



**The Great Britain Invasive Non-native Species Strategy (2015)
Review**

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Executive summary

This review of The Great Britain (GB) Invasive Non-Native Species (INNS) Strategy (2015) has synthesised evidence from over 70 documents and websites in addition to views of approximately 150 key stakeholders via an on-line questionnaire and semi-structured interviews. This review has found that progress has been made towards all aims of the 2015 Strategy, with notable achievements such as a move away from individual species and towards pathway management, the continued vital role of the Non-Native Species Information Portal (NNSIP) for increasing vigilance, the robust risk assessment and management programmes, awareness raising through targeted campaigns, and collaboration with stakeholders and neighbouring states within the broader biosecurity agenda. The Strategy, under the coordination of the GB Non-Native Species Secretariat (NNS), has continued to drive management responses to the ruddy duck, Asian hornet, topmouth gudgeon, American bullfrog and water primrose amongst others. These successes have been possible despite the relatively low level of funding that is currently afforded to tackling INNS, compared to biosecurity funding as a whole.

There was broad, but weak, consensus amongst stakeholders over the benefit of the actions taken to achieve the aims of the 2015 Strategy. Areas where more progress is needed have been highlighted. Common themes emerged through all elements of the review process, leading to a range of recommendations relating to the chapters of the 2015 Strategy summarised below:

Review of 'Introduction and scope' and 'Strategic aims' - A total of six recommendations were made across the two chapters, relating to:

- Greater acknowledgement of complementary environmental strategies.
- Expansion of timescales for visions, strategic aims and actions to more closely align with both other environmental and ecological timeframes.
- More measurable visions, strategic aims and actions, with greater clarity on how they will be measured and by whom.

Review of 'Prevention' - A total of five recommendations were made for this chapter, relating to:

- A drive to implement all Pathway Action Plans (PAPs) under the next Strategy and continue to develop contingency plans.
- The establishment of an inspectorate and the definition of its roles.

Review of 'Early detection, surveillance, monitoring and rapid response' - A total of six recommendations were made for this chapter, relating to:

- Establishing pathway-specific monitoring.
- Greater coordination with the National Biodiversity Network to help them review data flow protocols.

Review of 'Long-term management and control' - A total of five recommendations were made for this chapter, relating to:

- The need for a concerted effort to coordinate progress towards measured outcomes for established INNS, with key steps involving the identification of priority sites for the management of widely established species, making use of existing and developing best practice and management tools, and establishing appropriate regional coordination of resources.
- Greater consideration of long-term management as part of the ecosystem restoration process.

Review of 'Building awareness and understanding' - A total of six recommendations were made for this chapter, relating to:

- The need for awareness-raising to have an aspirational focus on engaging the general public, through mainstream media, education and an update of the Non-Native Species Secretariat website.
- The need for the awareness raising effort amongst stakeholders to focus on 'Prevention' and 'Research' as these areas had the lowest level of understanding in the questionnaire.
- The need for existing organisations and projects to be acknowledged within the Strategy and engaged through its delivery, such as the Chartered Institute of Ecology and Environmental Management and the Biosecurity for LIFE project.

Review of 'Cross-cutting provisions' - A total of ten recommendations were made for this chapter, relating to:

- A review of where 'on the ground' coordination of effort is needed, particularly with respect to Local Action Groups, but more broadly in terms of drawing resources and expertise together at the most appropriate geographical and hierarchical level.
- The need for much greater strategic guidance for the marine sector, which is lagging behind other sectors in many respects.
- Steps that need to be undertaken to understand why INNS legislation is rarely enforced, how greater enforcement can be encouraged and whether the existing legislation is fit for purpose, including the creation of a publicly accessible repository for applications and 'near misses' of Species Control Provisions.

Review of 'Research' - A total of four recommendations were made for this chapter, relating to:

- The provision of clarity on research objectives, which could be:
 - Maintain biocontrol research momentum but focus on strategic implementation
 - Integrating with novel research streams such as genetic techniques, native predators and biodiversity resilience, and applied research support initiatives such as BioRISC

Review of 'Information exchange and integration' - A total of three recommendations were made for this chapter, relating to:

- Efforts that need to be made to incorporate INNS within Natural Capital approaches and actions relating to the Overseas territories should be strengthened.

Review of 'Implementation and review' - A total of four recommendations were made for this chapter, relating to:

- More resource being needed across the board to ensure that robust rapid response capabilities are effective, and an inspectorate is established, in line with recommendations from the Environmental Audit Committee.

1. Introduction

1.1 Context for this review

'The Invasive Non-Native Species Strategy Framework for Great Britain' (henceforth referred to as 'the 2008 Strategy'), published in 2008 and subsequently reviewed and updated as 'The Great Britain Invasive Non-native Species Strategy' in 2015 (henceforth referred to as 'the 2015 Strategy'), has been the backbone of the co-ordinated response to the overall aim to minimise the risks posed, and reduce the negative impacts caused by Invasive Non-Native Species (INNS) in Great Britain (GB). This report aims to meet an obligation originally outlined in the 2008 Strategy, to "evaluate the Strategy on a five-yearly basis", in this case reviewing the 2015 Strategy. Within this review not only has the Strategy been assessed but evidence has been incorporated from key review exercises from the last two years, a variety of additional documented evidence, as well as novel input from a questionnaire sent to stakeholders and semi-structured interviews conducted with key experts and stakeholders operating in fields crucial to the delivery of the strategy. As part of this process a forward look has been included, taking into account views and opinions gathered as part of the review, providing recommendations on the direction in which the next iteration of the Strategy could take (henceforth referred to as 'the 2021 Strategy').

As part of a balanced appraisal of the Strategy, major changes which have occurred since 2015 that will have affected and will continue to affect the delivery of the Strategy had to be taken into consideration. UK membership of the European Union (EU) has been pivotal in underpinning much of our environmental legislation and policy over the last 40 years. A great deal of progress has been made under initiatives such as the Water Framework Directive, the Habitats Directive, the Marine Strategy Framework Directive and the Invasive Alien Species Regulation, in relation to the management of INNS and the pathways by which they are moved. While there are now opportunities following UK exit from the EU, to introduce novel policies/legislation that may be more appropriate for GB environmental issues, it is vital that our contribution to the collective global environmental issues is maintained, and that we continue to co-ordinate and co-operate at an international level. A challenge for environmental issues posed by INNS are the anticipated changes to trade patterns as a result of EU withdrawal, which will need to be considered.

Since 1st January 2021 the requirements of EU Regulation 1143/2014 on the prevention and management of the introduction and spread of invasive alien species has been retained in domestic law. This provides a mechanism by which target 5 of the European Biodiversity Strategy is implemented, where species of special concern (known as species of Union concern under the EU Regulation) and other INNS and their pathways are identified and prioritised, with priority species controlled or eradicated, and pathways managed to prevent the introduction and establishment of new species of special concern or those INNS species identified as requiring emergency measures. The retained EU law facilitates the implementation of restrictions on the trade, keeping and movement of species of

special concern, and the development and implementation of pathway management plans and species management. This has become an essential tool in the delivery of over-arching UK INNS policy and therefore the Strategy.

The COVID-19 pandemic has highlighted the close link between societal and environmental resilience, with the frequency and magnitude of zoonotic disease events likely being exacerbated by severe food production mechanisms and biodiversity loss. The pandemic will inevitably have slowed the delivery of environmental policy such as INNS management. However, it may have helped to raise awareness of biosecurity issues in a more general sense, and will be followed by the UK Government's Green Industrial Revolution, which promises to put the environment at the centre of the UK's economic recovery out of the pandemic, including prioritising the creation of conservation jobs and establishing large-scale landscape restoration projects.

Climate change is another key consideration. Globally, the previous decade was the hottest on record, and we have witnessed emerging patterns of drought, flood and wildfire events. This decade marked a significant period in the progression towards the objective of net zero carbon emissions by 2050⁶¹. The UK target to reduce emissions by 63% from 2019 to 2035 will have a considerable impact on our water and energy infrastructure⁶¹. A substantial increase in the amount of renewable energy infrastructure and novel water transfer networks are opening up new pathways for the transfer of INNS with climate change facilitating the further spread of some species.

The 2015 Strategy consists of ten chapters covering the following points. The first two chapters set the context:

Chapter 1 – Introduction and scope: This chapter outlines the need for the 2015 Strategy and its overall visions and gives context and justification for its necessity. It also highlights key success since the 2008 Strategy.

Chapter 2 – Strategic aims: This chapter provides the overarching aim of the 2015 Strategy and breaks this down into specific strategic aims that are addressed by actions within the following thematic chapters.

The following chapters follow a similar structure of focusing on a specific topic of invasion biology relevant to the implementation of the 2015 Strategy, providing background, actions relevant to the topic covered by the 2008 Strategy, the relevance to UK policy and how it relates to other topics covered in the document. This is then followed by an objective and up to ten key actions.

Chapter 3 – Prevention: A key principle of invasion biology is preventing or reducing the risk of INNS introduction and spread.

Chapter 4 – Early detection, surveillance, monitoring and rapid response:

Early detection, surveillance and monitoring: This section of the chapter covers the essential process of detecting INNS early in the invasion process and evidencing the effectiveness of management measures e.g. population control and biosecurity.

Rapid response: This section of the chapter covers the process of responding to new introductions in a timely and structured manner.

Chapter 5 – Long-term management and control: This chapter includes actions covering the control, containment and/or eradication of species already established within GB.

Chapter 6 – Building awareness and understanding: This chapter covers the essential process of raising awareness and of disseminating information on the actions being taken and actions that people can take to aid in the control of INNS. This includes actions covering information delivery mechanisms such as the NNSS website and the Communications Working Group.

Chapter 7 – Cross-cutting provisions:

Governance and coordination: This section of the chapter covers the mechanisms by which the implementation of the 2015 Strategy is co-ordinated, specifically the Non-Native Species Secretariat (NNSS), INNS Programme Board (PB), Working Groups and Stakeholder Forum.

Prioritisation and risk: This section of the chapter covers the risk assessment process used by the NNSS to provide evidence to support decision making processes in prioritising effort.

Legislation: This section of the chapter covers the support process for the development and implementation of relevant legislative framework for the implementation of the 2015 Strategy.

Chapter 8 – Research: This chapter covers the co-ordination of a robust, strategic and coherent research programme to support policy. This includes the mechanism to support this work area in the form of a Research Working Group.

Chapter 9 – Information exchange and integration: This chapter covers action relevant to keeping up to date with developments domestically and internationally in addition to effective dissemination of information.

Chapter 10 – Implementation and review: This chapter covers actions relevant to the development and implementation of a plan for the delivery of the actions covered within the Strategy and the evaluation of the Strategy every five years.

1.2 Objectives of this review

The aim of this report is to review the 2015 Strategy, identifying what has gone well and what could have been done differently. Using this information, the report will present two primary outputs, with supporting recommendations:

- A retrospective review of the 2015 Strategy, and;
- A forward look on how the 2015 Strategy needs to be developed, considering the changing landscape, in order to inform the development of the 2021 Strategy.

A glossary of terms, abbreviations and definitions can be found in Appendix 1 .

2. Outline of approach

Three forms of evidence were reviewed in this report; 1) a review of key documents, 2) perceptions gathered by a stakeholder questionnaire, and 3) perceptions gathered by semi-structured interviews with key experts and stakeholders. Certain chapters, such as 'Prevention', are action-dependent and were assessed by documented evidence relating to those actions as well as opinions, while other chapters, such as 'Strategic aims' are not tied to measurable outcomes and the assessment therefore relies more heavily on stakeholder opinion.

2.1 Review of documents

A 'core list' of 29 documents were reviewed in order to assess the progress made towards the aims of the Strategy (Appendix 2), which included (an updated) Retrospective analysis which has been carried out by the NNS with input from the GB Administrations and their agencies, The Environmental Audit Committee (EAC) Invasive Species Report and Government Response, The European Commission's review of UK implementation of the EU IAS Regulation and output from the 2008 Strategy review exercise. A 'supplementary list' of 43 documents and websites was compiled and reviewed during this process (Appendix 3). These additional documents were considered to contain either invaluable evidence with respect to the implementation of the 2015 Strategy, or information of significance to the future direction of the Strategy. Documentary evidence will be cited within the report, following a statement, as a super script number ⁽¹⁻⁷²⁾. If a website source has been referenced (infrequent), it is referenced by footnote Roman numerals on the same page (i).

2.2 Questionnaire

2.2.1 Stakeholder criteria, questionnaire dissemination and design

The list of stakeholders to which the questionnaire was sent contained representatives from 232 organisations or individuals in all three GB Administrations, representing Governments, Government agencies, Non-Government Organisations (NGOs), Local Action Groups (LAGs), industry, the private sector, universities and charities in addition to identified INNS experts. The organisations represented those operating in terrestrial, freshwater and marine environments. The list was compiled from a combination of key stakeholders known to APEM, DEFRA and partners in the Welsh and Scottish Governments. Overseas Territories (OTs) stakeholders were not included in the questionnaire stakeholder list, as, given that the environment is devolved in the OTs, the OT obligations of the 2015 Strategy are largely advisory, rather than provision of systemic strategic guidance. The full list of stakeholder organisations is provided in Appendix 4. The questionnaire was designed on the survey platform 'SurveyMonkey', to be disseminated electronically as a website link, along with an explanation about why the questionnaire was being conducted. The questionnaire was made available in Welsh and English and approved by the DEFRA Survey Control Unit prior to dissemination. On the 9th June 2021, the questionnaire was simultaneously sent out via email to 209 of the stakeholders by APEM and

to stakeholders in Wales via the Wales Biodiversity Partnership. The link to the questionnaire was also posted on the NNS website news page, as well as being shared on APEM's social media platforms. It was available to complete until the 12th July 2021. It contained 44 questions in total, four questions designed to gather background information on the respondents and 40 to gather the opinions of respondents relating to all chapters of the 2015 Strategy. The questionnaire was divided into thematic sections, broadly corresponding with the chapters of the 2015 Strategy. There were two styles of question; 23 item-specific/ Likert scale multiple choice, and 17 open-ended text questions. All multiple-choice questions offered a 'Don't know' option, however, in order to keep these responses to a minimum, explanatory information was provided at the beginning of each thematic section, giving enough context, with links to documented evidence, for the respondent to make an informed response. Some chapters of the 2015 Strategy were merged within the thematic sections of the questionnaire to reduce the number of sections. A copy of the questionnaire is provided in Appendix 7 (NB. appendices are not presented in numerical order in the text so the questionnaire and largest appendix is last).

2.2.2 Likert scale/ Item-specific multiple-choice questions

Likert scale multiple choice questions are frequently used in questionnaires as they provide a standardised question framework to rapidly gather semi-quantitative opinion data, allowing comparison between questions or groups of questions⁶⁴. Questions using the Likert scale ask the respondent to what extent they agree or disagree with a statement. In this questionnaire the Likert questions allowed six multiple-choice responses:

- Strongly disagree (strongly negative response; score = 1)
- Disagree (negative response; score = 2)
- Neither agree nor disagree (neutral response; score = 3)
- Agree (positive response; score = 4)
- Strongly agree (strongly positive response; score = 5)
- Don't know (indicates that the respondent does not know enough about the subject in order to make an informed response; not scored)

Likert scale questions were used to ascertain stakeholder perceptions on how the 2015 Strategy had facilitated meeting its strategic aims, outlined in Chapter 2. Item-specific multiple-choice questions are a variant of the Likert scale, whereby the responses are more tailored to the subject of the question, but the same five-point scoring system can still be applied to the responses. Item-specific multiple-choice questions were used to assess how beneficial stakeholders perceived specific actions set out by the 2015 Strategy that seek to make progress towards the strategic aims and allowed six multiple choice responses:

- Highly detrimental (strongly negative response; score = 1)

- Detrimental (negative response; score = 2)
- Neither beneficial nor detrimental (neutral response; score = 3)
- Beneficial (positive response; score = 4)
- Highly beneficial (strongly positive response; score = 5)
- Don't know (indicates that the respondent does not know enough about the subject in order to make an informed response; not scored)

One draw-back of multiple-choice questions is the 'acquiescence response bias'– the tendency for respondents to select more positive responses, to be seen as agreeable, without the response being a true reflection of their own position. This phenomenon can lead to the overall response score being inflated, which should be considered when interpreting the output; greater importance should be attributed to the relative value, as opposed to the absolute value of the scores resulting from each question. Therefore, the results of the questionnaire are provided through graphical summary and citation of summary statistics (means and standard deviations (SD)). Graphical summary of data does not include the percentage of respondents who indicate 'Don't know' (with the exception of question 7, Figure 5) and therefore the percentages do not sum to 100%. The data from 'Don't know' responses was analysed separately and is presented in Figure 15. Question 7 was not included in this analysis because it was asking about a future action.

2.2.3 Open-ended questions

Open-ended text questions were also asked in order to ascertain where respondents believed the least and most progress had been made in relation to the specific thematic chapters of the Strategy. The length of the response was capped at 1500 characters in order to keep the volume of data manageable. These questions allow qualitative information about a subject to be volunteered by a respondent, avoiding the constraints of a multiple-choice framework, such as acquiescence response bias. They also provide an opportunity to voice opinions on issues not covered by the multiple-choice questions. In this way, the open-ended questions were designed to complement the multiple-choice questions and provide more detailed opinion data. Open-ended questions were also used to gather views on specific issues, such as recommendations made by the EAC.

In order to display the results of the open-ended questions, the 'SurveyMonkey' word cloud analytical tool was used. This tool identifies key words or phrases from all responses to a question (1 - 5 words) and calculates the percentage of responses in which they occur. The number of key words identified will vary between questions, and so in order to standardise the data presented, percentage of occurrence for the top 50% of key words for each question is displayed. Common words such as 'the' and 'from' were excluded by the word cloud tool (see Appendix 5 for list of words excluded) and words used within the question were also excluded. Excerpts capturing key sentiments have also been taken from certain responses and displayed in the report.

2.3 Semi-structured interviews

2.3.1 Key stakeholder and expert criteria

The purpose for the semi-structured interviews was to provide a more detailed perspective on the 2015 Strategy and its future direction. Therefore, the participants were chosen because they have been heavily involved with the delivery of at least one thematic element of the 2015 Strategy. The list of key stakeholders and experts was agreed with the three GB Administrations at an early stage and these were organised into thematic groups (hereafter referred to as 'discussion groups'). The full anonymised list of organisations represented by the participants in each discussion group is provided in Appendix 6

2.3.2 Semi-structured interview methodology

Semi-structured interviews are in-depth discussions where the participants are guided through some predetermined open-ended questions or topics, whilst allowing scope to explore subjects that the participants feel are relevant, or subjects that naturally emerge as part of the discussion. The discussion groups were conducted with individuals or small groups (six people maximum), between the 1st June and 1st July 2021. The interviews lasted between 60 and 90 minutes. The interviews took place using video-conferencing platforms and were recorded (following participant consent) in order to effectively capture the interview data. Notes were then compiled, summarising the conversations that took place within each of the discussion groups. The summary note from each discussion group was designated a letter (see Appendix 6), which will be cited as evidence within the report, following a statement, as a super script, lower-case letter (^{a-s}). When discussion groups and documents are being cited as evidence for the same statement, the discussion groups will be cited before the documents, separated by a comma, for example; statement ^{ab,23}.

3. Results and synthesis

Overview of the questionnaire responses

A total of 126 people responded to the questionnaire, of which 42 only filled out the background information questions (questions 1-4) and did not complete any other part of the questionnaire. These 42 respondents were not included within further analysis. Respondents operated in organisations from all three GB Administration areas, as well some that represent the whole of the UK, and a smaller number that represent GB specifically (Figure 1A). The majority (81%) of respondents were aware of the 2015 Strategy; they had read it at least in part and were aware of the key features of the strategy (Figure 1B). This can be interpreted two ways: 1) we effectively selected key stakeholders, and/ or 2) overall stakeholder awareness of the 2015 Strategy is high. A broad range of organisation types responded to the questionnaire (Figure 1C), but the largest group of respondents (n = 22; 26%) were from 'Environmental' organisations. This group comprised mostly rivers trust and wildlife trust organisations, as well as smaller conservation charities.

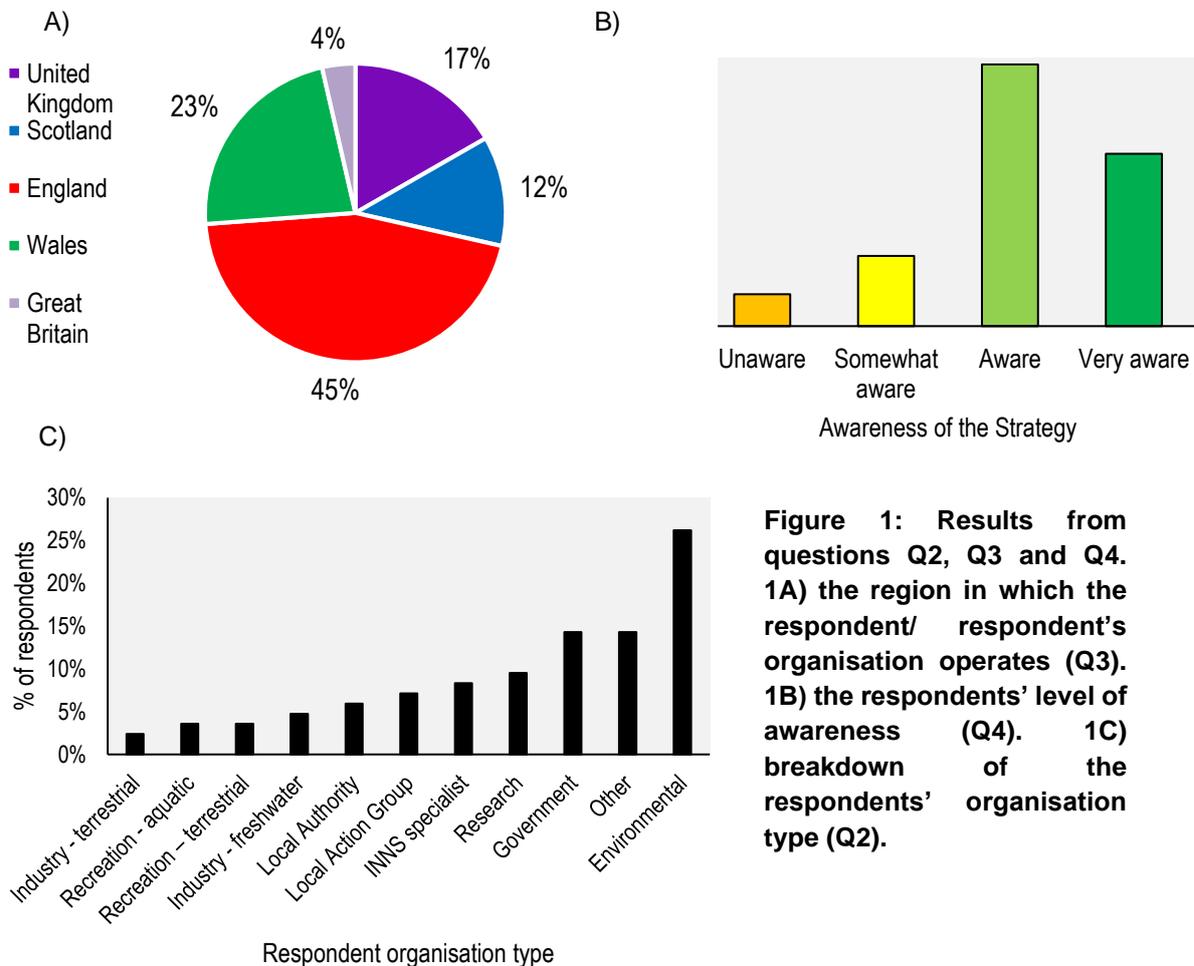


Figure 1: Results from questions Q2, Q3 and Q4. 1A) the region in which the respondent/ respondent's organisation operates (Q3). 1B) the respondents' level of awareness (Q4). 1C) breakdown of the respondents' organisation type (Q2).

3.1 Review of 'Introduction and scope'

Retrospective review:

The visions of the 2008 Strategy were to provide:

- widespread awareness and understanding of the risks and adverse impacts associated with invasive non-native species, and greater vigilance against these;
- a stronger sense of shared responsibility across government, key stakeholder organisations, land managers and the general public; and
- a guiding framework for national, regional and local invasive non-native species mitigation, control or eradication initiatives.

Given the success of these visions with the implementation of the 2008 Strategy, two additional visions were added to the 2015 Strategy:

- integration of INNS within the broader biosecurity agenda;
- improved co-ordination and co-operation on INNS issues at a European and international level.

No specific questions were asked in relation to the visions as part of the questionnaire as the review of all other elements of the 2015 Strategy was considered to reflect on the success of the overall visions. Additionally, the overall visions were considered too broad and esoteric to be appraised by a closed multiple-choice response and were therefore discussed during the semi-structured interviews. Overall, the opinion was that the visions had been fulfilled with strong successes in relation to the main elements. Such as:

- the continued efforts on the awareness raising campaigns, leading to more widespread understanding of the risks and adverse impacts associated with INNS;
- the success of the NNSIP for increasing greater vigilance;
- a move away from a focus on individual species and towards management of pathways;
- the collaboration of stakeholders aiding in the integration with the broader biosecurity agenda; and,
- a strong sense of responsibility.

Forward look

Support was widely voiced amongst discussion groups to align the 2021 Strategy with other national and international environmental sustainability strategies ^{dfii}. The targets to be set out in The Post-2020 Global Biodiversity Framework (CBD) have not been finalised, but the latest draft of the target pertaining to INNS is:

The Post-2020 Global Biodiversity Framework (Target 6)

Manage pathways for the introduction of invasive alien species, preventing, or reducing their rate of introduction and establishment by at least 50 per cent, and control or eradicate invasive alien species to eliminate or reduce their impacts, focusing on priority species and priority sites.

A general consensus was for Target 6 to be incorporated into the vision of the Strategy and the 2021 Strategy will therefore need to define how we will measure our progress towards the first part of Target 6 ^{dfj}. The UK Government's 25 Year Environment Plan for England acknowledges the importance of the 2015 Strategy for leading on INNS issues, while the Welsh Government's Nature Recovery Action Plan and the Scottish Government's Scottish Biodiversity Strategy recognise the significant impacts of INNS. The aims and actions of the 2021 Strategy should therefore closely link to the plan, where appropriate ^{df}. Climate change is likely to affect INNS in two ways that should be reflected within the vision; 1) the creation of novel pathways of introduction through climate change mitigation measures, and 2) provide conditions for established NNS to become invasive or facilitate the arrival of new INNS through existing pathways ^c.

There was a mixed range of opinions concerning the inclusion of pathogenic INNS into the 2015 Strategy. While there was a clear view amongst many groups as to the need for their inclusion and consideration, the main consensus was that processes already exist for the management of pathogens as a whole in GB and that the inclusion of pathogenic INNS such as *Aphanomyces astaci*, the invasive non-native water mould that causes the lethal disease crayfish plague in native European crayfish species, within the Strategy could weaken the existing processes ^{dn}. However, given the increasingly recognised importance of pathogenic INNS and INNS as vectors of disease a more clearly defined component to address this issue needs to be considered. It is therefore suggested that as a long-term overarching issue this would best fit as an extension of the visions. The recommendations for the 'Introduction and scope' chapter of the 2015 Strategy are outlined below:

Recommendation 1.1: Achieve greater synergy with other national and international environmental strategies, namely Targets within the Convention on Biological Diversity, and the GB Administration's relevant environmental plans.

Recommendation 1.2: Extend the timescale over which the visions of the Strategy apply to align with the timescale of other environmental strategies. It is suggested that the visions of the strategy should be set to a time scale more relevant to invasion biology (e.g. 25 years) with aims being set over a 10-year time frame and actions set over a 5-year period.

Recommendation 1.3: Expand the visions to more clearly acknowledge climate change, including those INNS that have established/ or those NNS that have become invasive as a consequence of climate change.

Recommendation 1.4: Expand the visions to include a clearly defined element in relation to the integration and alignment of the 2021 Strategy with actions being undertaken to manage and control pathogenic INNS and INNS as vectors of disease.

3.2 Review of 'Strategic aims'

Retrospective analysis

One strategic aim was removed from the 2008 Strategy, leaving eight in the current Strategy (stated below – these have been re-ordered so as to reflect the structure of the chapters within Strategy, also given):

- Chapter 3 - to reduce and, where possible, prevent the intentional and unintentional introduction of INNS;
- Chapter 4 - to make optimum use of available capacity and resources to improve detection and monitoring capabilities;
- Chapter 4 - to ensure, where possible, that effective contingency response capabilities are in place to prevent the establishment of new invasions;
- Chapter 5 - to help ensure that strategic action to control established INNS is adequately resourced and delivered;
- Chapter 6 - to achieve an appropriate level of awareness of non-native species issues and promote appropriate changes in behaviour or attitudes throughout all relevant sectors;
- Chapter 7 - to provide clarity and co-ordination of responsibilities and functions within government and its associated bodies;
- Chapter 7 - to improve co-ordination of actions to tackle INNS in partnership with key interest groups outside government; and,
- Chapter 8 - to identify gaps and priority areas for further development.

Most of the discussion groups considered the strategic aims to be appropriate for the time ^{abdhkmoqprs} and some went further, proposing that the aims are still pertinent today ^s. There were also groups that questioned the continued relevance of some of the aims in light of significant landscape changes since the adoption of the 2015 Strategy ^{emoq}. A small number of groups suggested that the aims could be more ambitious ^j in relation to what the Strategy is trying to achieve and its long term aims.

Eight questions were asked within the questionnaire, corresponding to each strategic aim, asking the respondent to what extent they agreed/disagreed that the 2015 Strategy had facilitated GB in meeting the respective aims. Generally, there was a weak agreement by stakeholders that the Strategy had helped to ensure achieving the strategic aims (mean: dotted line in Figure 2 = 3.43), but there were clear differences between the themes of the 2015 Strategy (Figure 2). The SDs for all responses were similar, indicating there was a consistent range in the responses across all strategic aims, except for aims relating to 'Prevention' and 'Research', where smaller SDs indicated greater agreement amongst respondents.

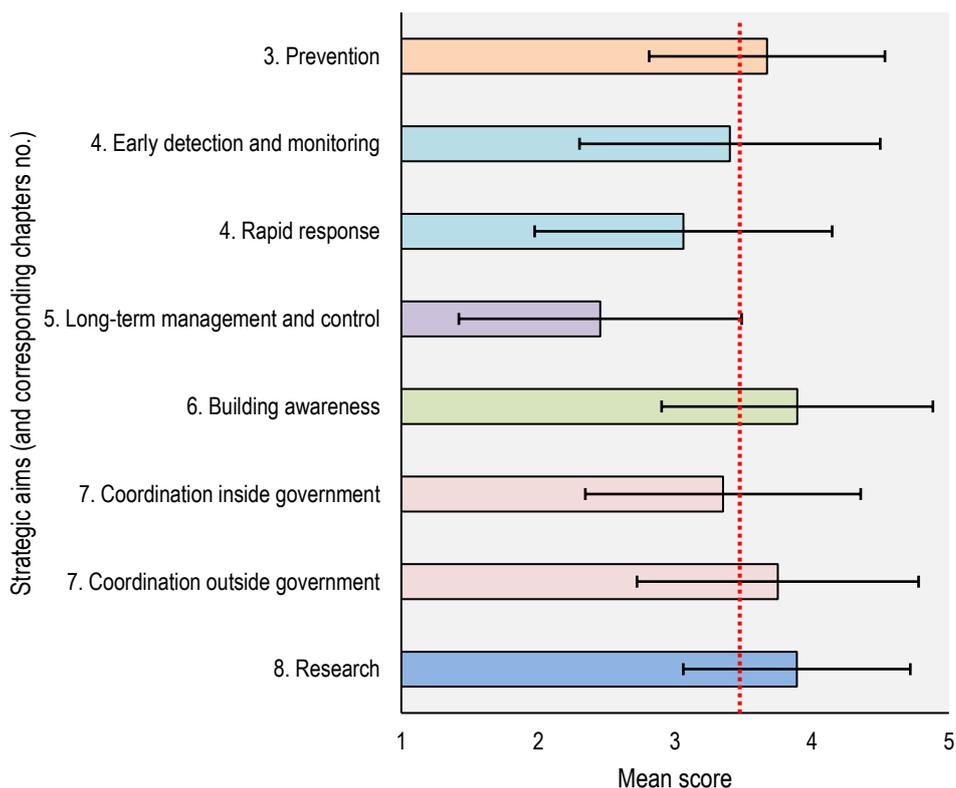


Figure 2: The mean scores from questions asking to what extent they agreed/disagreed that the Strategy had facilitated GB in meeting the key strategic aims relating to respective themes. A score of 1 indicates strong disagreement, while a score of 5 indicates strong agreement. Error bars represent SDs and the dotted line represents the mean across all questions.

‘Building awareness’ and ‘Research’ were areas where the 2015 Strategy was perceived to have helped the most with respect to meeting their strategic aims, while ‘Rapid response’ and ‘Long-term management and control’ were highlighted as areas where there has been less progression (Figure 2). In broad agreement with the questionnaire results, several of the discussion groups did not believe that the strategic aims had been fully met ^{bjks}. Two common explanations for this were 1) lack of resource ^{rs}, and 2) the aims are not tied to measurable outcomes, making it difficult to quantify the progress made ^{ajos}.

Forward look

The aims were generally considered to be fit for purpose in relation to the next iteration of the Strategy but needed to be more specific, measurable and ambitious. For example, the updated strategic aim within the 2021 Strategy for ‘Prevention’ could be:

- to reduce the number of intentional and unintentional introductions of INNS each year over the next 10 years, such that there are half the number of introductions detected in 2031 compared to 2021.

The updated strategic aim within the 2021 Strategy for 'Long-term management and control' could be:

- to have established appropriate eradication, control or containment measures for priority INNS, such as the widely established Species of Union Concern in England and Wales (alternatively risk assessment criteria could be used to determine priority INNS), at priority sites (these will need defining, but see recommendation 5.2, Section 3.5) by 2031.

A common view amongst discussion groups was that the strategic aims need to be made long term to fit in with the time scale over which INNS management needs to be implemented^d. This aligns with the recommendation for the overarching vision of the 2021 Strategy to be considered over a 25-year time scale, with the aims set over a 10-year period. The recommendations for the 'Strategic aims' chapter of the 2015 Strategy are outlined below:

Recommendation 2.1: Make the actions more explicitly related to the strategic aims of the Strategy

Recommendation 2.2: The strategic aims contained within the 2021 strategy need to be outcome driven; more clearly defined and measurable, including timescales to completion (e.g. SMART planned).

3.3 Review of ‘Prevention’

Retrospective analysis

From the original target, to risk assess 26 species and four pathways⁴⁰ (based on the 2003 INNS policy review), substantial progress has been made. Risk assessments have been completed for 116 speciesⁱ, while 36 pathways have been analysed and prioritised, yielding six priority pathways³¹ for development of Pathway Action Plans (PAPs), but only three have been completed to date and are awaiting consultation²; 1) zoos/aquaria³⁴, 2) angling³² and 3) recreational boating³³. Although pathway prioritisation and PAP development were considered by stakeholders as beneficial (mean score = 4.13, SD = 0.59 and mean score = 4.10, SD = 0.62, respectively, Figure 3) with 82% and 89% of respondents believing the actions to be beneficial or highly beneficial for the delivery of the Strategy, GB has failed to meet 2020 CBD Target 9, to develop PAPs for all priority pathways. This will need urgent attention in order to meet the anticipated Post-2020 CBD Target 6.

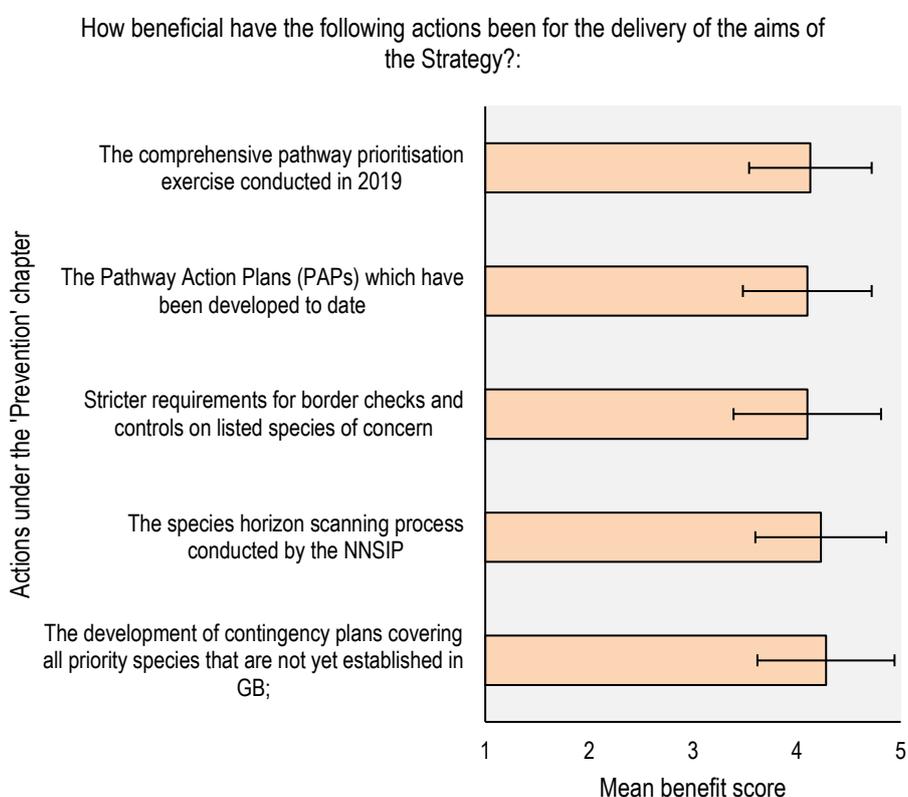


Figure 3: The mean scores from question 6; asking how beneficial the respondent considered different actions under the ‘Prevention’ chapter to be. A score of 1 indicates highly detrimental, while a score of 5 indicates highly beneficial. Error bars represent SDs.

ⁱ <http://www.nonnativespecies.org/index.cfm?pageid=143>

'Pathways' was the second most frequently used key words identified in response to question 8, regarding where the least progress had been made within this theme (contained in 11% of responses, Figure 4A). Conflictingly, 'Pathways' was also one of the two most frequently used key words identified in response to question 8, regarding where the most progress had been made within this theme (contained in 14% of responses, Figure 4B). This conflict may be explained by a lack of general awareness of the actions under 'Prevention', indicated by a large proportion of respondents selecting 'Don't know' response to question 6 (Figure 3), regarding the benefit of the pathway prioritisation and PAP development actions (38% each, see Box 2 - Section 3.6). Horticultural plants and horticultural contaminant PAPs are under development, with extensive stakeholder involvement ^m, and a working group was established in January 2021². Rapid completion for these PAPs and continued close co-ordination with the horticultural trade were called upon by numerous discussion groups ^{beno}.

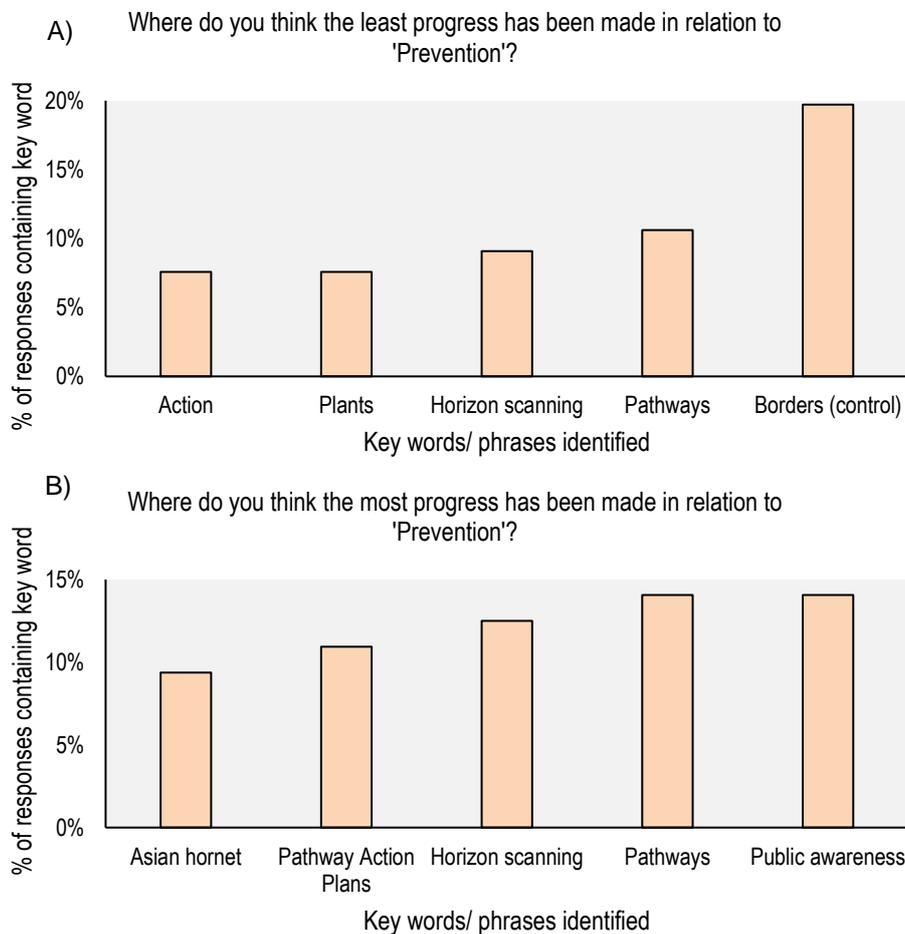


Figure 4: The top 50% of identified key words according to the percentage of answers containing key word for A) question 8, and B) question 9.

Furthermore, to our knowledge, little progress has been made in terms of implementing the PAPs, with the exception of regional initiatives led by Water Companies, to implement the PAP for recreational boating. This regional progress is believed to have been partially facilitated, by the development of

Regional Invasive Species Management Plans (RIMPs) through the RAPID-life project in England³⁵⁻³⁹, partly to cover the gaps in the RIMPs. However, the funding period for this project has lapsed, leaving a gap in regional coordination of PAP implementation and so a concerted effort will be required to advance PAP implementation in England (see more in Section 3.7.1. Governance and Coordination). Border checks at ports and airports under the IAS (Enforcement and Permitting) Order 2019 are undertaken by Border Force and Animal Health and Plant Health Inspectors from the Animal and Plant Health Agency (APHA) inspectors for listed 'species of special concern'². This action was perceived to be beneficial by stakeholders (mean score = 4.10, SD = 0.59, Figure 3) with 80% of respondents believing it to be beneficial or highly beneficial for the delivery of the 2015 Strategy. However, 'Border control' was considered to be the action under 'Prevention' where the least progress has been made, occurring in 20% of the answers to question 8 (Figure 4A). A horizon scanning exercise completed in 2014 identified two key INNS that have since been recorded and of the top ten priority species identified by this exercise, 8 are now present in the UK³, several of which are marine species. The horizon scanning exercise has recently been repeated through the NNSIP. Led by CEH, the horizon scanning exercise began in summer 2019 and culminated in a consensus building workshop in December 2019. As requested, the exercise included species that impact on economic and human health interests as well as environmental ones. Combining the three lists into a single unified list was carried out in 2020 and finalised in August². There was a consensus amongst stakeholders that the 'Horizon scanning' was effective, being the third most frequently used key words identified in response to question 9, regarding where the most progress had been made within this theme (contained in 13% of responses, Figure 4B). Of the four responses that mentioned 'Horizon scanning' in response to question 9, regarding where the least progress had been made within this theme, three of the responses cite the action as being effective, but go on to criticise the implementation of the horizon scanning process, with gaps in the process relating to visibility of potential INNS in trade, such as the ornamental and horticulture sectors. This is in agreement with the conclusions of the EAC; GB are effective in predicting novel species introductions but there is a disconnect between this knowledge and our ability to prevent them from establishing, which is likely due to the slow progress to tackle pathways³ and carry out contingency/rapid responses. This was raised as being particularly relevant in relation to marine species where no actions were carried out in relation to the arrival of certain marine horizon species. While generic contingency plans have been developed across England, Wales and Scotland, they are not species-specific and have only been put out for consultation with stakeholders within England. The contingency Plan for the Asian hornet (*Vespa velutina*) has thus far provided a robust framework to co-ordinate a response to incursions, outlining detection, interception, eradication, containment and long-term management measures⁶⁵. However, such plans do not exist for other species to the same extent. It was acknowledged in discussion groups that improvement was needed in terms of getting contingency plans in place and training staff to respond to novel detections ⁶⁶. It should be noted however, that not all of these plans are in the public eye, being targeted at government and agencies, and therefore some discussion groups may not have been aware of these.

Forward look

PAPs should be rapidly developed and implemented within the next five years. Concerns over water resources have required the Water Industry to expand their Raw Water Transfer (RWT) network. This pathway was not considered within the pathway prioritisation exercise as it was not responsible for introductions³¹ but was mentioned in the EAC report. It will be a major consideration for secondary spread over the next five years and requires explicit attention. Additionally, the risk of introduction posed by online commerce such as through eBay and Gumtree has not been adequately addressed, and bans should be applied sooner and for more species³. Contingency plans should continue to be developed and steps should be taken to test them on an annual basis under a broad range of scenarios. A key recommendation from the EAC for the establishment of an INNS Inspectorate was an issue raised by numerous discussion groups ^{adejklq} and when stakeholders were asked whether they thought the establishment of an inspectorate would be beneficial for meeting the aims of the Strategy, the response was the most positively answered question in the entire questionnaire, with the lowest percentage of answers indicating a ‘Don’t know’ response (mean = 4.58, SD 0.57, ‘Don’t know’ = 8.43%, Figure 5). Support was also shown for their role to be outlined within the 2021 Strategy ^{dl}. Initial considerations and roles for an INNS inspectorate, gathered during the semi-structured interviews, are outlined in Box 1.

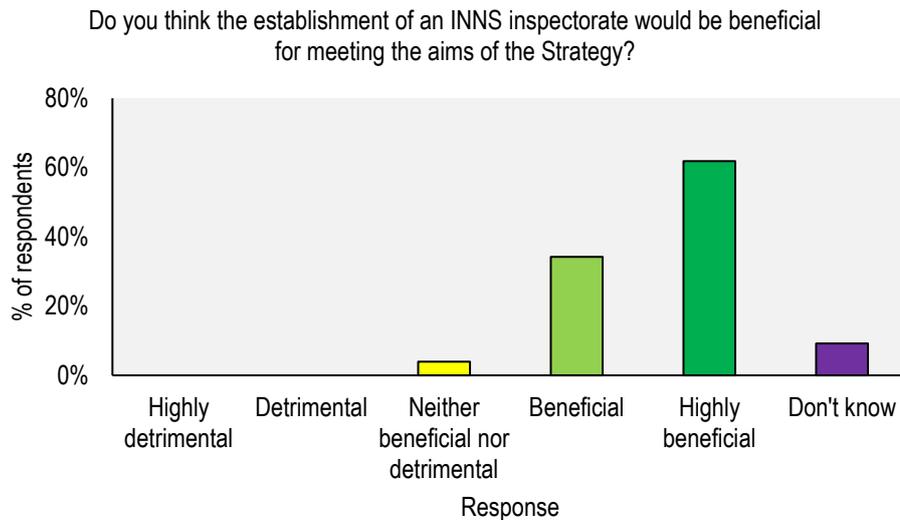


Figure 5: The percentage of respondents in different response categories from question 7.

Box 1: The potential role of an INNS Inspectorate

An Inspectorate taskforce has already been established and are already dealing with a wide range of enquiries^{fi}. In order to be effective, it was stressed that the inspectorate would need to be adequately resourced^{eklr}, well-co-ordinated with other inspectorates^f and have sufficient powers; perhaps requiring additional legislation^{bf}.

Potential roles to include:

- Border control checks including checking of commodities^{dj}.
- Educating and raising awareness with stakeholders in key pathways^d.
- Strategic oversight and coordination, ensuring adoption of best practiceⁱ.
- Inspecting ornamental and horticultural trade stock
- Auditing biosecurity measures in industry^r.
- Investigation and rapid response to releases, escapes and new species incursions^{djl}.
- Utilisation of SCA and SCO powersⁱ.
- A centre of expertise for long-term managementⁱ.

Another key consideration from some groups was in relation to enforcement and delivery of Inspectorate actions within the marine environment. It was perceived that this was not clear especially in light of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWMC). The recommendations for the 'Prevention' chapter of the 2015 Strategy are outlined below:

Recommendation 3.1: Action 3.3 (to develop PAPs for priority pathways) should be retained and updated to reflect the lack of progress made in developing PAPs:

Develop PAPs for all six priority pathways identified by the pathway prioritisation exercise, in partnership with relevant stakeholders, by 2025.

Recommendation 3.2: Include a new action in the future Strategy with explicit targets for PAP implementation.

Recommendation 3.3: Establish a protocol for horizon scanning for new establishing pathways and within existing pathways (such as online trade).

Recommendation 3.4: Continue to develop contingency plans. Contingency plans should be tested annually to ensure that resources are available, and actions and responsibilities are understood.

Recommendation 3.5: To outline the role of the inspectorate in the next version of the Strategy.

3.4 Review of ‘Early detection, surveillance, monitoring and rapid response’

3.4.1 Review of ‘Early detection, surveillance and monitoring’

Retrospective analysis

The Non-Native Species Information Portal (NNSIP) was delivered through the NNS in collaboration with the Centre for Ecology & Hydrology (CEH), the British Trust for Ornithology (BOT), Botanical Society of the British Isles (BSBI), and the Marine Biological Association (MBA) under the 2008 Strategy. It performs the fundamental role of hosting an online database of species records and alert system to which novel arrivals are reported. The reports are then rapidly verified and followed up¹⁵. NNSIP was updated in 2017² and has continued to play a pivotal role in providing alerts on early detections such as the Asian hornet (*Vespa velutina*). Since the publication of the Strategy, the alert system has received over 27,500 records². A large proportion (41%) of stakeholders considered NNSIP to be an effective repository for species distribution data, although 9% considered it to be either ineffective or highly ineffective, suggesting that some improvements could be made (Figure 6A).

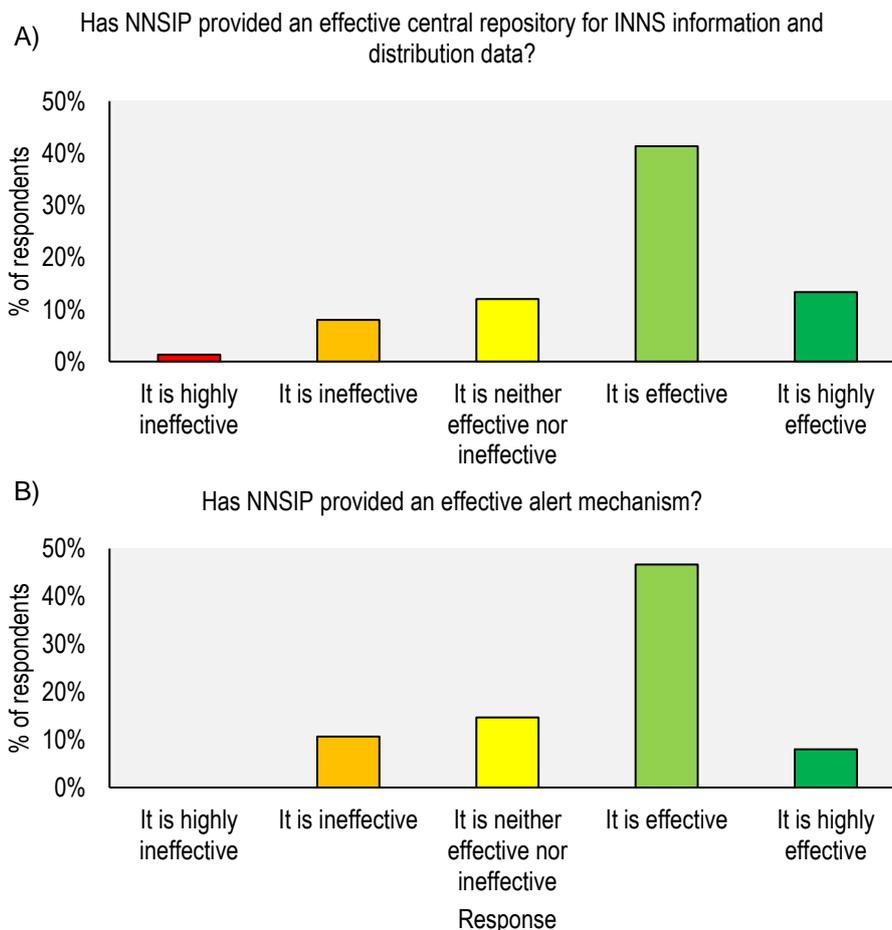


Figure 6: The percentage of respondents in different response categories for A) question 12, and B) question 13.

A large proportion (47%) of stakeholders considered NNSIP to be an effective alert mechanism for INNS, although 11% considered it to be ineffective, suggesting that some improvements could be made to this element of the mechanisms as well (Figure 6B). Alert systems in key pathways have been developed, such as the citizen science initiative, 'Plant Alert' app for the ornamental plant garden escape pathway⁵⁵. Similarly, the development of the 'Asian Hornet Watch' app, developed through CEH, has added substantial value to the already-effective, Asian hornet surveillance system (with 40,000 registered beekeepers being engaged as surveillance agents³), which was perceived as highly beneficial by stakeholders (mean score = 4.49, SD = 0.56). The data are provided to DEFRA's National Bee Unit and NNSIP, with over 2,000 records managed in the month after an Asian hornet detection event in 2016. Such initiatives also perform targeted awareness raising functions, with Plant Alert communicating concepts such as 'native swaps', where they promote native alternatives to desirable non-native ornamentals. Plant Alert and other citizen science initiatives such as 'iRecord', as well as the network of Recording Schemes and Societies provide annual updates to NNSIP. This information is then shared with the National Biodiversity Network (NBN) Atlas, the chief species distribution database in the UK. It was pointed out by discussion groups that some "charismatic INNS" such as the Asian hornet, are both easier to identify and easier to engage the public and stakeholders over, which has likely aided their success^b. This has led to blind spots in surveillance and alert systems, where many, equally damaging species could be overlooked because they represent an eclectic mix of taxa that are less easy to raise awareness on and require expert knowledge to identify^b. Issues with the NBN were also identified in relation to the speed in which information is updated as well as verification of information.

Forward look

Two out of the three PAPs that have been developed make no specific mention of monitoring other than monitoring of awareness and behavioural uptake³²⁻³⁴. However, this information alone does not evaluate the effectiveness of the plan and its implementation in the long run. INNS surveillance protocols are required in conjunction with awareness monitoring in order to evaluate if measures are effective. The zoo PAP does mention that any escapes should be recorded³⁴. Although initiatives such as BPW and Plant Alert are doing good work in engaging the horticulture trade and its customers on INNS awareness and surveillance effort, this was highlighted as an area where concerted effort is required^{bn}. There are many ways to gather data, all with different mechanisms and formats. The NBN is reviewing data flow protocols, seeking greater consistency in reporting^b. All major stakeholders should agree on a standardised route for dataflow, fidelity and format. The major reporting apps could be labelled as being compliant with the data framework which could be in turn managed as an accreditation by the GB NNSS. There are hundreds, if not thousands of Chartered Institute of Ecology and Environmental Management (CIEEM) registered environmental consultancies across GB, all of whom have field operatives conducting a vast number of ecological surveys every year. Being registered with CIEEM, they are compelled to submit their species data to the appropriate biological

recording centres, but the level of INNS awareness and training is variable. There is an opportunity, by engaging with CIEEM, to increase the quality and standardisation of this considerable monitoring resource. The EAC have made the recommendation to follow New Zealand’s approach and train members of the public as 'biosecurity citizens army', to perform a key role in early detection and surveillance³. There was broad support for this aspiration from stakeholders, with the key word ‘Yes’ being identified in frequently used key words identified in 42% of answers to question 15 (Figure 7). However, reservations were expressed regarding the amount of ‘Funding’ (identified in 31% of answers) required to implement this initiative, and that this might detract from the already underfunded LAGs (identified in 14% of answers Figure 7). These concerns were also voiced by discussion groups and vital differences between New Zealand and GB were highlighted, such as the lower awareness levels of the general public over INNS issues in GB, a key component for the success of such an initiative. The potential value of such an initiative is unquestionable, but it should be considered an aspiration for later iterations of the Strategy, when public awareness levels are higher. Making better use of the resourcing available such as with CIEEM to increase awareness amongst professionals could greatly assist in bridging some of the gaps, especially in relation to monitoring.

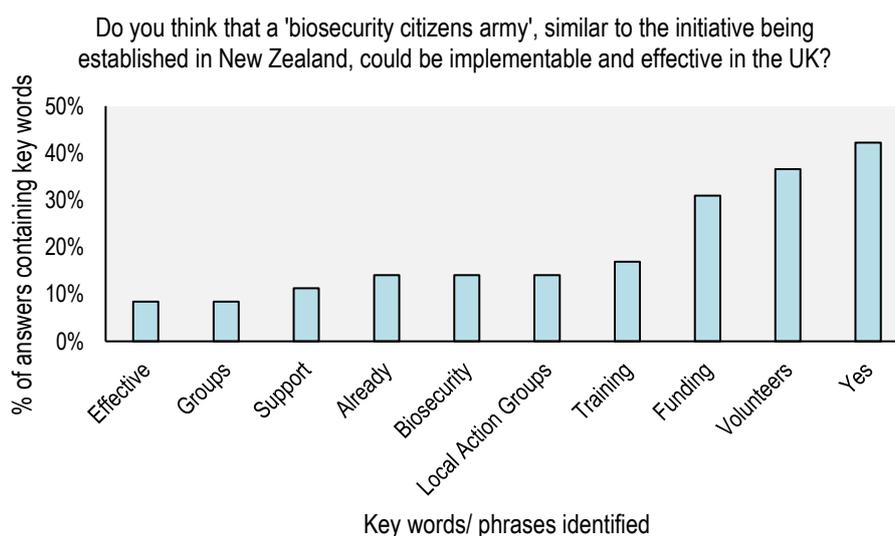


Figure 7: The top 50% of identified key words in response to question 15.

Below are the recommendations for the ‘Early detection, surveillance and monitoring’ chapter of the Strategy:

Recommendation 4.1: As PAPs are implemented going forward, pathway-specific surveillance and reporting protocols will be vital, and their importance should be embedded as an action within the 2021 Strategy.

Recommendation 4.2: NBN should be engaged and assisted in their review of data flow protocols, and efforts should be made to standardise reporting methodologies.

Recommendation 4.3: Increase INNS identification and reporting training level for environmental operatives (involving chartered institutes such as CIEEM).

Recommendation 4.4: Given constraints on resources, the 'biosecurity citizens army' should be considered an aspiration for the future, but not an immediate priority for the 2021 Strategy.

3.4.2 Review of 'Rapid response'

Retrospective analysis

The risk management methodology was developed under the 2008 Strategy¹⁹, a process that evaluates the management options for INNS in order to effectively mitigate the risks they pose. The risk management method was perceived positively by stakeholders in relation to its role in prioritising species for eradication (mean score = 4.19, SD = 6.33), with 75% considering it either beneficial or highly beneficial (Figure 8).

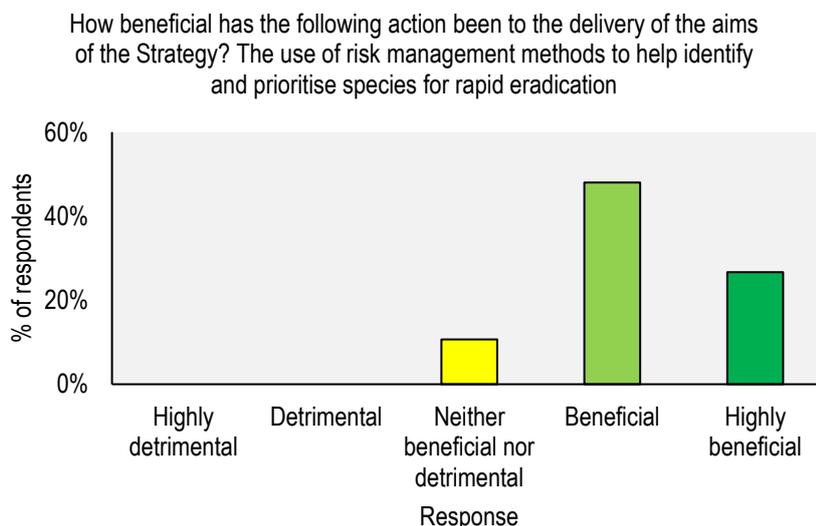


Figure 8: The percentage of respondents in different response categories for question 14.

Risk management exercises have now been undertaken for numerous species, culminating in a paper that outlines the methodology and how it was used to prioritise species for eradication, including the feasibility of achieving management successfully⁵⁶, all of which has been used to inform spending requirements². The rapid response working group was re-established in 2015 and has been regularly reporting to the PB, but more could be done to make rapid response a priority for the board¹. Rapid response to topmouth gudgeon (*Pseudorasbora parva*) through coordination with the Environment Agency (EA) is a good example of what is possible, with only seven remaining populations in England

from a known 34ⁱⁱ with two to be treated by the end of the year³. DEFRA is committed to continued rapid responses to monk parakeets (*Myiopsitta monachus*) and variable leaf water milfoil (*Myriophyllum heterophyllum*)³. On the other hand, in the UK the rapidly increasing distribution of the ring-necked parakeet (*Psittacula krameria*) that has gone from around 500 individuals in the mid-1990s (prior to the development of rapid response protocols), to as many as 40,000 at present, demonstrates how crucial rapid response measures are to the success of the Strategy. Although progress has been made with respect to rapid response, it is evident that stakeholders do not perceive this to have been sufficient, with ‘Rapid response’ being the most frequent key word identified in answers to question 16 of the questionnaire (contained in 23% of responses, Figure 9A). However, stakeholders widely believed that the specific rapid response to the Asian hornet was where the most progress had been made (contained in 23% of responses, Figure 9B).

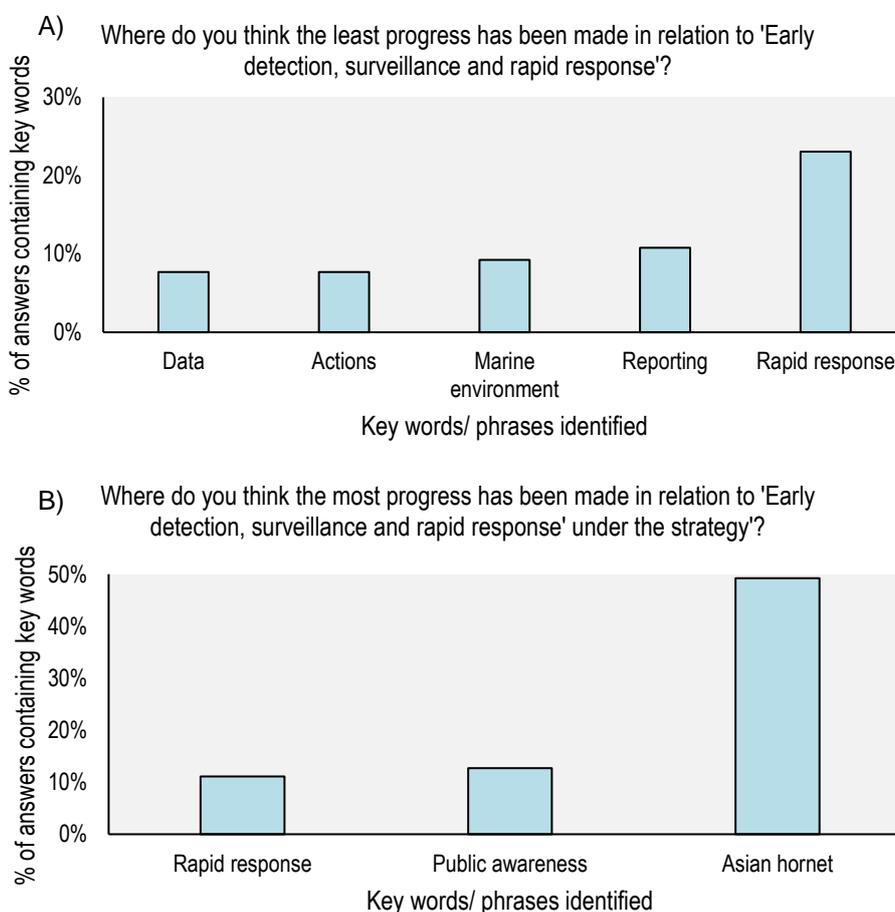


Figure 9: The top 50% of identified key words according to the percentage of answers containing key word for A) question 16, and B) question 17.

ⁱⁱ <https://www.gov.uk/government/news/environment-agency-removes-more-invasive-non-native-fish>

Forward look

Many of the stakeholders who cited rapid response as the area where the least progress has been made in this theme, commonly stated two reasons for this: 1) lack of clarity of responsibilities because of inadequate progress with contingency planning, and 2) lack of capacity even when responsibilities are known. These issues were also highlighted by the EAC in relation to the arrival of the gulf wedge clam (*Rangia cuneata*) in 2015, a clear example of where if a small amount of money was available at an early stage (£30,000 in this case), it would save many times that amount of money being spent in the future³. This highlights a lack of process in identifying species for rapid response action. Lack of progress on marine INNS was mentioned as an issue by several respondents to the questionnaire and in discussion groups ^{dips}. Rapid response is an area of the Strategy where a relatively minor amount of funding can yield direct and tangible results, with substantial long-term benefits, provided that resourcing is consistent and protected [!]. The recommendations for the 'Rapid response' chapter of the 2015 Strategy are outlined below:

Recommendation 4.5: Greater amounts of ring-fenced funding, should be allocated for rapid response in addition to identifying target species and key delivery bodies for on the ground action.

Recommendation 4.6: A rapid response incident team should be established, reporting to the PB.

3.5 Review of ‘Long-term management and control’

Retrospective analysis

Some progress has been made by individual GB Administrations towards the development of systems to prioritise strategic responses to established INNS, the Wales Biodiversity Partnership INNS Group has developed a list of priority species for eradication or long-term management and the Wales Resilient Ecological Network (WaREN) project⁷² is developing a collaborative and sustainable approach to the management of INNS across Wales. There is an equivalent prioritisation process in England outlined within RIMPS in five regions through the RAPID-life project³⁵⁻³⁹. However, engagement with the development of RIMPS was perceived as difficult and the final outputs were not considered a robust basis for a strategic approach to the management of established INNS^{eh}. This is perhaps reflected by the relatively low benefit score for the related action (mean = 3.84, SD 0.75, ‘Don’t know’ = 22%, Figure 10), with 64% of people considering it not beneficial.

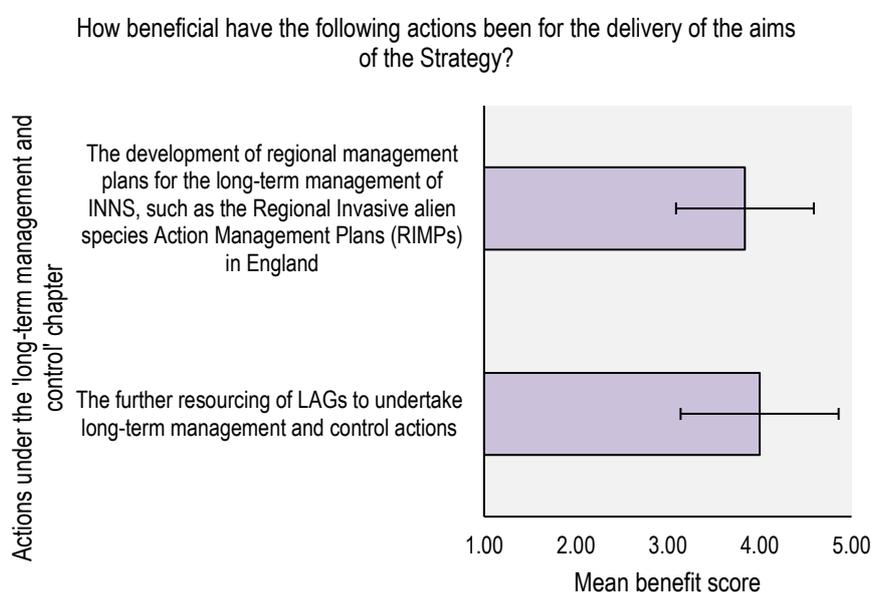


Figure 10: The mean scores from questions asking how beneficial they thought the various actions relating to ‘Long-term management and control’ were (question 19). A score of 1 indicates highly detrimental, while a score of 5 indicates highly beneficial. Error bars represent SDs.

Article 19(1) the retained EU Regulation 1143/2014 on Invasive Alien Species, states that “*management measures shall be proportionate to the impact on the environment and appropriate to the specific circumstances of the appropriate authority, be based on an analysis of costs and benefits*”⁵³. DEFRA and the Welsh Government have set out these management measures for the 14 widely spread species of special concern (SSC) in England and Wales, which provides a good foundation for management of these species in England and Wales⁵⁴. Natural England (NE) and Natural Resources Wales (NRW) administer licences in relation to these management activities². However, work is required to coordinate these national objectives at a local scale and link the objectives with practical management

interventions that effectively contribute towards the species objectives. DEFRA continues to fund the successful invasive ruddy duck (*Oxyura jamaicensis*) eradication project which is very close to completion². Progress has also been made towards the eradication of other INNS, including the American bullfrog (*Lithobates catesbeianus*)^d, African clawed frog (*Xenopus laevis*), water primrose (*Ludwigia peploides*), topmouth gudgeon (*Pseudorasbora parva*), black bullhead (*Ameiurus melas*), flathead minnow (*Pimephales promelas*), and monk parakeet (*Myiopsitta monachus*)ⁱⁱⁱ, there are however still many species which require further attention (e.g. listed crayfish).

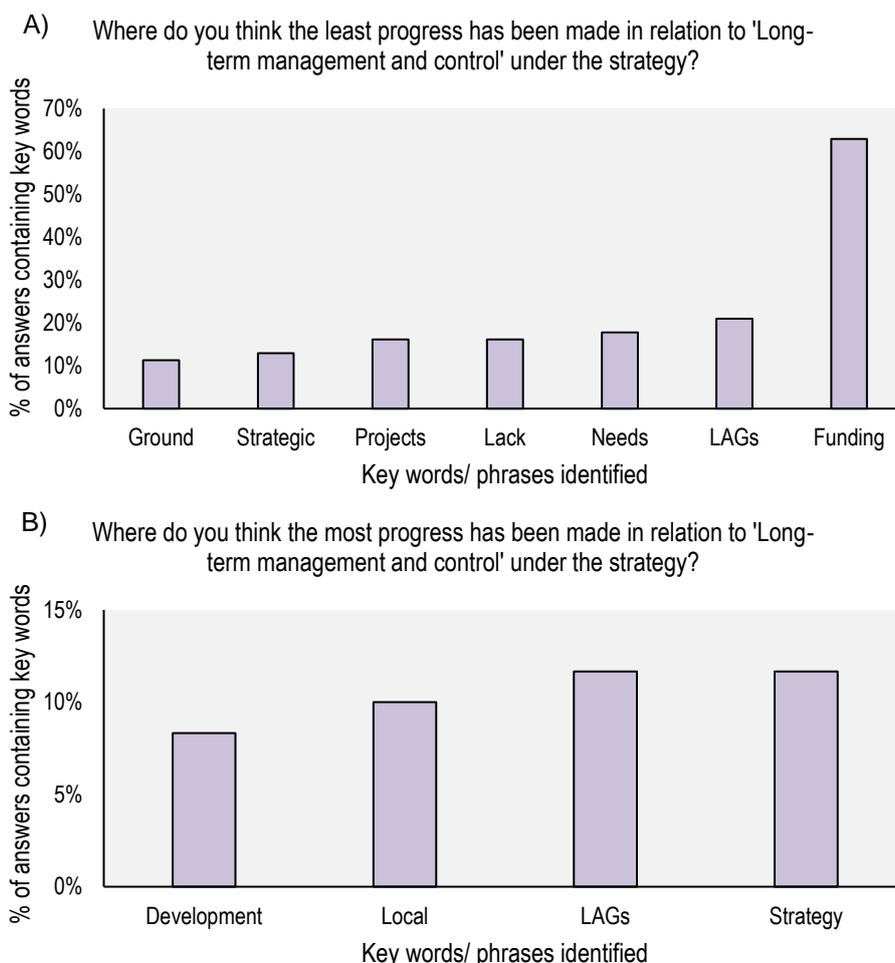


Figure 11: The most frequently identified key words in response to A) question 21, and B) question 22.

Improved support of LAGs through resourcing was considered the most beneficial of the actions under this theme, with the lowest proportion of respondents selecting 'Don't know' (mean = 4.00, SD = 0.75, 'Don't know' = 11%, Figure 10). 'Funding' was also where stakeholders considered the least progress

ⁱⁱⁱ <https://deframedia.blog.gov.uk/2020/05/13/government-responds-to-eac-report-into-invasive-non-native-species/>

had been made, by a large margin (contained in 63%, Figure 11A). Many of the remaining key words: 'Lack', 'Needs', 'LAGs' and 'Projects' were typically contained in the context of resources. The short-term nature of LAG funding was mentioned by several discussion groups, as being particularly damaging for the long-term management of some species, because of the mismatch between the funding cycles and the rapid population recovery times of many of the riparian plant species that LAGs typically work to manage, sometimes undoing years of progress after just a small reduction in momentum from the volunteers. However, both 'LAGs' and the 'Strategy' were frequently identified, when stakeholders were asked where the most progress has been made (each contained in 12%, Figure 11B), with the Strategy itself often being considered an important driver behind the success of the LAGs. The LAG workshops have continued on an annual basis and are considered to be highly valuable opportunities to share best practice^h. Some progress has been made on the delivery of Invasive Species Action Plans (ISAPs), such as the recent publication of the carpet sea squirt (*Didemnum vexillum*) ISAP through collaboration with the British Irish Council (BIC)⁷³. However, there has been a move away from ISAPs, in favour of PAPs.

The Forestry Commission (FC), DEFRA, NRW and Environment Agency (EA) have all taken steps to improve their biosecurity protocols. Both the Scottish Environment Protection Agency (SEPA) and NRW have made biosecurity e-learning mandatory for field operatives². Raw Water Transfer (RWT) networks are expanding in order to allow more long-distance movements of water around the country, so as to mitigate for ever-increasing local water shortages. This represents a considerable risk in terms of secondary spread of INNS³. The risk assessment of RWTs and potential establishment of preventative measures has been prioritised in WINEP AMP7 (2020-2025). The first stage of these assessments is due to be completed by early 2022.

A database of INNS management projects was originally developed in 2008 but the review of the 2008 Strategy concluded that it was not widely used¹⁹. Despite this, the action was extended into the 2015 Strategy, but no action has since been taken to update the database or increase its utility². While this has been designated low priority, the LAGs do a lot of the 'heavy lifting' when it comes to controlling widespread, established INNS such as Himalayan balsam (*Impatiens glandulifera*) and with no means of registering their efforts and outcomes, effective, strategic coordination will be difficult^h.

Article 19(1) of the retained EU Regulation 1143/2014 on Invasive Alien Species, states that "as far as is feasible, restoration measures" should be included following INNS management measures⁵³. A scoping paper has been prepared to address the issue of habitat restoration, but it has not been completed. This lack of progression was brought up in several of the discussion groups^{eip}.

The answers to question 20, on the best way to integrate information from horizon scanning and pathway analysis into management of INNS, predominantly discuss ensuring clear lines of responsibility

and communication between stakeholders and experts involved in the horizon scanning, PAP and management stages. Horizon scanning and PAP information should be used to prioritise pathway management efforts (Figure 12).

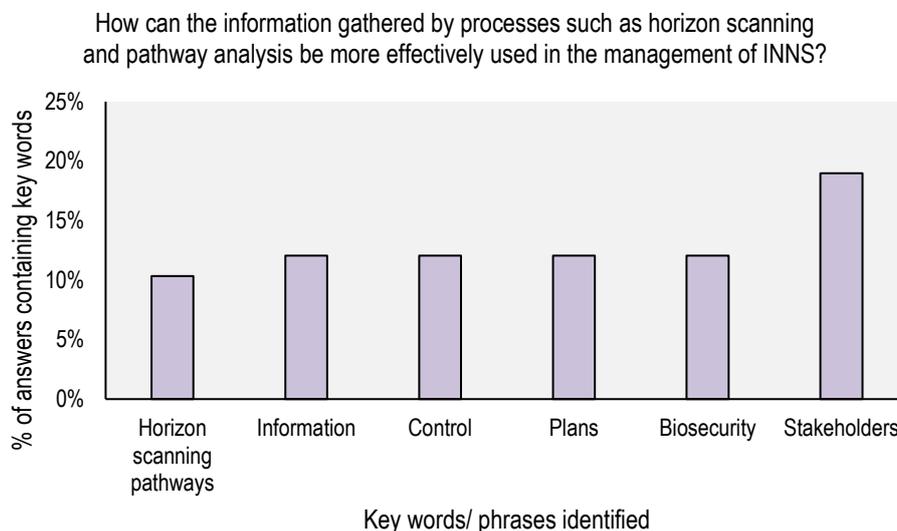


Figure 12: The most frequently identified key words in response to question 20.

Forward look

Catchment-scale coordination of LAGs was generally considered to be a key requirement going forwards. This co-ordination could come from either a regional level (following on from the RAPID-life work and taken forward through the WaREN project in Wales) or from the GB Administration level, perhaps linking with the Country Working Groups, or from the proposed Inspectorate (Recommendation 3.5, Section 3.3). Regardless of the level at which work is co-ordinated, the role should be undertaken by full-time co-ordinator positions (see Section 3.7.1 for further discussion). This co-ordinating function will be vital for delivering the management objectives set out by DEFRA and the Welsh Government for the 14 widely spread SoSC in England and Wales. Further understanding is likely to be required with respect to the management objectives, in order to inform more meaningful long-term management efforts. For example, when carrying out actions under a management measure licence to “*reduce further spread of the species and mitigate its impacts*”; what proportion and/or demographic class of the target population should be removed in order to cause a given reduction in impacts, or rate of spread? Can removal of certain types of animal accelerate spread? These are considerations for research but with applied outputs to inform guidelines, that can progress actions towards the objectives for target species. These measures must be deployed in order to contribute towards a measurable strategic aim, such as those suggested in Section 3.2. Therefore, now that priority INNS have been identified, priority sites and associated actions must also be identified.

The importance of habitat restoration is currently overlooked within 'Long-term management and control'. The promotion of INNS management as part of restoration ecology, not only provides a more ecologically desirable and resilient endpoint for management projects (that should be more resilient to future invasions) but may increase the appeal of INNS management in terms of attracting both volunteers and funding. This shift in perception could provide opportunities for alliance with movements such as the UN Decade of Ecosystem Restoration. Another potentially vital avenue for LAG funding will be the Environmental Land Management Scheme (ELMS) and Scottish and Welsh equivalents. Currently, the Strategy does not include any acknowledgement of the role of environmental consultants (particularly invasive species specialists), and there was a perception that they are not regularly involved in working groups. At the least they represent a potential source of expertise, but at the most they could carry out technically demanding stages of management projects, for example the location and removal of the last remaining individuals within a population, or more efficient and accurate monitoring.

The recommendations for the 'Long-term management and control' chapter of the 2015 Strategy are outlined below:

Recommendation 5.1: All organisations with field operatives from all administrations should follow the lead of SEPA and NRW and make INNS and biosecurity e-learning a mandatory training requirement.

Recommendation 5.2: Identify priority sites and actions for long-term management of priority INNS, such as the widespread 14 priority species in England and Wales.

Recommendation 5.3: Strengthen the action relating to habitat restoration. INNS management must be considered as a vital 'cog' within the 'ecosystem restoration machine'.

Recommendation 5.4: Whilst continued and increased funding for LAGs is greatly needed, additional avenues should be explored such as the ELMs and the equivalent schemes in Scotland and Wales.

Recommendation 5.5: Greater coordination between INNS experts and LAGs. Include an action to encourage coordination.

3.6 Review of ‘Building awareness and understanding’

Retrospective analysis

The ‘Be Plant Wise’ (BPW) and ‘Check Clean Dry’ (CCD) campaigns, launched under the 2008 Strategy are effective targeted awareness-raising initiatives^{0,3}, evidenced by the increase in the number of anglers who now enact some form of biosecurity measure after every trip⁵². It is therefore encouraging that CCD and BPW were updated in 2018 and 2020, respectively², an action that was perceived as beneficial by stakeholders (mean score = 4.38, SD = 0.57, Figure 13), with 40% of questionnaire respondents considering it highly beneficial.

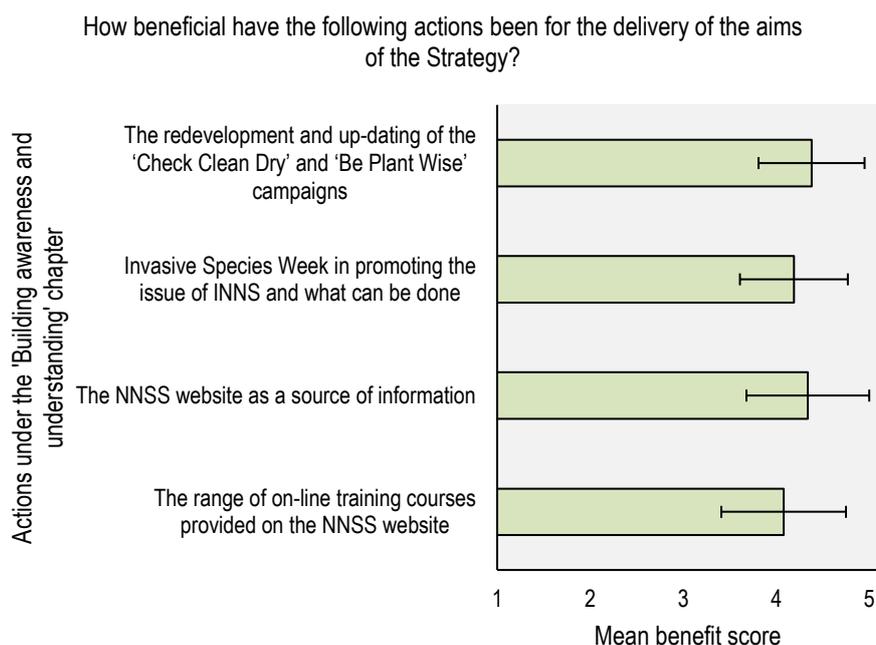


Figure 13: The mean scores from questions asking how beneficial they thought the various actions relating to ‘Building awareness and understanding’ were (question 26). A score of 1 indicates highly detrimental, while a score of 5 indicates highly beneficial. Error bars represent SDs.

‘CCD’ and ‘Campaigns’ were the first and third most frequently used key words identified in response to question 28, regarding where the most progress had been made within this theme (contained in 16% and 11% of responses, respectively, Figure 14B). NGO, trade and government organisations have been involved with the establishment and continued development of these campaigns⁶². France was identified as the most frequently visited neighbouring country by anglers⁵², highlighting the importance of NNSS engagement with the country, who have agreed to promote CCD². However, awareness of CCD may have diminished¹¹, with only 48% of anglers being aware of the campaign in 2015⁵². Newsletters produced by the NNSS and the Wales INNS Group provide another useful platform for targeted engagement². INNS are not currently considered within the competency frameworks for either CIEEM or IFM, both members of the Wildlife and Countryside Link (WCL), an organisation heavily involved in the promotion of INNS issues⁵⁸.

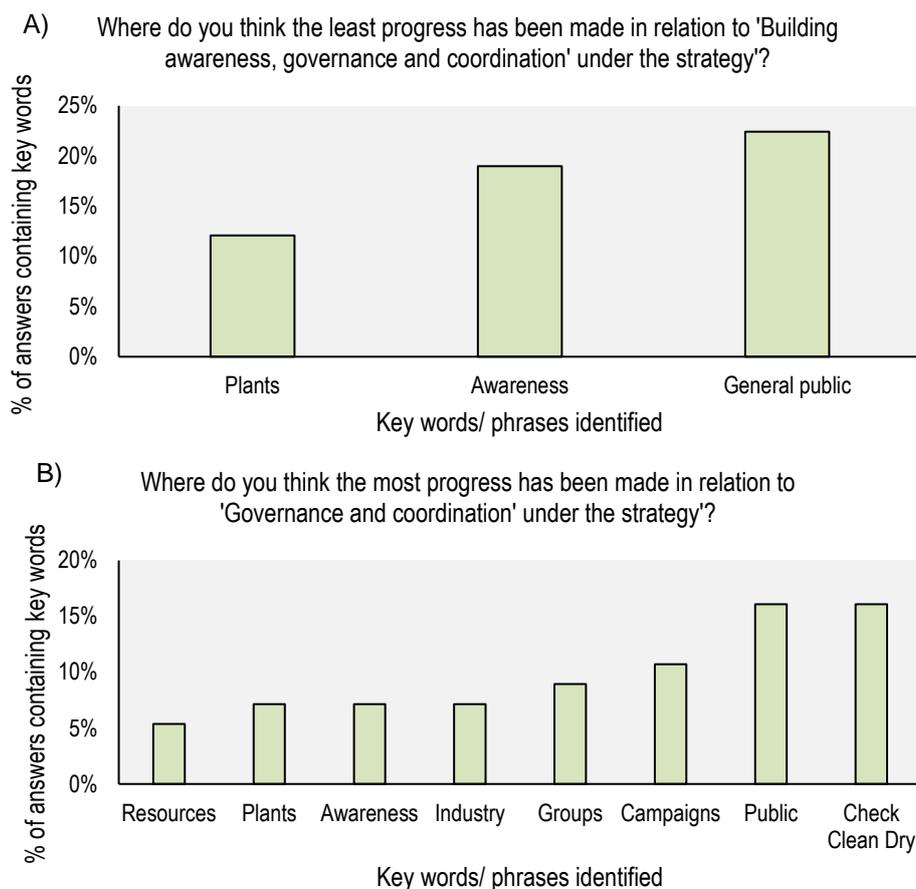


Figure 14: The most frequently identified key words in response to A) question 27, and B) question 28.

The continued success of the Asian hornet surveillance systems and rapid response protocols demonstrates the importance of engagement with Animal, Plant, Fish and Bee Health regimes by NNS to strengthen biosecurity messaging and protocols². The ministerial Monthly Biosecurity Meetings (MBMs) in England are deemed crucial for this ongoing engagement ^d. Co-ordination between the regimes ensured the timely revival of BPW during Plant Health Week in 2020².

The number of organisations involved in Invasive Species Week (ISW) has grown from 160 in 2016, to 340 in 2017⁶², but decreased to 320 in 2019². ISW was perceived as being beneficial for promoting the issue of INNS (mean score = 4.19, SD = 0.58, Figure 13) and is a crucial platform for engagement with the general public¹² (as well as stakeholders). A survey providing baseline information on the general public’s attitudes towards INNS issues was published in 2018. It found that there was a need to improve general awareness of their impacts, support for management, and awareness of biosecurity⁶³ (only 7% of the general public were aware of the BPW campaign⁶³). This has been echoed by both discussion group participants ^l, and stakeholders in the questionnaire, with ‘General public’ being the most frequently used key word identified in response to a question regarding where the least progress had

been made within this theme (contained in 22% of responses, Figure 14A). Furthermore, 'Plants' was the third most frequently used key word identified in response to the same question (contained in 12% of responses, Figure 14B). Currently in GB, while the concept of 'threats to biodiversity' are introduced to students in the GCSE syllabus and further explored at A-level (in both AQA and OCR exam boards), invasive species are not discussed.

The NNSS website, established under the 2008 Strategy⁹ and previously appraised as an effective resource by stakeholders¹¹, continues to be considered beneficial for the delivery of the Strategy (mean score = 4.34, SD = 0.66, Figure 13) with 87% of respondents believing it beneficial or highly beneficial and discussion groups considered the website "excellent"ⁱ and a "vital resource" for LAGs in particular^h. The six freely available training videos published on the NNSS website in 2014⁶² have been added to, covering predominantly identification and biosecurity-related content², and represent a substantial step in engaging with both the general public and stakeholders. They were considered to be beneficial to the delivery of the 2015 Strategy by stakeholders (mean score = 4.08, SD = 0.67, Figure 13). This resource has been incorporated into mandatory training by SEPA².

Forward look

There has been substantial progress within this theme and as such, going forward it should be where the aims and actions for the next five years are most aspirational. By identifying the least understood areas by the stakeholders who completed the questionnaire, Box 2 (Figure 15) highlights some themes (namely 'Prevention' and 'Research') within the Strategy where targeted awareness raising would be beneficial. The Media and Communications (M&C) Plan is comprehensive, but there are opportunities to engage more closely with NGOs such as through WCL, WEL and SEL in order to promote the importance of INNS within their member organisations such as CIEEM and IFM. Another opportunity exists to co-ordinate with Plant Health by linking the 2021 Strategy to 'A Plant Biosecurity Strategy for Great Britain', which is currently out for consultation^d. Similarly, no link is made to the 'Biosecurity for LIFE project', that outlines biosecurity protocols for offshore islands (particularly with reference to seabird conservation). GB islands are not explicitly considered within the Strategy at present, but this could be covered by acknowledging such projects. More emphasis on engagement with the general public is required. They should be engaged through both traditional and novel mass media channels, ensuring that the successes are promoted along with the biosecurity message^{a,62}. The increased awareness of biosecurity issues brought about by COVID-19 was raised as an opportunity to reinforce INNS biosecurity communications^f. There should be a long-term ambition to incorporate INNS into GB secondary education syllabus, with incorporation into tertiary education being a more immediate aim. There is a baseline understanding of awareness of BPW and CCD and associated behavioural change, but this should be assessed again within the next five years in light of the campaign updates. Efforts should be made to ensure that ISW both continues to grow and remains widely accessible. Given the importance of the NNSS website as a resource, we agree with the recommendations of the M&C Plan,

to update the website and improve its usability. Training videos should be developed to cover not only 'Prevention' and 'Surveillance', but also 'Rapid response' and 'Long-term management and control'.

Box 2: Where to focus awareness raising effort amongst stakeholders?

Figure 15 shows the percentage of respondents to answer 'Don't know'. A high percentage of respondents answering with 'Don't know' was interpreted as a low level of awareness of that action/ strategic aim or theme (mean % answering 'Don't know' across all questions within a theme). Perhaps unsurprisingly, the theme with the highest overall awareness was 'awareness raising', demonstrating that the strategic aim and actions taken within this theme are well known. The themes with the lowest awareness were 'Prevention' and 'Research'. This corresponds with the low SDs around the means for questions on the strategic aims relating to these themes in Figure 1. This indicates that while there is low awareness, those who are familiar with these themes, tend to agree on how effectively their related strategic aims have been met. This suggests that broader awareness is required around activities under 'Prevention' and 'Research', outside of those who are highly familiar, and likely involved with these activities. Question 7, relating to the establishment of an inspectorate, was not included in this plot, as it was not directly related to actions, aims or mechanisms of the last five years.

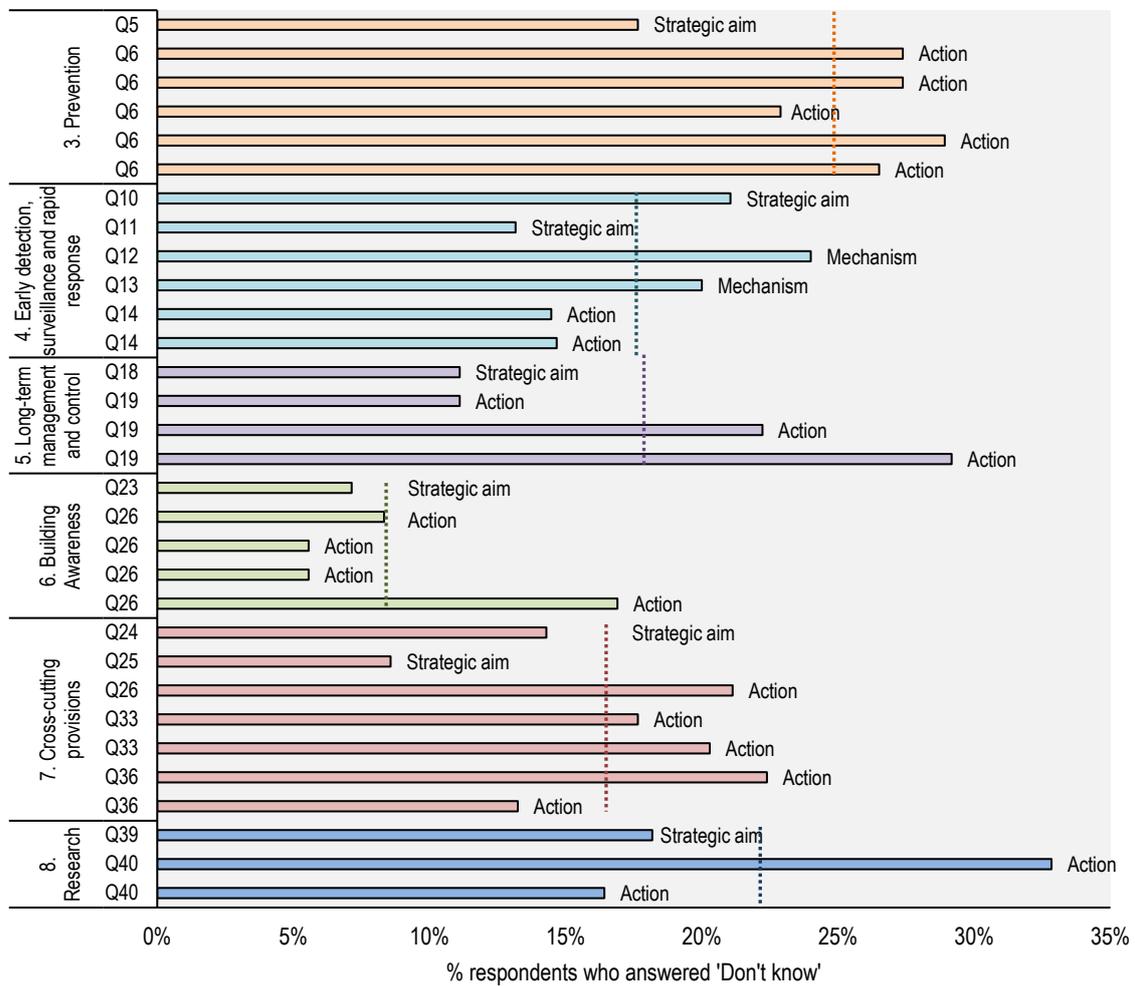


Figure 15: The percentage of respondents answering 'Don't know' across all multiple-choice questions. Dotted lines indicate the mean percentage of respondents answering 'Don't know' across all questions within a theme.

The recommendations for the 'Building awareness and understanding' chapter of the 2015 Strategy are outlined below:

Recommendation 6.1: More awareness raising amongst stakeholders is required for the 'Prevention' and 'Research' themes of the Strategy.

Recommendation 6.2: Organisations such as CIEEM and IFM, through WCL, should be more actively engaged, as they are in a strong position to influence awareness, skills and training relating to INNS within the environmental management industry.

Recommendation 6.3: Awareness raising campaigns have been very successful but may be limited to those who are already familiar with the message. A concerted effort should be made to raise awareness in the general public through education and engagement with both new and mainstream media and also with respect to plants specifically.

Recommendation 6.4: Links should be made with existing, relevant biosecurity initiatives such as the 'Biosecurity for LIFE project' and should be acknowledged within the 2021 Strategy.

Recommendation 6.5: The understanding, uptake and resulting behavioral changes of awareness raising campaigns such as CCD and BPW should continue to be monitored.

Recommendation 6.6: The NNSS website should be updated, which should include the expansion of interactive training materials to cover 'Rapid response' and 'Long-term management and control'. Research output should also be made more easily accessible under the 'Research' section of the website.

3.7 Review of ‘Cross-cutting provisions’

3.7.1 Review of ‘Governance and coordination’

Retrospective analysis

There was support from all respondents in relation to the amount of effort and work conducted by the NNS on co-ordination and implementation of the Strategy, especially considering the comparatively low level of resourcing that had been made available. However, it was considered that there was still a lack of engagement and transparency in relation to the PB, how it operates, who it is composed of and how decisions are made. Recent changes to the function of the PB, the creation of the GB NNS Committee and the change in function of NNRAP (to Risk Analysis Forum) have all been implemented but not yet advertised. There were also comments made on the composition of the board and a lack of agencies/organisations involved specifically from the marine environment. These comments come despite similar concerns being raised with the review of the 2008 Strategy.

The English Working Group has been reconstituted and according to results from the questionnaire familiarity is on par with the Welsh and Scottish Working Groups amongst respondents accounting for the higher proportion of respondents from England (Figure 16). The general lack of familiarity or involvement with the working groups is however high (Figure 16) with over 50% of respondents stating they are unfamiliar or not involved with any Working Group. It should be noted that the Welsh Working Group is also known as the WBP INNS Group, which may also explain the lack of recognition.

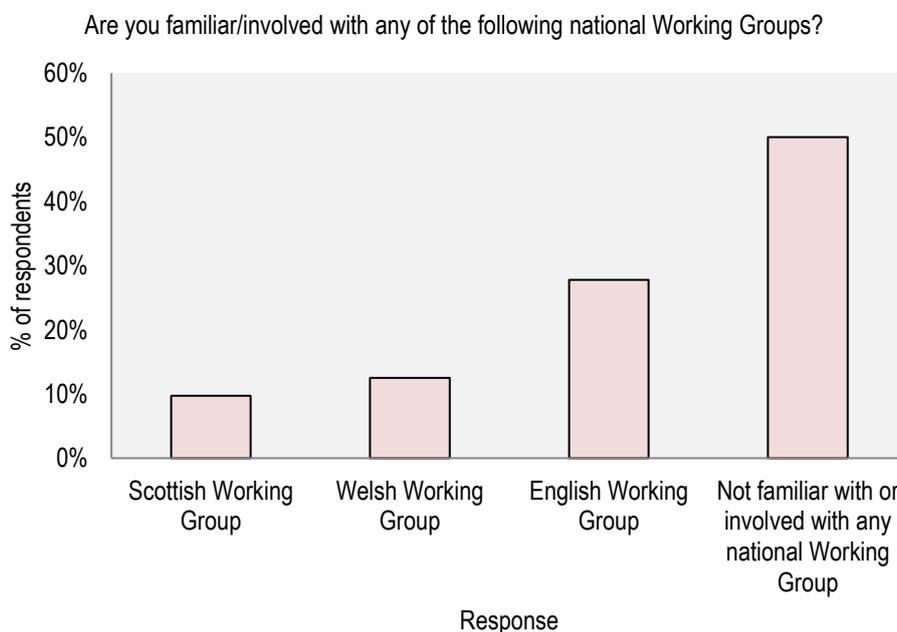


Figure 16: The percentage of respondents in different response categories from question 29.

Despite the level of awareness of the English Working Group, its relative effectiveness is still considered to be lower (mean score = 3.40, SD = 0.82) than the Scottish and Welsh Working Groups (mean score

= 4.00, SD = 0.00, and mean score = 3.75, SD = 0.50, respectively, Figure 17), with the Scottish Working Group being considered the most effective. This may be as a result of the English Working Group only recently being reformed and effectiveness will increase as it becomes more established.

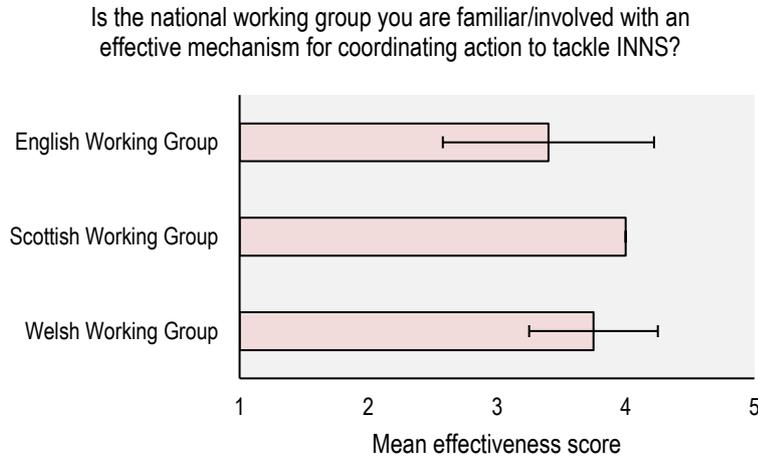


Figure 17: The mean effectiveness score from questions 30-32, asking how effective the respondents felt their respective Country Working Groups were at coordinating action to tackle INNS. A score of 1 indicates highly ineffective disagreement, while a score of 5 indicates highly effective. Error bars represent SDs

The Stakeholder Forum is clearly viewed by respondents as being Beneficial/Highly Beneficial as a mechanism for information sharing (Figure 18). This was also echoed in discussion groups with numerous participants stating how useful the Stakeholder Forum is. This further reiterates the support for the work conducted by the NNSS. The question of why the PB is not a more prominent part of the Forum was raised by several groups especially as this was viewed as a good opportunity for engagement.

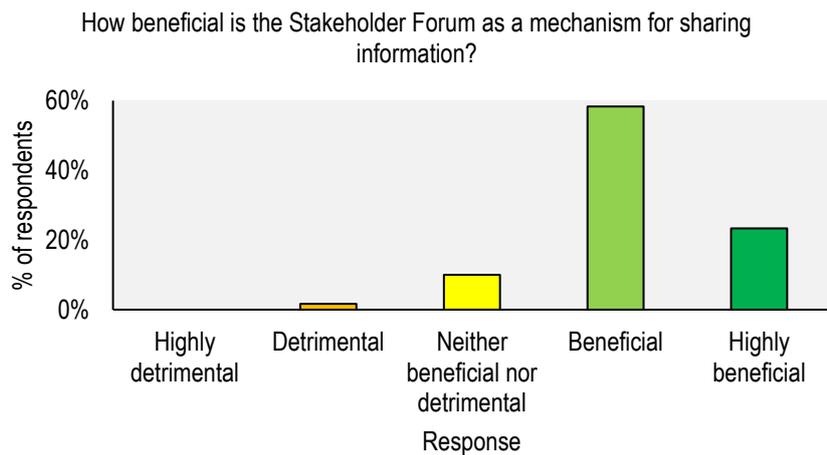


Figure 18: The percentage of respondents in different response categories from question 26.

Another key point raised within the discussion groups, especially within England, was in relation to co-ordination. While general views were that the NNSS has been providing excellent high-level co-ordination, there was still a lack of regional level co-ordination which was seen as essential for the delivery of numerous elements of the Strategy on the ground. While one of the aims of the RAPID-life project was to establish a regionally based framework across England to deliver more effective management based on Regional Management Plans, this was considered not to have fulfilled its full potential. The Regional Invasive (alien species) Management Plans (RIMPs) have not been used as extensively as they could have been, mainly as the information provided within the RIMPs is at too high a level to be useful at a local level. The Wales Resilient Ecological Network (WaREN) project is aiming to provide regional level co-ordination within Wales. Understanding how effective this programme will be is difficult to ascertain as it is still relatively new. The Scottish Invasive Species Initiative (SISI) as well as the Scottish Working Group have both played a key role in ensuring a robust and co-ordinated approach to INNS on the ground within Scotland. It was also raised that the three GB Administrations are starting to develop INNS actions independently, for example with marine monitoring. It was felt that this was not reflected within the 2015 Strategy and that it remained DEFRA-focussed.

The implementation of the Strategy in relation to the marine environment was considered by a number of commenters (both via group discussions and the questionnaire) to be substantially behind terrestrial and freshwater INNS; with less attention being paid to marine INNS issues or coordination of action relating to Strategic aims in the marine environment. With the discontinuation of the Marine Pathways Group/UK Marine INNS Group there has been a lack of direction and co-ordination of the work area according to several discussion groups ^{dis}. This has also impacted on progress towards tackling marine INNS issues in wider strategic approaches (e.g. PAPs) and collaboration (e.g. BIC). While there is an overarching framework in the form of the Marine Strategy Framework Directive (and UK Marine Strategy) for marine INNS there is a perceived disconnect between this and the [INNS] Strategy and a lack of legislation to facilitate the implementation on the ground. This is illustrated by the delays in ratification and implementation of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWMC). The Department for Transport stated that in the EAC report that they were committed to completing the regulations and acceding the convention in 2020, and while this is now being developed there was considerable delay. Other areas of concern raised in relation to marine INNS and the current Strategy included significant issues with monitoring, early detection, reporting, data flow and storage. A perceived lack of co-ordination and direction in relation to rapid responses in the marine environment was also raised by commenters. For example, the different DAs have different marine monitoring protocols in place ^s. It was also pointed out that not many RAs have been completed for marine species (Q34).

Forward look:

The main points in relation to the forward look concerned a more inclusive approach to the composition of the PB, particularly in relation to organisations/agencies involved in the delivery of INNS work in the marine environment and the need for more effective engagement by the PB with the private sector, NGOs and volunteers. Additionally, there is a need to facilitate more effective co-ordination of on the ground actions within England. From comments received, this co-ordination is required in relation to prevention, monitoring/surveillance, rapid responses and long-term management. Views on how co-ordination could be achieved included:

- The newly formed Inspectorate picking up the role,
- The Working Group co-ordinating actions, or
- Dedicated regional INNS co-ordinators are put in place.

We would suggest the best approach to identify the most effective approach(es) would be to conduct a review of the key requirements along with all potential options, conducted in close collaboration/engagement with the private sector, NGOs and volunteers (re: LAGs). While there were considerable comments made concerning the retrospective review in relation to marine INNS, there were fewer comments made in how this could be addressed going forwards. The general consensus was that marine INNS needs to be more robustly integrated into the future draft of the Strategy across the board. This may not require specific actions under each chapter of the Strategy but would need additional engagement from the NNSS and PB in considering marine INNS issues further. One recommendation made was that a review of current action in the marine environment would be undertaken, identifying key pain points and how these can be addressed going forwards. This would require the engagement of all those involved in marine INNS management, specifically the Maritime and Coastguard Agency (MCA) in relation to the Ballast Water Convention and wider considerations of enforcement that an Inspectorate may not be able to cover. The recommendations for the 'Governance and coordination' chapter of the 2015 Strategy are outlined below:

Recommendation 7.1: A review of existing membership of the PB, especially in relation to organisations/ agencies involved in delivery of marine work.

Recommendation 7.2: set a specific action relating to greater engagement by the PB with the private sector, NGO's and volunteers, this could be in the form of a specific annual meeting, a regular news-letter slot or greater visibility of PB members at the annual Stakeholders Forum.

Recommendation 7.3: A review of the 'on the ground' co-ordination requirements and potential options in close collaboration with the private sector, NGOs and volunteers (re: LAGs) across GB.

Recommendation 7.4: Either greater effort is required to ensure actions are delivered at a GB level or the differences in approaches between the GB Administrations need to be recognised within the Strategy.

Recommendation 7.5: A review of current marine INNS management actions, identifying pain points in relation to implementation of the UK Marine Strategy and the [INNS] Strategy effectively and the identification of key actions to address these points. This should include:

- Addressing the development and implementation of marine pathway management
- A standardised approach and programme to provide the required monitoring for marine INNS
- The roles of agencies in relation to enforcement in the marine environment
- The rapid response actions in relation to marine INNS

3.7.2 Review of ‘Prioritisation and risk analysis’

Retrospective analysis

The risk assessment process provides key evidence to support decision making within the strategy. As with other mechanisms co-ordinated by the NNSS feedback received from the discussion groups was very positive towards the processes used, the information outputs and the level of co-ordination. This is supported by evidence from the questionnaire where respondents viewed the INNS risk assessment process and the summary sheets linking the assessments, risk management and policy decision together as beneficial (Figure 19).

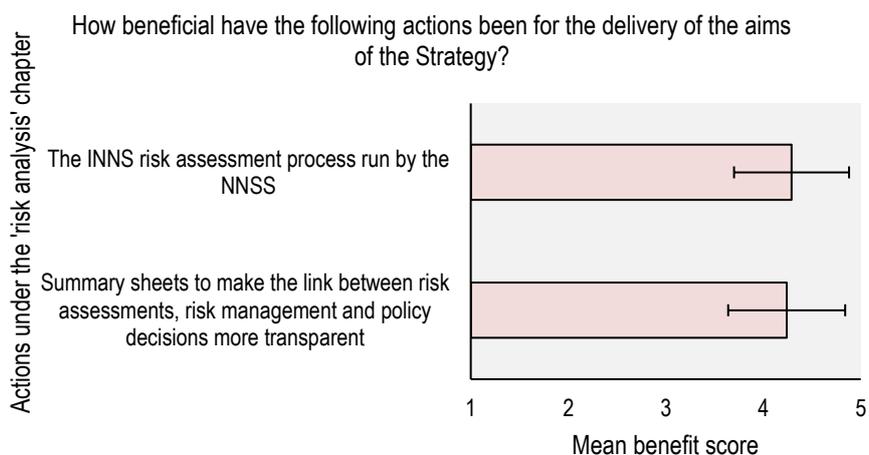


Figure 19: The mean benefit score from questions asking to what extent they agreed/disagreed with the benefit of the risk assessment process (question 33). A score of 1 indicates strong disagreement, while a score of 5 indicates strong agreement. Error bars represent SDs

Respondents felt the time taken to complete the risk assessments was too long, with time taken being a recurring subject in response to where the least progress had been made within this theme (Figure 20A). Other areas where respondents felt there was a lack of progress was with the number of species assessed, especially in the context of forestry and the marine environment (Figure 20A), although this is not actually the case for marine species. However, the need for quality and robust assessments should be considered in relation to these comments.

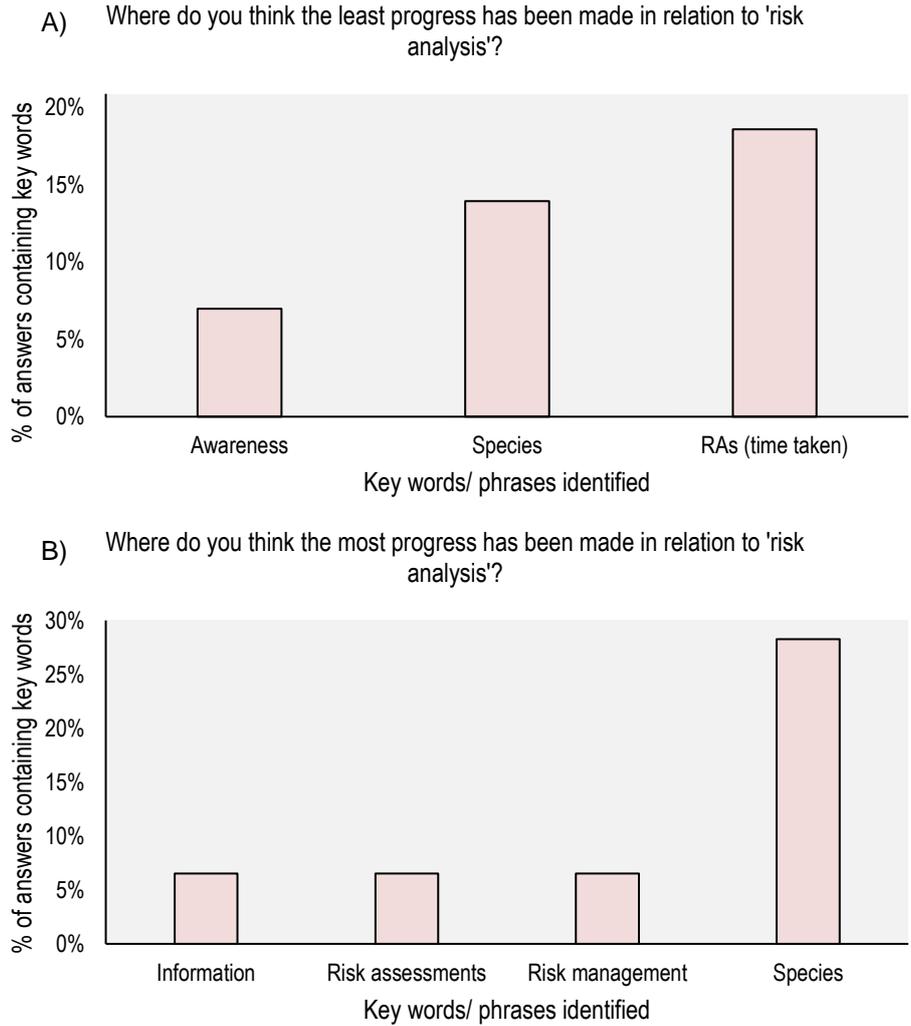


Figure 20: The most frequently identified key words in response to A) question 34, and B) question 35.

In support of the comments above, respondents felt that the most progress in relation to risk analysis was with the robust, detailed and effective assessment process along with the availability of this information. The risk management tool was also seen as an area of progress, but the majority of respondents viewed the volume of species that have been risk assessed as the main area of progress and the detail in which the assessments are conducted (Figure 20B).

Forward look

Key suggestions relating to prioritisation and risk analysis were for there to be more species assessed relevant to the forestry environment. In addition, greater links between the risk assessment and risk management processes would be beneficial, whereby additional information relevant to the risk management assessments would be gathered during risk assessments to expedite the risk management process. This recommendation does however have to be viewed in relation to the length

of time risk assessments already take as mentioned in the retrospective analysis. The recommendations for the 'Prioritisation and risk analysis' chapter of the 2015 Strategy are outlined below:

Recommendation 7.6: More forestry related species need to be risk assessed as a priority.

Recommendation 7.7: Greater link between the risk assessment and risk management processes whereby information required for risk management assessments is gathered during the risk assessments to expedite the process.

3.7.3 Review of 'Legislation'

Retrospective analysis

Considerable progress has been made in the development and adoption of INNS relevant legislation since 2015, however, there is still a widely held perception that more should have been done under the Strategy in bringing together the widely dispersed relevant legislation. This was raised especially in relation to the marine environment where more rigorous action should have been taken to ratify the BWMC and assist with the implementation of the INNS relevant sections of the Marine Strategy Framework Directive since 2015. It was, however, acknowledged during the discussion groups that progress is now being made in relation to implementation of the BWMC.

There was also a perceived lack of co-ordination and co-operation between regulators, particularly in relation to developing a consistent approach to enforcement. This was raised specifically in relation to the risk of introductions posed by online commerce such as through the major online platforms not having been adequately addressed. There have also been very few successful applications of the legislative enforcement powers afforded by the WANE Act (2011) in Scotland and by amendments made to the Wildlife and Countryside Act 1981 through the Infrastructure Act (2015) in England and Wales (Box 3) to allow the use of Species Control Agreements and Species Control Orders. At present it is difficult to understand whether this is due to a lack of willingness to enforce stricter measures for a notoriously difficult environmental issue to regulate and define clear responsibilities, or because simply the mention of the powers by regulators when engaging with landowners is enough to elicit compliance (as Species Control Agreements and Orders should only be used as a last resort).

Box 3: Review of Species Control Provisions (SCPs) across GB England and Wales: Infrastructure Act (2015)

- Powers have not been used.

Scotland: WANE Act (2012)

- Species Control Agreements (SCAs) have been used in marine (carpet sea squirt in aquaculture), freshwater (American signal crayfish, *Pacifastacus leniusculus*) between SEPA and Forestry and Land Scotland (FLS) and terrestrial contexts (*rhododendron*, *rhododendron ponticum*, for private landowners).

An innovative application of SCPs in Scotland

Forestry and Land Scotland (FLS) has joined forces with the Scottish Environment Protection Agency (SEPA) to help prevent the spread of invasive non-native species (INNS) in the River Ken/Dee catchment on the eastern edge of the Galloway Forest Park in Dumfries and Galloway. A SCA between the two organisations has been made under Section 14D (2) of the Wildlife and Countryside Act 1981 (as amended in Scotland).

In the first such SCA involving both organisations, a new protocol and a series of measures have been put in place to help prevent the further spread of signal crayfish. The headwaters of the River Ken/Dee catchment are critically close to the headwaters of nearby rivers with important salmon populations, so preventing further spread is essential to protect Scottish waterbodies.

As well as travelling along watercourses, signal crayfish can survive out of water for short periods, particularly in wet weather. Forestry operations carried out in wet areas adjacent to water courses where signal crayfish may be present can potentially spread them with soil and debris attached to machinery and equipment. Because of this, forestry operations such as road construction and maintenance, quarrying, harvesting, ground preparation and drainage all pose a potential risk as machinery moves between catchments.

Under the SCA, FLS have introduced a reporting process for staff and contractors and have implemented a biosecurity protocol for all forestry operations within the catchment, with sensitive areas flagged up during work planning. This includes a commitment to thoroughly clean all heavy machinery that is used in the area before it is moved off site. The SCA will help FLS fulfil legal responsibilities under the Wildlife and Countryside Act 1981 and reinforce the requirements of the UK Forestry Standard as an essential element of sustainable forestry practice.

The biosecurity protocol has been running since early 2020. There is additional cost to undertake the wash down process which is now built into the pricing structure for any work taking place.

The lack of enforcement in relation to INNS was further identified within the questionnaire where it was the area under legislation where respondents thought there had been the least progress. Other areas where a lack of progress was identified via the questionnaire was with the development of a UK-specific target species list under the retained Invasive Alien Species Regulation and more detailed enforcement of management objectives for the widespread priority species (Figure 21). It should however be noted that some key legislation, such as the Invasive Alien Species (Enforcement and Permitting) Order only came into force in 2019 and therefore some members of the public may not have been aware of the provisions and powers under this legislation.

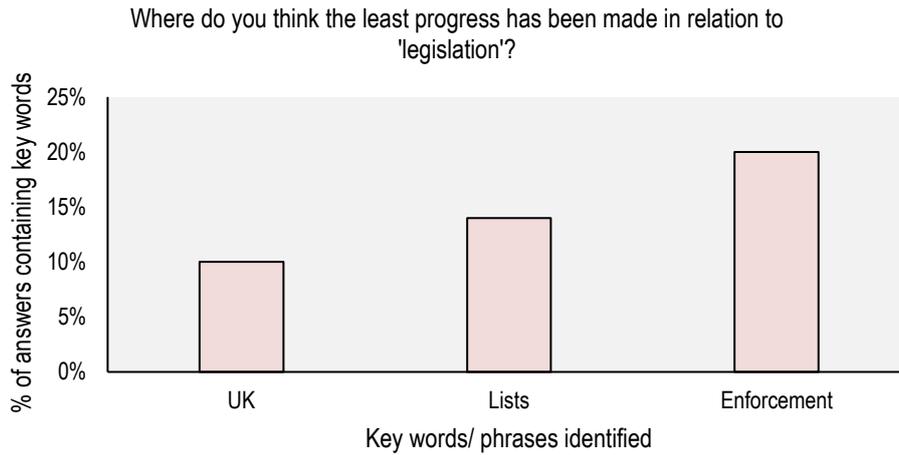


Figure 21: The most frequently identified key words in response to question 37

The engagement with stakeholders during the development of INNS legislation and the domestic implementation of the Invasive Alien Species Regulations were both seen to be beneficial/highly beneficial actions undertaken as part of the Strategy (Figure 22).

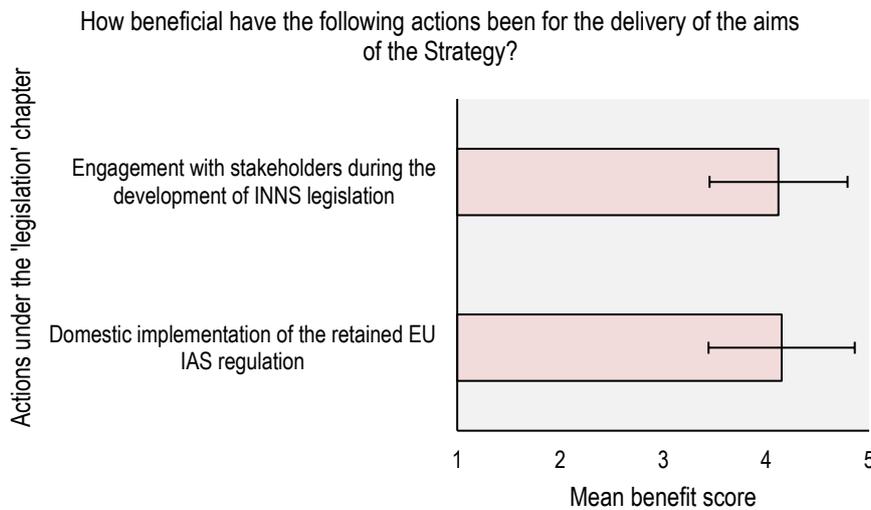


Figure 22: The mean scores from questions asking how beneficial they thought the various actions relating to 'Legislation' were (question 36). A score of 1 indicates highly detrimental, while a score of 5 indicates highly beneficial. Error bars represent SDs

Only two words were identified in responses to question 38, asking where the most progress had been made in relation to legislation; 'EU' (contained in 13% of responses) and 'Retention' (contained in 9% of responses), the latter being used in relation to EU legislation.

Forward look

Gaps in understanding of how and where legislation has been applied was a key point raised by several discussion groups. It was suggested that a database used by relevant agencies should be compiled to provide information on where legislation had been applied, especially in relation to the Species Control Agreements and Species Control Orders, under both the WANE Act (2011) in Scotland and the Wildlife and Countryside Act 1981 (as amended by the Infrastructure Act (2015)) in England and Wales. Furthermore, this database should include information on near misses where threat of enforcement was used. This database could potentially be developed into an inter-agency enforcement database sharing information on enforcement activities. It was considered that the powers to ban the sale of species should be used more robustly and promptly, especially in relation to online retailers who should be held to account for allowing INNS to be sold. This relates to the need for more robust enforcement of the legislation already in place and was the most common recommendation made in relation to the legislation section of the Strategy by the discussion groups. This was predominantly seen as the role of the newly establishing INNS Inspectorate in addition to other agencies which currently have enforcement powers under relevant legislation. The recommendations for the 'Legislation' chapter of the 2015 Strategy are outlined below:

Recommendation 7.8: Ban of sale should be applied more promptly and retailers (especially online) held to account for allowing species to be sold.

Recommendation 7.9: More rigorous and consistent enforcement of INNS related legislation.

Recommendation 7.10: Produce a database of applications of legislation, specifically for Species Control Agreements and Species Control Orders, under both the WANE Act (2011) in Scotland and the Wildlife and Countryside Act 1981 (as amended by the Infrastructure Act 2015) in England and Wales. This database should include registration of 'near misses', where the threat of enforcement was perceived to have been enough to achieve the desired outcomes.

3.8 Review of ‘Research’

Retrospective analysis

The Research Working Group (RWG), which was established in 2018, is currently drafting an Evidence Strategic Plan². Although stakeholders did not feel the RWG was as beneficial as sharing of best practices were within the questionnaire (mean score = 3.82, SD = 0.64, compared to mean score = 4.05, SD = 0.69, Figure 23), the lack of coordination over research direction was commented on by discussion groups⁹. No progress has been made towards the action to collate and maintain a publicly available database of commissioned INNS research as it was considered a low priority². Although more progress on co-ordinated research effort is needed, there has been some progress, particularly with the BIC, and with CABI and EPPO panel².

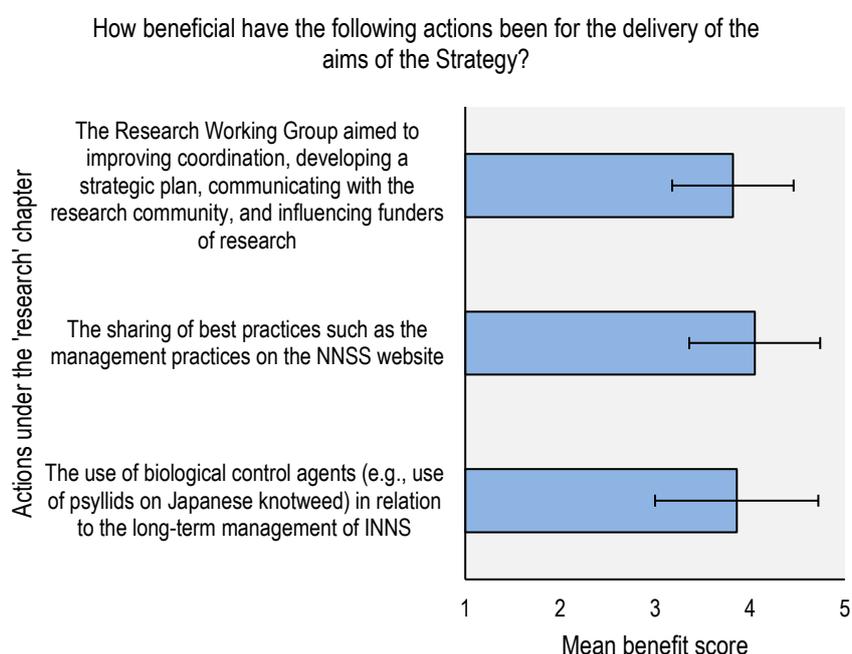


Figure 23: The mean scores from questions asking how beneficial they thought the various actions relating to the ‘Research’ theme were (question 40). A score of 1 indicates highly detrimental disagreement, while a score of 5 indicates highly beneficial. Error bars represent SDs.

It was suggested by discussion groups that there is a lack of transparency, communication and opportunity for stakeholder input into the RWG⁹. This was echoed by responses to question 41, regarding where the least progress had been made within this theme, with ‘Awareness’ (grouped with ‘Understanding’) being the second most frequently used key word (14%, Figure 24A). More progress is also needed towards the sharing of good practice on the NNSS website², a sentiment captured by the comments of several stakeholders in the questionnaire who stated that there was “*limited sharing of best practice on the NNSS website*” and that it can be “*difficult to find management options*”. Correspondingly, research into ‘Management’ (key word grouped with ‘Control’) was identified as an

area were the least progress has been made in question 41 (contained in 16% of responses, Figure 24A). Additional gaps in research proposed by the answers to this question included invertebrates, social science related to INNS, eradication of invasive plants and restoration of degraded habitats degraded by INNS. The use of biological control was seen as beneficial (Mean = 3.86, SD = 0.86, % 'Don't know' = 29%, Figure 23) and was commonly cited as an area where the most progress has been made (contained in 15% of responses, Figure 24B). This is in agreement with the conclusions of the EAC; the research into biocontrol agents is of fundamental importance, especially for the long-term management of invasive plant species, but focus also needs to be placed on the strategic delivery of the output of biocontrol research ^{eglo}.

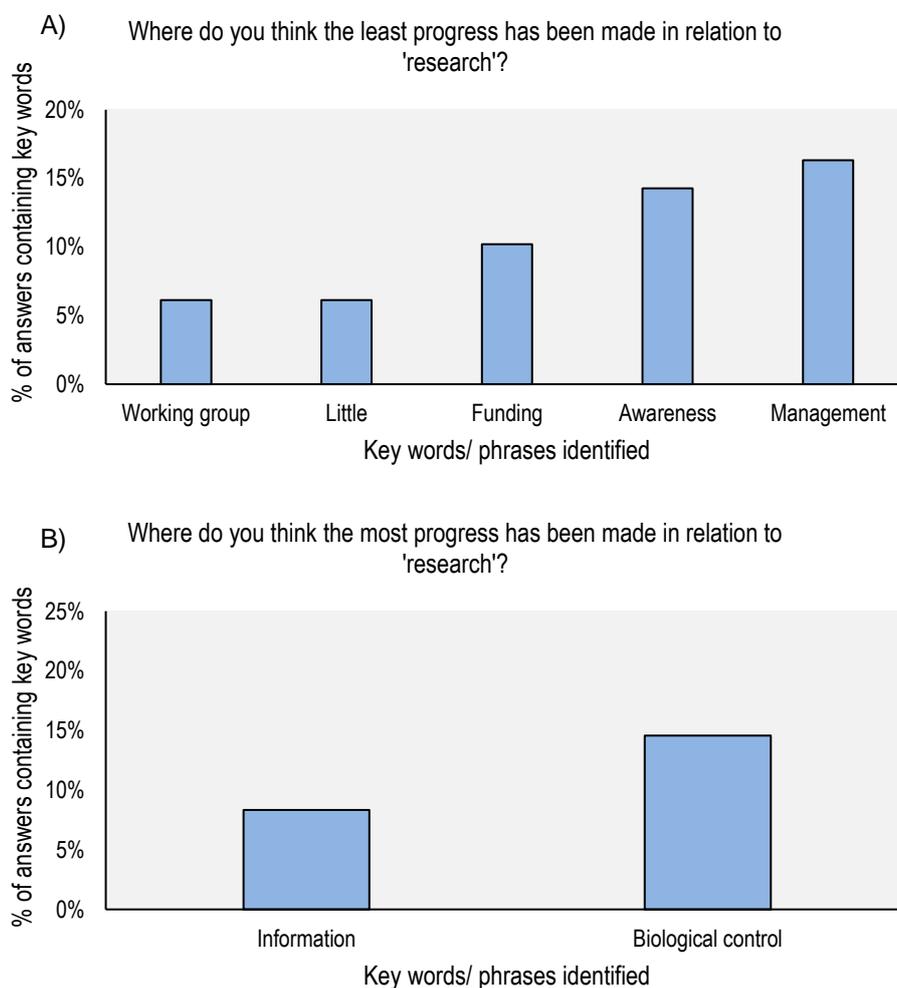


Figure 24: The most frequently identified key words in response to A) question 41, and B) question 42.

Forward look

Several discussion groups mentioned the fundamental importance of the research by CABI into the economic impacts of INNS in GB⁶⁷ as evidence to encourage action. It was suggested that this work,

resulting in the often quoted ‘£1.7 billion per annum’ of impacts, should be updated, as it is considered an underestimate⁵⁴. If the creation of an INNS research database is still considered a low priority for the 2021 Strategy, the Strategy should direct its users to both use and contribute to initiatives that are already undertaking similar actions. The website www.metadataset.com represents a tool, developed by the Biosecurity Research Initiative at St Catherine’s (BioRISC), University of Cambridge, that extracts data and metadata about INNS management interventions from scientific publications⁶⁶. It allows the user to more easily find publications that are relevant (for example by geography or by species) to the management issue they are facing⁶⁶. The BioRISC group are also involved in the development of a standardised reporting tool for management interventions, including relevant information such as costs and outcomes⁹. Conservation Evidence is another initiative that seeks to condense the results of scientific literature into a more useable format for environmental managers. Due to the management-focussed nature of these initiatives, it is possible that by greater integration with initiatives such as these going forward, progress towards actions such as 5.1 and 5.5 under ‘Long-term management and control’ could also be achieved. While the valuable research into biocontrol agents should continue, with a renewed focus on strategic implementation, research objectives should be broadened, to include use of genetic techniques relevant to both ‘Early detection, surveillance and monitoring’ (environmental DNA, eDNA)⁷⁰ and ‘Long-term management and control’ (CRISPR-based Gene Drives)^{68,69}. Research into the promotion of native biocontrol agents, as part of the wider drive to restore native ecosystems, as outlined by the 25 Year Plan and Green Industrial Revolution strategies, should also be considered as part of the Strategies research agenda, for example, the relationship between the recovery of native pine marten (*Martes martes*) populations and the decline of grey squirrels (*Sciurus carolinensis*)⁷¹. An acknowledgement of the potential effects of climate change on the arrival rates of INNS and invasiveness of NNS should also be made by the Strategies research agenda⁹. The recommendations for the ‘Research’ chapter of the Strategy are outlined below:

Recommendation 8.1: Increased communication regarding research group activities.

Recommendation 8.2: Commission an updated review of the economic impacts.

Recommendation 8.3: Conservation Evidence and BioRISC represent extremely valuable resources in terms of sharing best practice through the provision of synthesized management literature, but also in terms of tools for identifying successful management interventions to help plan long-term management projects. A repository for standardised reporting of management project efforts and results is currently under development. These initiatives should be engaged prior to the development of the 2021 Strategy.

Recommendation 8.4: While research into plant biocontrol agents should continue, the scope of the research priorities should expand to include novel genetic approaches such as eDNA and CRISPR-based gene drive. The use of native predators for management of INNS should be considered, as part of a more holistic, ecosystem restoration approach. More work needs to be done to incorporate the consequences of climate change into INNS research.

3.9 Review of 'Information exchange and integration'

Retrospective analysis

It should be noted that there are cross cutting points between this section and the Building Awareness and Understanding section, especially in relation to the contended contribution to the wider policy and biosecurity initiatives. Neighbouring states have engaged over improving prevention measures, including Belgium, the Netherlands and Ireland. And it has been agreed through this engagement to promote Check, Clean, Dry and to attend an annual meeting to update on progress. Additionally, there have been agreements to try to link the relevant parts of their PAPs, identifying several important international competitions/events to target for increased biosecurity. France has also agreed to adopt Check, Clean, Dry following a RAPID Life workshop in summer 2019. Despite leaving the EU the work undertaken with colleagues within Europe has proven to be highly valuable to aiding in regional co-ordination of actions, such as with the control of ruddy duck. Work in relation to the marine environment via OSPAR was also mentioned during discussion groups as a key driver for the marine work to date via the Pathways Actions Group.

Through the collaboration of the BIC INNS Working Group, Ireland, the Isle of Man and the Channel Islands have also agreed to adopt CCD and hold an Invasive Species Week at the same time each year. The importance of maintaining this link through the BIC is essential in facilitating a closer co-ordinated approach between the contracting parties and plays a part in the wider political landscape.

Considerable action under the 2015 Strategy has taken place with OTs (Overseas Territories). Working with the OTs, the Foreign and Commonwealth Office (FCO), the Department for International Development (DFID) and the Joint Nature Conservation Committee (JNCC), Defra has agreed a Strategy for the Conservation and Sustainable Use of Biodiversity in the OTs. Funding had been secured under the FCO's (now FCDO) Conflict, Stability and Security Fund (CSSF) to help the development of comprehensive biosecurity for the OTs by providing them with access to UK expertise on risk analysis, pathway management, pest identification, horizon scanning, contingency planning, rapid response capability and species management, which has been managed by the GB NNSS.

Forward look

There were no specific comments from the discussion groups in relation to engagement with BIC or EU Member States other than that these relationships were viewed as highly important for information and knowledge exchange, collaboration on research and taking a more coherent and joined up approach with shared interests, which was considered particularly important in relation to marine related issues. Relationships with EU Member States, the EU and BIC should therefore continue to be encouraged and nurtured wherever possible.

The British OTs contain over 90% of UK biodiversity, and as the majority are small islands, they are particularly susceptible to the impacts of INNS. Whilst the strategic approach to INNS in the OTs should remain under the governance of the ‘UK Overseas Territories Biodiversity Strategy’, greater acknowledgement should be made to OTs within the Strategy. This is particularly important given that the funding model is changing for OT INNS work following the EU exit, as well as the innate vulnerability of small islands to the impacts of climate change – many of the characteristic OT ecosystems, such as coral reefs and mangroves, have been identified as “most vulnerable” by the IPCC.

Natural Capital assets are the stocks of renewable and non-renewable Natural Capital and the natural processes that underpin them. The benefits we obtain from these Natural Capital assets are referred to as ecosystem services. The 25 Year Environment Plan strongly encourages the use of Natural Capital in decision-making, as part of its commitment to improving the environment and leaving it in a better state for future generations. Natural Capital was mentioned within several discussion groups as being of growing importance within the overarching environmental based management approach within the UK. Ensuring this is identified within the 2021 Strategy will be essential in ensuring a coherent and joined up approach to thinking in this work area.

This involvement with the Regional Seas Committees, particularly OSPAR, was considered essential for the continued co-ordinated delivery of marine INNS work going forwards.

The recommendations for the ‘Information exchange and integration’ chapter of the 2015 Strategy are outlined below:

Recommendation 9.1: Strengthen actions within the Strategy relating to OTs and incorporate climate change considerations into these actions.

Recommendation 9.2: Incorporate actions to ensure INNS are considered within Natural Capital approaches.

Recommendation 9.3: Continue to engage with OSPAR in the co-ordination of marine INNS work on a regional scale.

3.10 Review of 'Implementation and review'

Retrospective analysis

A key action under this part of the Strategy is the development and maintenance of an implementation plan to deliver the key actions of the Strategy. The single issue raised most often within the questionnaire and the discussion groups limiting the implementation of the Strategy was the lack of funding. Funding was raised specifically by the EAC where the recommendation was: *for the government to commit to increasing investment in invasive species to £6 million, funding on-the-ground biosecurity capacity and the formation of a dedicated invasive species inspectorate.* The lack of funding was mentioned in relation to every aspect of the Strategy, but specifically concerning the management of marine INNS, research into management methods (including biosecurity), long term management of established species, particularly in relation to LAGs, enforcement of legislation and rapid responses, especially where immediate and concerted short term action involving relatively small amounts of funding could save considerable amounts of money in the future. INNS cost the UK at least £1.7 billion per year due to impacts such as damage and loss of crops, increased flooding and additional building construction costs. This economic cost (including both impact and control costs), calculated in 2010, is likely to be a serious underestimate when the spread of existing INNS and the establishment of new species in the intervening years is taken into consideration. Inflation alone means the cost will now be at least £2.2 billion per year. Without clear resourcing of the Strategy this cost will continue to increase and could potentially be further inflated by climate change and the current political landscape. Within the questionnaire funding was identified as the single greatest barrier to achieving the aim of the Strategy since 2015 (Figure 25). This was the single greatest response to any question asked during this review highlighting the significant need of funding this work area requires in the opinion of those that provided responses. Other areas raised as barriers to the implementation of the 2015 Strategy, which relate back to funding, refer to a lack of enforcement in key legislation, prevention of INNS being introduced, rapid response to introductions, research and co-ordination at the location level. Other key words identified in relation to barriers to achieving the aims of the 2015 Strategy identified gaps in stakeholder engagement and there being no long-term Strategy (in comparison to the time scale over which invasion management needs to be considered). Several respondents also raised the point that INNS are still a low priority in several parts of Government and more needed to be done to address this issue, especially in relation to marine INNS.

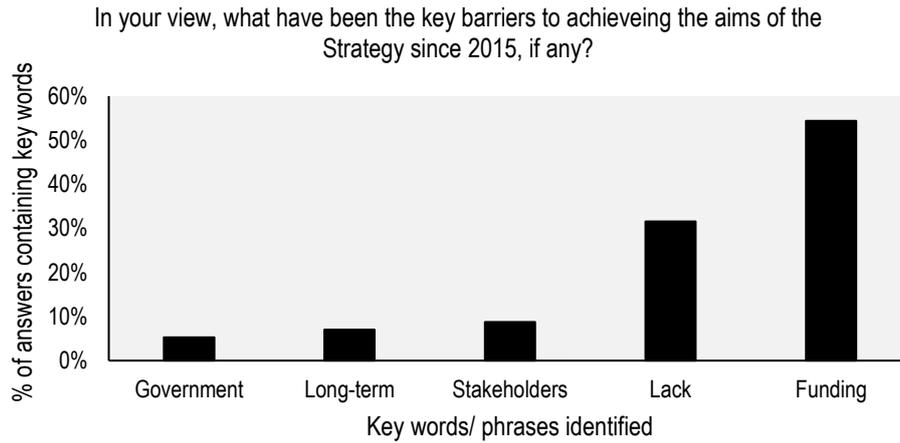


Figure 25: The most frequently identified key words in response to question 44.

Forward look

The time scale over which the Strategy functions was raised in several working groups as well as in the questionnaire. Views gathered were that the time scale of the Strategy needs to be more aligned with that of other environmental strategies (e.g., 25 Year Environment Plan) as well that of invasion management. The plan should therefore be reconsidered in light of the scope of the document being set over a 25-year time frame, with the strategic aims set over 10 years and the actions reviewed every five years. It is believed that this will significantly help in developing a more robust, longer term and coherent approach to invasion management. When the 2021 Strategy is reviewed following the next five year period, it is suggested that a similar approach to the review is used with respect to the questionnaire, such that a consistent data set can be built to monitor the progress of the Strategy. Several questionnaire respondents indicated the value of this opportunity to input into the future of the Strategy. This should include maintaining and building on the stakeholder list and adopting the same questions (where appropriate) and response formats.

While a lack of funding was clearly identified as a key issue in relation to implementation of the Strategy, which will need to be addressed as a matter of utmost priority, where the funding should be directed was also considered by participants of the questionnaire. Of the main subject areas covered by the 2015 Strategy, prevention was considered the area requiring the most financial input over the next 5 years, closely followed by long term management (Figure 26), with legislation and research considered to be the areas requiring the least financial input.

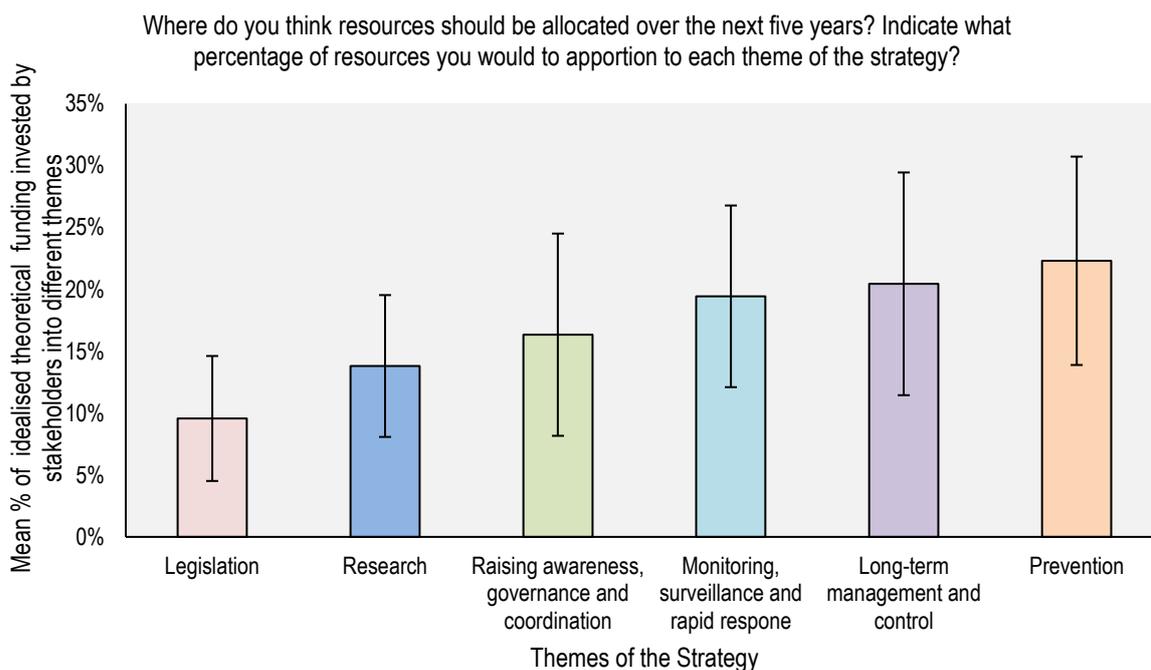


Figure 26: The mean percentage of funding attributed by respondents to the different themes within the Strategy (question 43).

The recommendations for the ‘Implementation and review’ chapter of the Strategy are outlined below:

Recommendation 10.1: The economic impacts of INNS in the UK need re-evaluating more than a decade on from the original estimates, as it is likely that the impacts are being underestimated. The recent paper by Cuthbert et al. 2021 suggests the cost to the UK of INNS per annum is £122.1 million, which is a significant decrease from the figure which is currently being used extensively in support of policy of £1.7 billion per annum.

Recommendation 10.2: The timetable for reviewing the Strategy needs to be considered in relation to changes in the time scale over which different parts of the Strategy are recommended to be based:

- Visions should be reviewed over a 25-year time scale
- Aims reviewed over a 10-year time scale
- Actions reviewed over a 5-year time scale

Recommendation 10.3: The review process that follows the next five-year period should include a repeat of the stakeholder questionnaire exercise (retaining key questions in order to start monitoring perceptions over time).

Recommendation 10.4: It is clear that funding is an issue and that additional funding is required to implement the 2015 Strategy more effectively. Where the funding should be directed needs to be considered more carefully. While the information presented here provides some insight into where stakeholders think future funding should be directed, it is recommended that a more robust review is conducted.

Appendix 1 Glossary of terms, abbreviations and definitions

BIC: British-Irish Council

CABI: Centre for Agriculture and Bioscience International

CEH: UK Centre for Ecology and hydrology

CCD: The 'Check, Clean, Dry' campaign

DEFRA: The department for Environment, Food and Rural Affairs

EAC: Environmental Audit Committee

GB Administrations – Defra, the Scottish Government and the Welsh Government

INNS: Invasive Non-Native Species - animals and plants that are introduced accidentally or deliberately into a natural environment where they are not normally found, with serious negative consequences for their new environment, typically because of rapid population growth.

IAS: Invasive Alien Species – equivalent to INNS, but more typically used in a European context

LAG: Local Action Group

NGO: Non-Government Organisation

NNSS: The Non-Native Species Secretariat

NNS: animals and plants that are introduced accidentally or deliberately into a natural environment where they are not normally found.

NNSIP: Non-Native Species Information Portal

OT: Oversea Territory

PAP: Pathway Action Plan

PB: The (Invasive Non-Native Species) Programme Board

RIMP: Regional Invasive Species Management Plan

SD: Standard Deviation (measure of central tendency around the mean)

SEL: Scottish Environment Link

SSC: Species of special concern (under the retained EU IAS Regulation)

SoSC: Species of special concern (under the retained EU IAS Regulation).

WCL: Wildlife and Countryside Link

WEL: Welsh Environment Link

Appendix 2 Review of documents: core document list

Citation number	Core document title
1	The Great Britain Invasive Non-Native Species strategy (2015)
2	Retrospective analysis carried out by policy team, GB Non-native Species Secretariat (GBNNS), GB Administrations and GB Invasive Non-native Species Programme Board
3	First Report of Session 2019: House of Commons Environmental Audit Committee - Invasive species (2019)
4	Government response to Environmental Audit Committee: Invasive species (2020)
5	The European Commission's review of UK implementation of the EU IAS Regulation.
6	Strategy_Review_workshop_1_-_Prevention_chapter
7	Strategy_Review_workshop_1_-_Review_of_prevention_actions
8	Prevention_-_Key_Actions_-_Workshop_findings_v1
9	Strategy_Review_workshop_2_-_Building_Awareness_chapter
10	Strategy_Review_wprkshop_2_-_Review_of_building_awareness_actions
11	Building_Awareness_-_Key_Actions_-_Workshop_findings_v1
12	Strategy_Review_workshop_2_-_Media_and_Communications_Strategic_Plan
13	Report of NNS training working group
14	Workshop_3_-_Early_Detection_(chapter_excerpt)
15	Review_of_monitoring_and_surveillance_actions
16	Surveillance_-_Key_Actions_-_Workshop_findings_final
17	2012_-_NNSIP_Final_report
18	Workshop_4_-_Mitigation_Control_and_Eradication_(chapter_excerpt) (3)
19	Review of rapid response mitigation and control
20	Research_-_Workshop_findings_FINAL
21	2009 Rapid_response_working_group_FINAL_REPORT_-_v.4.2_(2009)
22	Update_on_biocontrol_projects_for_GB
23	Governance_Strategy_Review_Workshop_5_-_chapter_4_roles_and_responsibilities
24	Strategy_Review_Workshop_5_-_chapter_12_information_exchange
25	GB_Strategy_Review_Workshop_5_-_paper_on_GB_coordinating_mechanism
26	Governance_-_Information_Exchange_-_Workshop_findings_FINAL
27	GB_Strategy_Review_Workshop_6_-_chapter_11_research
28	Review Hulme_GB_INNS_Review_2014
29	Review_Pierre Genovisi_2014_v1

Appendix 3 Review of documents: supplementary document list

Citation number	Supplementary document title
30	Progress toward pathway prioritisation in compliance to Aichi Target 9
31	Comprehensive analysis of pathways of unintentional introduction and spread of invasive alien species – report of the UK
32	GB_Angling_Pathway_Action_Plan & additional docs
33	Recreational_Boating_Pathway_Action_Plan & additional docs
34	UK_Zoo_PAP_pre-consultation_draft & additional docs
35	RAPID LIFE_South_West_Regional Invasive Species Management Plan
36	RAPID LIFE_South_East_Regional Invasive Species Management Plan
37	RAPID LIFE_East_Regional Invasive Species Management Plan
38	RAPID LIFE_Midlands_Regional Invasive Species Management Plan
39	RAPID LIFE_North_Regional Invasive Species Management Plan
40	2006 Risk_Assessment_Final_NNSS_Peer_Review process
41	2008 Invasive_NNS_Framework_Strategy_GB_E
42	Tackling INNS in the Overseas Territories
43	Submission to EAC PB July18-04 Resourcing - introduction
44	Submission to EAC PB July18-05 Biosecurity Comparison
45	Submission to EAC PB July18-06 Biodiversity and agency spend
46	Submission to EAC PB July18-07 Maintaining specialist capacity
47	Submission to EAC PB July18-08 General Resourcing for GB Strategy
48	Submission to EAC PB July18-09 Summary resource paper
49	Green & Grosholz-Functional eradication as a framework for invasive species controlfee.2277
50	NNSS website (01/03/21-XX/03/21)
51	Maritime & Coastguard Agency: Ballast Water Management FAQ
52	Smith et al (2019). Recreational angling as a pathway for INNS spread: awareness of biosecurity and the risk of long distance movement into Great Britain
53	Consultation letter for management measures for widely spread INNS
54	Management measures for widely spread INNS in England and Wales
55	Plant Alert-Katharina_Stakeholder_Forum - Presentation
56	Booy et al (2017). Risk management to prioritise the eradication of new and emerging invasive non-native species.
57	OTs project summary
58	Wildlife and Countryside Link – Prevention is Better than Cure Report (2020)
59	Sixth national report to the CBD 2019
60	First draft of the post-2020 global biodiversity framework
61	Progress in adapting to climate change: 2021 Report to Parliament
62	The INNS Media and Communications Plan for Great Britain
63	Survey of Attitudes, Knowledge and Behaviour in Relation to Non-native Species
64	Taherdoost, H. (2019) What is the Best Response Scale for Survey and Questionnaire Design; Review of the Different Lengths of Rating Scale/ attitude Scale/ Likert Scale. <i>International Journal of Academic Research in Management</i> . Vol 8(1): 1-10.
65	Pest Specific Contingency Plan: Asian hornet
66	www.metadataset.com
67	CABI (2014). Demonstrating the cost of invasive species to Great Britain

- 68 McFarlane et al (2018). CRISPR-based Gene Drives for Pest Control
69 Faber et al (2021) Novel combination of CRIPSR-based gene drives eliminates
resistance and localises spread
70 Cowart et al (2018). Environmental DNA (eDNA) applications for the conservation of
imperilled crayfish (Decapoda: Astacidea) through monitoring of invasive species
barriers and relocated populations
71 Sheehy et al (2018). The enemy of my enemy is my friend: native pine marten
recovery reverses the decline of the red squirrel by suppressing grey squirrel
populations'
72 Invasive Non-native Species (INNS) – Priority Species for Action in Wales

Appendix 4 List of stakeholder organisations for questionnaire

AECOM
Aire Action Leeds
Allen Valley Angling and Conservation
Anglia Ruskin University
Anglian Water
Angling Trust
Animal and Plant Health Agency
Argyll and Bute Council
Arun and Rother (Invasive Species Strategy)
Avon Frome Partnership
Avon Invasive Weeds Forum
Avon Source to Sea Project (Hampshire and Dorset)
Bangor University
Bewdley Civic Society
Bollin Environmental Action and Conservation
Bollin Environmental Action and Conservation
Bollin Valley Partnership
Bournemouth University
Brecon Beacons National Park
Brecon Beacons National Park Authority
Bristol Avon Rivers Trust
Bristol Water
Bristol Zoo
British Association for Shooting and Conservation
British Canoeing
British Ecological Society
British Marine
British Marine - The Green Blue
British Rowing
British Trust for Ornithology
British Tust for Ornithology Scotland
Buglife
Buglife Cymru
Centre for Agriculture and Bioscience International
Cam Valley Forum
Canal and Rivers Trust
Canoe Wales
Cardiff Harbour Authority
Centre for Environment, Fisheries and Aquaculture Science
Centre for Ecology and Hydrology
Chelmer Canal Trust
Cheshire Wildlife Trust
Chester Zoo

Chilterns Area of Outstanding Natural Beauty
 Cornwall Invasive Non-Native Group
 Community Connection Projects/Groundwork South/Friends of Oxhey Park
 Community Green Initiative
 Country Land & Business Association
 Countryside Alliance
 Cromarty Firth Fishery Trust
 Cumbria Freshwater INNS Initiative
 Darlington & Teesdale Naturalists Field Club
 Dedham Vale AONB and Stour Valley Project
 Dee Invasive Non-native Species Project
 DEFRA
 Devon Invasive Species Initiative
 Devon LAG
 Devon Local Nature Partnership
 DINNS Partnership / North Wales Wildlife Trust
 Dwr Cymru
 Eastleigh Biodiversity Partnership
 Eden Rivers Trust
 Edinburgh Napier University
 Environment Agency
 Essex Biodiversity Project
 Essex Wildlife Trust
 Exmoor National Park Authority
 Falkirk Council
 Farming Union Wales
 Findhorn, Nairn and Lossie Fisheries Trust
 Five Rivers Contracting Ltd
 Forestry Commission
 Freshwater Invasive Non-native Species Initiative
 Friends of Pollok Country Park, Glasgow
 Friends of the River Frome
 Froglife
 Galloway Fisheries Trust
 Garden Centre Association
 Grasmere Red Squirrel Group
 Ground Control Ltd/ British Association of Landscape Industries
 Groundbreaking Projects
 Hafren Dyfrdwy
 Hampshire & Isle of White Wildlife Trust
 Harper Adams University College
 Herefordshire Wildlife Trust
 Highland Invasive Species Forum
 Himalayan Balsam group Dyffryn Ogwen
 Horticultural Trades Association
 Humane Society International

Imperial College London
 Inland Waterways Association
 Institute of Fisheries Management
 International Association of Horticultural Producers
 Isle of Wight Non-native Plants Project
 Japanese Knotweed Solutions Ltd
 Joint Nature Conservation Committee
 Knotweed Control
 Lancashire Law School
 Leicester INNS forum
 Loch Flemington Catchment Management Group
 London Gateway
 London Invasive Species Initiative
 London Port Authority
 Marine Biological Association
 Marine Management Organisation
 Mark Spencer Botanist
 Medway Swale Estuary Partnership
 Medway Valley Countryside Partnership
 Mersey Rivers Trust
 Mid Arun Valley Environmental Survey
 National Farmers Union
 National Farmers Union Scotland
 National Farmers Union Wales
 National Museum Wales
 National Trust
 National Trust for Scotland
 Natural England
 Natural England/River Avon Invasive Plant Forum
 Natural Enterprise
 Natural History Museum
 Natural Resources Wales
 Nature Conservation Services
 National Biodiversity Network
 Network Rail Infrastructure Limited
 New Forest Non-native Plants Project
 Newcastle University
 Nith Catchment Fishery Trust
 Non-native Species Secretariat
 Norfolk non-native Species Initiative
 North Wales Wildlife Trust
 Northern Ireland Environment Agency
 Northern Red Squirrels
 Northumbrian Water
 North Wales Wildlife Trust/ Dee Invasive Non-Native Species Project
 Ornamental Aquatic Trade Association

PBA Ecology Ltd.
 Peak District and Lowland Derbyshire Non-native Species Initiative
 Peel Ports
 Pembrokeshire Coast National Park
 Pembrokeshire Coast National Park
 Pevensey Levels Alien Species Project
 Plantlife
 Plantlife & Botanical Society of Britain and Ireland
 Plantlife Scotland
 Plymouth Marine Laboratory
 Quaggy Waterways Action Group
 Queens University Belfast
 Reptile and Exotic Pet Trade Association
 Ribble Rivers Trust
 River Barle signal crayfish project / Culm Community Crayfish Project / Devon Invasive Species Initiative
 River Char Project
 River South Esk Partnership
 River Stour Project Officer
 River Usk Giant Hogweed Forum
 River Wiske Rehabilitation
 Rivers and Fisheries Trusts of Scotland
 Royal Botanic Garden Edinburgh
 Royal Botanic Garden Kew
 Royal Horticultural Society
 Royal Yachting Association
 Royal Society for the Protection of Birds /BirdLife International/European Habitats Forum
 Salmon and Trout Association
 Scottish Association for Marine Science
 Science & Advice for Scottish Agriculture
 Scottish Environment Protection Agency
 Scottish Forestry
 Scottish Government
 Scottish Invasive Species Initiative
 Scottish Natural Heritage (NatureScot)
 Scottish Water
 Severn Estuary Partnership
 Severn Rivers Trust
 Shellfish Association of Great Britain
 Shropshire Wildlife Trust
 Skye and Lochalsh Environmental Forum
 South Downs
 South West Lakes Trust
 South West Water
 South Yorkshire Biodiversity Research Group
 South Yorkshire Econet
 Staffordshire Wildlife Trust

Stockholm Environment Institute, University of York
 Surrey Wildlife Trust
 Sussex Ouse Conservation Society and the River Adur Conservation Society
 Sussex Wildlife Trust
 Sustainable Users Network
 Swansea University
 Tamar Invasives Group
 Tayside Biodiversity Partnership
 Tees Rivers Trust
 Thames 21
 Thames Water
 The Deer Initiative
 The Marine Biological Association
 The Rivers Trust
 The South East Rivers Trust
 The Tay Foundation
 The Wandle Trust
 The Wildlife Trust for Bedfordshire, Cambridgeshire & Northamptonshire
 Tweed Forum
 Tweed Forum Invasives Project
 Tyne Catchment Local Action Group
 Tyne Rivers Trust
 UK Squirrel Accord
 United Utilities
 University of Aberdeen
 University of Cambridge
 University of Coventry
 University of Leeds
 University of Sheffield
 University of Stirling
 Wales Environment Link
 Wandle INNS Group
 Wales Resilient Ecological Network (North Wales Wildlife Trust)
 Warwickshire Wildlife Trust, Tame Valley Wetlands
 Welsh Fisherman's Association
 Welsh Government
 Wessex Water
 West Country Rivers Trust
 Wey Valley Landscape Partnership
 Wildfowl and Wetlands Trust
 Wildlife and Countryside Link
 Wildlife Trust
 Wiltshire Wildlife Trust Invasive Plant Project
 Woodland Trust
 World Conservation Monitoring Centre
 Wye and Usk Foundation

Yorkshire Dales INNS Biosecurity Group
Yorkshire Dales Rivers Trust
Yorkshire Water
Yorkshire Wildlife Trust

Appendix 5 Questionnaire: Word cloud excluded words

a, about, above, after, again, against, all, am, an, and, any, are, aren't, as, at, be, because, been, before, being, below, between, both, but, by, can, can't, cannot, com, could, couldn't, did, didn't, do, does, doesn't, doing, don't, down, during, each, else, ever, few, for, from, further, get, had, hadn't, has, hasn't, have, haven't, having, he, he'd, he'll, he's, her, here, here's, hers, herself, him, himself, his, how, how's, http, I, I'd, I'll, I'm, I've, if, in, into, is, isn't, it, it's, its, itself, just, k, let's, like, me, more, most, mustn't, my, myself, no, nor, not, of, off, on, once, only, or, other, ought, our, ours, ourselves, out, over, own, r, same, shall, shan't, she, she'd, she'll, she's, should, shouldn't, so, some, such, than, that, that's, the, their, theirs, them, themselves, then, there, there's, these, they, they'd, they'll, they're, they've, this, those, through, to, too, under, until, up, very, was, wasn't, we, we'd, we'll, we're, we've, were, weren't, what, what's, when, when's, where, where's, which, while, who, who's, whom, why, why's, with, won't, would, wouldn't, www, you, you'd, you'll, you're, you've, your, yours, yourself, yourselves

Appendix 6 Semi-structured discussion group participant organisation list

Citation letter	Discussion group	Organisations represented
a	Aquatic Recreation	Angling Trust, Tweed Forum, British Canoeing
b	Biological Recording	Local Environment Record Centres Wales, National Biodiversity Network, Association of Local Environmental Records Centres
c	Climate Change	Climate Change Committee: Adaptation Committee
d	DEFRA	DEFRA: Invasive Non-native Species Policy Team, DEFRA: Plant Health, DEFRA: Marine and Fish Directorate
e	Environmental Consultants	AECOM (Architecture, Engineering, Construction, Operations and Management), Advanced Invasives Ltd.
f	English Government	Environment Agency, Natural England, CEFAS (Centre for Environment, Fisheries and Aquaculture Science)
g	Forestry	Natural Resources Wales, Scottish Forestry
h	Local Action Groups	Hampshire and Isle of White Wildlife Trust, Scottish Invasive Species Initiative
i	Marine	Marine Biological Association, Marine Management Organisation
j	Non-Government Organisations	Countryside Link, RSPB (Royal Society for the Protection of Birds), Angling Trust
k	Non-Native Risk Assessment Panel	Imperial College London, University of Sheffield, DEFRA: Plant Health
l	Non-Native Species Secretariat	Animal and Plant Health Agency
m	Ornamental and horticultural trade	Ornamental Trade Association, Royal Horticultural Association
n	Plant Science	Kew Botanical Gardens, National Botanic Garden of Wales, Royal Botanic Garden Edinburgh, Plant Life
o	Research Institute	Centre for Ecology and Hydrology, Centre for Agriculture and Bioscience International
p	Scottish Government	NatureScot, SEPA (Scottish Environment Protection Agency), Scottish Forestry, Scottish Government, SASA (Science & Advice for Scottish Agriculture)
q	University Research	University of Aberdeen, University of Cambridge, University of Newcastle
r	Water Companies	Anglian Water, Southwest Water, Scottish Water
s	Welsh Government	Welsh Government, Natural Resources Wales

Appendix 7 INNS Strategy for Great Britain : questionnaire

The purpose of this questionnaire is to gather the views of stakeholders on the implementation of the Invasive Non-native Species (INNS) Strategy for Great Britain since 2015 ([link](#)) and provide some indication of the future direction of the next iteration.

The aim of the Strategy is to address INNS issues in Great Britain by minimising the risk they pose and reduce their negative impacts in GB. The Strategy follows the Convention on Biological Diversity (CBD) hierarchical approach stressing prevention, followed by early detection and rapid response and finally long-term management and control. The GB Non-Native Species Secretariat (NNSS) is responsible for coordinating the approach to tackling INNS in Great Britain and therefore implementation of the Strategy.

It is intended that the Strategy is reviewed every five years to assess how effectively it has been implemented as well as how it should be adapted going forward. This questionnaire is part of the review process and is aimed at gathering responses from a broad range of stakeholders. We would appreciate it if you can consider as many of the questions as possible and give answers that best represent your organisation or you as an individual if presenting your personal views. However, if you are not familiar with the material that a given question is addressing, please make use of the 'Don't know' option. All data collected as a part of this questionnaire will be anonymised and will not be shared with any third parties (please see Privacy Notice below). Anonymised data will be published in a review document that will be made publicly available on the GB Non-Native Species Secretariat Website following its review. The questionnaire should take approximately 25 minutes. You will be able to take part in the questionnaire up until Monday 12th July. Thank you in advance for your time and valued contribution.

- 1) Who or what organisation do your answers represent?
- 2) Which category most effectively describes your role in relation to INNS?
 - Government / Government Agency
 - Local Authority
 - Recreation – land-based focus
 - Recreation - aquatic focus
 - Environmental / conservation organisation
 - Local Action Group
 - Research (university or academic institution)
 - INNS specialist – consultant organisation or solo
 - Industry / Industry representative – land focus
 - Industry / Industry representative – freshwater focus
 - Industry / Industry representative – marine focus
 - Other – please specify
- 3) Where are you based (in your role)?
 - Wales
 - Scotland
 - England
 - Northern Ireland
 - Great Britain
 - United Kingdom
 - Overseas territory
 - Crown dependency
- 4) How aware are you of the 2015 GB INNS Strategy?
 - Very aware (have read multiple times and/ or contributed to it)
 - Aware (have read at least in part and am aware of the key features of the Strategy)
 - Somewhat aware (have seen it referenced and may be aware of/ work on outputs of the document)

- Unaware (Not aware of the Strategy document specifically, but aware of the general approaches to management of INNS)

2. Prevention

Preventing the introduction/spread of INNS is the primary aim of the Strategy. A comprehensive analysis of pathways of introduction and spread was carried out in 2019 by the GB NNSS ([link – second in the list](#)). This work prioritised 6 pathways: hull fouling, horticulture escapes, contaminants of ornamental plants, ballast water, stowaways on fishing equipment and zoos. Draft Pathway Action Plans (PAPs) for zoos, recreational angling and recreational boating have been compiled with stakeholder engagement and are available on the GB NNSS website for comment ([link](#)), with other PAPs currently under development.

Horizon scanning is an approach which is being used to identify and prioritise the threat posed by potentially new INNS. Initially this exercise was conducted by The Non-Native Species Information Portal (NNSIP) in 2014 and repeated in 2019, which has resulted in the publication of a list of new species which pose a threat to GB ([link](#)). Border control points are often crucial nodes in invasion pathways. Stricter border checks and controls on the 66 species of special concern are being conducted by the Animal and Plant Health Agency (APHA) with support by Border Force. It has been recommended that an INNS Inspectorate is set up in order to help with the implementation of biosecurity measures across GB.

If introductions do occur, generic contingency plans have been produced for each country, describing how governments and operational partners will respond. The plans are separated into six broad groups reflecting differences in the species and agencies involved: terrestrial vertebrates, terrestrial invertebrates, terrestrial plants, freshwater animals, freshwater plants and marine.

- 5) Do you agree/disagree with the following statement? ‘The Strategy has reduced and, where possible, prevented the intentional and unintentional introduction of INNS since 2015’;
- Strongly disagree
 - Disagree
 - Neither agree nor disagree
 - Agree
 - Strongly agree
 - Don’t know

The following question aims to gather information on your views of how beneficial actions carried out since 2015 have been in delivering work under the Strategy in relation to ‘Prevention’. For each of the following key actions how beneficial have they been to the delivery of the aims of the Strategy?

- 6) The comprehensive pathway prioritisation exercise conducted in 2019;
- Highly detrimental
 - Detrimental
 - Neither beneficial nor detrimental
 - Beneficial
 - Highly beneficial
 - Don’t know

The Pathway Action Plans which have been developed to date;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

The species horizon scanning process conducted by the NNSIP;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

Stricter requirements for border checks and controls on listed species of concern;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

The development of contingency plans covering all priority species that are not yet established in GB;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

7) Do you think the establishment of an INNS inspectorate would be beneficial to meeting the aims of the Strategy? Select one and please elaborate

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

8) Where do you think the least progress has been made in relation to 'Prevention' under the Strategy?

9) Where do you think the most progress has been made in relation to 'Prevention' under the Strategy?

3. Early detection, surveillance and rapid response

There is a clear need for accurate, up to date information on non-native species distributions to underpin decision-making. NNSIP provides the mechanism for maintaining and updating this information. It comprises a register of over 3,000 species, together with supporting information on status and impact as well as maintaining the GB 'alert system'. Since 2015 the alert system has received more than 27,500 records of species of potential concern ([link](#)).

Various citizen science initiatives also encourage citizen involvement in the monitoring process, such as iRecord ([link](#)). While the network of Recording Schemes and Societies provide annual updates of

INNS, including taxonomy and dates of first record which is incorporated into the NNSIP species registers. In some cases, dedicated surveillance networks have been established for particular species, such as the use of beekeepers to monitor for the presence of the Asian hornet ([link](#)).

Rapid response requires swift action to contain and where possible, remove a newly detected INNS population, to prevent the target species becoming established or widespread. As part of this process risk management methods have been developed in 2018 to help identify and prioritise species for rapid response ([link](#)).

- 10) Do you agree/disagree with the following statement? 'The Strategy has made optimum use of available capacity and resources to improve detection and monitoring capabilities';**
- Strongly disagree
 - Disagree
 - Neither agree nor disagree
 - Agree
 - Strongly agree
 - Don't know
- 11) Do you agree/disagree with the following statement? 'Through effective implementation of the Strategy, contingency response capabilities are in place to prevent the establishment of new invasions';**
- Strongly disagree
 - Disagree
 - Neither agree nor disagree
 - Agree
 - Strongly agree
 - Don't know
- 12) Has NNSIP provided an effective central repository for INNS information and distribution data?**
- It is highly ineffective
 - It is ineffective
 - It is neither effective nor ineffective
 - It is effective
 - It is highly effective
 - Don't know
- 13) Has NNSIP provided an effective alert mechanism?**
- It is highly ineffective
 - It is ineffective
 - It is neither effective nor ineffective
 - It is effective
 - It is highly effective
 - Don't know

The following question aims to gather information on your views of how beneficial actions carried out since 2015 have been in delivering work under the Strategy in relation to 'Early detection, Surveillance and Rapid response'. For each of the following key actions how beneficial have they been to the delivery of the aims of the Strategy?

- 14) Dedicated surveillance for high priority species such as the Asian hornet;**
- Highly detrimental
 - Detrimental
 - Neither beneficial nor detrimental

- Beneficial
- Highly beneficial
- Don't know

The use of risk management methods to help identify and prioritise species for rapid eradication in GB;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

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- 15)** New Zealand, often considered international leaders in their approaches towards INNS, has set out plans to establish a 'biosecurity citizens army' whereby approximately 3% of the population will be designated as biosecurity champions and trained in how to identify and respond to novel INNS detections (effective during 2020-2025). Do you think that a similar initiative could be implementable and effective in the UK (please elaborate)?
- 16)** Where do you think the least progress has been made in relation to 'Early detection, surveillance and rapid response' under the Strategy?
- 17)** Where do you think the most progress has been made in relation to 'Early detection, surveillance and rapid response' under the Strategy?

4. Long-term management and control

The impacts of INNS already widely established in GB is clearly recognised and as such there is a need to manage these species. Management measures have been agreed and published for the widespread INNS to aid in taking appropriate actions ([link](#)).

Local Action Groups (LAGs) are crucial for the management of widely established INNS. They represent an invaluable resource for delivering sustainable, long-term management of certain species at a local and regional level. LAGs are supported through annual workshops, that not only provide an opportunity for LAGs to share best practice guidance and feedback to the NNSS, but also for higher-level decision makers to update LAGs on national progress, legislation and new developments ([link](#)).

Regional initiatives to co-ordinate action on long-term management of established species have been/ are being developed through the RAPID LIFE project in England and WaREN project in Wales. The RAPID LIFE project has delivered six Regional Invasive species Management Plans (RIMPs) that prioritise species and sites for control at a regional level ([link](#)), whilst the WaREN has undertaken a baseline assessment of INNS impacts and distribution in Wales, identified key stakeholders and scoped a variety of toolkits and action recording tools for future implementation.

Additionally, the Centre for Agriculture and Bioscience International (CABI) have continued to progress their research on the use of biological control agents on the management of invasive plant species, such as the use of the use of psyllids on Japanese knotweed ([link](#)).

- 18)** Do you agree/disagree with the following statement? The Strategy has helped to ensure that strategic actions to control established INNS are adequately resourced and delivered;
- Strongly disagree
 - Disagree
 - Neither agree nor disagree

- Agree
- Strongly agree
- Don't know

The following question aims to gather information on your views of how beneficial actions carried out since 2015 have been in delivering work under the Strategy in relation to 'Long-term management and control'. For each of the following key actions how beneficial have they been to the delivery of the aims of the Strategy?

19) The further resourcing of LAGs to undertake long-term management and control actions;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

The development of regional management plans for the long-term management of INNS, such as the Regional Invasive alien species Action Management Plans (RIMPs) in England?

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

The use of biological control agents (e.g., [use of psyllids on Japanese knotweed](#)) in relation to the long-term management of INNS?

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

20) How can the information gathered by processes such as horizon scanning and pathway analysis be more effectively used in the management of INNS?

21) Where do you think the least progress has been made in relation to 'Long-term management and control' under the Strategy?

22) Where do you think the most progress has been made in relation to 'Long-term management and control' under the Strategy?

5. Building awareness, Governance and Coordination

Improved awareness and understanding of the issue of INNS is fundamental for gaining support for relevant policies and programmes, and for engaging the public. Invasive Species Week ([link](#)) in addition to the 'Be Plant Wise' ([link](#)) and 'Check, Clean, Dry' ([link](#)) initiatives have been crucial awareness raising campaigns, delivering simple but important messages about biosecurity to stakeholders. Since their initial launch both campaigns have been updated and relaunched in 2018 and 2020 respectively. Free

online training has also been provided on the NNSS website for species identification, biosecurity and specific guidance for sectors/ recreational groups that are likely to encounter INNS issues ([link](#)).

A number of working groups have been set up with the support of the Secretariat including the Risk Analysis Panel, Media and Communications Working Group, Rapid Response Working group and Research Working group, additionally the Stakeholder Forum brings together representatives annually from a range of sectors to discuss strategic issues ([link](#)). Country level working groups have been established in each Administration which operate as a source of expertise, identifying INNS priorities in their respective regions ([link](#)).

23) Do you agree/disagree with the following statement? ‘The Strategy has increased awareness of non-native species issues and promoted changes in behaviour or attitudes throughout all relevant sectors;

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree
- Don't know

24) Do you agree/disagree with the following statement? The Strategy has provided clarity and co-ordination of responsibilities and functions within government and its associated bodies;

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree
- Don't know

25) Do you agree/disagree with the following statement? The Strategy has improved co-ordination of actions to tackle INNS in partnership with key interest groups outside government;

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree
- Don't know

The following question aims to gather information on your views of how beneficial actions carried out since 2015 have been in delivering work under the Strategy in relation to ‘Building awareness, Governance and Coordination’. For each of the following key actions how beneficial have they been to the delivery of the aims of the Strategy?

26) The redevelopment and up-dating of the ‘Check Clean Dry’ and ‘Be Plant Wise’ campaigns;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

Invasive Species Week in promoting the issue of INNS and what can be done;

- Highly detrimental

- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

The NNSS website as a source of information;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

The range of on-line training courses provided on the NNSS website;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

The Stakeholder Forum as a mechanism for sharing information;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

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- 27)** Where do you think the least progress has been made in relation to the 'Building awareness, Governance and Coordination' objectives under the Strategy?
- 28)** Where do you think the most progress has been made in relation to the 'Building awareness, Governance and Coordination' objectives under the Strategy?
- 29)** Are you familiar/involved with any of the following national Working Groups? (pick the one most relevant to you);
- Scottish Working Group
 - Welsh Working Group
 - English Working Group
 - Not familiar with or involved with any national Working Group
- 30)** Is the English Working Groups an effective mechanism for coordinating action to tackle INNS in England?;
- It is highly ineffective
 - It is ineffective
 - It is neither effective nor ineffective
 - It is effective
 - It is highly effective
- 31)** Is the Scottish Working Groups an effective mechanism for coordinating action to tackle INNS in Scotland?;
- It is highly ineffective
 - It is ineffective
 - It is neither effective nor ineffective

- It is effective
 - It is highly effective
- 32) Is the Welsh Working Groups an effective mechanism for coordinating action to tackle INNS in Wales?;**
- It is highly ineffective
 - It is ineffective
 - It is neither effective nor ineffective
 - It is effective
 - It is highly effective

6. Risk analysis

There are nearly 2,000 non-native species established in GB, approximately 300 of which have known adverse impacts, and more will arrive and have an impact in future. Without limitless resources, it is essential to set priorities for achieving the greatest benefit. The NNSS Risk Assessment Scheme for non-native species is intended to be used to assess the potential risk posed by a particular species within Great Britain. The UK has been instrumental in setting the standards for the risk assessment process in the EU. Further information on the approach taken to risk analysis can be found [here](#). Risk analysis summary sheets are designed to provide a summary of the results of risk analysis and how to use the information to guide action.

The following question aims to gather information on your views of how beneficial actions carried out since 2015 have been in delivering work under the Strategy in relation to 'Risk analysis'. For each of the following key actions how beneficial have they been to the delivery of the aims of the Strategy?

- 33) The INNS risk assessment process run by the NNSS;**
- Highly detrimental
 - Detrimental
 - Neither beneficial nor detrimental
 - Beneficial
 - Highly beneficial
 - Don't know
- Summary sheets to make the link between risk assessments, risk management and policy decisions more transparent;
- Highly detrimental
 - Detrimental
 - Neither beneficial nor detrimental
 - Beneficial
 - Highly beneficial
 - Don't know

-
- 34) Where do you think the least progress has been made in relation to 'Risk analysis' under the Strategy?**
- 35) Where do you think the most progress has been made in relation to 'Risk analysis' under the Strategy?**

7. Legislation

The EU Invasive Alien Species Regulation 1143/2014 has been retained in GB law. This means the requirements of the EU Regulation continue to be applied to GB. Species of Union concern are now referred to as 'species of special concern'. In England and Wales, the Invasive Alien Species (Enforcement & Permitting) Order 2019 puts in place certain requirements contained in the EU Regulation including enforcement measures and a permitting and licensing regime. A public consultation was undertaken regarding the use of criminal and civil sanctions for breaches of the EU Regulation in England and Wales ([link](#)) and a further consultation was undertaken on management measures for widely spread species ([link](#)). In Scotland, the EU Regulation is being implemented under sections 14, 14A, 14ZC and 14AA of The Wildlife and Countryside Act 1981.

Under the retained law it is an offence to: import, keep, breed, place on the market, exchange, allow to grow, cultivate or permit to reproduce and, finally, release into the environment any of the 66 listed species of union concern. Additionally, in England and Wales, 14 widely spread INNS have been identified for eradication, control or containment management measures, whereby the "management measures shall be proportionate to the impact on the environment and be based on an analysis of costs and benefits and also include, as far as is feasible, the restoration measures". Further detail on national and international legislation can be found [here](#).

The following question aims to gather information on your views of how beneficial actions carried out since 2015 have been in delivering work under the Strategy in relation to 'Legislation'. For each of the following key actions how beneficial have they been to the delivery of the aims of the Strategy?

36) Engagement with stakeholders during the development of INNS legislation;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

Domestic implementation of the retained EU IAS regulation to include additional controls on INNS such as restrictions of transport, sale and keeping of certain species;

- Highly detrimental
- Detrimental
- Neither beneficial nor detrimental
- Beneficial
- Highly beneficial
- Don't know

37) Where do you think the least progress has been made in relation to 'Legislation' under the Strategy?

38) Where do you think the most progress has been made in relation to 'Legislation' under the Strategy?

8. Research

Research is key to informing on all actions on INNS from understanding the effectiveness of current actions to the development of novel monitoring methods and establishing new control measures. It is vital that policy is underpinned by a strong evidence base, and research outcomes are aimed at addressing key policy requirements. Research therefore is essential to the continued successful implementation of a Strategy aimed at the management of INNS in GB ([link](#)). Research is co-ordinated by the Research Working Group, established in 2018, which is currently preparing a strategic plan.

- 39)** Do you agree/disagree with the following statement? The implementation of the Strategy has aided in identifying research gaps and priority areas for further development in relation to INNS;
- Strongly disagree
 - Disagree
 - Neither agree nor disagree
 - Agree
 - Strongly agree
 - Don't know

The following question aims to gather information on your views of how beneficial actions carried out since 2015 have been in delivering work under the Strategy in relation to 'Research'. For each of the following key actions how beneficial have they been to the delivery of the aims of the Strategy?

- 40)** The Research Working Group aimed to improving coordination, developing a strategic plan, communicating with the research community, and influencing funders of research;
- Highly detrimental
 - Detrimental
 - Neither beneficial nor detrimental
 - Beneficial
 - Highly beneficial
 - Don't know
- The sharing of best practices such as the management practices on the NNSS website;
- Highly detrimental
 - Detrimental
 - Neither beneficial nor detrimental
 - Beneficial
 - Highly beneficial
 - Don't know

-
- 41)** Where do you think the least progress has been made in relation to 'Research' under the Strategy?
42) Where do you think the most progress has been made in relation to 'Research' under the Strategy?

9. Final thoughts:

- 43)** Where do you think resources should be allocated over the next five years? Please indicate what percentage of resources you would suggest being appropriate to apportion to each element of the Strategy (must add up to 100%)?
- Raising awareness, governance and coordination
 - Legislation
 - Long-term management and control
 - Research
 - Prevention
 - Monitoring, surveillance and rapid response
- 44)** In your view what have been the key barriers to achieving the aims of the GB Strategy since 2015 if any?