Scotland is lead body with respect to fish diseases and escapes	- Undertake site visits to discuss and advise on issues involving INNS - Promote disinfection of equipment and provide appropriate facilities to eliminate the risk of accidental transfer of INNS
Loch Lomond & the Trossachs NP	-Promote awareness of INNS issues within the national park and threats to the park posed by further introductions of INNS - Raise awareness of INNS with park users i.e. campers, anglers, walkers, canoeists etc.	- Posters displayed at campsites, walking trails, angling sites and canoe launching spots.

The delivery mechanisms form the basis for the actions required to promote awareness amongst the key stakeholders of the Forth District. These are presented in Section 5.2 along with the responsible agency and a timeframe for their implementation.

Objective 3: Develop systems to ensure the detection and surveillance of INNS and rapid response to the threat.

⁷² http://www.sepa.org.uk/science_and_research/what_we_do/biodiversity/invasive_non-native_species.aspx

⁷³ http://www.sepa.org.uk/science_and_research/what_we_do/biodiversity/invasive_non-native_species.aspx

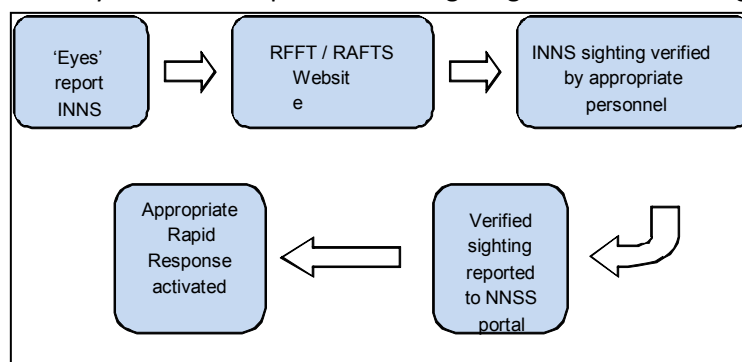
Outputs

- 3.1 Establish an 'early warning system' for detecting new threats
- 3.2 Develop strategic monitoring of INNS in the Forth District
- 3.3 Develop rapid response protocols for new significant threats to local biodiversity and economy

2.1 Early Warning system

The “eyes” of the early warning system will be trained members of the public, bailiffs, ghillies, canoeists and walkers with reported sightings verified by trained RFFT personnel. A sighting of a GB or local high priority species (Table 10) will be verified within 72 hours. If confirmed, it will initiate the appropriate GB or local high priority response (see Output 2.2 below).

Reports of priority species will be verified as time permits. All verified sightings will also be entered onto the RFFT GIS system which will be



linked into the existing RAFTS reporting system⁷⁴ to monitor INNS distributions within the Forth District and reported to the GBNSS. Actions to establish the early warning system are described in Section 5.2.

3.2 Develop strategic monitoring of INNS in the Forth District.

The RFFT will work with Scottish Fisheries Co-ordination Centre (SFCC), SEPA and SNH to develop and agree national protocols for INNS surveying and monitoring as well as ensuring that INNS data is stored in a format which can readily be shared using GIS. A standardised SFCC recording sheet and data storage protocol would ensure compatibility with existing SFCC habitat data. Manuals on methodologies will be produced and staff trained to ensure that high quality data is collected, stored and shared between agencies.

Currently there are various datasets and collections of data in the Forth District that contain mapping data of INNS (Table 12). A review of this data is required to identify priority areas for further survey.

Table 10 Datasets and collections of data held by organisations/networks

Organisation or dataset	Description of data
Stirling Invasives, managed by CSET	GIS data of INN weed locations held by Clackmannanshire and Stirling Environment Trust, available on Council intranet but not public.
Falkirk Council	Invasive species survey of River Carron by Falkirk ranger service, not currently in GIS format.
City of Edinburgh Council	Environmental health department in CEC keeps records of some INNS on private and public land. Map of target invasive species also being compiled as part of LBAP. It is not known what format this data exists in.

⁷⁴ www.invasivespeciesscotland.org.uk/invasive_non_native_species/report_a_sighting.asp

Organisation or dataset	Description of data
Water of Leith Conservation Trust.	Ordinance survey coordinates of HB, GH and JK are kept and updated on an excel spreadsheet.
East Lothian Council	Document describing invasive non-native plants locations in East Lothian. Not in GIS format.
Fife nature records centre ⁷⁵	The Fife nature records centre maintains and updates a species account database which records INNS, in particular records of Japanese knotweed, giant hogweed and Himalayan balsam. This is compiled from a wide range of sources including SNH, Scottish Wildlife Trust (SWT), members of the public, consultants, countryside rangers and the RSPB. Data is stored on a recorder database in ArcGis. In turn, records are uploaded to the National Biodiversity Network
SNH	Survey of Giant Hogweed, Japanese Knotweed and Himalayan Balsam on five major Lothian rivers (2004) ⁷⁶ . Grid references recorded which can be inputted into ArcGIS. Also, all site conditioning monitoring data for SACs includes presence/absence of INNS, for example the Avon Gorge SSSI.
The Trossachs water vole reintroduction trial	Trapping locations and positive trapping returns mapped in ArcGIS. Data is held locally by FCS Cowal & Trossachs district forest Conservation team.
National Biodiversity Network Gateway (www.searchnbn.net)	Stores records from various organisations, includes distribution maps for each species.
Scottish Wildlife Trusts reserves data	Some presence/absence data for alien species on SWT reserves are held and ongoing work to improve this data is underway. Not known what format this data is in.
Loch Lomond and the Trossachs National Park ⁷⁷	Carried out an audit of LLTNP recording position of Japanese knotweed and Himalayan balsam infestations. Held on GIS database.
River Forth Fisheries Trust	Holds information on North American signal crayfish locations within the district as part of SNH funded survey.
SEPA	SEPA holds locations of invasives data as part of its Water Framework Directive monitoring data.
Forestry Commission Scotland	The Native Woodland Survey of Scotland (NWSS) contains an invasive species dataset, mapped using GIS. FCS also holds the following data on GIS: Pirri pirri burr, skunk cabbage & rhododendron locations on FCS land, any control carried out.
National otter survey (SNH)	Mink data was collected as part of this survey, data is not in GIS format (10km survey squares).
The Wildlife Information Centre (TWIC) ⁷⁸	Maintains records on GIS of INNS in the Lothian's and borders
CGI Japanese knotweed mapping project data	Volunteer mapping data, descriptive and with grid ref ⁷⁹ . Not in GIS format.
British Waterways Scotland	Zebra Mussel dataset, GIS.
SEPA	SEPA record the presence of INNS in relation to Water Framework

⁷⁵ www.fifecoastandcountryside-trust.co.uk/fife-nature-records-centre_134.html

⁷⁶ http://www.snh.org.uk/pdfs/publications/commissioned_reports/Report%20No223.pdf

⁷⁷ www.lochlomond-trossachs.org/images/stories/Looking%20After/PDF/publication%20pdfs/invasives.pdf

⁷⁸ www.wildlifeinformation.co.uk

⁷⁹ http://www.cgiscotland.org/Page/invasive_species.html

Organisation or dataset	Description of data
	Directive monitoring and also in relation to the diffuse pollution priority catchment work. SEPA ecologists record riparian INNS at all routine ecology monitoring sites and other alien species on the UKTAG high-impact list when they are found. The riparian monitoring involves recording density and extent of Rhododendron, Japanese knotweed, Himalayan balsam and giant hogweed at planned monitoring sites. . This is held in a GIS database and updated biannually.

Surveys of priority areas will use the survey protocols that have been agreed between SEPA, SFCC, SNH and the rivers and fisheries trusts (see Objective 2) so that it can be used to inform the Water Framework Directive river classification system and the National Biodiversity Network portal.

3.3 Rapid response mechanism established for new INNS that pose significant threats to local biodiversity and economy.

The type of response will depend on the severity of the species detected (Table 10) and is proportionate to the 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 11 Response level for 31 invasive non native species

GB Response	High Priority Local Response	Priority Local Response
<i>Gyrodactylus salaris</i>	American signal crayfish	American mink
Asian topmouth gudgeon	Mitten crab	Canadian pondweed
Ruddy duck	Slipper limpet	Japanese knotweed
<i>Didemnum spp.</i>	Zebra mussel	Himalayan balsam
Wireweed	New Zealand pygmyweed	Giant hogweed
Water primrose	Large flowered waterweed	Rhododendron
<i>Dikerogammarus villosus</i>	Curly waterweed	Rainbow trout
		Minnow
		Red vent syndrome (RVS)
		Orfe
		Nuttall's pondweed
		Water fern
		Common cord grass
		Bullhead
		Fanwort
		Floating pennywort
		Parrot's feather

There are likely to be some species, which will not qualify for a GB rapid response, which are considered priorities at a Scottish level and Scottish agencies or the Scottish Government may therefore instigate

action. There is no agreed species list at present; this work is being taken forward by the Scottish Working Group on Invasive Non-Native Species and once agreed, will be circulated to all interests.

A confirmed sighting of a GB priority species will trigger the GB contingency plan for that species e.g. *Gyrodactylus salaris*. However, there is still a need for local level protocols to link with the GB response as well as for local level contingency plans for local priority species. The elements to be included in the response to detection of a GB priority species or the contingency plans for local priority species are outlined in Table 11. The actions required to establish and maintain the Rapid Response Mechanism are presented in Section 5.2

Table 12 Elements of contingency plans or protocols for response to GB priority, local high priority and priority species

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

Objective 4: Develop coordinated and sustainable control and eradication programmes for INNS

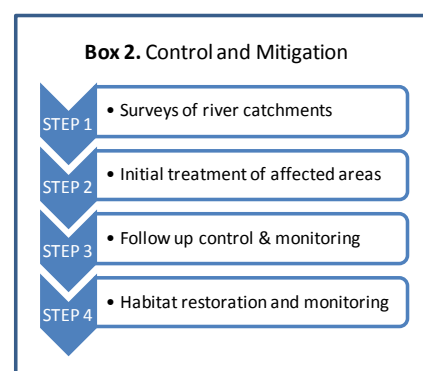
Outputs

4.1 Develop and initiate control and eradication programmes

4.2 Establish a local management framework in the Forth District for the effective and sustainable management of INNS issues.

4.1. Develop and initiate control and eradication programmes

The most common INN riparian plant species present in the Forth catchments are giant hogweed, Japanese knotweed and Himalayan balsam and these will be targeted by control and eradication programmes (Table 13). Of equal importance however is the eradication of small pioneer colonies of invasive plants such as North American skunk cabbage; these populations must be dealt with as soon as possible to avoid potentially more serious problems in the future. An integrated approach to Japanese knotweed, giant hogweed and Himalayan balsam is especially



important as by their nature, these plants colonise disturbed sites and the removal of one non-native species is likely to lead to its replacement by other opportunist non-natives. Existing control of American mink will continue and be supported and where possible extended.

As surveys reveal the distribution and extent of INNS in the Forth district, control and eradication programmes will be developed in conjunction with key stakeholders using up-to-date NNSS advice on good practice for each INNS present (Box 2). Priority will be given to developing programmes that support and link current activities to develop a coordinated and systematic approach to the control and eradication of INNS within the Forth District. The RFFT will encourage and facilitate practitioners in the District to utilise management good practice. A combination of specialist contractors, volunteers, river managers and local estate staff will be used depending on the management requirements of the area involved.

Survey, surveillance and monitoring information will be entered onto GIS and analysed to target nascent and “upstream or source” populations of INNS that are potential sources of spread and re-infestation.

Before any proposed INNS control and eradication programme that may impact on the water environment SEPA local operations team staff should be contacted to comment on to ensure appropriate mitigation measures are taken. It is a legal requirement that SEPA is contacted before herbicides are used in or near watercourses.

The actions required to establish the proposed control/eradication programme are presented in Section 5.2.

Table 13 Required invasive non-native species control and eradication within different management units in the Forth District

Stakeholders	Action	Sub actions & delivery
River Forth sub-catchment		
Stirling Council (SC) Clackmannanshire and Stirling Environment Trust (CSET) Forth and Teith sub management group	Control/Eradication of giant hogweed (GH), Himalayan balsam (HB) and Japanese knotweed (JK). Identify and close pathways to dispersal.	Compile and update existing SEPA & CSET Invasive weed mapping data through further survey work & using standardised mapping protocols decided upon by SEPA and the SFCC. Define stakeholder responsibilities. Initiate catchment-wide eradication programme with F & T sub management group with backing of CSET.
	Record and monitor sightings of rainbow trout	Identify reporting network within Council bailiffs/rangers. Raise awareness amongst anglers of the need to report any catches of escapee rainbow trout.
River Teith sub-catchment		
Trossachs water vole reintroduction programme (Forestry Commission and	Monitoring and control of American mink	Cooperate with TWVRIP to: i) Compile mink mapping data ii) Extend mink monitoring and trapping programme downstream of the National park on Fisheries proprietors land.

Stakeholders	Action	Sub actions & delivery
SNH) CSET	Control & eradication of GH, HB and JK. Identify and close pathways	Compile and update existing SEPA, CSET & LLTNP mapping data through further survey work. Ensure all data is SEPA compatible.
Fisheries proprietors		Define stakeholder responsibilities. Include LLTNP in reporting system, thereby able to monitor upstream extent of GH infestation.
Forth and Teith sub-management group		Initiate catchment-wide eradication programme with F & T sub-management group and fisheries proprietors with backing of CSET.
Loch Lomond & the Trossachs National Park.	Record and monitor sightings of pike and rainbow trout.	Identify reporting network within SC bailiffs/rangers. Raise awareness amongst anglers of the need to report any catches of escapee rainbow trout & formal mechanism in place to do so.
	Monitor and compile existing mapping data on North American skunk cabbage & piri piri burr.	Compile and update existing mapping data held by SEPA & LLTNP and investigate if mapping data is held by FCS. Ensure all data is SEPA compatible. Define stakeholder responsibilities.
	Monitor and compile existing mapping data on Canadian pondweed. Close pathways.	Include LLTNP in reporting system, thereby able to continuously monitor upstream population of Skunk cabbage at Loch Ard. Investigate feasibility of eradication of this nascent population. Compile and update existing mapping data held by SEPA & LLTNP and investigate if mapping data is held by FCS. Ensure all data is SEPA compatible. Confirm and investigate populations status of Canadian pondweed reported at Lake of Menteith and Loch Lubnaig. Raise awareness with a view to preventing further dispersal. RFFT to keep well informed and abreast of new developments in pondweed control by NNSS.
	Monitor population of North American signal crayfish.	RFFT to monitor current population around Row Burn and investigate sightings where and when they occur. RFFT to keep well informed and abreast of new developments in crayfish control by NNSS.
Allan Water sub-catchment		

Stakeholders	Action	Sub actions & delivery
Perth and Kinross Council	Control & eradication of GH, HB and JK. Identify and close pathways.	Compile and update existing SEPA & CSET mapping data through further survey work. Ensure all data is SEPA compatible.
Stirling Council		Define stakeholder responsibilities.
CSET		Define upstream extent of riparian INNS. Engage P & K Council in upper Allan catchment for inclusion into catchment-wide invasive control.
Allan Water Angling Improvement Association		Support, initiate, coordinate and monitor catchment-wide eradication programme with AWAIA and F & T sub management group with support of CSET. Engage with Network rail in control programme as Hogweed extends to railway line on some burns. Railway is a vector for seed dispersal.
Network rail	Record and monitor sightings of rainbow trout and coarse fish as part of early warning system.	Identify reporting network within AWAIA and SC bailiffs/rangers.
	Eradication where desirable or feasible	Raise awareness amongst anglers of the need to report any catches of escapee rainbow trout. Monitor Allan water in the vicinity of Orchill coarse fishery for escapee fish. Engage with fishery owners to establish code of practice to prevent escape events.
	Monitoring and control/eradication of North American skunk cabbage.	RFFT with cooperation of AWAIA confirm extent of infestation at Dunblane. Define stakeholder responsibilities. Implement eradication and post eradication monitoring of Skunk cabbage.
	Control of North American mink	Set up and raise awareness of formal reporting routes for mink sightings. Hold mink trapping training day for anglers in AWAIA. Procure trapping equipment for AWAIA. Maintain and extend trapping programme carried out by AWAIA. Investigate possible linkage with Trossachs Water Vole Reintroduction Trial.
River Devon sub-catchment		
Clackmannanshire Biodiversity Partnership	Record and monitor sightings of rainbow trout.	Identify reporting network within Devon Angling Association and Council bailiffs/rangers.
Ochils Landscape Partnership ⁸⁰		Raise awareness amongst anglers of the need to report any catches of escapee rainbow trout. Formal reporting mechanism in place to allow anglers to do so.

⁸⁰ <http://www.ochils-lp.com/>

Stakeholders	Action	Sub actions & delivery
Stirling Council	Control & eradication of HB and JK. Identify and close pathways.	Compile and update existing SEPA & CSET INNS weeds mapping data through further survey work. Ensure all data is SEPA compatible.
CSET Devon Angling Association	Monitor & report any infestations of as yet absent GH.	RFFT to link district-wide plan with the Control of Alien Species project (B2.3) being undertaken by the Ochils Landscape Partnership.
River Black Devon sub-catchment		
Fife Coast and Countryside Trust Clackmannan Council Ochils Landscape partnership CSET Devon Angling Association.	Control & eradication of GH, HB and JK. Identify and close pathways	Compile and update existing SEPA & CSET INNS weeds mapping data and Fife nature records centre mapping through further survey work. Ensure all data is SEPA compatible. Define stakeholder responsibilities. Cooperate with all stakeholders to support, initiate, coordinate and monitor catchment-wide eradication programme.
River Leven sub-catchment		
Fife coast and Countryside Trust River Leven Angling Club	Reduce risk of North American signal crayfish introduction from nearby Tiel burn.	Raise awareness amongst RLAC about North American signal crayfish through distribution of RAFTS crayfish awareness materials. Identify reporting network within FCCT and RLAC.
.	Record and monitor sightings of rainbow trout. Eradication where desirable or feasible.	Identify reporting network within FCCT and RLAC. Electrofishing removal of fish by RFFT.
.	Control & eradication of GH. Identify and close pathways Ensure that any new instances of JK and HB are reported	Compile and update existing SEPA & Fife nature records centre mapping data through further survey work. Define stakeholder responsibilities. Cooperate with FCCT & RLAC to initiate catchment-wide eradication programme.
River Carron sub-catchment		
North Lanarkshire Council Stirling Council Falkirk Council LSAC CATCA	Record and monitor sightings of rainbow trout. Eradication where desirable or feasible.	Identify reporting network within Falkirk Council, LSAC, CATCA, RCFMG & RLAC. Raise awareness amongst anglers of the need to report any catches of escapee rainbow trout. Formal reporting mechanism in place to allow reporting.

Stakeholders	Action	Sub actions & delivery
RCFMG	Control & eradication of GH, HB and JK. Identify and close pathways.	Compile and update existing SEPA, Falkirk Council INNS and CGI/CATCA weeds mapping data. Ensure all data is SEPA compatible. Define stakeholder responsibilities and form stakeholder group to tackle invasive weeds (especially knotweed) on the River Carron. Determine whether data already collected by CATCA and Falkirk Council is SEPA compatible. Cooperate with all stakeholders to initiate catchment-wide eradication programme.
	Monitoring and control of American mink.	Set up and raise awareness of formal reporting routes for mink sightings. Hold mink trapping training day for anglers in both LSAC and neighbouring River Avon Federation. Procure trapping equipment for LSAC. Maintain and extend trapping programme carried out by LSAC.
River Avon sub-catchment		
Falkirk Council West Lothian Council River Avon Federation (Inc. Avon-valley AA Slammanan AC & Linlithgow AA) SNH (Avon Gorge SSSI) Avon & Kinneil AC	Control & eradication of GH, HB and JK. Identify and close pathways.	Compile and update existing SEPA, West Lothian invasive weed mapping data through further survey work and liaison with The Wildlife Information Centre for the Lothians and borders (TWIC). Ensure all data is SEPA compatible. Define stakeholder responsibilities and priorities especially with regard to Avon Gorge SSSI, one bank of which is managed by RAF. Cooperate with all stakeholders to initiate catchment-wide eradication programme.
	Monitoring and control of American mink.	Identify reporting network within River Avon Federation. Set up and raise awareness of formal reporting routes for anglers. Hold mink trapping training day for anglers in both RAF and neighbouring Larbert & Stenhousemuir AC. Initiate volunteer trapping programme within the Federation.
River Almond sub-catchment		

Stakeholders	Action	Sub actions & delivery
Cramond Angling Club West Lothian Angling Association North Lanarkshire Council City of Edinburgh Council West Lothian Council River Almond Sub Management group	Control & eradication of GH, HB and JK. Identify and close pathways.	Compile and update existing SNH INNS weed mapping data for the Almond through further survey work, examine data held by other stakeholders such as SEPA, CAC, CEC Department of Environmental health and West Lothian Council (through TWIC). Ensure all data is SEPA compatible. Build on past INNS work carried out by CAC. Define stakeholder responsibilities; seek to include North Lanarkshire in partnership approach in upper reaches of Almond. Initiate catchment-wide eradication programme including all concerned stakeholders. In conjunction with West Lothian Council RFFT to work on submitting a bid as part of the River Almond Alien Invasive Action Plan. The establishment of a broad-based partnership to tackle invasives can be replicated on other River systems within the Forth District
	Monitoring and control of American mink.	Identify reporting network within River Avon Federation. Set up and raise awareness of formal reporting routes for anglers. Coordinate existing mink control where this does not currently exist Incorporate existing trapping programme into monitoring system for mink in the district. Investigate feasibility of including and training CAC in long term mink trapping programme.
	Record and monitor sightings of rainbow trout. Eradication where desirable or feasible.	Identify reporting network within SC bailiffs/rangers. Raise awareness amongst anglers of the need to report any catches of escapee rainbow trout & formal mechanism in place to do so.
Water of Leith sub-catchment		

Stakeholders	Action	Sub actions & delivery
CEC	Control & eradication of JK, GH and HB. Identify and close pathways.	Compile and update existing Water of Leith Conservation Trust, TWIC, CEC and SEPA data through further survey work. Ensure all data is SEPA compatible.
Water of Leith Conservation Trust	Ensure that any new introduction of Japanese knotweed is reported promptly	Define stakeholder responsibilities, particularly in upper catchment (West Lothian).
West Lothian Council		Support, initiate, monitor and coordinate catchment-wide eradication programme involving all concerned stakeholders.
		Incorporate and support provisions of Water of Leith Management plan through this Biosecurity plan.
	Reporting of mink sightings	Identify reporting network within WOLCT river patrollers.
		Raise awareness amongst of the need to report mink sightings & formal mechanism in place to do so.
Rivers Esk sub-catchment		
Borders Council	Control & eradication of GH, HB and JK. Identify and close pathways	Compile INNS mapping data arising from existing INNS reporting system and protocols between Midlothian Council & TWIC and include existing East Lothian weed mapping data, SEPA & SNH INNS data. Ensure all data is SEPA compatible.
Midlothian Council		Coordinate and cooperate with Borders Council to ensure that the head waters of the two Esks are monitored for invasive species through River Champions programme.
Esk Valley Trust		
East Lothian Council		Incorporate TWIC reporting system into early warning system for invasives. Define stakeholder responsibilities. Initiate catchment-wide eradication programme, engaging with ERT, MDAC, Mid and East Lothian Councils.
Musselburgh & District Angling Association		
Forestry Commission Scotland WIAT Scheme	Monitoring and control/eradication of North American skunk cabbage.	RFFT to monitor nearby population of skunk cabbage (at Carberry house); feasibility of eradication to prevent from spreading into South Esk.
River Tyne sub-catchment		

Stakeholders	Action	Sub actions & delivery
Midlothian Council East Lothian Council East Lothian Angling Association	Control & eradication of GH, HB and JK. Identify and close pathways	Compile INNS mapping data arising from existing INNS reporting system and protocols between Midlothian Council & TWIC and include existing East Lothian weed mapping data, SEPA & SNH mapping data. Incorporate TWIC reporting system into early warning system for invasives. Ensure all data is SEPA compatible. Define stakeholder responsibilities. Initiate catchment-wide eradication programme, engaging with ELAA, Mid and East Lothian Councils. Support, initiate, coordinate and monitor catchment-wide eradication programme, engaging with ELAA.
	Monitoring and control/eradication of North American skunk cabbage.	Examine 2/km grid reference resolution sighting of skunk cabbage near River Tyne (NBN gateway). Close pathways for spread and investigate feasibility of eradication.
	Monitoring and control of American mink	Set up and raise awareness of formal reporting routes. Coordinate existing mink control where this does not currently exist. Investigate feasibility of including and training ELAA in mink trapping programme.
Beil water sub-catchment		
East Lothian Council	Control & eradication of HB, GH, and JK. Identify and close pathways	Compile and update existing East Lothian weed mapping data & SEPA data through further survey work. Ensure all data is SEPA compatible. Determine through East Lothian Council, extent of survey work carried out by private landowners on Beil water. Identify and support work of Beil riparian owners group. Identify other stakeholders on Beil water.
Canals		
BWS Local Authorities	Monitoring and control of zebra mussels. Control & eradication of GH, and JK. Identify and close pathways	RFFT to incorporate Zebra mussel dataset into INNS GIS database. Monitoring and reporting network for Zebra mussels established with BWS Monitoring and reporting network for INNS riparian weeds established with BWS. Ensure control programme is integrated with other subcatchment work(s) as the canal passes through different Local authorities.

5.2 Actions and Timeframes

The table below presents the actions required to realise the objectives and outputs described in Section 5.1 along with the lead agency, key partners and timeframe required for their implementation.

Table 14 Timeframes and actions

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Objective 1: Establish a local management framework in the Forth District for the effective and sustainable management of INNS issues.											
Output 1.1 - Coordinate activities with Forth Invasive Species Forum and Forth AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the RFFT area.											
Complete draft biosecurity plan	RFFT										
Consultation with all stakeholders to agree biosecurity plan	RFFT										
Establish Forth Invasives Species Forum	RFFT	AAG, FEF, Local Authorities ¹									
Establish biosecurity officer post within RFFT	RFFT	Local Authorities ¹									
Objective 2: Reduce the risk of the introduction and spread of INNS within the Forth fisheries district.											
Output 2.2 – All key stakeholders aware of: i) The ecological and economic impacts of INNS. ii) The potential pathways for introduction and spread of INNS. iii) Management best practices to prevent introduction and spread.											
Launch of Forth Fisheries District biosecurity plan through national and local press release and SEPA website	RFFT	FEF SEPA									
Link on RAFTS invasive species Scotland website on legislation relating to waste management & planning regulations	Local Authorities ⁸¹	AAG, SNH									

⁸¹ Fife, Clackmannanshire, Stirling, Falkirk, North Lanarkshire, West Lothian, Midlothian, City of Edinburgh, East Lothian Council and Scottish Borders Councils

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Produce leaflet on biosecurity risks and the reporting system. Launch of facebook page or page on RFFT website, linked to RAFTS	RFFT /RAFTS	AAG, SNH		—							
Produce posters on biosecurity risks and distribute to the general public	RAFTS	RFFT AAG Local Authorities ¹		.....							
Continue to promote and install disinfection facilities for anglers at all angling proprietors fishing huts/parking points	FDSFB & RFFT		.....								
Distribute codes and posters to relevant retail outlets and clubs at open days and events such as agricultural shows	Local Authorities	RFFT AAG members BWS			.....						
Engage with landowners and angling clubs to promote awareness of measures to tenants, resource – users, members and visitors	RFFT & FDSFB	SEPA SNH Angling clubs ²		—							
Work with environmental groups and local schools to enhance awareness of INNS	LBAP groups /Rangers services/Biodiversity partnerships	RFFT BTCV Local Authorities' Ranger Services ¹ CSET EVT OLP CATCA WOLCT			.....						
Objective 3: Establish framework for the detection and surveillance of INNS, linked to a protocol to ensure a rapid management response.											
Output 3.1 - 'Reporting system' established for INNS in district.											
Train at least two RFFT personnel and FDSFB bailiff(s) in the identification of INNS	FDSFB/RFFT /RAFTS	SEPA		—							

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Train RFFT personnel as trainers	RFFT/RAFTS	SEPA		—							
Work with user and interest groups to identify “reporting network”	RFFT	Local Authorities ¹ AAG Angling clubs ² SEPA FEF BWS TWVRP		—	—						
“Reporting network” in the district identified and familiarised with standardised INNS reporting and mapping protocols	RFFT	RAFTS Local Authorities ¹ WOLCT OLP EVT CATCA CSET Angling clubs ⁸² BWS		—	—		—	—	—	—	—
Establish, test and refine communication mechanisms within ‘early warning’ system	RFFT	RAFTS Local Authorities ¹		—	—						
Produce database to record and manage INNS sightings	SFCC			—							
Monitor and periodically evaluate efficacy of system	RFFT	Local Authorities ¹ WOLCT OLP EVT CATCA CSET BWS		.....	.....	.....	.....	.....	.....	.....	.....
Output 3.2 – Develop strategic monitoring of INN species in district.											
Develop and agree survey protocols	Fisheries Trusts	SEPA (national)/SNH	—	—							
Produce database to manage INNS survey data	SFCC	SEPA (national) SNH		—							
Training of Trust and other agency staff in monitoring methods	RFFT	SFCC/RAFTS, SEPA Local Authorities ¹		.....	.....	.....	.....	.....	.....	.....	.....
Develop monitoring manual	SFCC	RAFTS SEPA(National)	—	—							

⁸² MDAC, AWAIA, DAC, CAC, LSAC, RAF, SLAC, ELAA, RLAC

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Output 3.3 – Rapid response mechanism established for new INNS that pose significant threats to local biodiversity and economy.											
Formulate contingency plans for key high level threat species	RAFTS	Local Authorities ¹ , SEPA, SNH, RFFT		————							
Identification of personnel for response teams	RFFT	Local Authorities ¹ , SEPA and SNH		——							
Training of personnel to execute contingency plans	RFFT	Local Authorities ¹ , SEPA and SNH,		————							
Identification of funding resources	RFFT	Local Authorities ¹ , RAFTS		.....							
Refresher training	RFFT	RAFTS, SNH					—	—	—	—	—
Monitor populations/treated areas	RFFT	SNH, SEPA		.....							
Objective 4: Develop coordinated control and eradication programmes for INNS											
Output 4.1 – Coordinated control, eradication and habitat restoration programmes established and operational											
Initiate and complete surveys of non surveyed areas by trained personnel	RFFT	SFCC		————							
Develop GIS database for recording and mapping INNS within Forth district	RFFT	SFCC		——							
Continuation and extension of mink eradication, supporting mink trapping carried out by angling clubs	RFFT	Trossachs water vole reintroduction programme Angling clubs ²	—	—	—	—	—	—	—	—	—
Implementation of phase 1 of control/eradication programme see table 13 for details of proposed works	RFFT	BTCV SEPA ⁸³ Local Authorities BWS AAG members		—	—	—	—	—	—	—	—
Implement habitat restoration scheme within successful control areas taking into account all relevant species	RFFT	BTCV, Local Authorities, SEPA ⁸⁴			——	——	——	——	——	——	——

⁸³ May be eligible for funding from the Water Environment Restoration Fund

⁸⁴ May be eligible for funding from the Water Environment Restoration Fund

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Monitor the effectiveness of control programmes	RFFT	SEPA		—	—	—	—	—	—	—	—
Marine Scotland Science monitoring Red vent syndrome	Marine Scotland Science			—	—	—	—	—	—	—	—
Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Objective 1: Establish a local management framework in the Forth District for the effective and sustainable management of INNS issues.											
Output 1.1 - Coordinate activities with Forth Invasive Species Forum and Forth AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the RFFT area.											
Complete draft biosecurity plan	RFFT			—							
Consultation with all stakeholders to agree biosecurity plan	RFFT			—							
Establish Forth Invasives Species Forum	RFFT	AAG, FEF, Local Authorities ¹		—	—						
Establish biosecurity officer post within RFFT	RFFT	Local Authorities ¹			—	—	—	—	—	—	—
Objective 2: Reduce the risk of the introduction and spread of INNS within the Forth fisheries district.											
Output 2.2 – All key stakeholders aware of: i) The ecological and economic impacts of INNS. ii) The potential pathways for introduction and spread of INNS. iii) Management best practices to prevent introduction and spread.											
Launch of Forth Fisheries District biosecurity plan through national and local press release and SEPA website	RFFT	FEF SEPA		—							
Link on RAFTS invasive species Scotland website on legislation relating to waste management & planning regulations	Local Authorities ⁸⁵	AAG, SNH		—	—						

⁸⁵ Fife, Clackmannanshire, Stirling, Falkirk, North Lanarkshire, West Lothian, Midlothian, City of Edinburgh, East Lothian Council and Scottish Borders Councils

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Produce leaflet on biosecurity risks and the reporting system. Launch of facebook page or page on RFFT website, linked to RAFTS	RFFT /RAFTS	AAG, SNH		—							
Produce posters on biosecurity risks and distribute to the general public	RAFTS	RFFT AAG Local Authorities ¹		.....							
Continue to promote and install disinfection facilities for anglers at all angling proprietors fishing huts/parking points	FDSFB & RFFT		.....								
Distribute codes and posters to relevant retail outlets and clubs at open days and events such as agricultural shows	Local Authorities	RFFT AAG members BWS			.....						
Engage with landowners and angling clubs to promote awareness of measures to tenants, resource – users, members and visitors	RFFT & FDSFB	SEPA SNH Angling clubs ²		—							
Work with environmental groups and local schools to enhance awareness of INNS	LBAP groups /Rangers services/Biodiversity partnerships	RFFT BTCV Local Authorities' Ranger Services ¹ CSET EVT OLP CATCA WOLCT			.....						
Objective 3: Establish framework for the detection and surveillance of INNS, linked to a protocol to ensure a rapid management response.											
Output 3.1 - 'Reporting system' established for INNS in district.											
Train at least two RFFT personnel and FDSFB bailiff(s) in the identification of INNS	FDSFB/RFFT /RAFTS	SEPA		—							

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Train RFFT personnel as trainers	RFFT/RAFTS	SEPA		—							
Work with user and interest groups to identify “reporting network”	RFFT	Local Authorities ¹ AAG Angling clubs ² SEPA FEF BWS TWVRP		—	—						
“Reporting network” in the district identified and familiarised with standardised INNS reporting and mapping protocols	RFFT	RAFTS Local Authorities ¹ WOLCT OLP EVT CATCA CSET Angling clubs ⁸⁶ BWS		—	—		—	—	—	—	—
Establish, test and refine communication mechanisms within ‘early warning’ system	RFFT	RAFTS Local Authorities ¹		—	—						
Produce database to record and manage INNS sightings	SFCC			—							
Monitor and periodically evaluate efficacy of system	RFFT	Local Authorities ¹ WOLCT OLP EVT CATCA CSET BWS		.....	.....	.....	.....	.....	.....	.....	.....
Output 3.2 – Develop strategic monitoring of INN species in district.											
Develop and agree survey protocols	Fisheries Trusts	SEPA (national)/SNH	—	—							
Produce database to manage INNS survey data	SFCC	SEPA (national) SNH		—							
Training of Trust and other agency staff in monitoring methods	RFFT	SFCC/RAFTS, SEPA Local Authorities ¹		.....	.....	.....	.....	.....	.....	.....	.....
Develop monitoring manual	SFCC	RAFTS SEPA(National)	—	—							

⁸⁶ MDAC, AWAIA, DAC, CAC, LSAC, RAF, SLAC, ELAA, RLAC

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Output 3.3 – Rapid response mechanism established for new INNS that pose significant threats to local biodiversity and economy.											
Formulate contingency plans for key high level threat species	RAFTS	Local Authorities ¹ , SEPA, SNH, RFFT		—————							
Identification of personnel for response teams	RFFT	Local Authorities ¹ , SEPA and SNH		———							
Training of personnel to execute contingency plans	RFFT	Local Authorities ¹ , SEPA and SNH,		—————							
Identification of funding resources	RFFT	Local Authorities ¹ , RAFTS		.....							
Refresher training	RFFT	RAFTS, SNH					—	—	—	—	—
Monitor populations/treated areas	RFFT	SNH, SEPA		.....							
Objective 4: Develop coordinated control and eradication programmes for INNS											
Output 4.1 – Coordinated control, eradication and habitat restoration programmes established and operational											
Initiate and complete surveys of non surveyed areas by trained personnel	RFFT	SFCC		—————							
Develop GIS database for recording and mapping INNS within Forth district	RFFT	SFCC		———							
Continuation and extension of mink eradication, supporting mink trapping carried out by angling clubs	RFFT	Trossachs water vole reintroduction programme Angling clubs ²	—	—	—	—	—	—	—	—	—
Implementation of phase 1 of control/eradication programme see table 13 for details of proposed works	RFFT	BTCV SEPA ⁸⁷ Local Authorities BWS AAG members		—	—	—	—	—	—	—	—
Implement habitat restoration scheme within successful control areas taking into account all relevant species	RFFT	BTCV, Local Authorities, SEPA ⁸⁸			———						———

⁸⁷ May be eligible for funding from the Water Environment Restoration Fund

⁸⁸ May be eligible for funding from the Water Environment Restoration Fund

Action	Lead	Partners	TIMEFRAME								
			Early 2010	Late 2010	2011	2011	2012	2013	2014	2015	2016
Monitor the effectiveness of control programmes	RFFT	SEPA		---	---	---	---	---	---	---	---
Marine Scotland Science monitoring Red vent syndrome	Marine Scotland Science			---	---	---	---	---	---	---	---

6. Monitoring implementation of the Biosecurity plan

Biosecurity is being initiated within the Forth District by the RFFT. It must be recognised that if current resources are not increased progress will be limited. However, despite limitations, any work completed by the RFFT and other partners in this plan will be monitored and the results evaluated particularly in the light of changing circumstances e.g. climate change. In this respect, the RFFT will endeavor to evaluate its work and strategy on a 5-year basis.

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. A fully coordinated monitoring programme will be established and include:

-  Assessment of efficacy of surveillance and rapid response systems
-  Determining the occurrence and distribution of the selected INNS within the district
-  Assessing the effectiveness of control/eradication programme including:
 - Application/delivery of effective concentrations of biocides & checking that treatments have been effective
 - Re-treating immediately where there is doubt
 - Monitoring any apparent resistance to treatments and investigate
 - Surveying 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
-  Monitoring general activities within the district and assessing them in terms of risk for the introduction of INNS.

A monitoring programme will be developed based on the agreed objectives and outputs of this plan. Monitoring activities will be undertaken by RFFT staff in conjunction with stakeholder representatives who by virtue of their work operate within the District on a regular basis e.g. roads department and access officers employed by Local Authorities.

The plan will be reviewed in year on a three year basis.