

River Nith Catchment Bio-Security Plan

2011-2016



Prepared by
Nith Catchment Fishery Trust
2011
Registered Scottish Charity SC040908

- **What is Biosecurity?**

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

- **What are Invasive Non-native Species?**

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

Abbreviations

Abbreviation	Organisation
ASSG	Association of Scottish Shellfish Growers
AAG	Area Advisory Group
BTA	British Trout Association
FCS	Forestry Commission Scotland
DGERC	Dumfries and Galloway Environmental Resources Centre
MS	Marine Scotland
NCFT	Nith Catchment Fishery Trust
NDSFB	Nith District Salmon Fishery Board
NNSS	Non-native Species Secretariat
RAFTS	Rivers and Fisheries Trusts of Scotland
SEPA	Scottish Environment Protection Agency
SFCC	Scottish Fisheries Co-ordination Centre
SG	Scottish Government
SNH	Scottish Natural Heritage
SSPO	Scottish Salmon Producers’ Organisation
TWG	Tripartite Working Group

Table of Contents

EXECUTIVE SUMMARY.....	2
1 PURPOSE AND SCOPE	7
2 BACKGROUND	8
3 THE CONTEXT	9
3.1 Biosecurity: The Nature of the Problem.....	9
3.2 Policy and Legislation	11
3.3 Existing Planning Framework	12
4 BIOSECURITY ISSUES IN THE RIVER NITH CATCHMENT	15
4.1 Description of the River Nith catchment.....	15
4.2 Use of the Catchment.....	15
4.3 Biosecurity – current and potential threats	17
4.3.1 Current biosecurity issues	17
4.3.2 Potential biosecurity threats	21
4.4 Stakeholders.....	23
4.5 Existing Control Activities	25
5 BIOSECURITY MANAGEMENT STRATEGY	27
5.1 Objectives and Outputs	27
5.2 Actions and Timeframes.....	36
6 MONITORING	36

EXECUTIVE SUMMARY

This plan describes the biosecurity issues identified within the River Nith catchment 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) and fish diseases. This vision of this plan is:

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

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

Objective 1: Reduce the risk of introduction and spread of INNS within the River Nith catchment.

Output 1.1: Key stakeholders aware of:

- 1) The ecological and economic impacts of INNS
- 2) The potential pathways for introduction and spread of INNS.
- 3) Management best practices to prevent introduction and spread of INNS.

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

Output 2.1 Early warning systems for surveillance, detection and monitoring of new and existing INNS in the district established.

Output 2.2 Rapid response mechanism established for new INN species which pose significant threats to local biodiversity and economy.

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

Output 3.1 Coordinated control, eradication and habitat restoration programmes established and operational

Output 3.2 Coordinate activities with SEPA AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the River Nith catchment

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

- The maintenance and enhancement of biodiversity – invasion by non-native species is one of the top five drivers for global biodiversity loss and is increasing with globalisation and tourism.
- The visual conservation of local landscapes.
- A holistic, cost effective control programme of INN plants e.g. Giant Hogweed (*Heracleum mantegazzianum*), Japanese Knotweed (*Fallopia japonica*), and

Himalayan Balsam (*Impatiens glandulifera*), the former being a threat to human health, will be founded in partnership with key stakeholders.

- The conservation of important natural habitats for native species such as Otter (*Lutra lutra*), Atlantic salmon (*Salmo salar*), Freshwater Pearl Mussel (*Margaritifera margaritifera*), European Eel (*Anguilla anguilla*).
- The prevention of the salmon parasite *Gyrodactylus salaris* from entering the River Nith catchment which would avoid catastrophic economic and environmental loss.
- Prevention/ control of American signal crayfish (*Pacifastacus leniusculus*) and killer shrimp to safeguard aquatic biodiversity and fisheries.
- The protection of the endangered water vole from predation by the American mink (*Mustela vison*).
- Helping to ensure the outcome of INNS management in the River Nith catchment area is more cost effective, strategic and sustainable.

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 table 1 below. Note that the inclusion of an organisation as a 'lead', or a 'partner' does not mean that they are necessarily a funder.

Table 1 Timeframes and actions

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

Action	Lead	Partners	TIMEFRAME									
			2011	2011	2012	2012	2013	2013	2014	2015	2016	
Objective 1: Reduce the risk of introduction and spread of INNS within the River Nith catchment.												
Output 1.1 – Key stakeholders aware of; 1) The ecological and economic impacts of INNS 2) The potential pathways for introduction and spread of INNS 3) Management best practices to prevent introduction and spread of INNS												
Launch of River Nith Catchment Biosecurity plan through national and local press release	NCFT	NDSFB		—								
Produce leaflet on biosecurity risks and the reporting system	NCFT	RAFTS AAG SNH		—								
Produce posters on biosecurity risks and distribute to the general public	NCFT	RAFTS AAG D&G Council Plantlife			.....	.....	.....	.....	.....	.....	.....	.....
Continue to promote and install disinfection facilities for anglers at all angling proprietors fishing huts/parking points	NCFT/NDSFB		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Action	Lead	Partners	TIMEFRAME									
			2011	2011	2012	2012	2013	2013	2014	2015	2016	
Distribute Codes and posters to relevant retail outlets and clubs at open days and events such as agricultural shows	NCFT	NDSFB AAG D&G Council	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Engage with Landowners and angling clubs to promote awareness of measures to tenants, resource –users, members and visitors	NCFT/NDSFB	SEPA SNH	————	————	————							
Work with environmental groups and local schools to enhance awareness of INNS	NCFT		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Action	Lead	Partners	TIMEFRAME								
			2011	2011	2012	2012	2013	2013	2014	2015	2016

Objective 2: Establish framework for the detection and surveillance of INN species, linked to a protocol to ensure a rapid management response.

Output 2.1 - Early warning systems for surveillance, detection and monitoring of new and existing INNS in the district established.

Train two NCFT/NDSFB personnel in the identification of INNS	NCFT/NDSFB	RAFTS	————	————								
Train NCFT as trainers	NCFT/RAFTS			————								
Work with user and interest groups to identify monitors	NCFT	DGERC AAG SEPA SNH		————	————							
Training of monitors	NCFT	RAFTS		————	————		—		—		—	—
Establish, test and refine communication mechanisms within 'early warning' system	NCFT/NDSFB	DGERC SEPA SNH		————	————							
Maintain database to record and manage INNS sightings	NCFT	DGERC	————	————								
Monitor and periodically evaluate efficacy of system	NCFT & other partners		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Produce database to manage INNS survey data	NCFT			————								
Training of Trust and other agency staff in monitoring methods	NCFT	SFCC/RAFTS, SEPA D&G Council	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Develop monitoring manual	SFCC	RAFTS SEPA National		————	————							

Output 2.2 – Rapid response mechanism established for new INN species which pose significant threats to local biodiversity and economy.

Formulate contingency plans for key species	NCFT/NDSFB	D&G Council SEPA SNH		————	————							
Identification of personnel	NCFT/NDSFB	D&G Council SEPA SNH		————								

Action	Lead	Partners	TIMEFRAME									
			2011	2011	2012	2012	2013	2013	2014	2015	2016	
Training of personnel to execute contingency plans	NCFT/NDSFB	D&G Council SEPA SNH		—	—							
Identification of funding resources	NCFT	RAFTS D&G Council SEPA SNH		.....	.....	.....	.....	.....	.....	.....	.....	.....
Refresher training	NCFT	RAFTS					—	—	—	—	—	—
Monitor populations/treated areas	NCFT/NDSFB	SEPA		.....	.....	.....	.....	.....	.....	.....	.....	.....

Action	Lead	Partners	TIMEFRAME								
			2011	2011	2012	2012	2013	2013	2014	2015	2016
Objective 3: Develop effective control and eradication programmes for existing INNS which are operational and sustainable.											
Output 3.1 – Coordinated control, eradication and habitat restoration programmes established and operational											
Initiate and complete catchment wide surveys by trained personnel	NCFT/NDSFB			—————							
Establish GIS database for recording and mapping INNS within the River Nith catchment	NCFT/NDSFB	DGERC		———							
Implementation of phase 1 of control/ eradication programme (see table 10 for details of proposed works)	NCFT/NDSFB	Angling clubs Landowners SEPA	.....							
Implement habitat restoration scheme within successful control areas taking into account all relevant species	NCFT/NDSFB	D&G Council SEPA ¹			.....					
Monitor the effectiveness of control programmes	NCFT/NDSFB		.....							
MARINE SCOTLAND SCIENCE monitoring Red vent syndrome	MARINE SCOTLAND SCIENCE		—————								
Output 3.2 Coordinate activities with SEPA AAG and other key stakeholders to ensure sufficient funding and resources in place to continue prevention and control of INNS within the River Nith catchment											
Complete draft Biosecurity plan	NCFT	NDSFB	———								
Consultation with all stakeholders to agree Biosecurity plan	NCFT	All		———							
Consult with representatives from all stakeholder groups	NCFT	All	———								
Identify and develop opportunities for future funding of eradication projects	NCFT	AAG SEPA SNH			.....					

¹ May be eligible for funding from the Restoration Fund

1 PURPOSE AND SCOPE

This plan describes the biosecurity issues associated with aquatic and riparian habitats within the River Nith catchment 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) and fish diseases. This vision of this plan is:

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

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

Objective 1: Reduce the risk of introduction of new INNS within the River Nith catchment.

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

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

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

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

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

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

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

- A holistic, cost effective control programme of INN plants e.g. Giant hogweed, Japanese knotweed, and Himalayan balsam, the former being a threat to human health.

² www.nonnativespecies.org

- The conservation of important natural habitats for native species such as otter, Atlantic salmon, Freshwater pearl mussel and European eel.
- The prevention of the salmon parasite *Gyrodactylus salaris* from entering the River Nith catchment which would avoid catastrophic economic and environmental loss.
- The prevention of the introduction of American signal crayfish, killer shrimp and other invasive species that have the potential to harm the biodiversity of our aquatic ecosystems and have negative socio-economic impacts.
- The protection of the endangered water vole from predation by the American Mink.

2 BACKGROUND

Although prepared by the Nith Catchment Fishery Trust (NCFT), 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 Fishery Trusts of Scotland (RAFTS) with backing and support from the Scottish Government, Scottish Natural Heritage (SNH), Scottish Environment Protection Agency (SEPA) and the Esmée Fairbairn Foundation.

The Nith Catchment Fishery Trust (NCFT) is a registered Scottish Charity with the following mission statement:

- **To advance environmental protection and improvement by conserving and enhancing all species of freshwater fish and their environs within the River Nith catchment, for public benefit.**
- **To advance the education of the general public through raising awareness of aquatic ecosystems including their fauna, flora and economic activity within the River Nith catchment.**

NCFT considers that the preparation and implementation of this biosecurity plan is an essential step in the delivery of its mission statement. The NCFT Fishery Management Plan highlights the importance of biosecurity planning in relation to the Trust's objectives.

The need for action on biosecurity issues has been identified in the [River Nith Catchment Fishery Management Plan](#)³, the [North Solway River Basin Area Management Plan](#)⁴ that has been prepared as part of the [River Basin Management Plan](#)⁵ for the Solway Tweed River Basin District. This biosecurity plan provides a platform for local action to address those biosecurity issues. This plan has a lifespan of six 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

³ <http://www.river-nith.com/index.php?page=publications>

⁴ http://www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/solway.aspx

⁵ http://www.sepa.org.uk/water/river_basin_planning.aspx

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 NCFT 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 NCFT, stakeholders and appropriate regulatory agencies in the River Nith catchment for the prevention, early detection and control of riparian INNS, fish diseases and parasites. This plan will also facilitate coordination and communication with the neighbouring Fisheries Trusts, Boards, local authorities and other stakeholders of neighbouring areas e.g Galloway, Ayr, Clyde and Annan.

3 THE CONTEXT

3.1 Biosecurity: The Nature of the Problem

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

According to a [survey](#)⁶ commissioned by SNH in 2001, there are approximately 1000 non-native species present in Scotland, the majority of which exist in small populations with little impact on 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 of their natural range and that damage our environment, the economy, our health and the way we live.

Invasive non-native species are the second greatest threat to biodiversity being capable of rapidly colonising a wide range of habitats and excluding the native flora and fauna ([CBD, 2006](#)⁷). 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

⁶ www.snh.org.uk/pdfs/publications/review/139.pdf

⁷ <http://www.cbd.int/gbo2/>

medium for the dispersal of many of these species, rivers and lochs and their banks and shorelines are amongst the most vulnerable areas to the introduction, spread and impact of these species. The ecological changes wrought by INNS can further threaten already endangered native species and reduce the natural productivity and amenity value of riverbanks, shorelines and their waterbodies.

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

- [DEFRA](#)⁸ have estimated that INNS cost the UK economy at least £2 billion per year
- In the UK Japanese knotweed is thought to affect an area roughly the size of London and the report of the [Review of Non-Native Species Policy \(2003\)](#)⁹ has estimated the total cost of its removal using current techniques at £1.56bn.
- A Scottish Government [report](#)¹⁰ 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](#)¹¹ 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.
- Invasive species have already changed the character of iconic landscapes and waterbodies in Scotland reducing the amenity value of those areas.

There is also a growing recognition of the impacts of **translocated species**. Translocated species are native species that have been transported outside of their natural range and they can also have severe ecological impacts. Examples of translocated species that are impacting the ecology of Scotland's rivers and lochs are the minnow (*Phoxinus phoxinus*) and ruffe (*Gymnocephalus cernuus*). The ruffe in particular has decimated the once significant and diverse population of the rare and protected powan (*Coregonus lavaretus*) in Loch Lomond.

Without some form of coordinated and systematic approach to the prevention of introduction and control of the spread of INNS and fish diseases, it is likely that the ecological, social and economic impacts and the costs for mitigation, control and eradication of these species and diseases will continue to increase. This plan is a first attempt to set out and implement such an approach at a local level for [selected species and diseases](#)¹² that significantly impact freshwater fisheries and the aquatic environment. This local plan and its

⁸ <http://www.defra.gov.uk/wildlife-countryside/wildlife-manage/non-native/index.htm>

⁹ <http://www.defra.gov.uk/wildlife-countryside/pdf/wildlife-manage/non-native/review-report.pdf>

¹⁰ www.scotland.gov.uk/resource/doc/1062/0042434.pdf

¹¹ [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)

¹² www.invasivespeciesscotland.org.uk

implementation is also part of a strategic and coordinated approach to INNS management being undertaken across Scotland by RAFTS members.

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 in the River Nith catchment. These approaches are consistent with the [GB Invasive Non-native Species Framework Strategy](#)¹³ and the [Species Action Framework](#)¹⁴ 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 \(1981\)](#)¹⁵ makes it an offence to allow any animal (including hybrids) which is not ordinarily resident in Great Britain, to escape into the wild, or to release it into the wild; or to release or allow to escape from captivity, any animals that is listed on Schedule 9 to the 1981 Act. It is also an offence to plant or otherwise cause to grow in the wild any plant listed on Schedule 9 to the 1981 Act.
- Local Authorities have powers to take action against Giant hogweed where it is considered a statutory nuisance.
- Section 179 of the [Town and Country Planning \(Scotland\) Act 1997](#)¹⁶ empowers local authorities to serve notice requiring an occupier to deal with any land whose condition is adversely affecting the amenity of the other land in their area.
- The [Possession of Pesticides \(Scotland\) Order 2005](#)¹⁷ regulates the use of pesticides and herbicides for the control and eradication of INNS.
- [Environmental Protection Act 1990](#)¹⁸ contains a number of legal provisions concerning “controlled waste”, which are set out in Part II. Any Japanese knotweed or Giant hogweed contaminated soil or plant material discarded is classified as

¹³ www.nonnativespecies.org

¹⁴ www.sng.org.uk/speciesactionframework

¹⁵ www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1981/cukpga_19810069_en_1

¹⁶ www.opsi.gov.uk/acts/acts1997/ukpga_19970008_en_1

¹⁷ www.opsi.gov.uk/legislation/scotland/ssi2005/20050066.htm

¹⁸ www.opsi.gov.uk/acts/acts1990/ukpga_19900043_en_1

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](#)¹⁹ 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](#)²⁰ and the [Environmental Protection \(Duty of Care\) Regulations 1991](#)²¹ provide guidance for the handling and transfer of controlled waste.
- [The Aquaculture & Fisheries \(Scotland\) Act 2007](#)²² that regulates against the unauthorised introduction of fish to inland waters.
- The [Prohibition of Keeping or Release of Live Fish \(Specified Species\) Order 2003](#)²³ requires that a licence be obtained for the keeping or release of species listed on Schedules 1 and 2.
- The [NetRegs](#)²⁴ website contains useful guidance on INNS and their control

The procedures for the detection, notification and control of fish diseases procedures are already well defined by fisheries legislation. This stipulates that [Marine Scotland](#)²⁵ 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.

3.3 Existing Planning Framework

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

- the River Nith Catchment Fishery Management Plan 2008,
- the North Solway Area and River Basin District Management Plan,
- the Dumfries & Galloway Local Biodiversity Action Plans

Furthermore, this plan supports the conservation objectives of fifteen SSSI’s and four SAC natural heritage sites within the River Nith catchment.

¹⁹ http://www.opsi.gov.uk/si/si1994/uksi_19941056_en_1.htm

²⁰ www.opsi.gov.uk/si/si1991/uksi_19911624_en_1.htm

²¹ www.opsi.gov.uk/si/si1991/uksi_19912839_en_1.htm

²² http://www.opsi.gov.uk/legislation/scotland/acts2007/asp_20070012_en_1

²³ <http://www.scotland.gov.uk/resource/doc/47133/0009766.pdf>

²⁴ <http://www.netregs.gov.uk/netregs/default.aspx>

²⁵ <http://www.scotland.gov.uk/marinescotland>

Table 2 Identified Actions in the NCFT Biosecurity Plan supporting provisions or requirements of other relevant plans

Provision or Requirement of Existing Plan	Action in Biosecurity Plan
<p>The RBMP for the Solway Tweed river basin district²⁶ contains the following measures relating to biosecurity;</p> <ul style="list-style-type: none"> • 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 <p>In particular in the Solway Tweed RBMP, to develop a partnership approach that:</p> <ul style="list-style-type: none"> • gives priority to measures to prevent introductions of invasive non-native species; • establishes a network that can detect newly introduced non-native species and, where appropriate, undertake rapid action to prevent their establishment; • develop longer-term mitigation measures such as containment or control for established invasive non-native species where these put at risk ecological status or other Water Framework Directive objectives. <p>Area advisory groups to help to identify local priorities for, and the feasibility of, controlling or eradicating populations of high impact invasive non-native species where these put at risk the achievement of river basin planning objectives.</p>	<p>RBMPs can help facilitate a coordinated and widespread response to biosecurity issues through the area advisory groups (AAGs) and the implementation of the area management plans by:</p> <ul style="list-style-type: none"> • Raising awareness of biosecurity issues • Acting as a conduit for national initiatives into the local management sphere • Develop and encourage catchment-based approach to control and eradication • Ensure control methods do not impact on the water environment • Monitoring and reporting progress

²⁶ www.sepa.org.uk/water/river_basin_planning.aspx

²⁶ <http://www.river-nith.com/uploads/PDFs/RNCFMP%20%28emailable%29.pdf>

Provision or Requirement of Existing Plan	Action in Biosecurity Plan
<p>River Nith Catchment Fishery Management Plan²⁷</p> <p>Contains the following biosecurity objectives;</p> <ul style="list-style-type: none"> • The need to take all required measures to preserve the biosecurity of the River Nith catchment ; • Continue high profile publicity campaigns. 	<p>This Biosecurity Plan fulfills the identified need for biosecurity planning and the other identified biosecurity measures in the Fisheries Management Plan</p>
<p>Gyrodactylus salaris (Gs) Contingency Plan:²⁸</p> <p>A strategy to rapidly contain and eradicate Gs if introduced to Scotland</p>	<p>Formulate rapid response protocols for new INN species which pose significant threats to local biodiversity and economy.</p>
<p>Dumfries & Galloway Biodiversity Action Plan²⁹</p> <p>Objective 5 – Minimise the impact of non-native species on biodiversity</p> <ul style="list-style-type: none"> • Identify the invasive species in D&G that pose the greatest threat to biodiversity; • Raise awareness of the risks posed by non-native invasive species through production of a guide for the public. <p>Other recommended actions</p> <ul style="list-style-type: none"> • Assess practicality and cost of controlling/eradicating INNS • Monitor the spread of priority invasive species • Co-ordinate any programmes with national programmes • Raise awareness 	<p>This plan puts forward a programme for eradication of existing species, preventative measures to curtail new introductions and development of a rapid response aimed at eradication of any new introductions if they do occur.</p>
<p>Ayrshire Biodiversity Action Plan³⁰</p> <p>Acknowledges the threat from non-native species to native biodiversity</p>	<p>This plan puts forward a programme for eradication of existing species, preventative measures to curtail new introductions and development of a rapid response aimed at eradication of any new introductions if they do occur.</p>
<p>Plans supporting designated natural heritage sites (SACs and SSSIs).</p> <p>Scotland's Biodiversity: A strategy for the conservation and enhancement of biodiversity in Scotland.³¹</p>	<p>Supports the conservation of biodiversity target species through the control and eradication of INNS detrimental to their ecology</p>

²⁷ <http://www.river-nith.com/index.php?page=publications>

²⁸ www.scotland.gov.uk/Topics/Fisheries/Fish-Shellfish/18610/diseases/g-salaris/GsCGrev

²⁹ <http://www.dumgal.gov.uk/index.aspx?articleid=1978>

³⁰ <http://www.south-ayrshire.gov.uk/sustainable-development/lbap.aspx>

³¹ www.scotland.gov.uk/Publications/2004/05/19366/37239

4 BIOSECURITY ISSUES IN THE RIVER NITH CATCHMENT

4.1 Description of the River Nith catchment

The River Nith Catchment Biosecurity Plan covers the management area of the Nith District Salmon Fishery Board and the Nith Catchment Fishery Trust and spans two local authority areas; Dumfries and Galloway and East Ayrshire. The River Nith is one of several rivers that flow into the north shoreline of the Solway Firth in South West Scotland.

The catchment of the River Nith is long and narrow in shape and spans an area of approximately 1,200 km². The catchment originates from the upland, industrialised landscape around New Cumnock, noted for its traditional local industry of coal mining. The catchment extends from the industrialised upper catchment in East Ayrshire south through Dumfries & Galloway to the estuary in the Solway Firth. The land use through the majority of the catchment is dedicated to agriculture and many of the watercourses are foliated by deciduous trees. The river then traverses an urbanised area through the town of Dumfries, the largest town in South West Scotland. The tidal limit of the River Nith is at Dumfries but the river actually enters the sea at Glencaple village located approximately 7 kms to the south of Dumfries. To the west, the catchment includes the area around the village of Moniaive and eastwards to the Lowther Hills.

4.2 Use of the Catchment

Land Use

The catchment features a diversity of habitats including peat bogs, upland moorland, conifer and broadleaf woodlands, wetlands and semi-natural grasslands. Much of the catchment in the mid section, extending from north of Thornhill to Dumfries, is designated as a nitrate vulnerable zone.

The land use in the River Nith catchment is predominantly agricultural. Sheep and beef farming comprise the mainstay land use although there are over 100 dairy units within the catchment. The more intensive dairy units are generally located in the lower valley bottoms while sheep are grazed on the hill tops. Arable land accounts for 13% of land use within the catchment (SEPA, 2007³³) with wheat and winter/spring barley as two standard examples of diverse crop farming. Large areas of the upper Nith catchment are categorised as rough grazing having Less Favoured Area (LFA) status.

The coastal section of the catchment of the River Nith is located in the Solway Firth. The tidal influence on this area is considerable and can range from 1 - 6 metres, depending on the height of the tide. Much of this coastal part of the catchment is dry at low tide. The rainfall experienced in the Nith catchment area is impacted upon by the topography of the

region. Annual average rainfall across the catchment is calculated at 1429 mm (SEPA, 2007³²).

Some areas of the upper River Nith catchment have been planted with conifer trees. Some of these plantation areas have since been deemed to be an inappropriate use of land for economic reasons and by reason of conflict with modern biodiversity theory and practice. Planting undertaken 40-50 years ago has been detrimental to nursery areas for salmonids and has changed the flood flow/retention characteristics of the river and its main tributaries. However, the situation is improving. Modern forestry plans within the River Nith catchment make provision for the removal of riparian coniferous trees and replanting with native broadleaf species. Conifer forests currently cover 15% and broadleaf forests cover 3% of the catchment area (SEPA, 2007³³).

Geology

The geology of the River Nith catchment differs from many of the other south west catchments draining into the Solway Firth. Large reserves of coal exist in the upper River Nith catchment in Ayrshire and extend down the River Nith valley to south of the town of Sanquhar. Much of the geology to the west of the Nith catchment is predominantly granite. However, the granite gives way to a mixture of other geological features and combinations in the Nith catchment.

Sandstone is present around the village of Thornhill in the mid river reaches and large reserves of sandstone exist in the Dumfries area. Indeed, many grand buildings in the town of Dumfries and some in the city of Glasgow are constructed with locally quarried sandstone. Currently, coal is mined in the Nith catchment and sandstone is still quarried. Whinstone is quarried within the catchment on the western side of the River Nith.

Industry and Settlement

The River Nith catchment is amongst the most populated and industrialised catchments in South West Scotland. Large areas of the upper catchment are utilised by the industrial process of surface coal mining. Historically this industry employed underground methods for the winning of coal but now the coal is worked using surface mining techniques. Often these areas are reinstated to their former land use, however, long term conservation objectives are given a priority and habitat works are often carried out to restore the riparian zone along river channels and burns.

The main settlement within the Nith catchment is the town of Dumfries which currently has a population of approximately 31,600. The majority of towns within the catchment are situated on the banks of the River Nith; these include New Cumnock, Kirkconnel, Sanquhar, Thornhill and Dumfries.

³² www.sepa.org.uk/water/water_publications/catchment_plans.aspx

³³ www.sepa.org.uk/water/water_publications/catchment_plans.aspx

Tourism and Leisure

The River Nith attracts visitors to Dumfries and Galloway that are interested in angling, walking, wildfowling and canoeing. These visitors are important to the rural economy and an economic survey conducted in 2000 revealed that angling on the Nith accounts for £ 2.2 million being spent in the local economy (Leslie, 2000). The River Nith has a very productive salmon and sea trout fishery and on the basis of average annual catch statistic returns for salmon and sea trout from river systems throughout Scotland in recent years, as published by the Scottish Government agency Marine Scotland, it consistently produces returns of these species to rank it among the top ten rivers in Scotland. Angling is widespread over most of the main stem and some larger tributaries of The Nith.

The main species fished for on the River Nith are salmon sea trout, brown trout and grayling but there are a few lochs within the catchment where brown trout, rainbow trout, tench and bream are also fished for. There are five angling clubs along the length of the River Nith and the rest of the river is fish privately.

There are also net fishing interests in the estuarial reaches, with Haaf netting a commonly used method. There are a range of fixed nets on the western boundary of the Nith District Salmon Fishery Board area of jurisdiction. These netting interests are an important part of local coastal communities and historically for Dumfries and Galloway, with fishing rights being handed down from generation to generation.

4.3 Biosecurity – current and potential threats

Thirty two INNS and fish diseases have been included in the River Nith Catchment Biosecurity Plan of which nineteen are high priority species which will be the main focus for action. These high priority species were identified as those that:

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

4.3.1 Current biosecurity issues

Current biosecurity issues in the River Nith catchment are associated with twelve INNS:

- **American mink** (*Mustela vison*) is present throughout the entire River Nith catchment. American mink spread by migration and kill water fowl, small mammals and juvenile fish. American mink are linked to the large decline of water voles in the River Nith catchment area.
- **Giant hogweed** is widespread and is present in large areas of the Nith Catchment. It spreads through seed dispersal and the movement of soil contaminated by its seeds. It is a public health hazard due to the toxins in the sap reacting with UV light to blister skin.

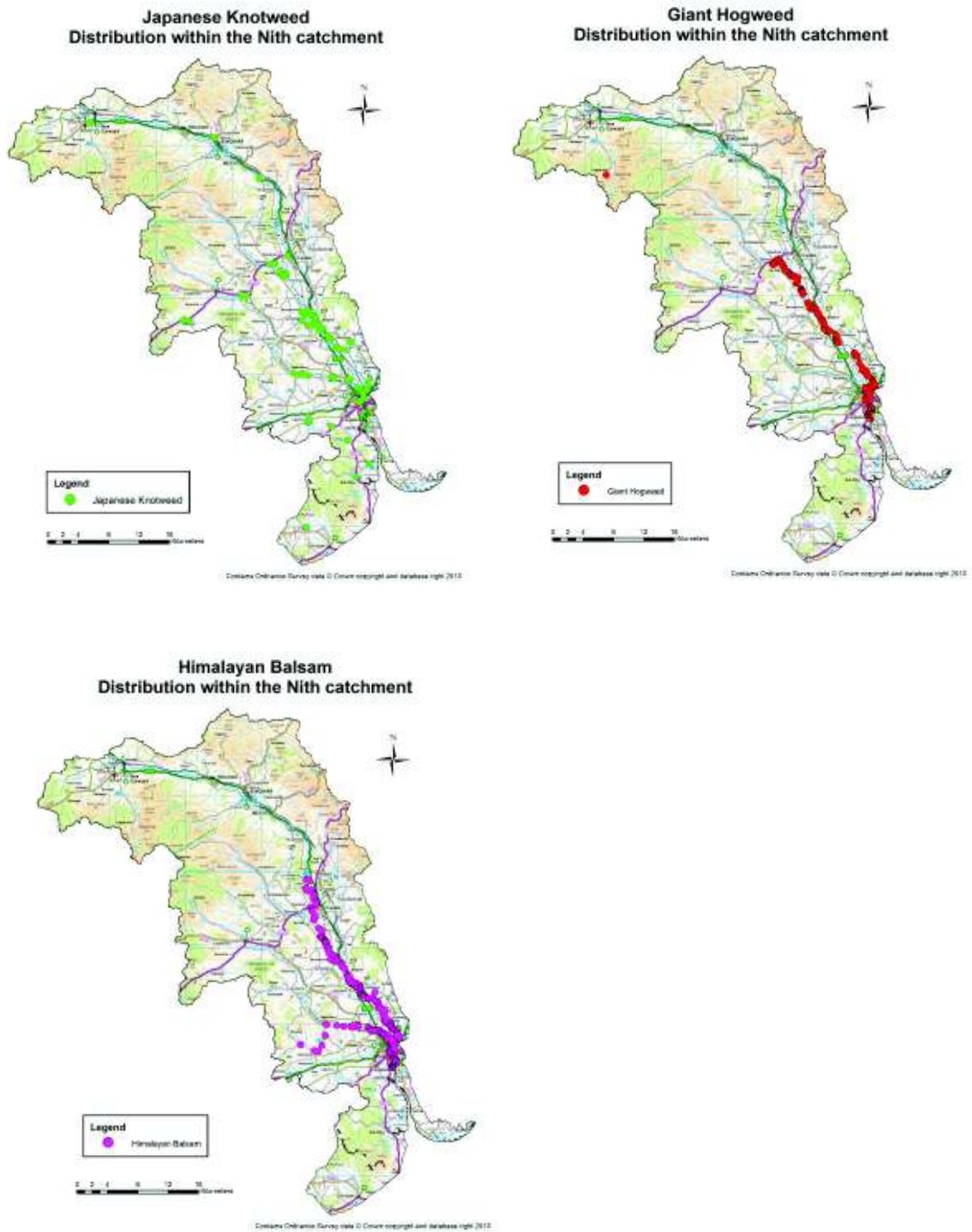
Dense stands can hinder access. Giant hogweed out competes native vegetation for space and resources, and can result in a loss of plant and invertebrate diversity. Winter dieback exposes soil to erosion with loss of river banks and increased sedimentation. (See distribution Map 1 below)

- **Japanese knotweed** (*Fallopia sachalinensis*) is found extensively throughout the River Nith Catchment with the worse affected areas located between Thornhill and the Estuary. It is also found in localised stands as far up the catchment as New Cumnock and on the rivers Cairn and Scaur. It has spread along rivers by movement of plant fragments by water and is found in many other areas, especially along roadsides, through the movement of plant debris in soil and on vehicles. It forms dense thickets which can exclude native plants and prohibit regeneration. Dense stands can also hinder access, reduce biodiversity and alter the habitat for wildlife. (See distribution Map 1 below)
- **Himalayan balsam** (*Impatiens glandulifera*) is present within the Nith Catchment and is present in high densities along the River Nith between Thornhill and Dumfries. It spreads through natural dispersion by wind or water from areas in which it has been planted or introduced through the transport of contaminated soil. It forms thick monospecific stands that can shade out low level native plants reducing biodiversity and denuding river banks of understory vegetation. Winter dieback of the plants exposes soil to erosion. (See distribution Map 1 below)
- **Rhododendron** is present in many locations throughout the River Nith catchment. It spreads by natural seed and vegetative dispersal after intentional planting in gardens, parks and demesnes. It forms dense thickets and out-competes native plants for space and resources with impacts on fish and invertebrate communities as well as preventing site access.
- **Rainbow trout** (*Oncorhynchus mykiss*) are farmed at a couple of locations within the River Nith catchment and 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.
- **Canadian pondweed** (*Elodea canadensis*) is present in various locations throughout the River Nith catchment. It is spread by disposal of plants or plant fragments near waterways, escapes from garden ponds during flood episodes and possibly by birds and other animals. Canadian pondweed can dominate native macrophyte communities which can lead to their extinction and thereby impacts local invertebrate communities. It can also increase metal loads within water bodies which compounds its impacts on native flora and fauna.
- **Nuttall's pondweed** (*Elodea nutallii*) is present in two locations within the catchment of the River Nith catchment. It spreads through escapes from garden ponds, through garden waste and by birds and animals. It dominates native macrophyte communities

which can lead to their extinction and removes metals from sediments and releases them into the water

- **Minnow** (*Phoxinus phoxinus*) is a translocated species that has been introduced into the River Nith catchment and are present in large densities. 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.
- *Anasakis 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 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.
- **Common Cord Grass** (*Spartina anglica*) is present along the shores of the Solway Firth and is present in the Nith catchment at Southernness. It is a perennial salt marsh grass which has been planted widely to stabilise tidal mud flats. Its natural dispersal is by seed and expansion through the rhizomes, seeds can remain dormant for several years. Its invasion and spread creates monospecific stands in the upper intertidal areas often occupied by *Zostera*.
- **Parrots Feather** (*Myriophyllum aquaticum*) is present in one location within the Nith catchment. It out competes native macrophytes, reducing species diversity, clogs waterways leading to problems for drainage and access. It is spread through its introduction as a garden pond plant, escapes from garden ponds and readily fragments, leading to the establishment of new colonies in the wild. There is a possibility of accidental spread by fragments attaching to footwear or fishing equipment including boats and nets.

Map 1. Distribution of Japanese knotweed, Giant Hogweed and Himalayan balsam in the River Nith catchment



4.3.2 Potential biosecurity threats

The INNS listed below are not currently present within the River Nith catchment. 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 River Nith catchments.

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 seven High Threat level species that could be introduced into the River Nith catchment that include the fish parasite *Gyrodactylus salaris*, four freshwater invertebrates and two aquatic plant species (Table 3).

Table 3 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: <ul style="list-style-type: none"> ▪ contaminated fish ▪ clothing/equipment Ballast water 	<ul style="list-style-type: none"> ▪ Projected catastrophic impact on salmon (<i>Salmo salar</i>) populations throughout Scotland. (It has largely exterminated <i>S. salar</i> in 41 Norwegian rivers)
North American signal crayfish (<i>Pacifastacus leniusculus</i>)	High – deliberate introduction by aquariums and others through: <ul style="list-style-type: none"> ▪ use of fish food ▪ stocked fish ▪ intended for food in restaurants 	<ul style="list-style-type: none"> ▪ Eradication of indigenous species ▪ Impacts on other species and habitats including fish and invertebrates
Killer shrimp (<i>Dikerogammarus villosus</i>)	High – through unintentional introduction from anglers and water sport enthusiasts	<ul style="list-style-type: none"> ▪ As a voracious predator it kills a range of native species, including young fish, and can significantly alter ecosystems
Curly waterweed (<i>Lagarosiphon major</i>)	High – found in neighbouring catchment and spread through: <ul style="list-style-type: none"> ▪ Disposal of garden waste ▪ Animals and human activity ▪ Fragmentation by wind dispersal, boat movement, angling equipment and possibly water fowl 	<ul style="list-style-type: none"> ▪ Capable of forming very dense infestations in suitable habitats and occupying the full water column in waters up to 6m deep with significant impacts on native plants, insects and fish. ▪ It is a serious threat to tourism, angling, boating and other recreational pursuits as well as conservation goals

SPECIES	RISK OF INTRODUCTION	LOCAL IMPACTS
Australian swamp stonecrop (<i>Crassula helmsii</i>)	High – Through introduction from two existing populations in a neighbouring catchment. Other pathways include: <ul style="list-style-type: none"> ▪ Garden trade³⁴ ▪ Disposal of garden waste ▪ Spread by animals and human activity 	<ul style="list-style-type: none"> ▪ Suited to a wide range of slow moving freshwater systems. ▪ Out-competes native species. ▪ Forms dense carpets choking ponds and ditches. ▪ Reduced light levels below dense growths can cause die off of waterweeds and algae and reduce water oxygen levels
Zebra mussel (<i>Dreissena polymorpha</i>) Freshwater Bivalve	Medium - through unintentional introduction from contaminated boat hulls and engines and bilge water.	<ul style="list-style-type: none"> ▪ Major economic impact on all subsurface water structures e.g. blocking pipes and impacting upon hydro-electric schemes ▪ Varied and unpredictable ecological impacts including changes to freshwater nutrient cycles, extinction of local mussels and changes to stream substrate affecting spawning areas
Chinese mitten crab (<i>Eriocheir sinensis</i>) Resides in freshwater but migrates to the sea for breeding.	Medium -through unintentional introduction from boat hulls and live food trade.	<ul style="list-style-type: none"> ▪ Burrowing in high density populations damages river banks ▪ Concern over impacts on local species ▪ Intermediate host for the mammalian lung fluke <i>Paragonimus ringer</i>, known to infect humans

There are also thirteen Medium Threat level species, of which there is a medium risk of introduction for eight species and a low risk for five species (see Table 4 below). The UK TAG website www.wfduk.org/tag lists other alien species which may also be at risk of introduction.

Table 4 The risk of introduction of Medium Threat level INNS.

SPECIES	RISK OF INTRODUCTION
Slipper limpet (<i>Crepidula fornicata</i>)	Medium Unintentional introduction from boat ballast water and hull fouling.
Bullhead (<i>Cottus gobio</i>)	Medium Translocated species recorded in central Scotland and native to Cumbria that could be introduced deliberately or as live bait.
Orfe (<i>Leuciscus idus</i>)	Medium Unintentional introduction from garden centres.
Ruffe (<i>Gymnocephalus cernuus</i>)	Medium Currently recorded in a neighbouring catchment and in central Scotland and could be introduced as live bait or in ballast water
Water primrose (<i>Ludwigia grandiflora</i>)	Medium Unintentional introduction from garden centres.
Water fern (<i>Azolla filiculoides</i>)	Medium Through intentional/unintentional introduction from two existing populations in Cumbrian and Ayrshire.
Large flowered waterweed (<i>Egeria densa</i>)	Medium Possible introduction from ponds and garden centres.
Wireweed (<i>Sargassum muticum</i>)	Medium Through unintentional introduction.

³⁴ Note that although the sale of species that are or can become invasive is not illegal, garden centres should be made aware of the impacts of known or potential INNS if they are released into the wild.

SPECIES		RISK OF INTRODUCTION
Floating pennywort (<i>Hydrocotyle ranunculoides</i>)	Low	Currently only in England up to the Midlands. Possible introduction from ponds.
Fanwort (<i>Cabomba caroliniana</i>)	Low	Only found in one location in the Central belt, possible introduction from garden ponds and aquariums.
Ruddy duck (<i>Oxyura jamaicensis</i>)	Low	Could migrate from a number of locations in eastern Scotland
Didemnum Tunicates/Sea squirts (<i>Didemnum vexillum</i> , <i>Didemnum spp</i>)	Low	Unintentional introduction through fouling of ocean going vessels
Asian Topmouth Gudgeon (<i>Pseudorasbora parva</i>)	Low	Introduction through use of fish bait

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

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

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

4.4 Stakeholders

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

➤ **Policy and Legislation**

Scottish Government Edinburgh
 Scottish Natural Heritage
 Scottish Environment Protection Agency
 Marine Scotland
 Association of Salmon Fishery Boards
 Rivers and Fisheries Trusts Scotland

➤ **Land Resources**

Forestry Commission
 Dumfries and Galloway Council
 National Farmers Union Scotland
 Country Landowners Association

Scottish Rural Property and Business Association

➤ **Water Resources**

Dumfries and Galloway Area Advisory Group

Scottish Water

Scottish and Southern Energy

➤ **Fisheries Management**

Nith District Salmon Fishery Board

Marine Scotland Science (regulation of fish movements and introductions)

Nith Catchment Fishery Trust

➤ **Recreation**

Dumfries Canoe Club

Ramblers Association

Aquaculture / commercial fisheries

Local Angling Associations

➤ **Conservation and Biodiversity**

Dumfries and Galloway Constabulary wildlife crime unit

Scottish Wildlife Trust

Royal Society for the Protection of Birds

Scottish Native Woods

Dumfries and Galloway Local Biodiversity Action Group

Plant Life

Dumfries and Galloway Environmental Recording Centre

Solway Firth Partnership

British Trust for Conservation Volunteers

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 5 Pathways and stakeholders in Dumfries & Galloway

Pathway	Stakeholders
Intentional introduction or planting	Plantlife/ Riparian landowners/ Members of public/ Local councils and planning departments/ Marine Scotland/SEPA/ SNH
Fouling and ballast water of freshwater vessels	Local Port Authorities/SEPA/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)	Nith District Salmon Fishery Board/Marine Scotland/Local canoe and water sports organisations/Anglers/Local angling clubs/ Fishing agents/Tackle shops
Escapes from fish farms, ponds, gardens, demesnes.	Nith District Salmon Fishery Board/ Marine Scotland/ SEPA/Planning Authorities/ Plantlife/ Riparian owners/ Members of the public/Angling clubs/ Members of the public /Riparian owners
Movement of contaminated soils or vehicles	Local Councils/SEPA/Quarries/ Building contractors
Introduction of live fish, contamination of water	NDSFB/Marine Scotland/Aquaculture/Still Water

used to transport live fish.	Fisheries/Angling Associations
Improper control and disposal measures e.g. cutting and dumping without treatment	Local councils/SEPA/Environmental health/ Plantlife/Riparian owners/Members of the public/Be Plant Wise

This plan identifies key actions 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 Control Activities

INN Plant Species Control Programme

The NDSFB completed an invasive plant survey across the entire River Nith catchment, specifically for Japanese knotweed, Himalayan balsam and giant hogweed, of which all three were found to be present. This survey provided baseline data which enabled the development of a strategic plan to control these major invasive riparian plants to be formed. Following the survey of the river Nith catchment in 2007, the Dumfries and Galloway Invasive Non-native Species Project commenced in 2010 with the aim of controlling invasive riparian plants throughout Dumfries and Galloway. This project is a partnership between the Nith District Salmon Fishery Board (NDSFB), Nith Catchment Fishery Trust (NCFT), River Annan District Salmon Fishery Board (RADSFB), Galloway Fisheries Trust (GFT), SEPA Catchment Management Initiative (CMI) and Dumfries and Galloway Environmental Resources Centre (DGERC). The DG INNS project works with the local authorities to coordinate control of riparian weeds and a launch was held in 2010 to inform local stakeholders of the project objectives and raise awareness of the issues of INNS. This is a five year project and has been funded by SEPA Restoration Fund, Leader, CMI, Patterson's and Shank's Landfills.

Work carried out in 2010 included the physical removal of giant hogweed (GH) during the spring. This work was conducted with due care and consideration of the potential health and safety issues associated with human contact with GH sap. In addition Roundup Pro Biactive was injected into GH stems to kill the plant and individual plants were sprayed. The approach of utilising the most appropriate methods for site specific conditions was adopted. Work was also conducted on the control of Japanese Knotweed (JK). Using the stem injection system, which injects individual stems, was mainly employed and whilst this method is time consuming it does appear to be very effective. Spraying was carried out at locations where access was difficult or dangerous and where large stands of JK were creating a monoculture which was blanketing the area. Typically at these locations impacts on non target species are limited. Work has been conducted to control Himalayan balsam (HB), initially concentrating on areas at the upstream limit of its distribution throughout the catchment, i.e. Thornhill area. However the magnitude of HB in the Nith catchment has led to a strategy of attempting to gain catchment wide support by anglers and other users of the

catchment to physically remove HB when they are out on the river. A concerted effort to remove HB on individual tributaries will be more likely to bring success in the upper catchment. It has been acknowledged for some time now that if there is to be success in controlling INNS in the River Nith catchment then support and general buy in from users and riparian owners is essential. To this end the NCFT continues to promote the INNS project at every public event and opportunity that affords itself over the winter period when INN species of plants are dormant.

American Mink Capture Programme

The NDSFB has been running a long standing American mink capture programme. This programme has gained the support of angling interest who acknowledges that mink are undesirable and counter productive to the biosecurity of the river Nith catchment. Trapping of mink is conducted during the winter months and continues up to the point in the year prior to mink producing their young. Cage traps are set at locations and checked every 24 hour period and any mink caught are dispatched humanly. Non targeted species are set free and GPS readings are taken. The information gained from the Nith mink trapping programme is all recorded within the River Nith database and entered onto GIS system. The current mink trapping programme is limited and could be expanded given the appropriate resources.

American Signal Crayfish Monitoring

American signal crayfish (ASC) are present in some of the neighbouring catchments surrounding the Nith and this means that we must remain vigilant at all times so that we may react to any reported sightings of these INNS. In addition, the NCFT monitors areas of the catchment which are in closest proximity to recorded sightings of ASC. These sites are monitored on an annual basis in order that managers are informed at the earliest time of positive sightings of ASC and a control strategy embarked on.

Awareness Raising

The NDSFB and NCFT have been active in raising awareness of the risks posed by *Gyrodactylus salaris* (GS) and American Signal Crayfish, including distributing leaflets and signage. Signage informing the public about GS has been placed at all popular points of access to the river by anglers and other river users. The clear message that fishery managers and owners are attempting to get across is that prevention is better than cure. The River Nith cooperates with and participates in all material campaigns to prevent the ingress of GS to Britain.

5 BIOSECURITY MANAGEMENT STRATEGY

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

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

5.1 Objectives and Outputs

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 reporting system supported by routine **monitoring** of established populations or sites vulnerable to the introduction and spread of these species. **Control** and **eradication** activities are undertaken in a strategic and systematic manner.

Objective 1: Reduce the risk of introduction and spread of new INNS within the River Nith catchment.

Output 1.1: Key stakeholders aware of:

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

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:

- Invasive non-native species 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
- Invasive Non-native Species:
 - Threaten our native plants, animals and habitats,
 - Estimated to cost the British economy between £2 and £6 billion pounds annually,
 - Can threaten our health.

The local priorities for awareness will focus on disrupting the pathways for the introduction and spread of INNS in the River Nith catchment. The key stakeholders, the identified areas of priority and the proposed mechanisms for delivery are presented in Table 6 below. The roles and actions of key government agencies and non government bodies in promoting awareness of INNS issues is presented in Table 7.

Table 6 Proposed priority areas for awareness and delivery mechanisms according to stakeholder group

Stakeholder Group	Priority Area	Mechanism of Delivery
Local fish farms	<ul style="list-style-type: none"> - Inform fish farms of the impact of INNS and how they spread -Dangers of importing from contaminated areas - Use of proper screens and other biosecurity measures -Need for controls on movement of stock and water 	<ul style="list-style-type: none"> - NCFT/NDSFB to liaise with local industry and trade associations to advise members regularly of best practice in respect of INNS -Invasive Species Scotland³⁵ website - Marine Scotland Fish Health Inspectors to discuss with fish farms during audits
Local Garden Centres	<ul style="list-style-type: none"> -Educate trade buyers to avoid stocking invasive species -Promotion of existing codes of practice covering the security and disposal of INNS to all garden centres -Target gardeners to dispose plant material and/or soils in a responsible manner. 	<ul style="list-style-type: none"> NCFT to work with garden centres to encourage distribution of codes and posters (available from Plantlife and Be Plant Wise) and to advise the general public of INNS issues
Local Aquarium and Pond stockists	<ul style="list-style-type: none"> -Promote code of practice to all pet shops and suppliers of ornamental fish -Target aquarists and pond keepers to dispose of unwanted animals or plants in a responsible manner 	<ul style="list-style-type: none"> -NCFT to work with retailers to encourage distribution of codes and posters (available from Plantlife and Be Plant Wise) -NCFT to provide guidance on website for dealing with unwanted fish or plants
Water User associations (e.g. canoeists, rowing clubs)	<ul style="list-style-type: none"> -Promote awareness to clubs and participants of the dangers arising from INNS and Gs -Identification of suitable persons to act as monitors for NCFT 	<ul style="list-style-type: none"> -NCFT to work with associations to promote disinfection of equipment and provide appropriate facilities to eliminate the risk of accidental transfer of INNS - FACT campaign and web site -Invasive Species Scotland website
Riparian Landowners	<ul style="list-style-type: none"> - Promote knowledge of biosecurity issues amongst all tenants and resource users - Identification of suitable persons to act as monitors for NCFT 	<ul style="list-style-type: none"> -NDSFB to work with NCFT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -NCFT to offer training for monitors -Invasive Species Scotland website

³⁵ www.invasivespeciesscotland.org.uk

Stakeholder Group	Priority Area	Mechanism of Delivery
Angling clubs	<ul style="list-style-type: none"> - Promote knowledge of biosecurity issues amongst all members and visiting anglers - Ensure the distribution of information and erection of signage in fishing huts and recognised car parks -Recommend suitable members to act as monitors 	<ul style="list-style-type: none"> -Local AC's work with NCFT/NDSFB to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -NCFT/NDSFB to work with associations to promote disinfection of equipment and provide appropriate facilities to eliminate the risk of accidental transfer of INNS -NCFT to offer training for monitors -Invasive Species Scotland website
General Public	<ul style="list-style-type: none"> - General awareness of impacts and measures to prevent/control INNS 	<ul style="list-style-type: none"> -Local Media Campaigns -Use of websites (RAFTS, INNS, NCFT/NDSFB) -NCFT to develop a leaflet to promote the Biosecurity plan, the dangers arising from INNS and the reporting system -Promote the Biosecurity Plan to all retail outlets who deal with INNS e.g. pet shops, garden centres -Invasive Species Scotland website
Contractors / Ground Maintenance Workers	<ul style="list-style-type: none"> - General awareness of impacts and measures to prevent/control INNS 	<ul style="list-style-type: none"> - NCFT to work with industry bodies to ensure dissemination of best practices - NCFT to offer training for "monitors" through industry bodies Invasive Species Scotland website
Schools	<ul style="list-style-type: none"> - General awareness of impacts and measures to prevent/control INNS 	<ul style="list-style-type: none"> -School visits focusing on ecological clubs and encouraging appropriate field trips

Table 7 Proposed roles and/or actions of key government and non government agencies in promoting awareness of INNS issues

Stakeholder Group	Priority Action	Mechanism of Delivery
NCFT	<ul style="list-style-type: none"> - Promote awareness to general water users promoting the Biosecurity Plan and highlighting the dangers from INNS 	<ul style="list-style-type: none"> - Promote and launch of Biosecurity Plan to coincide with National Biosecurity Action -Develop a leaflet to promote the Biosecurity plan, the dangers arising from INNS and the reporting system and ensure appropriate distribution to stakeholders -See actions for NCFT above
Nith District Salmon Fishery Board	<ul style="list-style-type: none"> -Continue to promote awareness of management issues and threats arising from INNS to anglers and angling clubs. Liaising with riparian owners and tenants through NDSFB. 	<ul style="list-style-type: none"> - Continue to promote disinfection of equipment and provide appropriate facilities. - Production of Invasive Weed Management Strategies and training courses for approved control techniques.
Local Councils: Dumfries & Galloway and East Ayrshire Councils	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Councils to promote codes of best practice at every opportunity e.g. including INNS guidance within planning application responses / guidelines and building warrants - Production (by Council's legal department) and distribution of information leaflets on all relevant legislation relevant to INNS

Stakeholder Group	Priority Action	Mechanism of Delivery
	local business - Promote awareness of the GB INNS Framework strategy to the general public - Encourage responsibility within Local Authorities for the control of all NNIS on public land.	- Holding of awareness event/open days to promote biosecurity issues - Display posters (produced by RAFTS) in council offices, libraries and other public places - Issue NNIS Identification and guidance cards to appropriate council employees
SEPA	- Clarify SEPA responsibilities for INNS to both staff and customers - Incorporate INNS issues into relevant guidance documents (as they are developed or updated)	- Page on website with links to relevant SEPA information and other sites e.g. Non-Native Species Secretariat, RAFTS, and Scottish Canoe Association. - Digital documents available for download on SEPA Website
SNH	- Promotion of good practice in the prevention, control and eradication of INNS. - Provision of funding for local INNS initiatives	- Holding of SNH Sharing Good Practice events. - SNH part funded this biosecurity plan. This survey will inform any catchment/tributary scale operations in relation to INNS issues.
Marine Scotland	- Fish Health Inspectorate part of Marine Scotland is lead body with respect of 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

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

The activities detailed in Table 8 are currently being undertaken to help promote the awareness of INNS to general water users.

Table 8 Current awareness raising activities

SPECIES	ACTIVITIES	PARTNERS	FUNDED
Be Plant Wise - Invasive Aquatic Plants 2011	- Contacting retail outlets - Encouraging correct disposal of species - Distributing leaflets - Disseminate information at events	- NCFT - NDSFB - Natural Scotland - NNSS - OATA - HTH - Plantlife	Yes (2011) FERA
Gs Awareness Ongoing	- Displaying signage - Encourage disinfection - Disseminate information at events	- NCFT - NDSFB - ASFB - RAFTS - SCA	Promotional material supplied

SPECIES	ACTIVITIES	PARTNERS	FUNDED
American Signal Crayfish 2009 – ongoing	- Distribute leaflets - Raise awareness via presentations, talks etc - Disseminate information at events	- NCFT - NDSFB - RAFTS - SNH - Scottish Government - SEPA	Promotional material supplied
Invasive Riparian Plant Species 2007 – ongoing	- Distribute leaflets - Encourage correct control of species - Raise awareness via presentations, talks etc - Disseminate information at events	- NCFT - NDSFB - DGERC - CMI - Solway heritage	Yes (2010,2011) SEPA Restoration CMI Shanks Landfill Leader (2010 only)

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

Output 2.1 Early warning systems for surveillance, detection and monitoring of new and existing INNS in the district established



The monitors of the early warning system will be trained members of the public, water bailiffs, ghillies, canoeists and walkers, with reported sightings verified by trained NCFT personnel. A sighting of a GB or local high priority species (Table 9) will be verified within 48 hours. If confirmed, it will initiate the appropriate GB or local high priority response (see Output 2.2 below). Reports of medium priority species will be verified as time permits. All verified sightings will also be entered onto the NCFT Geographic Information System to monitor INNS distributions within the River Nith catchment and reported to the DGERC for inclusion into their environmental database. Actions to establish the reporting system are presented in Section 5.2.

Output 2.2: Rapid response mechanism established for new INN species which pose significant threats to local biodiversity and economy.

The type of rapid response will depend on the species detected (Table 8) and proportionate to the threat posed. There are three levels of response:

- a GB level response that will be lead by national governmental institutions as part of the GB INNS strategy

- a high priority local rapid response
- a priority local rapid response

Table 9 Response level for the 32 invasive non-native species

GB Response	High Priority Local Response	Priority Local Response
Gyrodactylus salaris Asian Topmouth Gudgeon Ruddy duck Didemnum spp Wireweed Water primrose	American signal crayfish Killer Shrimp Australian swamp stonecrop Zebra mussel Curly waterweed Mitten crab	American mink <i>Anasakis sp.</i> Bullhead Canadian pond weed Common cord grass Fanwort Floating pennywort Giant hogweed Himalayan balsam Japanese knotweed Large flowered waterweed Minnow Nuttal's pond weed Orfe Parrot's feather Rainbow Trout Rhododendron Ruffe Slipper limpet Water fern

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 action may therefore be instigated by Scottish agencies or the Scottish Government. 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, for example *Gyrodactylus salaris*. However, there is still a need for local level protocols to link with and assist 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 10. Actions to establish the RRM are presented in Section 5.2.

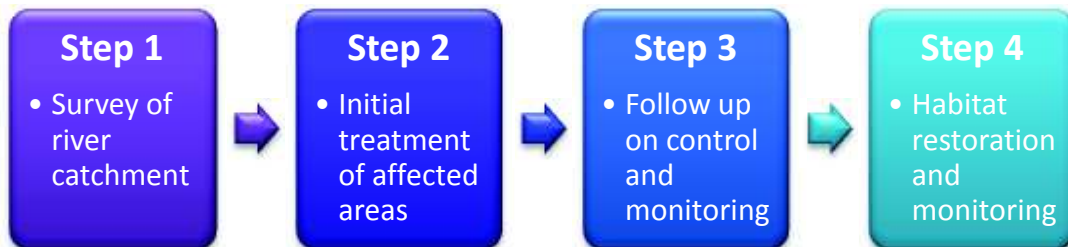
Table 10 Elements of contingency plans or protocols for response to GB priority, local high priority and priority species

GB Response	Local High Priority Response	Local Priority Response
- Report to local and GB institutions - Determine the extent of infestation - Isolate area where practicable	- Report to appropriate local and GB institutions - Determine the extent of infestation - Isolate area where practicable - Establish source and check	- Report to appropriate local and GB institutions where required - Determine the extent of infestation - Survey in course of normal

	related sites - Closure of all pathways - Decide on appropriate action eradication/containment. - Approve eradication methodology - Monitor	work to establish and map distribution - Include new areas in existing eradication/control programmes - Identify and close all pathways - Monitor as part of planned catchment monitoring programme
--	---------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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

Output 3.1 Coordinated control, eradication and habitat restoration programmes established and operational



In 2007 an initial survey of the Nith catchment specifically to detect riparian INN plant species was conducted and as a result a five year control programme was instigated in 2010. This Riparian INNS project, along with the localised American mink trapping programme and the annual American signal crayfish monitoring programme that is being operated, will continue. Surveys for other priority species will identify their distributions within the River Nith catchment. All survey 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. Control and eradication programmes will be phased, generally with treatment commencing at the upstream point of distribution and then systematically progressing downstream. A combination of NCFT/NDSFB staff and volunteers will be used depending on the management requirements of the area involved. Envisaged and current mitigation, eradication and control measures for the 12 INNS present in the Nith catchment are presented in Table 11.

Table 11 Existing Invasive Non-native Species Control and Eradication in the Nith catchment

SPECIES	ACTION	TREATMENT/POST TREATMENT ACTIONS
American mink	Control	Continue localised trapping programme and explore opportunities to expand project if possible.
Giant hogweed	Control/Eradication Identify and close pathways	<ul style="list-style-type: none"> - Spray large areas with Glycophosate (aquatic roundup) three times for initial treatment; repeat as required. Stem injection will also be used on individual/isolated stems and small areas. - Monitor catchment for activation of dormant sources of infestation - Habitat restoration if required
Himalayan balsam	Control/Eradication Identify and close pathways	<ul style="list-style-type: none"> - Hand pull / Mow prior to seed development - Monitor catchment for activation of dormant sources of infestation - Habitat restoration if required
Japanese knotweed	Control/Eradication Identify and close pathways.	<ul style="list-style-type: none"> - Leaf spraying with Glycophosate (aquatic roundup) for large stands with follow up of stem injection treatment to maintain control. - Stem injection for smaller stands and individual plants. - Requirements for riparian zone habitat restoration assessed and implemented. - Approach DG First, Scottish Water and Network Rail regarding control on infected sites which are pathways for re-infection and intersect with watercourses.
Canadian pond weed	Monitor distribution	
Minnow	Monitor distribution	
Nuttal's pond weed	Monitor distribution	
Red vent syndrome	Monitor occurrence	
Rhododendron	Monitor distribution	
Common cord grass	Monitor distribution	
Parrot's feather	Monitor distribution	
Rainbow trout	Control / Monitor	<ul style="list-style-type: none"> - Control occurrences of Rainbow trout in open water. - Identify sources and close pathways.

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

Strategic response designed to limit the spread of or eradicate new or establishing species (where possible) will greatly reduce the long term impact and cost associated with delayed action and are presented in Table 12.

Table 12 Phase 1 Control and Eradication Measures

ACTION	WHERE	PARTNERS	FUNDED
American mink control 1991 - Ongoing	Localised areas on the - Lower River Nith - River Cairn - Cample Water - Nith near New Cumnock	- NDSFB - Landowners - New Cumnock AA	No
Giant hogweed control 2010 - 2015	- River Nith/Scar from Dumfries to Penpont - New Cumnock	- NCFT - NDSFB - DGERC - CMI - Solway heritage	Yes (2010,2011) SEPA Restoration CMI Shanks Landfill Leader (2010 only)
Japanese knotweed control 2010 - 2015	- River Nith from New Cumnock to Dumfries - River Cairn - Scar Water - Cargen Water - Numerous other small tributaries/waters	- NCFT - NDSFB - DGERC - CMI - Solway heritage	Yes (2010,2011) SEPA Restoration CMI Shanks Landfill Leader (2010 only)
Himalayan balsam control 2010 - 2015	- River Nith from Sanquhar to Dumfries - River Cairn - Cample Water - Numerous other small tributaries/waters	- NCFT - NDSFB - DGERC - CMI - Solway heritage	Yes (2010,2011) SEPA Restoration CMI Shanks Landfill Leader (2010 only)

Output 3.2 Coordinate activities with SEPA AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the River Nith catchment.

The delivery of the aims of this plan would be assisted by the coordination of activities with the existing SEPA Area Advisory Group, LBAP and others relating to INNS in the River Nith catchment.

5.2 Actions and Timeframes

This section 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. Note that the inclusion of an organisation as a 'lead', or a 'partner' does not mean that they are necessarily a funder.

Table 13 Required actions, lead agency, key partners and timeframe according to objective and output.

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

Action	Lead	Partners	TIMEFRAME								
			2011	2011	2012	2012	2013	2013	2014	2015	2016
Objective 1: Reduce the risk of introduction and spread of INNS within the River Nith catchment.											
Output 1.1 – Key stakeholders aware of; 1) The ecological and economic impacts of INNS 2) The potential pathways for introduction and spread of INNS 3) Management best practices to prevent introduction and spread of INNS											
Launch of River Nith Catchment Biosecurity plan through national and local press release	NCFT	NDSFB		—							
Produce leaflet on biosecurity risks and the reporting system	NCFT	RAFTS AAG SNH		—							
Produce posters on biosecurity risks and distribute to the general public	NCFT	RAFTS AAG D&G Council Plantlife		·····	·····	·····	·····	·····	·····	·····	·····
Continue to promote and install disinfection facilities for anglers at all angling proprietors fishing huts/parking points	NCFT/NDSFB		·····	·····	·····	·····	·····	·····	·····	·····	·····
Distribute Codes and posters to relevant retail outlets and clubs at open days and events such as agricultural shows	NCFT	NDSFB AAG D&G Council	·····	·····	·····	·····	·····	·····	·····	·····	·····
Engage with Landowners and angling clubs to promote awareness of measures to tenants, resource –users, members and visitors	NCFT/NDSFB	SEPA SNH		—	—						
Work with environmental groups and local schools to enhance awareness of INNS	NCFT		·····	·····	·····	·····	·····	·····	·····	·····	·····

Action	Lead	Partners	TIMEFRAME								
			2011	2011	2012	2012	2013	2013	2014	2015	2016
Objective 2: Establish framework for the detection and surveillance of INN species, linked to a protocol to ensure a rapid management response.											
Output 2.1 - Early warning systems for surveillance, detection and monitoring of new and existing INNS in the district established.											
Train two NCFT/NDSFB personnel in the identification of INNS	NCFT/NDSFB	RAFTS	—	—							
Train NCFT as trainers	NCFT/RAFTS			—							
Work with user and interest groups to identify monitors	NCFT	DGERC AAG SEPA SNH		—	—						
Training of monitors	NCFT	RAFTS		—	—	—		—	—	—	—
Establish, test and refine communication mechanisms within 'early warning' system	NCFT/NDSFB	DGERC SEPA SNH		—	—						
Maintain database to record and manage INNS sightings	NCFT	DGERC	—	—							
Monitor and periodically evaluate efficacy of system	NCFT & other partners			.....	.....	.....	.....	.....	.....	.....	.....
Produce database to manage INNS survey data	NCFT			—							
Training of Trust and other agency staff in monitoring methods	NCFT	SFCC/RAFTS, SEPA D&G Council		.....	.....	.....	.....	.....	.....	.....	.....
Develop monitoring manual	SFCC	RAFTS SEPA National		—	—						
Output 2.2 – Rapid response mechanism established for new INN species which pose significant threats to local biodiversity and economy.											
Formulate contingency plans for key species	NCFT/NDSFB	D&G Council SEPA SNH		—	—						
Identification of personnel	NCFT/NDSFB	D&G Council SEPA SNH		—							
Training of personnel to execute contingency plans	NCFT/NDSFB	D&G Council SEPA SNH		—	—						
Identification of funding resources	NCFT	RAFTS D&G Council SEPA SNH		.....	.....	.....	.....	.....	.....	.....	.....
Refresher training	NCFT	RAFTS				—		—	—	—	—
Monitor populations/treated areas	NCFT/NDSFB	SEPA		.....	.....	.....	.....	.....	.....	.....	.....

Action	Lead	Partners	TIMEFRAME								
			2011	2011	2012	2012	2013	2013	2014	2015	2016
Objective 3: Develop effective control and eradication programmes for existing INNS which are operational and sustainable.											
Output 3.1 – Coordinated control, eradication and habitat restoration programmes established and operational											
Initiate and complete catchment wide surveys by trained personnel	NCFT/NDSFB			—————							
Establish GIS database for recording and mapping INNS within the River Nith catchment	NCFT/NDSFB	DGERC		———							
Implementation of phase 1 of control/ eradication programme (see table 10 for details of proposed works)	NCFT/NDSFB	Angling clubs Landowners SEPA	.....							
Implement habitat restoration scheme within successful control areas taking into account all relevant species	NCFT/NDSFB	D&G Council SEPA ³⁶			.....					
Monitor the effectiveness of control programmes	NCFT/NDSFB		.....							
MARINE SCOTLAND SCIENCE monitoring Red vent syndrome	MARINE SCOTLAND SCIENCE		—————								
Output 3.2 Coordinate activities with SEPA AAG and other key stakeholders to ensure sufficient funding and resources in place to continue prevention and control of INNS within the River Nith catchment											
Complete draft Biosecurity plan	NCFT	NDSFB	———								
Consultation with all stakeholders to agree Biosecurity plan	NCFT	All		———							
Consult with representatives from all stakeholder groups	NCFT	All	———								
Identify and develop opportunities for future funding of eradication projects	NCFT	AAG SEPA SNH			.....					

³⁶ May be eligible for funding from the Restoration Fund

6 MONITORING

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

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

- Assessment of efficacy of surveillance and rapid response systems
- Occurrence and distribution of the selected INNS within the River Nith catchment
- Effectiveness of control/eradication programme including:
 - Application/delivery of effective concentrations of biocides
 - Checking that treatments have been effective
 - Re-treating immediately where treatment has been ineffective or there is doubt
 - Monitoring and investigation of any apparent resistance to treatments
 - Surveillance of the area for signs of dormant plants becoming activated
- Assessment of the ability to close established pathways of transmission
- Monitoring the effectiveness of all legislation and codes of practice especially those which are aimed at restricting/closing pathways.
- Monitoring general activities within the district and assessing them in terms of risk for the introduction of INNS.
- Reviewing the contents of the Biosecurity Plan and the progress of the actions contained within it.

Monitoring activities will be undertaken by NCFT staff in conjunction with stakeholder representatives who will be aware of local initiatives and priorities for action.