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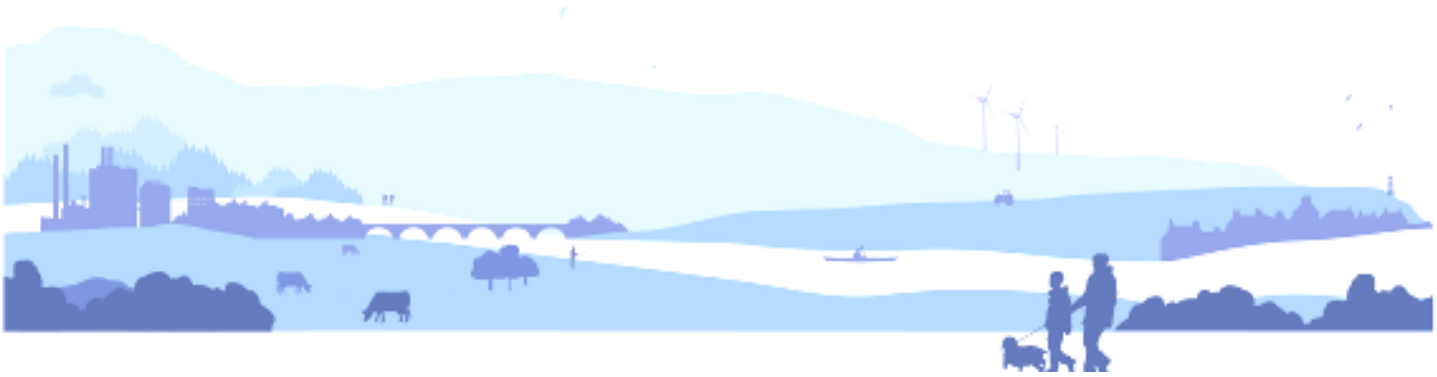
SCOTTISH GOVERNMENT

Managing Invasive Non-Native Species in Scotland's Water Environment:

A Supplementary Plan to the River Basin Management Plans



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Executive summary

The Water Framework Directive (WFD) requires that all pressures on the ecological quality of the water environment are addressed, with a view to maintaining or improving ecological quality by 2015. Non-native species (NNS) can pose a risk to ecological quality if they are allowed to establish and spread unchecked.

NNS can also affect the condition of designated natural heritage sites that are protected at a European or national level for their important species and habitats.

Climate change is likely to have a major impact on biodiversity in the future by affecting the distribution of native and non-native species.

Due to the ability of some NNS to spread rapidly, a co-ordinated approach to prevention and control is required to ensure that resources are combined and duplication of effort is avoided. River basin management planning promotes this co-ordinated approach to ensure that the objectives of the WFD are met.

This plan describes the roles of organisations and partners involved in risk assessment, monitoring, classification, data collection, and prevention and control mechanisms. Since these roles and responsibilities are shared across a number of organisations, both north and south of the border, it also aims to form a basis for cross-border discussions and partnership working with counterpart organisations in England.

Most importantly, the plan identifies resourcing pressures and proposes key actions to address these in order to ensure that the WFD objectives are met in future river basin planning cycles.

1. Introduction

This supplementary plan is aimed at those organisations which have a strategic role in the management of NNS. As a result, it refers to different geographical scales including the water body, catchment and cross-border scales. The main purpose of the plan is to identify the gaps in delivery, resources and co-ordination which increase the risk of failing to achieve Water Framework Directive (WFD) objectives and identifies a plan of action to address those gaps.

It is not intended for those groups involved in co-ordinating actions at the local level for which alternative sources of information are available. This plan is supported by a separate document, "Summary of Local Actions[1]", which includes information on the local actions which are being taken forward in Scotland.

The WFD requires that all pressures affecting the ecological status of the water environment are addressed, with its objectives being to both maintain and improve the ecological quality of all water bodies by 2015. The establishment and spread of NNS presents a risk to achieving the WFD objectives.

There are many NNS in Scotland, however, only a small minority become invasive (INNS) and seriously affect our native wildlife, economy and health. Once established in the water environment, they can have a significant impact on water bodies, leading to a downgrade in their ecological quality if they are allowed to spread unchecked. Those NNS which have the highest potential to cause adverse impacts in the water environment are listed on the UK Technical Advisory Group's (UKTAG) High Impact List and include marine, freshwater and riparian species. Where these NNS are established, water bodies can only achieve a maximum of *good ecological status*.

NNS can adversely affect habitats and species in a number of ways including:

- affecting the condition of areas protected under the Habitats Directive for those species or habitats which are important at a European level and those nationally important for biodiversity;
- having the potential to prey on, out-compete and displace native species and spread disease in both the marine and freshwater environments;
- affecting recreational activities such as angling and boating through the clogging up of waterways.

Clearly, there are multiple benefits to be gained through preventing the introduction and spread of NNS.

Scale of the issue in Scotland

In Scotland, our current understanding of the nature and scale of the problem is such that very few water bodies are at less than good status as a result of the presence of INNS. In 2008[2], at the start of the first river basin planning cycle, 13 water bodies were classified as at less than good status because of the impact of North American signal crayfish (*Pacifastacus leniusculus*). In addition, the presence of some INNS

[1] Summary of Local Actions document, which accompanies the supplementary plan, will be on SEPA's RBMP web pages following publication.
http://www.sepa.org.uk/water/river_basin_planning.aspx

[2] Figures are for water bodies within the Scotland and Solway Tweed river basin districts.

e.g. Australian swamp stonecrop (*Crassula helmsii*), Common cordgrass (*Spartina anglica*) and Leathery Sea-squirt (*Styela clava*) caused a downgrading in 57 water bodies from high status to good. Nine water-dependent Special Areas of Conservation were in unfavourable condition in 2008 because of the presence of aquatic or riparian INNS.

In 2011, the number of freshwater water bodies classified as at less than good status due to the impact of INNS had increased to 17. This is likely to be either a result of INNS spreading between water bodies or due to the discovery of new outbreaks where species have been previously un-recorded.

While we need to focus on improving water bodies to good status, the "no deterioration" objective is arguably more relevant as there is a recognised risk of deterioration if INNS are allowed to spread within and between water bodies and catchments. More information on classification can be found on SEPA's River Basin Planning pages.

Making links with climate change and biodiversity

Climate change may enable some native and non-native species to alter their ranges in future. It is possible that more NNS could become established in the United Kingdom and that some currently benign non-native species could become invasive. This supplementary plan supports Scotland's Climate Change Adaptation Framework (the forerunner to Scotland's Statutory Adaptation Programme, due to be published in 2013 under the Climate Change Scotland Act 2009) helping to ensure that water ecosystems are sufficiently resilient to support biodiversity and continue to supply vital ecosystem services.

The plan also supports the delivery of the "Aichi Targets"[3] set by the United Nations Convention on Biological Diversity in Japan in 2010 and the European Union's Biodiversity Strategy for 2020. These targets call for a step change in efforts to halt the loss of biodiversity, with INNS being one of the main drivers of loss. The Scottish Government, and its partners, is committed to meeting these targets through the Scottish Biodiversity Strategy, the"2020 Challenge for Scotland's Biodiversity". This sets out a strategy for the conservation and enhancement of biodiversity in Scotland, which includes recognising the need to tackle the threats posed by non-native species where early action is vital.

This supplementary plan makes close links with the overall aims of the 2020 Challenge, in particular:

- protect and restore biodiversity on land and in our seas, and to support healthier ecosystems;
- connect people with the natural world, for their health and wellbeing and to involve them more in decisions about their environment;
- maximise the benefits for Scotland of a diverse natural environment and the services it provides, contributing to sustainable economic growth.

A co-ordinated approach

The Scottish Government's consultation 'Scotland's Water: Future Directions' (2009), highlighted that management of NNS in the water environment requires a more co-

[3] http://www.cbd.int/sp/targets

ordinated approach to ensure delivery of WFD objectives. River basin management planning (RBMP) promotes this co-ordinated approach by engaging a wide range of partners and organisations in assessing the state of the water environment and identifying where action is needed. A high level framework is set out in chapters 2 and 3 of the Scotland and Solway Tweed river basin management plans.

What this plan aims to achieve

The main aims of this supplementary plan are to:

- clarify the requirements of the WFD with respect to NNS, including building the evidence base for setting appropriate WFD objectives;
- identify the main gaps in delivery and the key actions needed to address those gaps to ensure WFD objectives are achieved in future river basin planning cycles;
- outline an action programme that sets out the roles and responsibilities for the assessment, prevention, control and eradication of NNS.

The plan also:

- provides an overview of the hierarchy of actions for management of NNS;
- promotes the co-ordination of activities to ensure that resources are prioritised and used efficiently;
- forms the basis for co-ordination with the Environment Agency on the approach in the cross-border Solway Tweed river basin district.

2. Roles, responsibilities and co-ordination

Overview of roles and responsibilities in Scotland

A number of organisations have a role to play in co-ordinating non-native species action in Scotland. Scottish Natural Heritage (SNH) is the overall lead co-ordinating organisation, with support from others in respect of specific habitats. SNH itself leads for terrestrial habitats and wetlands, SEPA for freshwater aquatic habitats, Forestry Commission Scotland (FCS) for woodland and Marine Scotland (MS) for marine habitats. These roles are set out in the Code of Practice on Non-Native Species[4] and are referred to as the Framework of Responsibilities.

SEPA has a broader responsibility to co-ordinate the development of the river basin management plans. Responsible authorities and partners have a shared responsibility to ensure that effective processes are in place to implement river basin planning in Scotland. This includes making sure that the roles for the assessment and management of the risk of INNS, in the context of river basin planning, are clear and that action is taken to address any gaps. SEPA also facilitates advisory groups for RBMP which have both a national and local role.

There are also a number of legislative tools, regulatory instruments and enforcement procedures for various INNS.

An effective framework for co-ordination

Due to the ability of some NNS to spread rapidly, a co-ordinated nationwide approach to prevention and control is needed. To be effective, it must operate across different geographical scales, linking to approaches throughout Great Britain, and for some species, activities across Europe. National co-ordination takes place through a number of groups at a Great Britain and Scotland level and these are illustrated in Figure 1. In addition, there are groups co-ordinating action at a local or regional level, applying the principles developed at the Great Britain/Scotland level. These include the local authorities' Local Biodiversity Action Plan (LBAP) invasive species groups, local forums and sub-groups set up under the RBMP Area Advisory Groups (AAGs).

National co-ordination

The GB Non-Native Species Secretariat (GBNNSS) helps to co-ordinate the approach to INNS in Great Britain through the development of awareness raising materials and provision of technical information as set out in the INNS Framework Strategy for Great Britain[5] (GB Strategy). Their work is overseen by the GB Programme Board, which represents the relevant governments and agencies. The three government administrations provide the overall lead in implementing this strategy in England, Scotland and Wales.

The Scottish response to NNS is co-ordinated by two groups. The Statutory Group on Non-Native Species (SGNNS) brings together public sector bodies with a

[4] The Code of Practice on Non-Native Species clarifies the amendments made to the Wildlife and Countryside Act 1981 by the Wildlife and Natural Environment (Scotland) Act 2011.
[5] DEFRA (2008) The Invasive Non-native Species Framework Strategy for Great Britain.

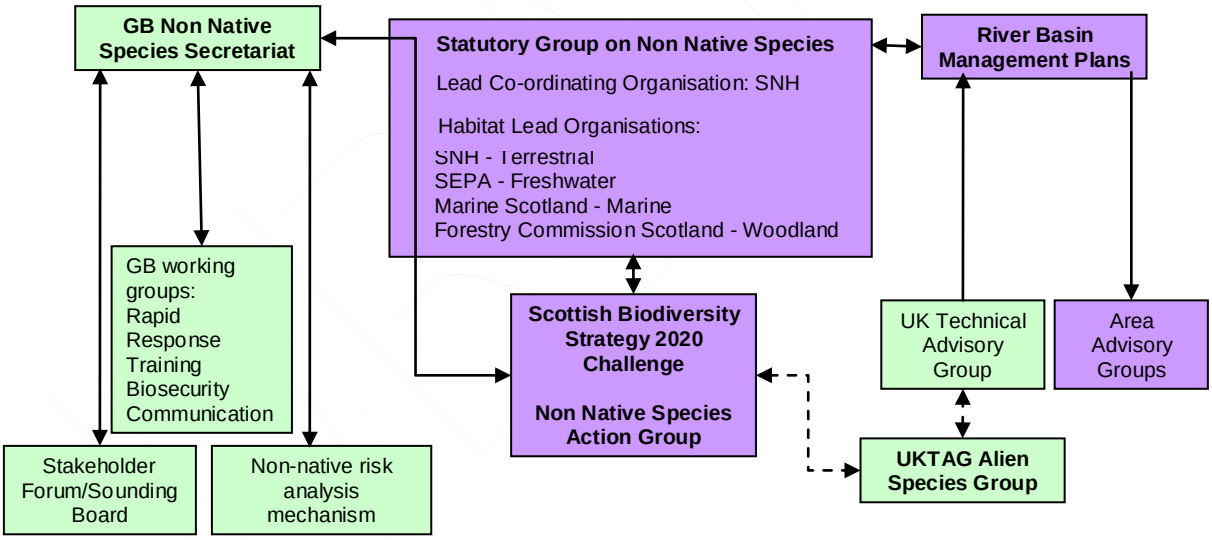
responsibility and powers to deal with NNS. The Non Native Species Action Group, which acts as the delivery group for NNS issues in the 2020 Challenge, brings together a wider group of NNS policy stakeholders from government, agencies, local government, research institutes, police and environmental interests.

The Joint Nature Conservation Committee (JNCC) has responsibility for the provision of nature conservation advice in the offshore area[6].

At the United Kingdom scale, the United Kingdom Technical Advisory Group (UKTAG) is responsible for providing technical guidance on the implementation of the WFD. This guidance includes categorisation of the risk posed and how to develop classification systems, objectives and timescales for improvement dependent on the availability, or feasibility of developing, suitable techniques for eradication, control or prevention of further spread.

The UKTAG Alien Species Group provides scientific advice on the WFD High Impact Species list for Great Britain. The group is also contributing to the development of European Union policy which aims to take a more consistent approach to the way in which INNS are dealt with across the EU.

Figure 1 Co-ordination of non-native species policy at Great Britain (green) and Scotland (purple) level



Local co-ordination

There is a need for a more strategic approach to managing NNS at the local level to ensure that strategies and policies developed at the Great Britain/Scotland level are translated into actions on the ground. Actions at the local level have often been carried out in a disjointed manner due to the lack of a co-ordinated, systematic approach.

[6] 'Offshore' is defined as beyond 12 nautical miles (nm) from the coastline to the extent of the United Kingdom Continental Shelf (UKCS). Within territorial limits (<12 nm) nature conservation advice is the responsibility of the relevant country conservation bodies.

The Local Action Groups pages of the GBNNSS website provide advice for groups in developing local strategic plans which focus on prioritising action for various species, surveying and monitoring, management options, and raising awareness. Development of these plans, however, is entirely voluntary and often carried out by groups working in geographical isolation. The website also has a list of Local Action Groups throughout Great Britain and is currently producing a map of their locations. The GBNNSS also hold an annual Local Action Group workshop which encourages sharing of experiences and good practice from groups working all over Great Britain.

In Scotland, a number of voluntary groups including local authorities' Local Biodiversity Action Plan (LBAP) invasive species groups, local forums and sub-groups set up under the RBMP AAGs are taking forward actions on the ground.

RBMP AAG sub-groups concentrate on developing local measures for water bodies where ecological status has been affected by INNS (see accompanying Summary of Local Actions). These groups consist of representatives from Rivers and Fisheries Trusts Scotland (RAFTS), District Salmon Fisheries Boards, Local Authorities, Royal Society for the Protection of Birds (RSPB), Forestry Commission Scotland (FCS), SNH and SEPA amongst others. Many of these organisations also have their own priorities in INNS management, aside from those relevant to the AAG.

RAFTS have been, and continue to be, a key partner in delivering actions on the ground through:

- developing bio-security plans;
- undertaking control and eradication programmes;
- working with anglers and local communities to increase awareness of NNS.

Their bio-security plans have been used as a basis for the development of marine bio-security plans and they are also advising fisheries organisations south of the border on development of their own bio-security plans.

Some areas of Scotland have set up dedicated NNS groups and forums, such as the Tweed Forum Invasives Project, River South Esk Partnership and Highland Invasive Species Forum, and others which specifically deal with marine and coastal NNS such as the Firth of Clyde Forum and Solway Firth Partnership.

Non-native species-related offences are increasingly the focus of law enforcement. Police Scotland, including the UK National Wildlife Crime Unit, investigate a wide range of situations, from the sale of pets to unlicensed trapping in Scottish rivers.

All of these groups and organisations play an important part in local co-ordination through enforcement, raising awareness, involvement of volunteers and landowners, promotion of bio-security plans, control and eradication work.

Case study - Highland Invasive Species Forum

The Highland Invasive Species Forum was set up in 2009 with the aims of:

- bringing together key players and to take stock of the situation regarding invasive non-native species in Highland region;
- raising awareness and spreading good practice;
- identifying major gaps and prioritise key areas for future work;
- working together to secure new resources and funding.

The Forum consists of representatives from organisations such as SNH, the National Trust for Scotland (NTS), road and rail network operating companies, fisheries boards and trusts and voluntary groups such as The Conservation Volunteers. By working together and sourcing funding from a variety of organisations, they have had considerable success in the Highland region.

Partnership achievements include mapping invasive species in Highland through a survey of existing data and undertaking a mink distribution survey in Skye and Lochalsh. A number of projects are underway, including the Lower Ness Invasive Plants Project (Glen Urquhart and Inverness), the Highland Rhododendron Project, giant hogweed control in Auldearn and Munlochy, and invasive plant control on the River Nairn. The group has held 5 annual events, which promote and raise awareness with the general public.

Himalayan balsam eradication project in the Lower Ness Catchment (before and after).

Image: John Parrott, Coille Alba.

Gaps in co-ordination and key actions

One of the main challenges in effectively co-ordinating actions, especially at the local scale, is ensuring that resources are available to translate national strategies into actions on the ground. This includes resources for establishing local groups in the first instance and putting in place prevention, control and eradication strategies on the ground. These strategies may include training, awareness-raising and promotion of campaigns such as “Check, Clean, Dry”.

There is currently no mechanism for assessing whether the combined efforts of individual groups are effective in preventing the spread of NNS at the cross-border and cross-catchment levels. In addition, the assessment of those efforts within catchments is variable; the overall response may be weakened by those areas where there are no local groups in place to carry out assessments of the risks.

Key actions for addressing these gaps are shown in Table 1 below. A table with the gaps and key actions collated from all sections of the plan is included in the Appendix at the end of this document.

Table 1: Summary of gaps in co-ordination and key actions

Issue	Gap	Action	Lead
Co-ordination	Funding for local co-ordination is not available or hard to identify.	Expand on work begun by SNH to identify funding sources for NNS and directing partners to this information.	SNH, SEPA
		Advise on sources of funding as they become available and encourage uptake and partnership working through NNS sub-groups and AAGs.	SNH, SEPA, Marine Scotland
	Understanding of joint funding mechanisms available (across administrative boundaries and organisational boundaries) is incomplete.	Develop and strengthen links with counterpart organisations in England.	SNH, SEPA, Marine Scotland, FCS
	Mechanisms for assessing the effectiveness of combined efforts for preventing the spread of INNS at the • catchment • cross-catchment and • cross-border scales do not exist.	Periodic review of geographical areas where local action groups are established to: • establish where gaps exist, • assess whether those gaps represent high risk areas and • take action to encourage local action groups to expand into those areas or new local action groups to be established in those areas.	SGNNS

3. Assessing current condition of the water environment

The current condition of water bodies is determined through the collection, collation; storage and sharing of data on INNS and these actions are undertaken by a number of different organisations. This information is used in a number of ways including:

- classifying water bodies affected by INNS to determine whether they are achieving the WFD objectives;
- identifying the level of risk that INNS present to the marine and freshwater environment;
- highlighting gaps in knowledge and data and identifying areas where sharing of data could be improved.

The following section describes the key elements in assessing current condition of the water environment and identifies gaps and key actions to address them.

Classification

The classification of WFD water bodies is managed by SEPA using data collected by SEPA and SNH. Classification is carried out in line with The Scotland River Basin District (Classification of Water Bodies) Directions 2009[7].

Some species have a more significant impact than others and this is reflected in how they are included in classification. For example, water bodies affected by riparian species are only downgraded to less than good status where the marginal or in-stream biological elements monitored show an impact. This does not provide a complete picture of the impact of riparian NNS. Developments are planned to directly include riparian INNS within existing morphology tools (used to assess the physical condition of the water environment) so that a more accurate assessment of their impacts can be made.

In the marine environment, those species on the WFD High Impact List are included in classification if there are records of them. Individual WFD tools may also indicate the impact of marine INNS, either **directly** where biological indices show lower scores where INNS are present or **indirectly** where INNS are present in such densities that a reduction in abundance of other taxa is observed.

Data gaps and data sharing

The dataset used in the first river basin plans for assessing the state of the water environment was the best available at the time. This dataset does not represent the full extent of the presence of NNS and this can be improved through increased data sharing of all WFD relevant INNS information between organisations. Any data which is intended for classification use needs to be quality controlled and staff of organisations involved will need to be trained in appropriate data collection methods. External organisations such as RAFTS are using suitable methods for collecting data for use in SEPA's classification scheme, however, there are issues with database compatibility that are still to be resolved.

[7] The Directions are updated periodically with the next update expected in 2014.

In addition to the formal collection of data, other sources of data are becoming increasingly important in raising local knowledge of NNS presence and informing local management of NNS. Increasingly, the general public is being encouraged to contribute through Citizen Science projects and recording schemes such as iRecord, Plant Tracker, Recording Invasive Species Counts (RISC) and other databases, all of which link directly to the National Biodiversity Network (NBN) Gateway.

Gaps in assessing the current condition of the water environment and key actions

Several gaps have been identified in assessment of the current condition of the water environment where actions and resources are needed to improve risk assessment, classification and data sharing. These actions will help to increase understanding of the impact of INNS with regard to achieving WFD objectives and these are shown in Table 2 below.

Table 2: Summary of gaps in assessment of the current condition of water environment and key actions

Issue	Gap	Action	Lead
Assessing current condition of the water environment	An understanding of direct and indirect impacts of riparian species is lacking.	Continue to develop functionality of WFD classification tools to improve assessment of INNS impacts i.e. riparian plants included in SEPA's morphology classification tool (MImAS).	SEPA
	Complete datasets for all WFD INNS (fully aquatic, riparian and marine) are not available.	Encourage organisations to share data through databases e.g. Scotland's Environment Web (SEweb), Botanical Society of the British Isles (BSBI).	SEPA, SNH
		Develop appropriate format and protocol for data collection and quality assurance to enable organisations outside the public agencies to include their data in WFD classification.	SEPA
		Support training for external organisation staff in appropriate identification, data recording and reporting.	SEPA, SNH, RAFTS

4. Management

The GB Strategy, to which all GB administrations have signed up, sets out overarching principles for policy and management approaches to INNS. It uses the three-stage hierarchical approach adopted by the Convention on Biological Diversity for the management of NNS with actions across Scotland, England and Wales focussing on:

- prevention (through bio-security measures, analysis of pathways, raising public awareness through the GB communications plan);
- developing detection and surveillance and protocols for rapid response to the arrival of new species;
- control and eradication (through national and local projects included in the summary of actions).

In some cases, the lack of funding available to undertake work may be exacerbating the unnecessary spread and increased impact of INNS. There is also a need to build on and develop links with the Environment Agency, Natural England and other partners for those water bodies which have cross-border catchments and shared coastlines.

Prevention

In tackling NNS, the main emphasis has been placed on prevention since this is recognised to be more effective and less costly than dealing with species once they arrive. Scottish Ministers can ban the keeping or sale of non-native species (or require reports of species to be made) but only where they are known to be invasive – this means that overall prevention relies heavily on good understanding of, and widespread adherence to, appropriate bio-security practices. Raising awareness of these, and putting in place the facilities to allow the public to adhere to them, requires resources.

There are a wide range of preventative measures available such as raising awareness through public campaigns, carrying out risk assessments for species and pathways and development of bio-security protocols. The following examples highlight some of the preventative actions being taken in both river basin districts within Scotland (see "Summary of Local Actions"[8]):

- Development of bio-security plans by the Rivers and Fisheries Trusts for Scotland (RAFTS) to prevent the movement of INNS between river catchments. This work is supported by the Esmée Fairbairn Foundation, SNH, Scottish Government and SEPA;
- Development of marine bio-security plans by partnerships such as the Firth of Clyde Forum and the Solway Firth Partnership aimed at reducing the risk of introduction and spread of INNS within the marine environment. This work is supported by SNH, SEPA, Scottish Government and RAFTS. In the case of the Solway Firth, it also encourages cross-border working with counterpart agencies in England;

[8] Summary of Local Actions document, whichaccompanies the supplementary plan, is on SEPA's RBMP web pages http://www.sepa.org.uk/water/river_basin_planning.aspx

- Development of codes of good practice by industry/sector which will prevent the transfer or introduction of INNS. These organisations include the aquaculture industry, horticulture sector and Scottish Canals (Canal and River Trust in England);
- Application of bio-security guidance for field staff by Scotland's Environmental and Rural Services (SEARS) which, as well as preventing the spread of agricultural pests and diseases will prevent the transfer and spread of INNS;
- Adoption (although not ratified as yet) of a Ballast Water Convention by The International Maritime Organisation and development of guidelines to reduce the risk of introducing INNS via bio-fouling of vessels;
- Development of pathway action plans, as required by the GB Strategy. This is at an early stage but will be progressed through the GB Secretariat;
- Raising public awareness through national initiatives like the 'Check Clean Dry' and 'Be Plant Wise' campaigns (https://secure.fera.defra.gov.uk/nonnativespecies/checkcleandry/index.cfm and https://secure.fera.defra.gov.uk/nonnativespecies/beplantwise/);
- Encouragement of public reporting using mechanisms such as iRecord and the Recording Invasive Species Counts (RISC). These have in-built verification systems and are useful in building a knowledge base.

Rapid response

Rapid response includes surveillance, monitoring and early detection to ensure that the risks posed by NNS are assessed rapidly. The sooner they are detected and a plan of action is in place, then the greater the chances of success. A rapid response also means that costs to biodiversity and resource requirements are ultimately reduced. There is a need to assess the likelihood of new species arriving by identifying pathways, and so enable suitable plans to be put in place which would maximise the effectiveness of rapid response action should species arrive.

In Scotland the introduction of the Framework of Responsibilities, as described in Section 2, clarifies the Scottish organisation of rapid response. The Scottish Rapid Response Protocol[9] sets out how the habitat lead organisation, in partnership with other relevant organisations and partners, should assess the feasibility of eradication or control options and work together to raise awareness to prevent further spread of the species. It will be important to increase the ability of partner staff working at potential points of entry to identify and raise the alarm should new species arrive, for example local authority or national park rangers, fisheries biologists, or staff working at marinas.

The police also play an important role in responding and acting rapidly to reports of NNS offences within Scotland and the rest of Great Britain.

Contingency plans should be developed for those species, or groups of species, predicted to move into Scotland and contingency funding identified to ensure that rapid response to new arrivals is effective. This will require close working with relevant partners, including the habitat lead organisations, north and south of the border for those water bodies in the Solway Tweed river basin district with a shared coastline or cross-border catchment.

[9] SNH, Rapid Response Framework for non-native species

Case study - National Wildlife Crime Unit and rapid response to marbled crayfish (*Procambarus sp.*)

Marbled crayfish (*Procambarus sp.)* originate from North America and are capable of reproducing asexually. They are sexually mature after 4 months and produce an average brood of 270 live young. The possession of any non-native crayfish is an offence in Scotland.

In October 2012, the National Wildlife Crime Unit (NWCU) was notified of marbled crayfish for sale on the internet. Enquiries traced the source to West Lothian where crayfish originally acquired from England were being advertised and sold to aquarists in Dunfermline, Kinross and Kirkcaldy. Within days of this knowledge reaching the Scottish Investigative Officer of the NWCU, all individuals were visited and marbled crayfish were voluntarily given up and secured by the officer.

The approach taken in this case focussed on education and co-operation with the crayfish owners and this was essential to establish whether any specimens had been passed on to others. The primary concern was to prevent potential environmental damage through disposal of crayfish into sewers or local water courses as a result of panic.

Marbled crayfish
Image: Charles Everitt, NWCU

Control and eradication

Control measures are aimed at containing NNS within limited areas, preventing or slowing down spread, and reducing or eradicating local populations. Once a species has become widely established, it is unlikely that full-scale eradication programmes will be successful.

For some species, e.g. North American signal crayfish, no effective control techniques are currently available, other than extreme measures which are only appropriate and effective in small standing water bodies (due to damage to other biota). Further research is needed to understand and develop technically feasible control techniques in these cases and also for the marine environment, where research on successful control methods is in the early stages of development. This

may involve research carried out elsewhere, but it is important that Scotland influences and benefits from any relevant outcomes.

The Species Action Framework, led by SNH and supported by a number of active partners, including FCS, SEPA, Marine Scotland and Fisheries Trusts/foundations, began in 2007 and ran over 5 years to:

- focus effort and resources to improve understanding of the impacts of some NNS;
- develop techniques to tackle them;
- carry out practical management.

Although the Species Action Framework is no longer in operation, it would be beneficial to build on the work that focussed on high impact INNS, with work co-ordinated at a catchment scale by the appropriate habitat lead organisation.

Effective management of NNS is also, in part, restricted by the limited availability of NNS specific funding and the lack of understanding surrounding what funding can be accessed for NNS work. European Union based funds such as LIFE+ and the Scotland Rural Development Programme (SRDP) are among the most commonly accessed funds. These funds are currently under development for the next programming period (2014-2020), with overall budgets, priorities and targets still to be set.

The following show examples where control and eradication is being carried out by a range of organisations and groups at different levels.

Control in the marine environment

- The Scottish Government is currently assessing management options for the WFD High Impact List species carpet sea squirt (*Didemnum spp*.). Local stakeholders such as the Firth of Clyde Forum will be involved in implementing any ensuing control and eradication plan.

Control at the catchment level

- RAFTS have undertaken numerous control and eradication programmes focussing on multiple invasive species with support from SNH, the Esmée Fairbairn Foundation, EU Interreg, SEPA and the Scottish Government;

Case study - Ballachulish Quarry Ponds – eradication of North American signal crayfish (*Pacifastacus leniusculus*)

Lochaber Fishery Trust has carried out eradication of North American signal crayfish at small disused slate quarry pond in Ballachulish, Lochaber. The crayfish were discovered in July 2011 by Highland Council Rangers and, being the only confirmed population in the West Highlands, potential spread into neighbouring watercourses could have had disastrous consequences for the fresh water environment. This population came about as a result of a deliberate release approximately 12 years earlier.

Working in partnership with other fishery trusts, FCS, SEPA, SNH, and the Highland Council, the infected pond was treated with a pyrethroid biocide, *Pyblast*, in June 2012. Pyblast is highly toxic to crayfish and has been used successfully in other small water bodies in England and Scotland.

The pond surface was sprayed using boat-mounted sprayers and the pond margins using backpack sprayers. Rigid hoses were used to treat the deeper parts of the pond and buckets were used to douse crevices in the slate along the banks. Dead crayfish were observed at the pond margins within an hour of the treatment. Intensive trapping was carried out two months after the treatment and no crayfish were caught during this time, however, further intensive trapping is required for the next 4 years to ensure that a small population has not survived. The total cost of the project was approximately £73,000, funded by SEPA, SNH and the Highland Council.

Pyblast being applied to the pond using boat-mounted sprayers
Image: Galloway Fisheries Trust

Pyblast being applied to pond margin from a backpack sprayer and dead crayfish in pond margin
Image: Galloway Fisheries Trust

Site-specific control

Action on individual sites is usually carried out by individual land owners or managers and organisations that own or manage them. They include the following:

- SNH lead on the control and, where possible, eradication of INNS on sites protected for natural heritage importance (Natura and SSSI sites);
- Forestry Commission Scotland, Forest Enterprise and the National Trust for Scotland undertake INNS, often rhododendron, control on their sites;
- local authorities, Transport Scotland and Network Rail are responsible for controlling INNS on the road, trunk road and rail networks;
- organisations such as Scottish Countryside Rangers Association and The Conservation Volunteers are involved where volunteer effort is provided;
- work is also being carried out by individual landowners and managers to protect private interests.

Case study - Loch Libo SSSI – experimental shading to control/eradicate Canadian waterweed (*Elodea canadensis*)

Canadian pondweed is a cause of unfavourable condition in several designated standing water sites across Scotland. SNH commissioned Sue Bell Ecology to undertake a trial of a technique to control *Elodea* in standing water. The trial involved the placing of jute matting on the bed of Loch Libo in Renfrewshire and monitoring the effect on growth of *Elodea*. This work followed on from trials in Ireland using jute matting for control of a morphologically-similar aquatic invasive species.

Initial results show that the use of jute matting has been successful in suppressing the growth of *Elodea*. Further work is needed to understand the ability to achieve long term control of the species and effects on native species.

Experimental shading to control/eradicate Canadian waterweed
Image: S. Bell, 2012 for Scottish Natural Heritage Commissioned Report No. 557.

Gaps in management of NNS and key actions

The key challenge in managing NNS effectively is identifying, prioritising and securing resources for all aspects of prevention, rapid response, and control and eradication measures. These range from providing training in identification of NNS, public awareness campaigns, bio-security planning, effective enforcement and rapid response contingency planning to researching and trialling new methods of control and eradication. The gaps and key actions for management are detailed in Table 3 below.

Table 3: Summary of gaps in management of NNS and key actions

Issue	Gap	Action	Lead
Management	Resources for preventative measures are not easy to identify or access and are not consistently used effectively.	Promote and encourage development of bio-security plans (including for the marine environment) through Area Advisory Groups, directing them to good examples and potential funding sources.	SEPA, RAFTS
		Expand on work begun by SNH to identify funding sources for NNS and directing partners to this information.	SNH, SEPA
	The level of understanding of bio-security amongst water users is not consistently high enough.	Continue to raise awareness through campaigns such as “Check, Clean, Dry” and “Be Plant Wise”.	
	Not enough contingency planning is undertaken for high risk areas or high risk groups of species.	High risk geographical areas and high risk groups of species are prioritised and contingency plans put in place.	SEPA/SNH/ FCS/ Marine Scotland and local partners
		Contingency plans are tested with all partners (statutory and relevant NGOs, community group etc) to identify gaps in knowledge, resources and skills.	
		Gaps identified by contingency plans are addressed or contingency plans are adapted to account for gaps that cannot be addressed.	
		Identify resources for aspects of rapid response e.g. provision of training partner staff working at potential points of entry to identify and raise the alarm.	Agencies and organisations north and south of the border
	Control methods for a large proportion of	Undertake review of research worldwide for control and eradication techniques (including costs assessment) for all UKTAG high impact species, plus potential new arrivals, to identify gaps that	SNH, SEPA, SG

	freshwater and marine INNS have not been developed.	need to be addressed by UK/Scottish partners.	
		Investigate opportunities to improve funding gaps in research and trials for novel techniques.	Statutory Group on Non Native Species
	Funding to support the control or eradication of INNS is not easy to identify or access.	Develop signposting to sources of funding which have been successfully used in the past (and could be used in future) for survey, control and eradication of INNS.	SNH, SEPA
		Encourage projects that have been funded previously to register with GBNNSS to share experience with others.	GBNNSS
		Investigate opportunities to improve funding of INNS work.	Statutory Group on Non Native Species
		Consider opportunities to use next LIFE funding round to tackle INNS.	SG, SEPA, SNH

5. Scotland's way forward

This supplementary plan forms a clear starting point for action to address gaps in co-ordination, knowledge and funding in Scotland. However, it may be influenced by future policy developments in GB and Europe, and therefore it will be reviewed annually in the first instance, in view of a newly-proposed EU Regulation and a review of the GBNNS strategy which is beginning in late 2013.

A proposed EU regulation

The proposed EU Regulation was announced in September 2013. It will focus on 3 types of action; prevention, early warning and rapid response, and management of established invasive alien species (IAS). This approach aligns with the hierarchy of intervention in the GBNNS Strategy, and promotes a shift towards a more co-ordinated and preventative approach in the management of IAS. This will help EU Member States to prioritise resources and improve efficiency in managing IAS. A black list of those species of highest concern to Member States will be drawn up based on risk assessments and scientific evidence. Selected species will be banned from the EU, making it illegal to import, buy, sell, use or release them.

Implementing the plan

The governance of the plan will be overseen by the Statutory Group on Non Native Species (SGNNS) which consists of representatives from SNH (as the lead co-ordinating organisation), SEPA and the other habitat lead partners.

The first action following publication of this plan will be for the SGNNS to meet and agree the individual tasks and actions identified in the Appendix of this document to develop ambitious but realistic timescales for implementation.

Delivering the strategic actions identified in this plan will be the responsibility of the habitat lead partners identified under the Framework of Responsibilities; this should help to develop a more co-ordinated, efficient approach to the management of aquatic NNS. Progress of actions will be reported annually, by the SEPA representative on the SGNNS.

Local delivery of actions will be largely driven by the RBMP Area Advisory Groups, whose membership includes responsible authorities and key stakeholders. They play an important role in raising awareness, working in partnership and securing funding to deliver actions on the ground. Evaluation of the effectiveness of the plan will be made through the RBMP monitoring and reporting process.

Appendix: Summary of gaps and key actions

Where possible timescales have been included but where they are not yet identified timescales will be agreed with partners as the first action following publication of the plan.

Issue	Gap	Action	Lead	Timescales
Co-ordination	Funding for local co-ordination is not available or hard to identify.	Expand on work begun by SNH to identify funding sources for NNS and directing partners to this information.	SNH, SEPA	
		Advise on sources of funding as they become available and encourage uptake and partnership working through NNS sub-groups and AAGs.	SNH, SEPA, Marine Scotland	
	Understanding of joint funding mechanisms available (across administrative boundaries and organisational boundaries) is incomplete.	Develop and strengthen links with counterpart organisations in England.	SNH, SEPA, Marine Scotland, FCS	
	Mechanisms for assessing the effectiveness of combined efforts for preventing the spread of INNS at the • catchment • cross-catchment and • cross-border scales do not exist.	Periodic review of geographical areas where local action groups are established to – • establish where gaps exist, • assess whether those gaps represent high risk areas and • take action to encourage local action groups to expand into those areas or new local action groups to be established in those areas.	SGNNS	3 yrly
Assessing current condition of the water	An understanding of direct and indirect impacts of riparian species is lacking.	Continue to develop functionality of WFD classification tools to improve assessment of INNS impacts i.e. riparian plants included in	SEPA	Ongoing (depending on resources)

Issue	Gap	Action	Lead	Timescales
environment		MiMAS tool.		
	Complete datasets for all WFD INNS (fully aquatic, riparian and marine) are not available.	Encourage organisations to share data through databases e.g. Scotland's Environment Web (SEweb), Botanical Society of the British Isles (BSBI).	SEPA, SNH	
		Develop appropriate format and protocol for data collection and quality assurance to enable organisations outside the public agencies to include their data in WFD classification.	SEPA	
		Support training for external organisation staff in appropriate identification, data recording and reporting.	SEPA, SNH, RAFTS	
Management	Resources for preventative measures are not easy to identify or access and are not consistently used effectively.	Promote and encourage development of bio-security plans (including for the marine environment) through Area Advisory Groups, directing them to good examples and potential funding sources.	SEPA, RAFTS	2013 onwards
		Expand on work begun by SNH to identify funding sources for NNS and directing partners to this information.	SNH, SEPA	
	The level of understanding of bio-security amongst water users is not consistently high enough.	Continue to raise awareness through campaigns such as "Check, Clean, Dry" and "Be Plant Wise".		

Issue	Gap	Action	Lead	Timescales
	Not enough contingency planning is undertaken for high risk areas or high risk groups of species.	High risk geographical areas and high risk groups of species are prioritised and contingency plans put in place.	SEPA/SNH/FCS/Marine Scotland and local partners	
		Contingency plans are tested with all partners (statutory and relevant NGOs, community group etc) to identify gaps in knowledge, resources and skills.		
		Gaps identified by contingency plans are addressed or contingency plans are adapted to account for gaps that cannot be addressed.		
		Identify resources for aspects of rapid response e.g. provision of training partner staff working at potential points of entry to identify and raise the alarm.	Agencies and organisations north and south of the border	
	Control methods for a large proportion of freshwater and marine INNS have not been developed.	Undertake review of research worldwide for control and eradication techniques (including costs assessment) for all UKTAG high impact species, plus potential new arrivals, to identify gaps that need to be addressed by UK/Scottish partners.	SNH, SEPA, SG	This work has started late 2013 through British-Irish Council Workshop.
		Investigate opportunities to improve funding gaps in research and trials for novel techniques.	Statutory Group on Non Native Species	
	Funding to support the control or eradication of INNS is not easy to identify or access.	Develop signposting to sources of funding which have been successfully used in the past (and could be used in future) for survey, control and eradication of INNS.	SNH, SEPA	

Issue	Gap	Action	Lead	Timescales
		Encourage projects that have been funded previously to register with GBNNSS to share experience with others.	GBNNSS	
		Investigate opportunities to improve funding of INNS work.	Statutory Group on Non Native Species	
		Consider opportunities to use next LIFE funding round to tackle INNS.	SG, SEPA, SNH	