

Cromarty Firth District Bio-Security Plan

2010 – 2015

Final Version 1

Cromarty Firth Fisheries



Prepared by

The Cromarty Firth Fishery Trust

2010

What is Biosecurity?

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

What are Invasive Non Native Species?

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

Abbreviations

Abbreviation	Organisation
ASSG	Association of Scottish Shellfish Growers
BTA	British Trout Association
CFFT	Cromarty Firth Fisheries Trust
DSFBs	District Salmon Fisheries Boards
FCS	Forestry Commission Scotland
HISF	Highland Invasive Species Forum
MS	Marine Scotland
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

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Executive Summary

This plan describes the biosecurity issues of the Cromarty Firth 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 invasive species (INNS), fish diseases and parasites. The vision of this plan is:

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

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

- 🌿 Output 1.1 – All 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 - ‘Reporting system’ established for INNS in district.
- 🌿 Output 2.2 – Develop strategic monitoring of INNS in district.
- 🌿 Output 2.3 – Rapid response mechanism established for new INNS which pose significant threats to local biodiversity and economy.

Objective 3: Develop coordinated control and eradication programmes for INNS.

- 🌿 Output 3.1 – Coordinated control, eradication and habitat restoration programmes established and operational
- 🌿 Output 3.2 Coordinate activities with Highland Invasive Species Forum and SEPA AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the CFFT area

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 Cromarty Firth district which would cause catastrophic economic and environmental loss.
- 🌿 A strategic, collaborative control programme of INN plants.
- 🌿 Increased 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.
- 🌿 The protection of the endangered water vole from American Mink.
- 🌿 The prevention of species such as Zebra mussel from entering the district’s watercourse helps protect nationally important hydro electric schemes from extremely costly mitigation measures.

- 🌿 The prevention of spread of American Signal Crayfish from a nearby catchment will safeguard aquatic biodiversity and fisheries.

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.

Action	Lead	Partners	TIMEFRAME									
			2010	2010	2011	2011	2012	2013	2014	2015	2016	
Objective 1: Prevent the introduction and spread of INN species within the Cromarty Firth fisheries district.												
Output 1.1 – All key stakeholders aware of; 1) The ecological and economic impacts of INNS 2) The potential pathways for introduction and spread. 3) Management best practices to prevent introduction and spread												
Launch of Cromarty Firth Biosecurity plan through national and local press release	Cromarty Firth Fisheries Trust	Moray Firth Partnership		—								
Produce leaflet on legislation including waste management & planning regulations	Highland Council/ Invasive Species Forum	AAG, SNH		—	—							
Produce leaflet on biosecurity risks and the reporting system	CFFT /RAFTS	AAG, SNH		—								
Produce posters on biosecurity risks and distribute to the general public	RAFTS	CFFT AAG Highland Council		.....	.....	.....	.....	.....	.....	.....	.....	.....
Continue to promote and install disinfection facilities for anglers at all angling proprietors fishing huts/parking points	Cromarty Firth Fishery Board & Trust		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Develop interim code of practice with Harbour Authority	Port Authorities	CFFT		—	—							
Distribute Codes and posters to relevant retail outlets and clubs at open days and events such as agricultural shows	Highland Council / Invasive Species Forum	CFFT AAG members			.....	.....	.....	.....	.....	.....	.....	.....

Action	Lead	Partners	TIMEFRAME								
			2010	2010	2011	2011	2012	2013	2014	2015	2016
Engage with Landowners and angling clubs to promote awareness of measures to tenants, resource – users, members and visitors	Cromarty Firth Fishery Board & Trust	SEPA, SNH		—————							
Work with environmental groups and local schools to enhance awareness of INNS	Easter Ross LBAP group	CFFB & T Highland Council Ranger Service		.....	.....	.....	.....	.....	.....	.....	.....
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 - 'Reporting system' established for INN species in district.											
Train two CFFT personnel in the identification of INNS	CFFT /RAFTS			—————	—————						
Train CFFT as trainers	CFFT /RAFTS			———							
Work with user and interest groups to identify "reporting network"	CFFT	Highland Council AAG SEPA Moray Firth Partnership		—————							
Training of "reporting network"	CFFT	RAFTS LBAP		—————		———	———	———	———	———	———
Establish, test and refine communication mechanisms within 'early warning' system	CFFT Highland Council	SEPA		—————							
Produce database to record and manage INNS sightings	RAFTS			———							
Monitor and periodically evaluate efficacy of system	CFFT & other partners			.....	.....	.....	.....	.....	.....	.....	.....
Output 2.2 – Develop strategic monitoring of INN species in district.											
Develop and agree protocols	SFCC	SEPA/SNH		—————							
Produce database to manage INNS survey data	SFCC	SEPA SNH		———							
Training of Trust and other agency staff in monitoring methods	CFFT	SFCC/RAFTS, SEPA Highland Council		.....	.....	.....	.....	.....	.....	.....	.....

Action	Lead	Partners	TIMEFRAME									
			2010	2010	2011	2011	2012	2013	2014	2015	2016	
Develop monitoring manual	SFCC	RAFTS SEPA (National)		—								
Output 2.3 – Rapid response mechanism established for new INN species which pose significant threats to local biodiversity and economy.												
Formulate contingency plans for key species	RAFTS CFFT	Highland Council, SEPA, SNH,		—								
Identification of personnel for response teams	CFFT,	Highland Council, SEPA and SNH,		—								
Training of personnel to execute contingency plans	CFFT,	Highland Council, SEPA and SNH,		—								
Identification of funding resources	CFFT	Highland Council, SEPA and SNH, RAFTS		.....							
Refresher training	CFFT	RAFTS, SNH					—	—	—	—	—	—
Monitor populations/treated areas	CFFT	SNH, SEPA		.....							
Objective 3: Develop coordinated control and eradication programmes for INN species												
Output 3.1 – Coordinated control, eradication and habitat restoration programmes established and operational												
Initiate and complete catchment wide surveys by trained personnel	CFFT	SFCC		—				—				
Develop GIS database for recording and mapping INNS within Cromarty Firth district	CFFT	SFCC		—								
Continuation of Mink eradication programme	CFFT	Mink Project Neighbouring Trusts	—	—	—	—	—	—	—	—	—	—
Implementation of phase 1 of control/eradication programme see table 10 for details of proposed works	CFFT	BTCV SEPA ¹	—	—	—	—	—	—	—	—	—	—
Implement habitat restoration scheme within successful control areas taking into account all relevant species	CFFT	BTCV, Highland Council, SEPA ²			—	—	—	—	—	—	—	—

¹ May be eligible for funding from the Restoration Fund

² May be eligible for funding from the Restoration Fund

Action	Lead	Partners	TIMEFRAME									
			2010	2010	2011	2011	2012	2013	2014	2015	2016	
Monitor the effectiveness of control programmes	CFFT			---	---	---	---	---	---	---	---	---
MARINE SCOTLAND SCIENCE monitoring Red vent syndrome	MARINE SCOTLAND SCIENCE			—	—	—	—	—	—	—	—	—
Output 3.2 Coordinate activities with Highland Invasive Species Forum and SEPA AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the CFFT area												
Complete draft Biosecurity plan	CFFT		—									
Consultation with all stakeholders to agree Biosecurity plan	CFFT		—									
Represent Cromarty Firth INNS issues at Highland Invasive Species Forum and SEPA AAG	CFFT	Highland Invasive Species Forum SEPA AAG		—	—	—	—	—	—	—	—	—
Set up BTCV INNS Apprenticeship within CFFT & Board. Post to assist with project management of control works	CFDSFB & BTCV		—	—								
Identify and develop opportunities for future funding of eradication projects	CFFT	Highland Invasive Species Forum SEPA AAG FC SNH		---	---	---	---	---	---	---	---	---

1. Scope and Purpose

This plan describes the biosecurity issues of the Cromarty Firth 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 invasive 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 Cromarty Firth fisheries district through appropriate management, data collection, liaison, and education’

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

Objective 1: Prevent the introduction and spread of INN species within the Cromarty Firth fisheries district.

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

Objective 3: Develop coordinated control and eradication programmes for INN species.

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](#)³:

-  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 Cromarty Firth district which would cause catastrophic economic and environmental loss.
-  A strategic, collaborative control programme of INN plants.
-  Increased 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.

³ www.nonnativespecies.org

-  The protection of the endangered water vole from American Mink.
-  The prevention of species such as Zebra mussel from entering the district's watercourse helps protect nationally important hydro electric schemes from extremely costly mitigation measures.
-  The prevention of spread of American Signal Crayfish from a nearby catchment will safeguard aquatic biodiversity and fisheries.

2. Background

Although prepared by the Cromarty Firth Fishery Trust, 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).

The need for action on biosecurity issues has been identified in the Trust's new Fisheries Management Plan (Cromarty Firth Fishery Management Plan⁴) and in the Draft [North Highland Area Management Plan](#)⁵ 2009-2015. 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 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 Cromarty Firth Fishery 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 Cromarty Firth Fishery Trust, stakeholders and appropriate local regulatory for the prevention, early detection and control of non native invasive species, fish diseases and parasites. . As the spread of INNS is not isolated to The Cromarty Firth this plan will also facilitate coordination and communication with the neighbouring fisheries Trusts, Boards, local authorities and other stakeholders of neighbouring areas e.g. Wester Ross, Ness and Beaully and Kyle of Sutherland.

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,

⁴ <http://www.rafts.org.uk/projects/fisheriesmanagementplanning>

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

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](#)⁶ 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 native flora and fauna. However, a small but significant proportion of these non native species are invasive.

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.

According to [CBD \(2006\)](#)⁷, **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, 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 £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 \(2003\)](#)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.
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⁶ www.snh.org.uk/pdfs/publications/review/139.pdf

⁷ <http://www.cbd.int/gbo2>

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)

-  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 a coordinated and systematic approach to the prevention of introduction and control of the spread of INN species 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.

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 Cromarty Firth Fisheries District. These approaches are consistent with the [GB Invasive Non Native Species Framework Strategy](#)¹² and the [Species Action Framework](#)¹³ 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 invasive non native species, fish diseases and parasites:

-  Section 14 of [The Wildlife and Countryside Act \(1981\)](#)¹⁴ 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.

¹² www.nonnativespecies.org

¹³ www.sng.org.uk/speciesactionframework

¹⁴ www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1981/cukpga_19810069_en_1

¹² www.netregs.gov.uk/netregs/63095.aspx.

- 🌿 Local Authorities have powers to take action against giant hogweed and Japanese knotweed where it is a threat to the local amenity of an area or if it is considered a statutory nuisance.
- 🌿 Section 179 of the [Town and Country Planning \(Scotland\) Act 1997](#)¹⁵ 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](#)¹⁶ regulates the use of pesticides and herbicides for the control and eradication of INNS.
- 🌿 [Environmental Protection Act 1990](#)¹⁷ contains a number of legal provisions concerning “controlled waste”, which are set out in Part II. Any Japanese knotweed or giant hogweed contaminated soil or plant material discarded is likely to be classified as controlled waste. This means that offences exist with the deposit, treating, keeping or disposing of controlled waste without a licence.
- 🌿 [The Waste Management Licensing Regulations 1994](#)¹⁸ 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](#)¹⁹ and the [Environmental Protection \(Duty of Care\) Regulations 1991](#)²⁰ 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](#)²¹ that regulates against the unauthorised introduction of fish to inland waters.
- 🌿 The [Prohibition of Keeping or Release of Live Fish \(Specified Species\) Order 2003](#)²² requires that a licence be obtained for the keeping or release of species listed on Schedules 1 and 2.
- 🌿 The [NetRegs](#)²³ website contains useful guidance on INNS and their control

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

¹⁵ www.opsi.gov.uk/acts/acts1997/ukpga_19970008_en_1

¹⁶ www.opsi.gov.uk/legislation/scotland/ssi2005/20050066.htm

¹⁷ www.opsi.gov.uk/acts/acts1990/ukpga_19900043_en_1

¹⁸ http://www.opsi.gov.uk/si/si1994/uksi_19941056_en_1.htm

¹⁹ www.opsi.gov.uk/si/si1991/uksi_19911624_en_1.htm

²⁰ www.opsi.gov.uk/si/si1991/uksi_19912839_en_1.htm

²¹ http://www.opsi.gov.uk/legislation/scotland/acts2007/asp_20070012_en_1

²² <http://www.scotland.gov.uk/resource/doc/47133/0009766.pdf>

²³ <http://www.netregs.gov.uk/netregs/default.aspx>

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 policy, legislation and strategic action with local actions, and reflects the provisions and requirements of the following existing plans (see also Table 1):

- 🌿 The Cromarty Firth Fishery Management Plan 2008-2012,
- 🌿 The North Highland Area and River Basin District Management Plans,
- 🌿 Ross and Cromarty East Biodiversity Action Plan.
- 🌿 SNH Mink Species Action Plan
- 🌿 Highland Invasive Species Forum invasive species policy / strategy
- 🌿 Moray Firth SAC Management Scheme

Furthermore, it supports the conservation objectives of designated conservation areas (SAC, SSSI, RAMSAR) in the Cromarty Firth district.

Table 1 Identified Actions in the Cromarty Firth Fisheries District Biosecurity Plan supporting provisions or requirements of other relevant plans

Provision or Requirement of Existing Plan	Action in CFFD Biosecurity Plan
<p>Plan: The Cromarty Firth Fishery Management Plan²⁴ 2008-2012.</p> <p>Provision/s: SP3 Develop and implement a Biosecurity policy for the district.</p>	<p>This plan fulfils the requirement of the Cromarty Firth 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.</p>
<p>Plan: Gyrodactylus salaris (Gs) Contingency Plan²⁵ :</p> <p>Provision/s: 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>Plan: Ross and Cromarty East Biodiversity Action Plan²⁶</p>	<p>Take steps to eradicate alien species such as Rhododendron ponticum, Japanese knotweed, giant hogweed and Himalayan balsam from watercourses.</p> <p>American mink control</p>

²⁴ www.rafts.org.uk/projects/fisheriesmanagementplanning.asp

²⁵ www.scotland.gov.uk/Topics/Fisheries/Fish-Shellfish/18610/diseases/g-salaris/GsCGrev

²⁶ www.ukbap.org.uk/lbap.aspx?ID=431

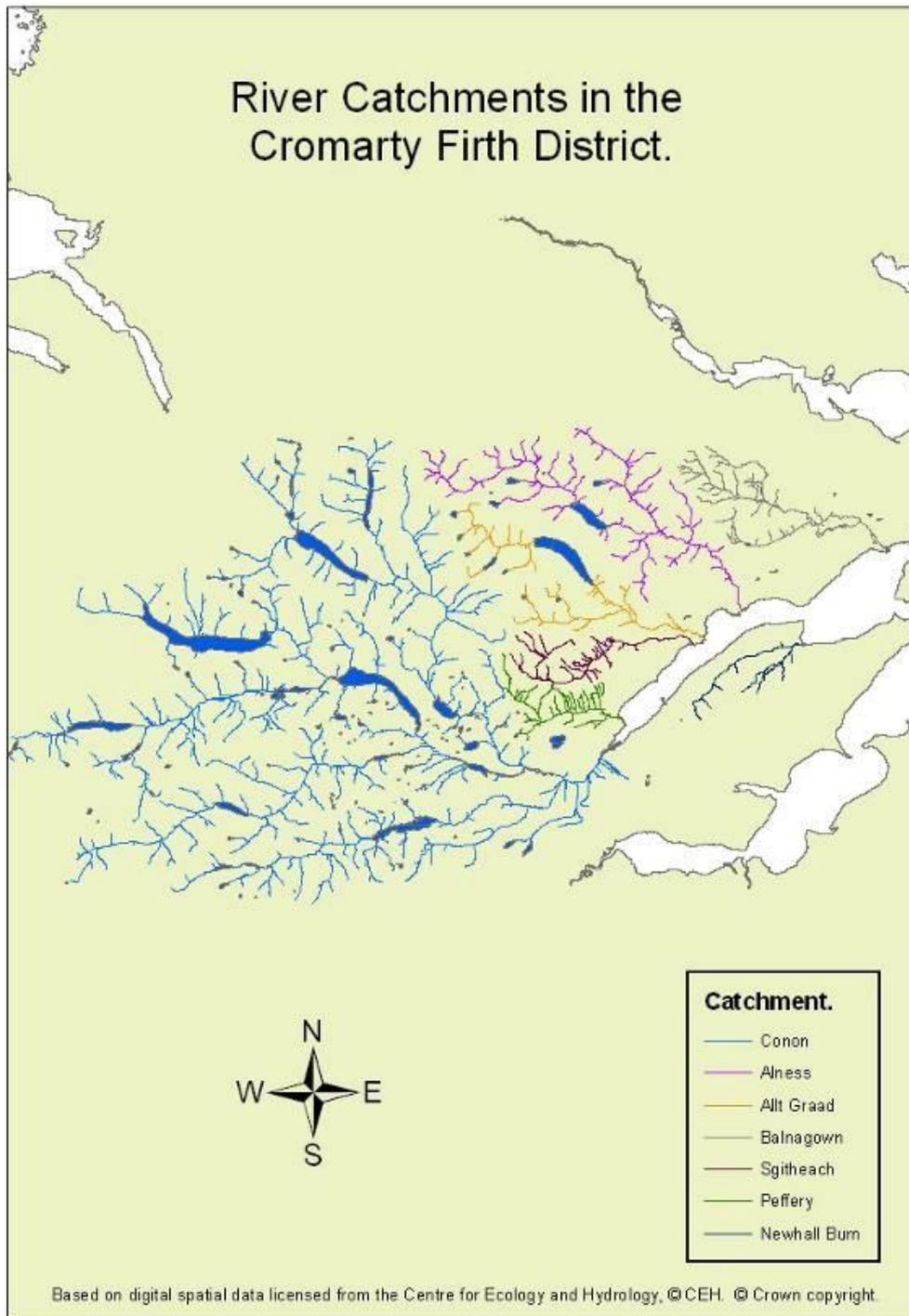
Provision or Requirement of Existing Plan	Action in CFFD Biosecurity Plan
<p>The RBMP for the Scotland river basin management plan North Highland Area Management Plan www.sepa.org The RBMP for Scotland river basin district contains the following measures relating to biosecurity;</p> <ul style="list-style-type: none"> • Identification of appropriate actions to manage species that threaten high and good status sites, together with identification of potential sources of reinfestation in the surrounding area. • Establishment of detection / surveillance /control strategies for problem species. • Risk assesment 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. • Development of biosecurity plans to prevent movement of species between catchments and respond quickly to new infestations. 	<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
<p>Highland Invasive Species Forum Strategy http://www.highlandbiodiversity.com</p>	
<p>Plans supporting designated conservation areas (SACs and SSSIs). Scotland's Biodiversity: A strategy for the conservation and enhancement of biodiversity in Scotland²⁷.</p>	<p>Supports the conservation of biodiversity target species through the control and eradictaion of INNS detrimental to their ecology</p>

4. Scope of the Plan

4.1 Cromarty Firth Fisheries District

The Cromarty Firth Fisheries Biosecurity Plan (CFFBP) covers the management area of the Cromarty Firth District Salmon Fishery Board (CFDSFB) within the Highland Region. The Cromarty Firth Fisheries District contains seven main catchments that drain into the Cromarty Firth (Map1). Although all contain stocks of migratory fish, the rivers Conon and Alness support the most significant fisheries. As well as the main river systems there are more than 160 still waters in the region. These range from large oligotrophic lochs and Hydro electric impoundments in the west, to smaller lochs and ponds in the coastal plain. The characteristics of the rivers and lochs reflect the changing topography and geology of the region. The west of the region is mountainous and underlain by igneous geology, whilst the low lying coastal plain is underlain by old red sandstone. This is described in detail in the Cromarty Firth Fishery management plan.

²⁷ www.scotland.gov.uk/Publications/2004/05/19366/37239



Map 1 Cromarty Firth Fisheries District

4.2 Summary of district land use.

Land use within each of the regions river catchments is mapped and described in detail in the Cromarty Firth Fishery Management Plan. A summary of land use in the region is shown on map 2 below.

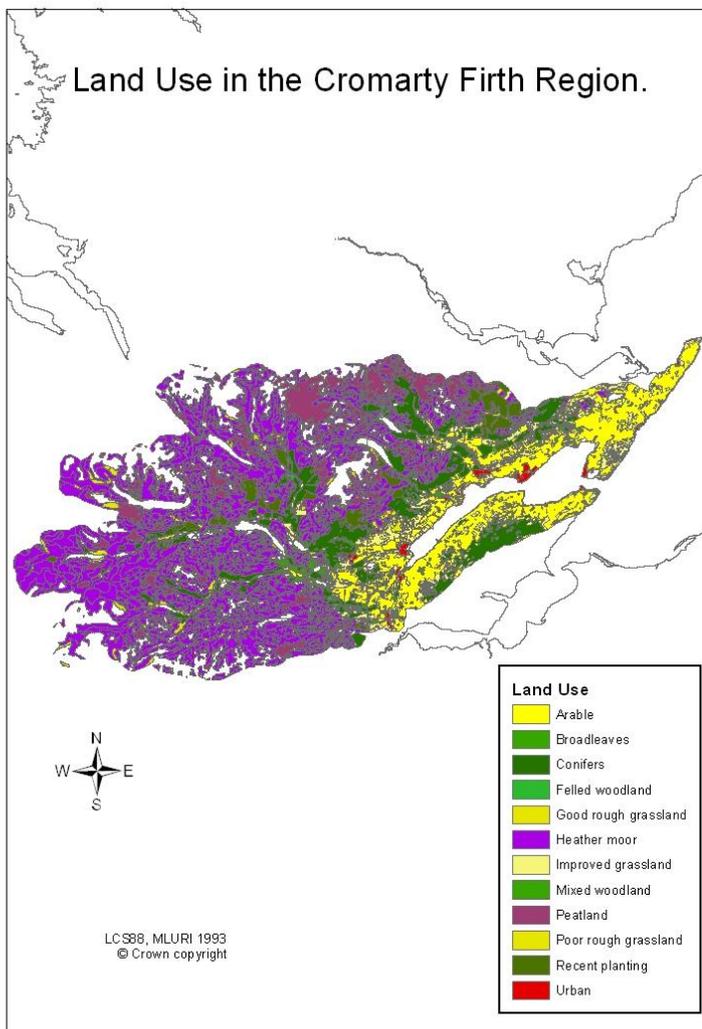
Land use reflects the topography and geology of the region with the west and north of the region dominated by expanses of open moorland and deer forest. This area has seen many hydro electric developments and in recent years there also has been increased windfarm development. During the 1950's and 60's the area was planted with conifers with plantations largely following the main river corridors.

Agriculture is the main land use in the coastal plains surrounding the Cromarty Firth. Urban development is also centred on the shores of the Cromarty Firth and the north shore is the focus of industrial development linked to the oil industry, shipping and distilling.

Recreation and tourism are becoming increasingly important to the region's economy. In 2004 the Scottish Executive published a report on the Economic Impact of Game and Coarse Angling in Scotland. This report estimated that there were 9,100 angler rod days per year on the River Conon. It also estimated that this generated an annual local expenditure of £959,007.

There is little aquaculture within the Cromarty Firth region and no marine or freshwater cage farming of fish. There is a rainbow trout farm at Urray on the River Orrin which has in the past had escapes during flood events. Although the Cromarty Firth DSFB operates salmon hatcheries on the Conon and Alness systems, these hatcheries are operated to ASFB guidelines and retain stocks within catchments.

There is also some stocking of commercial trout fisheries in the region with stocks imported from elsewhere. There are rainbow trout fisheries at Tarvie Lochs, Stoney field Loch, Brahan and Loch Achilty. Brown trout are also stocked into Loch Meig and Loch Achonachie.



Map 2 Cromarty Firth Land Use

4.3 Biosecurity: Current and potential threats

This section identifies 41 INNS and fish diseases for inclusion in the CFFD Biosecurity Plan of which 14 high priority species will be the main focus for action. The priority species were identified as those that:

-  Already exist within the CFFB 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 are associated with 10 INNS, 3 translocated native species and one fish parasite that are currently found in the Cromarty Firth District:

-  American mink (*Mustela vison*) is present in several Cromarty Firth catchments. Mink spread by migration and kill water fowl, small mammals and juvenile salmon and trout. Mink are linked to the decline of water voles which in recent years have only been recorded in upland areas to the West of the Cromarty Firth region where Mink are scarce.
-  Canadian pondweed (*Elodea canadensis*) has been recorded from one catchment in the Cromarty Firth region. 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 dominates native macrophyte communities which can lead to their extinction and thereby impacts local invertebrate communities. It can also increase metal loads within waterbodies that compounds its impacts on native flora and fauna.
-  Nuttall's Pond weed (*Elodea nuttallii*) has recently been recorded from one catchment in the Cromarty Firth region. Nuttall's pond weed dominates native macrophyte communities and this can lead to their local extinction. Impacts have also been recorded on invertebrate communities. All Elodea species take up metals from the sediment and release them into the water. *E. nuttallii* is very tolerant of Copper in particular.
-  Rhododendron (*Rhododendron ponticum & hybrids*) is present in several Cromarty Firth catchments. It is present on the banks of the Orrin, Conon, Balnagown, Ryefield burn, Sgitheach, Alness, Rosskeen burn, Peffery and Logie burn. The main areas which are heavily impacted are on the Orrin and Conon and Balnagown. Its distribution in other catchments is much more localised. 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.
-  Japanese knotweed (*Fallopia japonica*) has a localised distribution in six Cromarty Firth catchments. It is present in the Conon, Peffery, Allt Graad, Sgitheach, Balnagown and Ussie burn catchments. Most of stands are less than 20m in length. There are some larger stands along the

lower reaches of the river Peffery. 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 in the lower reaches of several Cromarty Firth rivers and is locally dominant. It is present in the Conon, Orrin, Sgitheach, Contulich, Culcraggie, Alness, Peffery, Allt Graad and Rosskeen burn catchments. 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.
-  Giant hogweed (*Herculeum mantegazzianum*) is scarce in the region with an isolated population on the river Peffery and more established population on the River Balnagown. The Balnagown population originates from a dense stand along a ditch line but is confined to small clumps or individual plants downstream. 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.
-  Rainbow trout (*Oncorhynchus mykiss*) are farmed at Orrin Fish Farm in the lower Orrin catchment. 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 Cromarty Firth district by anglers and is now known to be resident in the river Conon and its tributaries. 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.
-  Pike (*Esox lucius*) Pike have been introduced to the loch systems of the rivers Blackwater and Bran. They are now present throughout these rivers as well as the main stem of the Conon. Pike have also been introduced to a number of still waters in the area. Pike are significant predators on native fish species and are likely to limit smolt production from some areas.
-  Perch (*Perca fluviatilis*) Perch have been introduced to the lochs of the river Bran, they are also significant predators on native fish species.

-  Common Cord Grass (*Spartina anglica*) it is present within the Cromarty Firth close to Dingwall. 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*. This can reduce feeding areas for bird species such as Brent geese that depend on this habitat for food.

-  Ruddy duck (*Oxyura jamaicensis*) has been recorded as a breeding bird close to Strathpeffer and also recorded from loch Eye. Ruddy duck threaten the survival of the globally endangered White-headed duck (*Oxyura leucocephala*) with which it hybridises. UK has 95% of feral Ruddy Ducks in Europe imported into the UK from North America as part of wildfowl collections.

Also currently present in the Cromarty Firth district are six invasive riparian plant species not on WFD invasive alien species list.

-  Skunk Cabbage (*Lysichiton americanus*) is present as isolated single plants on the main stem of the Conon probably originating from a pond on Brahan Estate. It is also present in a ditch line at Loch Luichart.

-  Cone Flower (*Rudbeckia sp*) is present only in the tidal reaches of the Conon below Conon Bridge it has become very dominant and control mechanisms need to be investigated.

-  Snowberry (*Symphoricarpos albus*) is present on the banks of the Conon, Peffery, Logie burn, Sgitheach and Balanagown. It is present as isolated stands where it occurs and eradication should be a realistic aim.

-  Sycamore (*Acer pseudoplatanus*) is widespread throughout the region and eradication is unlikely however localised clearance where it is heavily shading would be desirable.

-  Ninebark (*Physocarpus sp.*) is present only in the lower reaches of the River Conon near Conon Bridge

-  Monkey Flower (*Mimulus sp.*) is present in the lower reaches of the Peffery and Conon

4.3.2 Potential biosecurity issues

The invasive non native species listed below are not currently present within the Cromarty Firth 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 Cromarty Firth 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 eleven High Threat level species that could be introduced into the Cromarty Firth district and they include one fish parasite, three fish species, five 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 which has been in contact with infected water including canoes ▪ 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>Pacifasticus leniusculus</i>)	High - Through intentional/ unintentional introduction from an existing population nearby. Accidental transfer with fish stocking	<ul style="list-style-type: none"> ▪ Burrows into river banks causing destabilisation ▪ Diet include small fish, fish ova and invertebrates
Australian swamp stonecrop (<i>Crassula helmsii</i>)	High – Through introduction from two existing populations nearby other pathways include: <ul style="list-style-type: none"> ▪ Garden trade²⁸ ▪ 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/canoe 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

²⁸ Note that although the sale of species that are or can become invasive is not illegal, garden centres should be made aware of the impacts of known or potential INNS if they are released into the wild.

SPECIES	RISK OF INTRODUCTION	LOCAL IMPACTS
Ruffe (<i>Gymnocephalus cernuus</i>)	Medium - growth of popularity of Pike angling increases the risk of transfer by visiting anglers.	<ul style="list-style-type: none"> ▪ Ruffe populations have a minimum population doubling time of less than 15 months and the species is an aggressive predatory species of zooplankton and other food sources of native species of fish as well as fish eggs. ▪ The introduction of Ruffe to L. Lomond has had disastrous consequences for the Powan and has significantly altered the ecology of the loch
Roach (<i>Rutilus Rutilus</i>)	Medium - Roach have become established in several large Scottish still waters. Movement by Anglers is the most likely means of introduction.	<ul style="list-style-type: none"> ▪ The introduction of Roach would significantly alter the ecology of a water body.
Stone Loach (<i>Barbatula barbatulus</i>)	Medium – Stone loach have been introduced to the neighbouring Kyle of Sutherland district probably by visiting Trout anglers.	<ul style="list-style-type: none"> ▪ Stone loach occur in very high densities and are likely to compete for habitat and food with native Salmonids.
Slipper limpet (<i>Crepidula fornicata</i>)	Medium - The presence of a deep water port at Invergordon increases the risk of introduction to the Cromarty Firth district. The likely pathways of introduction are by hull fouling and in ballast water.	<ul style="list-style-type: none"> ▪ Inhabits shallow subtidal area below low water mark often attached to oysters and mussels ▪ In France has altered benthic habitat through smothering of sediment beds with densities of 000's/m² that trap suspended silt, faeces and pseudofaeces ▪ Exclude other bivalves including oysters to whose beds they are a serious threat. ▪ Also a major threat to other protected species
Didemnum Tunicates/Sea Squirts <i>Didemnum vexillum</i>	<p>Medium- Vectors for introduction are uncertain but fouling of ocean going vessels and/or contamination of aquaculture produce are possibilities. The presence of a deep water port at Invergordon increases the risk of introduction to the Cromarty Firth district.</p> <p>Once established, it can spread rapidly by both sexual reproduction and asexually by fragmentation of the colonies.</p>	<ul style="list-style-type: none"> ▪ Marine habitat changes through overgrowth of sedentary benthic organisms such as seaweed, scallops, mussels, and oysters. ▪ Produces chemicals that deter most fish and other animals. ▪ Increases fouling of underwater structures such as docks, moorings, and boat hulls.
Curly waterweed <i>(Lagarosiphon major)</i>	<p>Medium – found in a small number of locations throughout Scotland especially in the central belt area and spread through:</p> <ul style="list-style-type: none"> ▪ Disposal of garden waste ▪ Animals and human activity ▪ Fragmentation by wind dispersal, boat movement, angling equipment and possibly water fowl 	<ul style="list-style-type: none"> ▪ Capable of forming very dense infestations in suitable habitats and occupying the full water column in waters up to 6m deep with significant impacts on native plants, insects and fish. ▪ It is a serious threat to tourism, angling, boating and other recreational pursuits as well as conservation goals

There are also ten Medium Threat level species of which there are five species with a medium risk of introduction and five species with a low risk of introduction (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
Orfe (<i>Leuciscus idus</i>)	Medium	Through intentional/unintentional introduction from an existing population nearby.
Water primrose (<i>Ludwigia grandiflora</i>)	Medium	Unintentional introduction from boat hulls and ponds
Water fern (<i>Azolla filiculoides</i>)	Medium	Through intentional/unintentional introduction from numerous locations throughout Scotland, especially central belt
Wireweed (<i>Sargassum muticum</i>)	Medium	Through unintentional introduction
Bullhead (<i>Cottus gobio</i>)	Medium	Translocated species recorded in central Scotland that could be introduced deliberately or as live bait
Large flowered waterweed (<i>Egeria densa</i>)	Low	Only found to date in East Lothian. Possible introduction from ponds
Floating pennywort (<i>Hydrocotyle ranunculoides</i>)	Low	Currently only in England up to the midlands. Possible introduction from ponds
Parrot's feather (<i>Myriophyllum aquaticum</i>)	Low	Through intentional/unintentional introduction from two existing populations in the south of Scotland
Fanwort (<i>Cabomba caroliniana</i>)	Low	Only found in one location in southern Scotland possible introduction from ponds
Asian topmouth gudgeon (<i>Pseudorasbora parva</i>)	Low	Currently only recorded from 5 locations in England. Could be introduced as live bait, in ballast water or as releases from aquaria

From Tables 3 and 4, the main pathways or means of introduction of both High and Medium Threat level species into the Cromarty Firth 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, fish factory waste.
- 🌿 Introduction of live fish, contamination of water used to transport live fish.

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
Highland Council
National Farmers Union
Highland Invasive Species Forum
Landowners Association

➤ **Water Resources**

North Highland Area Advisory Group
Scottish Water
Scottish and Southern Energy
British Waterways

➤ **Fisheries Management**

Cromarty Firth District Salmon Fishery Board
Marine Scotland Science (regulation of fish movements and introductions)
Cromarty Firth Fisheries Trust
Association of Still Water Fisheries

➤ **Recreation**

Inverness Canoe Club
Ramblers Association
Aquaculture / commercial fisheries
Local Angling Associations
RYA

➤ **Conservation and Biodiversity**

Northern Constabulary wildlife crime unit
Scottish Wildlife Trust
Royal Society for the Protection of Birds
Scottish Native Woods
Ross and Cromarty East Local Biodiversity Action Group
Plant Life
Highland Biological Recording Group
Dingwall Environment Group
British Trust for Conservation Volunteers
Dingwall Field Club
Tain Field Club

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 stakeholder groups in the Cromarty Firth District

Pathway	Stakeholders
Intentional introduction or planting	Plantlife, riparian landowners, members of the public, Marine Scotland, local councils
Fouling and ballast water of marine vessels	Local harbour authorities/SEPA
Fouling and ballast water of freshwater vessels	Port Authority/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)	CFFDSFB, local canoe/water sports organisations, anglers, angling associations, fishing agents and tackle shops.
Escapes from fish farms, ponds, gardens, and desmesnes.	Marine Scotland/ SEPA/ Planning Authorities/ Plantlife/ riparian owners/ members of the public
Movement of contaminated soils or vehicles	Local Councils/SEPA/quarries/ building contractors
Pefferly fish factory waste	SEPA/Scottish Water
Introduction of live fish, contamination of water used to transport live fish.	CFFDSFB/Marine Scotland/Still Water 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

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 control activities

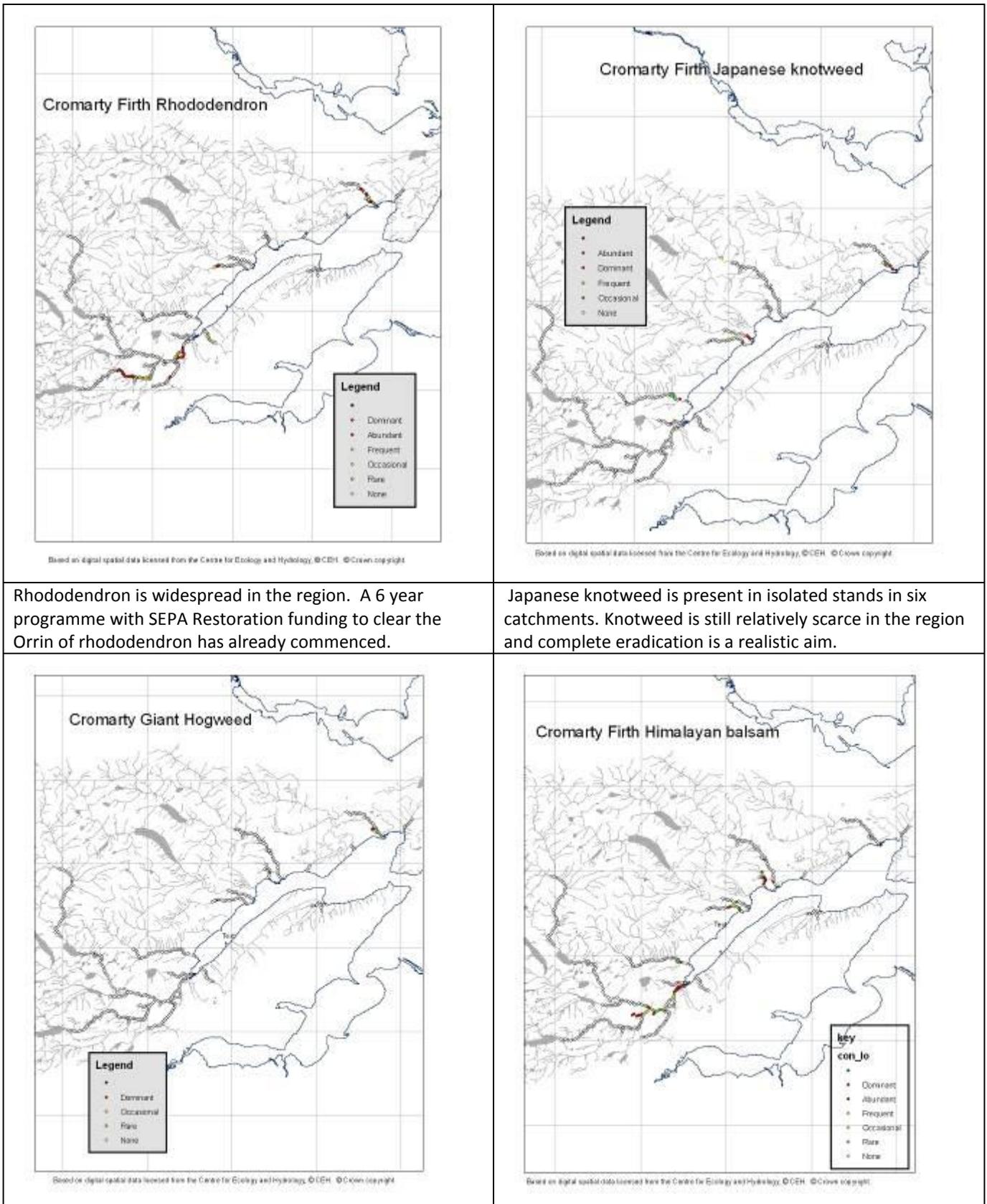
Gyrodactylus

During 2007 as part of a national campaign , the Cromarty Firth District Salmon Fisheries Board instigated a publicity campaign to prevent the introduction and spread of the parasite *Gyrodactylus salaris*. Interviews were given to local press and leaflets and posters distributed to angling and canoeing outlets. Information and warning signs were also installed at access points to rivers. In addition to the publicity campaign, anglers fishing in the district now sign a declaration form before fishing to ensure that their equipment is free from possible infection. Newsletters to anglers and ghillies are used to regularly remind of the risk of GS introduction.

INN Plant Species

Some clearance of INN plant species has been funded by SNH in relation to designated sites. In particular work has been carried out to control Himalayan balsam and other exotics in the SAC floodplain woodlands of the Conon valley.

In 2008 the CFFT began a three year project funded by the Esmee Fairbairn Trust to map the distribution of INN plant species within the Cromarty Firth region and set up a more strategic programme for control and eradication. The initial 2008 survey mapped the distribution of Rhododendron, Himalayan balsam, Japanese knotweed, giant hogweed, sycamore and other species. Distributions for the main INN species are shown below.



Rhododendron is widespread in the region. A 6 year programme with SEPA Restoration funding to clear the Orrin of rhododendron has already commenced.

Japanese knotweed is present in isolated stands in six catchments. Knotweed is still relatively scarce in the region and complete eradication is a realistic aim.

Giant hogweed is scarce in the region with an isolated population on the river Peffery and more established population on the River Balnagown. Complete eradication is a realistic aim.

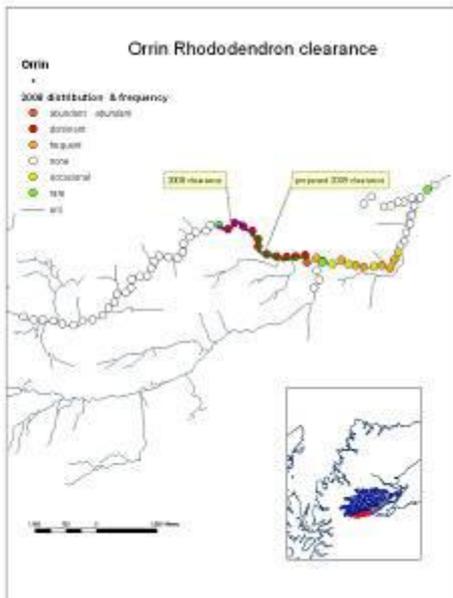
Himalayan balsam is widespread present in 9 catchments. Clearance works with a BTCV group have much reduced HB in the Orrin and Conon. Eradication from the Orrin and Conon to tidal reaches at Conon Bridge is a realistic aim.

Himalayan balsam control

Using labour from the British Trust for Conservation Volunteers Himalayan Balsam has been cleared from its source on a ditch leading into the River Orrin. Clearance works in 2008 and 2009 have extended downstream to Conon Bridge in the tidal reaches of the Conon. This is already showing a significant reduction in Himalayan balsam densities within the Conon catchment.



Rhododendron clearance



A rhododendron eradication strategy for the River Orrin was also produced in 2008. During the winter of 2008/9 Fishery Board Bailiffs and Fairburn Estate began the clearance of rhododendron from its upstream extent on the banks of the Orrin. Funding from the SEPA restoration fund has been granted to further expand this work in 2009/10.

A restoration strategy for the River Peffery is under development and includes the eradication of rhododendron, Himalayan balsam, giant hogweed and Japanese knotweed from the catchment.

North Highland Mink Project

In 2009 the North Highland Mink Project was set up. This is a collaboration between SNH, SWT and the Fishery Boards and Trusts of the North Highland region. The aim of the project is to confirm the current distribution of North American Mink in the North Highlands and then coordinate control activities to eradicate mink North of the Great Glen. A Project Officer has been employed and is



assisted by staff from the Fishery Boards and Trusts in the region. A network of mink rafts and traps has been set up using voluntary labour from ghillie, bailiffs and gamekeepers to give a strategic coverage of the North Highlands. Within the Cromarty Firth District more than 40 rafts and traps are in operation.

Highland Invasive Species Forum

Formed in June 2008 its aims are to:

- bring together the key players and take stock of the situation regarding invasive non-native species in Highland;
- raise awareness and spread good practice;
- identify any major gaps and prioritise key areas for future work; and
- work together to secure new resources and funding.

The forum has identified five key INNS, *Rhododendron ponticum*, Japanese knotweed, Himalayan balsam, giant hogweed and mink as high priority species and recently completed mapping their distributions in the area. A strategy has been produced and a Highland Rhododendron Officer appointed. The forum collaborates with the RAFTS Biosecurity and Invasive Species Programme and also supports control work of riparian INNS being undertaken by four fisheries trusts in the Highlands including Cromarty Firth.

5. Biosecurity management strategy

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

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

5.1 Objectives and outputs of Cromarty Firth 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 reporting system supported by routine **monitoring** of established populations or sites vulnerable to the introduction and spread of these species.

Objective 1: Prevent the introduction and spread of INN species within the Cromarty Firth fisheries district.

- 🌿 **Output 1.1 – All key stakeholders aware of;**
 - 1. The ecological and economic impacts of INNS**
 - 2. The potential pathways for introduction and spread.**
 - 3. 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 that has the ability to spread causing damage to the environment, the economy, or health and the way we live
- 🌿 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
 - 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 Cromarty Firth District. 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 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"> - 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 	<ul style="list-style-type: none"> - CFFT to work with local industry and trade associations to advise members regularly of best practice in respect of INNS - Enforcement agencies (Marine Scotland & CFDSFB) to undertake site visits to discuss and advise on issues involving INNS e.g. rainbow trout - Invasive Species Scotland²⁹ website
Port Authorities	<ul style="list-style-type: none"> - Avoid pumping out of non sterilised ballast water in harbour - Role of hull fouling in the introduction and spread of INNS 	<ul style="list-style-type: none"> -Promote implementation of code of practice requiring non-sterilised ballast water to be discharged away from harbour -CFFT to assist with the supply of posters and other awareness material for display and signage. - Invasive Species Scotland website
Local Garden Centres	<ul style="list-style-type: none"> -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. 	<ul style="list-style-type: none"> -CFFT to work with garden centres to encourage distribution of codes of practice and posters (available from Plantlife).
Highland Council Tec Services / contract workers	<ul style="list-style-type: none"> -Promote appropriate working practices and waste disposal to avoid spread of INNS 	<ul style="list-style-type: none"> -Formulate and promote codes of practice.
Local Aquarium and Pond stockists	<ul style="list-style-type: none"> -Promote code of practice to all pet shops and suppliers of ornamental fish 	<ul style="list-style-type: none"> -CFFT to work with retailers to encourage distribution of codes and posters (available from Plantlife)

²⁹ www.invasivespeciesscotland.org.uk

Stakeholder Group	Priority Area	Mechanism of Delivery
Water User associations (canoeists, sailing clubs)	-Promote awareness to clubs and participants of the dangers arising from INNS	-CFFT 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
Landowners	- Promote knowledge of biosecurity issues amongst all tenants and resource users - Identification of suitable persons to act as “eyes” for the CFFT	-Work with CFFT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -CFFT 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”	-CFFT 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 CFFT to ensure dissemination of best practices and appropriate signage to reduce threats from INNS -CFFT to offer training for “eyes” -Invasive Species Scotland website
General Public	-General awareness of impacts and measures to prevent/control INNS -Promote the Biosecurity Plan to all retail outlets who deal with NNS e.g. pet shops, garden shops	-Local Media Campaigns -Use of websites (RAFTS, NNSS) -CFFT to develop a leaflet to promote the Biosecurity plan, the dangers arising from INNS and the reporting system -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 CFFT to ensure dissemination of best practices - CFFT to offer training for “eyes” Invasive Species Scotland website

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

Organisation	Role and/or action	Delivery Mechanisms
CFFT	- Promote awareness to general water users promoting the Biosecurity Plan 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 actions for CFFT above
CFDSFB	-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
Marine Scotland Science	-Regulation of movement and introduction of fish	-Licensing system for fish movements.

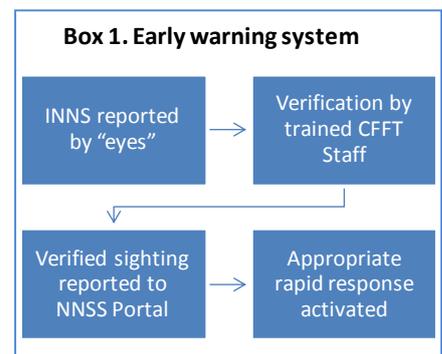
Organisation	Role and/or action	Delivery Mechanisms
Highland Council	<ul style="list-style-type: none"> - Promote use of codes of best practice for construction, haulage, horticulture, aquaculture amongst local business and relevant departments particularly construction, garden and pet trade - Promote awareness of planning, waste disposal and transport regulations amongst local business - Promote awareness of the GB communications strategy to the general public 	<ul style="list-style-type: none"> - Councils to promote codes of best practice at every opportunity e.g. including them with planning applications and building warrants - Production (by Council's legal department) 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, libraries and other public places
SEPA	<ul style="list-style-type: none"> - Clarify SEPA responsibilities for INNS to both staff and customers - Incorporate INNS issues into relevant guidance documents (as they are developed or updated) 	<ul style="list-style-type: none"> - Page on website with links to relevant SEPA information and other sites e.g. Non-Native Species Secretariat, RAFTS, Scottish Canoe Association. - Digital documents available for download on SEPA Website
SNH	<ul style="list-style-type: none"> - National: Promotion of good practice in the prevention, control and eradication of INNS - Local: SNH will continue to support and advise the Cromarty Firth Fisheries Trust. 	<ul style="list-style-type: none"> - Holding of SNH Sharing Good Practice events. - Grant funding may be available for some projects.
Marine Scotland	<ul style="list-style-type: none"> - Fish Health Inspectorate part of Marine Scotland is lead body with respect ot fish diseases and escapes 	<ul style="list-style-type: none"> - 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 Cromarty Firth District. These are presented in Section 5.2 along with the responsible agency and a timeframe for their implementation.

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 - 'Reporting system' established for INN species in district.

The “eyes” of the early warning system (Box 1) will be trained members of the public, bailiffs, ghillies, canoeists and walkers with reported sightings verified by trained CFFT 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 priority species will be verified as time permits. All verified sightings will also be entered onto the CFFT Geographic Information System to monitor INNS distributions within the Cromarty Firth District. Actions to establish the early warning system are described in Section 5.2.



Output 2.2 – Develop strategic monitoring of INN species in district.

The CFFT will work with Scottish Fisheries Coordination Centre, 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.

Output 2.3 – Rapid response mechanism established for new INN species which pose significant threats to local biodiversity and economy.

The type of response will depend on the severity of the species detected (Table 8) 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 8 Response level for 31 invasive non native species

GB Response	High Priority Local Response	Priority Local Response
Gyrodactylus salaris	American signal crayfish	American mink
Asian topmouth gudgeon	Ruffe	Canadian pond weed
Ruddy duck	Bullhead	Japanese knotweed
Didemnum spp	Mitten crab	Himalayan balsam
Wireweed	Slipper limpet	Giant hogweed
Water primrose	Zebra mussel	Rhododendron
	Australian swamp stonecrop	Rainbow trout
	Large flowered waterweed	Minnow
	Curly waterweed	Red vent syndrome (RVS)
		Orfe
		Nuttal’s pondweed
		Water fern
		Common cord grass
		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 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 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 9. The actions required to establish and maintain the RRM are presented in Section 5.2

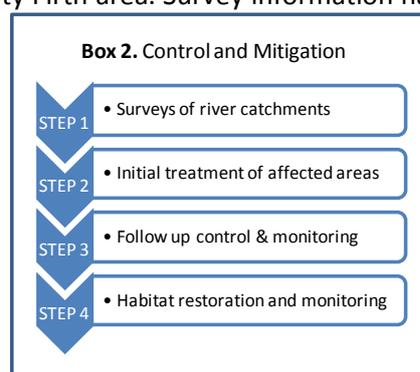
Table 9 Elements of contingency plans or protocols for response to GB priority, local high priority and priority species

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 3: Develop coordinated control and eradication programmes for INN species.

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

Surveys have largely identified INNS distributions within the Cromarty Firth area. Survey information has been entered onto GIS and analysed to target upstream extent of populations of INNS that are potential sources of spread and re-infestation. Control and eradication programmes will be phased with treatment commencing at the upstream point of distribution and then systematically progressing downstream. A combination of specialist contractors, volunteers and CFFT staff will be used depending on the management requirements of the area involved. Envisaged mitigation, eradication and control measures for the INNS present in the Cromarty Firth catchments are presented in Table 10. The actions required to establish the proposed control/eradication programme are presented in Section 5.2.



In order to achieve these aims additional manpower will be required to help project manage eradication works. It is proposed to employ a BTCV NNIS Apprentice in 2010 with funding sourced through BTCV and support from CFDSFB. This post will initially be for one year and will be important in co-ordinating works with BTCV groups, CFDSFB staff and other contractors as required. A period of five years will be required to achieve and funding will be required to develop this project officer post.

Most of the clearance and spraying works can be carried out by BTCV groups and CFDSFB staff. CFDSFB staff are already trained chainsaw operators and can carry out felling works supported by BTCV labour for dragging and burning of rhododendron.

CFDSFB staff should be trained in spraying techniques and equipped so that they can assist with spraying of rhododendron regrowth, Japanese knotweed and giant hogweed. This capacity building is important

so that after main eradication works are completed annual monitoring by CFDSB staff can be linked to further treatment as required.

Table 10 Phase 1 of Invasive Non Native Species Control and Eradication in the Cromarty Firth District

SPECIES	ACTION	TREATMENT/POST TREATMENT ACTIONS
Japanese knotweed (JK)	Control/Eradication Identify and close pathways.	-Leaf spraying with Glyphosate by CFFT/CFDSFB/ BTCV staff for existing populations with follow up of stem injection treatment to maintain control if required. -Spraying to take place spring and autumn over a 5 year period on the rivers Conon, Peffery, Allt Graad, Sgitheach, Balnagown and Ussie Burn. -Buffer strips identified cleared and maintained where road and rail pathways for reinfection intersect with watercourses. -Requirements for riparian zone habitat restoration assessed and implemented
Himalayan balsam (HB)	Control/Eradication Identify pathways and close	-Continue with BTCV Green Gym labour to clear Orrin and Conon of balsam. -Set up 5 year programme with BTCV Mid week group to clear the Peffery, Alness, Allt graad, Sgitheach, Contullich, Culcraggie and Rosskeen catchments in that order of priority. -Monitor catchment for activation of dormant sources of infestation -Habitat restoration if required
Giant hogweed (GH)	Control/Eradication Identify pathways and close	- Leaf spraying with Glyphosate by CFFT/CFDSFB/ BTCV staff for populations of giant hogweed in the Peffery and Balnagown catchments. Spraying to take place spring and autumn over a 5 year cycle. Follow up monitoring required. -Monitor catchment for activation of dormant sources of infestation -Habitat restoration if required
American mink	Control/Eradication	-Co-ordinated monitoring and trapping. Continue contribution to North Highland Mink project. Support work of Mink Project Officer, help liaise with volunteers, storage and delivery of equipment, use bailiffs to help with trapping and involve BTCV Apprentice in project delivery.
Rhododenron (R)	Control / Eradication	-Continue 6 year eradication programme on the River Orrin. Winter clearance by cutting and burning followed by summer spraying of regrowth. -investigate use of Lever and mulch method -Clear small isolated population on the River Peffery to achieve eradication in Peffery catchment. -Plan clearance programmes for Alness and Balnagown catchments followed by Sgitheach, Logie, Ryefield, and Rosskeen burns
Canadian pond weed	Monitor distribution	
Minnow / pike / perch	Restrict to present distribution	
Red vent syndrome	Monitor	-Joint monitoring project with Marine Scotland to begin in 2009.

Output 3.2 Coordinate activities with Highland Invasive Species Forum and SEPA AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the CFFT area

The delivery of the aims of this plan would be assisted by the coordination of activities with the existing Highland Invasive Species Forum and SEPA Area Advisory Group relating to INNS in the Cromarty Firth region. Representation on both these bodies by CFFT / DSFB will help with coordination planning and resourcing of actions.

The employment of a BTCV INNS Apprentice hosted by the Cromarty Firth Fishery Board / Trust would provide manpower to help project manage prevention and control activities in the region. The development of this link with BTCV will allow cost effective delivery of many of the more labour intensive measures required to control alien species in the Cromarty Firth region.

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.

Action	Lead	Partners	TIMEFRAME								
			2010	2010	2011	2011	2012	2013	2014	2015	2016
Objective 1: Prevent the introduction and spread of INN species within the Cromarty Firth fisheries district.											
Output 1.1 – All key stakeholders aware of; <ol style="list-style-type: none"> 1) The ecological and economic impacts of INNS 2) The potential pathways for introduction and spread. 3) Management best practices to prevent introduction and spread 											
Launch of Cromarty Firth Biosecurity plan through national and local press release	Cromarty Firth Fisheries Trust	Moray Firth Partnership		—							
Produce leaflet on legislation including waste management & planning regulations	Highland Council/ Invasive Species Forum	AAG, SNH		—	—						
Produce leaflet on biosecurity risks and the reporting system	CFFT /RAFTS	AAG, SNH		—							
Produce posters on biosecurity risks and distribute to the general public	RAFTS	CFFT AAG Highland Council		.....	.....	.....	.....	.....	.....	.....
Continue to promote and install disinfection facilities for anglers at all angling proprietors fishing huts/parking points	Cromarty Firth Fishery Board & Trust		.....	.....	.....	.....	.....	.....	.....	.....

Action	Lead	Partners	TIMEFRAME								
			2010	2010	2011	2011	2012	2013	2014	2015	2016
Develop interim code of practice with Harbour Authority	Port Authorities	CFFT		—————							
Distribute Codes and posters to relevant retail outlets and clubs at open days and events such as agricultural shows	Highland Council / Invasive Species Forum	CFFT AAG members			.....					
Engage with Landowners and angling clubs to promote awareness of measures to tenants, resource – users, members and visitors	Cromarty Firth Fishery Board & Trust	SEPA, SNH		—————							
Work with environmental groups and local schools to enhance awareness of INNS	Easter Ross LBAP group	CFFB & T Highland Council Ranger Service			.....					
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 - 'Reporting system' established for INN species in district.											
Train two CFFT personnel in the identification of INNS	CFFT /RAFTS			—————	—————						
Train CFFT as trainers	CFFT /RAFTS			—————							
Work with user and interest groups to identify "reporting network"	CFFT	Highland Council AAG SEPA Moray Firth Partnership		—————	—————						
Training of "reporting network"	CFFT	RAFTS LBAP		—————		———	———	———	———	———	
Establish, test and refine communication mechanisms within 'early warning' system	CFFT Highland Council	SEPA		—————							
Produce database to record and manage INNS sightings	RAFTS			—————							
Monitor and periodically evaluate efficacy of system	CFFT & other partners				.....					

Action	Lead	Partners	TIMEFRAME								
			2010	2010	2011	2011	2012	2013	2014	2015	2016
Output 2.2 – Develop strategic monitoring of INN species in district.											
Develop and agree protocols	SFCC	SEPA/SNH	—	—							
Produce database to manage INNS survey data	SFCC	SEPA SNH		—							
Training of Trust and other agency staff in monitoring methods	CFFT	SFCC/RAFTS, SEPA Highland Council		.....	.....	.....	.....	.....	.....	.....	.....
Develop monitoring manual	SFCC	RAFTS SEPA (National)	—	—							
Output 2.3 – Rapid response mechanism established for new INN species which pose significant threats to local biodiversity and economy.											
Formulate contingency plans for key species	RAFTS CFFT	Highland Council, SEPA, SNH,		—	—						
Identification of personnel for response teams	CFFT,	Highland Council, SEPA and SNH,		—							
Training of personnel to execute contingency plans	CFFT,	Highland Council, SEPA and SNH,		—	—						
Identification of funding resources	CFFT	Highland Council, SEPA and SNH, RAFTS		.....	.....	.....	.....	.....	.....	.....	.....
Refresher training	CFFT	RAFTS, SNH				—	—	—	—	—	—
Monitor populations/treated areas	CFFT	SNH, SEPA		.....	.....	.....	.....	.....	.....	.....	.....
Objective 3: Develop coordinated control and eradication programmes for INN species											
Output 3.1 – Coordinated control, eradication and habitat restoration programmes established and operational											
Initiate and complete catchment wide surveys by trained personnel	CFFT	SFCC		—	—	—	—	—			
Develop GIS database for recording and mapping INNS within Cromarty Firth district	CFFT	SFCC		—							

Action	Lead	Partners	TIMEFRAME									
			2010	2010	2011	2011	2012	2013	2014	2015	2016	
Continuation of Mink eradication programme	CFFT	Mink Project Neighbouring Trusts	---	---	---	---	---	---	---	---	---	---
Implementation of phase 1 of control/eradication programme see table 10 for details of proposed works	CFFT	BTCV SEPA ³⁰		---	---	---	---	---	---	---	---	---
Implement habitat restoration scheme within successful control areas taking into account all relevant species	CFFT	BTCV, Highland Council, SEPA ³¹			---	---	---	---	---	---	---	---
Monitor the effectiveness of control programmes	CFFT			---	---	---	---	---	---	---	---	---
MARINE SCOTLAND SCIENCE monitoring Red vent syndrome	MARINE SCOTLAND SCIENCE			-----	-----	-----	-----	-----	-----	-----	-----	-----
Output 3.2 Coordinate activities with Highland Invasive Species Forum and SEPA AAG to ensure sufficient funding and resources in place to continue prevention and control of INNS within the CFFT area												
Complete draft Biosecurity plan	CFFT		---									
Consultation with all stakeholders to agree Biosecurity plan	CFFT		---									
Represent Cromarty Firth INNS issues at Highland Invasive Species Forum and SEPA AAG	CFFT	Highland Invasive Species Forum SEPA AAG		-----	-----	-----	-----	-----	-----	-----	-----	-----
Set up BTCV INNS Apprenticeship within CFFT & Board. Post to assist with project management of control works	CFDSFB & BTCV		-----									
Identify and develop opportunities for future funding of eradication projects	CFFT	Highland Invasive Species Forum SEPA AAG FC SNH		---	---	---	---	---	---	---	---	---

³⁰ May be eligible for funding from the Restoration Fund

³¹ May be eligible for funding from the Restoration Fund

6 Monitoring

Biosecurity is being initiated within the Cromarty Firth district by the CFFT. It must be recognised that if current resources are not increased that progress will be limited. However, despite limitations, any work completed by the CFFT will be monitored and the results evaluated particularly in the light of changing circumstances e.g. climate change. In this respect, the CFFT 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. Thus a fully coordinated monitoring programme must be established to ensure efficacy and sustainable treatment initiatives and include:

- 👁️ Assessment of efficacy of surveillance and rapid response systems
- 👁️ Occurrence and distribution of the selected INNS within the district
- 👁️ 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 CFFT staff in conjunction with stakeholder representatives who by virtue of their work are out in the catchment on a regular basis e.g roads department and access officers employed by local councils.