# Papers

# Development of the England Wildlife Health Strategy – a framework for decision makers

## M. Hartley, R. Lysons

**Diseases in wildlife have been recognised as having the potential to affect human health, livestock health and species conservation. In order to assess and respond to these potential risks in an effective and a proportionate way, the UK Government initiated development of the Wildlife Health Strategy to provide a framework for decision making. The England Wildlife Health Strategy (EWHS) has been developed through extensive consultation. Discussions and negotiations with government departments, agencies, non-governmental public bodies and wildlife organisations were held to obtain advice and input on specific and specialised aspects of wildlife health. A series of workshops to investigate the application of innovative science to wildlife health policy contributed further. A formal public consultation was held that proposed a range of actions to implement the strategy. A summary of responses to this consultation was published in October 2007. The EWHS was published in June 2009 and provides a framework for a generic four-stage approach to wildlife health that can be adopted by decision makers both within and outside government.**

WILDLIFE is increasingly recognised as having a significant role in the epidemiology of exotic, endemic, new and emerging diseases that pose risks to human beings, livestock, biodiversity conservation and economic productivity (Daszak and others 2001, Sainsbury and others 2001).

Wildlife populations have long been considered a link in the chain of pathogen emergence by forming the reservoirs from which zoonotic pathogens may emerge. Of emerging infectious diseases in human beings, 60.3 per cent are zoonotic, and 71.8 per cent of these were caused by pathogens with a wildlife origin (Jones and others 2008). Examples of these include Nipah virus (Jones and others 2008) and West Nile virus (Meagher and Waage 2005).

Of the 38 livestock diseases that are notifiable and therefore subject to compulsory control or eradication under European legislation, 23 have wildlife hosts. Wild animals can also be reservoirs of diseases listed by the World Organisation for Animal Health (OIE) (Mörner and others 2002), and therefore wildlife disease monitoring programmes are increasingly part of proving national disease freedom status, which is important for maintaining and increasing international trade. Diseases that are monitored include classical swine fever and rabies (Artois and others 2001). The inter-relationships between livestock and wildlife create the potential for transmission of pathogens in either direction, from wild animals to domestic animals or vice versa. A number of infectious diseases emerging in wildlife are due to 'spillover' from domestic animals into wildlife populations.

These diseases can then 'spillback' into domestic animals, which may then create a conflict between conservation and commercial interests (Bengis and others 2002).

Infectious and non-infectious diseases can have a significant impact on the dynamics and conservation status of populations (Scott 1988, Deem and others 2001, Chomel and others 2007). Defining the diseases that have an impact on threatened wildlife is now considered integral to rehabilitation programmes for remnant wildlife populations and in captive breeding programmes designed to restore healthy animals to the wild (Woodford and Rossiter 1993, Leighton 2002, Mörner and others 2002). Examples include amphibian chytridmycosis, crayfish plague and pox virus in red squirrels.

In addition, wildlife health and welfare issues have a high public profile. Recent disease outbreaks including trichomonosis in garden birds and avian influenza have raised this further. The public expects that the welfare of wildlife, including the impact of disease, should be monitored (Kirkwood and Sainsbury 1996).

Apart from the direct economic, public health and trade implications of the presence of diseases in wildlife, overt disease outbreaks and mass mortality in wildlife may be important indicators of ecological disturbance, the introduction of new animal species, the emergence of new diseases, climatic or habitat change, or pollution (Sainsbury and others 2001, Mörner and others 2002). In order to assess and respond to these potential risks in an effective and appropriate way, the UK Government initiated development of the Wildlife Health Strategy.

## Background

In 2001, the UK Ministry of Agriculture, Fisheries and Food was merged with the Department of the Environment to create the Department for Environment, Food and Rural Affairs (Defra). This created a single government department that had responsibility for animal health and agricultural policy as well as biodiversity and environmental policy, allowing a holistic approach for wildlife health to be developed.

The Animal Health and Welfare Strategy (AHWS) (Defra 2004) provides the framework for the British Government's approach to veterinary intervention. Alongside this, a UK Veterinary Surveillance Strategy (VSS) was published in 2003 (Defra 2003), with the objec-

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tive of enhancing and coordinating national veterinary surveillance so that important animal health events are detected and assessed more rapidly and reliably. These strategies, although heavily focused on domestic livestock, clearly identified the potential role of wildlife in disease surveillance and mitigation but recognised that there were significant differences in the approach and partnerships required to implement the two strategies with regard to wildlife. Therefore, the England Wildlife Health Strategy (EWHS) was developed to operate in parallel with these two overarching strategies and to take forward their aims and objectives, but adapted into an appropriate wildlife context.

## Methodology

An initial scoping study identified that additional specialist resources would be required to develop a wildlife heath strategy. Therefore, in late 2005, a wildlife veterinary adviser with postgraduate training in wildlife health and a background both in free-ranging disease investigation and conservation was appointed to lead development of the strategy.

The initial stage of strategy development was to identify and consult with the core government policy-making directorates and delivery agencies with a potential interest in wildlife disease. The complexity of the task ahead became apparent as it was realised that wildlife health is affected by, and contributes to, factors monitored and managed across national government, both in central departments and an array of delivery agencies.

From this group, a formal project board was established to provide governance of the strategy development and to ensure engagement from across government and also with stakeholders. The members represented the Defra veterinary directorate, Defra biodiversity directorate, Defra's Veterinary Laboratories Agency (VLA), which conducts laboratory-based animal disease surveillance in England and Wales, the Food and Environmental Research Agency, the Health Protection Agency of the Department of Health, and two non-government wildlife disease experts from academia and charity sectors. The project board met on a bimonthly basis to review progress and guide development of the strategy using the feedback from a variety of stakeholder workshops and consultations, the details of which are described. The strategy continued to be developed through extensive formal and informal consultation.

In June 2006, a large workshop attended by representatives of 100 organisations was held to engage with stakeholders both within and outside government and to further develop and challenge early thinking (Defra 2006). Foresight (2010) is a government-funded programme, led by international scientists, investigating the application of innovative science in policy making. In May 2007, a technical workshop was held in conjunction with the Foresight initiative as part of its project on detection and identification of infectious diseases in plants, human beings and animals (Defra 2007a).

In July 2007, a formal 12-week public consultation was published (Defra 2007b). The 20 questions focused on how stakeholders could work in partnership with government and what issues they considered as a priority. Forty-nine responses were received from academia, non-governmental organisations, the public sector and private individuals. A summary of responses to this document was published in October 2007 (Defra 2008).

Further challenge to the developing strategy was provided by the Parliamentary Office of Science and Technology (POST), which is the UK Parliament's independent source of balanced analysis of public policy issues and aims to inform parliamentary debate. POST published a briefing note examining the impact of wildlife diseases, the current status of surveillance in the UK and options to strengthen policies (POST 2008).

A final stakeholder workshop was held in November 2008 to focus on the impact of wildlife disease on biodiversity and threatened species. It was recognised that this issue needed to be considered with a cadre of different stakeholders, utilising some novel approaches. In addition to these specifically designed workshops, officials attended a wide range of national and international veterinary and conservation conferences, presenting the developing strategy to experts seeking input and challenge.

The early workshops and public consultation identified some principal issues:

- Variable recognition of the risk factors that influenced the occurrence of wildlife disease and its potential impact.
- Roles and responsibilities with regard to wildlife disease were complex, ill defined and, in many cases, shared.
- There was little coordination, cooperation or consistency in the way wildlife disease issues were assessed or managed.
- Creation of a single wildlife health policy owner or single delivery agency was not feasible. Instead, wildlife health issues needed to be considered and included in policy areas across government.
- A number of established and successful projects focused on wildlife disease issues and these should not be negatively affected by development of a strategy, but there could be opportunities for sharing of resources and effort.
- There was already a wide range of surveillance, pathological and ecological information being collected on wildlife diseases; however, it was not readily available or easily shared. Data quality, compatibility and ownership were key issues.
- Although specialist wildlife veterinary experts were employed by government, they were not readily accessible to all who needed advice.
- Key areas of concern were the impact of non-native species, potential disease risks from rehabilitation of wildlife, wildlife poisoning, improvement of wildlife disease surveillance, overabundance of some species, zoonotic diseases and the impact of disease on conservation.

Because of these complex challenges, it became apparent that before the strategy could be developed further, careful consideration to define the final product and to be sure it would be effective was required. This required that all stakeholders shared an agreed understanding of the aim, scope and vision. The definitions of these terms are shown below.

### Aim

The high-level purpose of the strategy was agreed in the first stakeholder workshop in early 2006, and reflects the realisation that the strategy would not be able to respond to individual diseases or scenarios because they were so varied and specific. Instead, a consistent and scientifically justifiable approach to policy making was required. The strategy document summarises this as:

'The Wildlife Health Strategy provides a framework within which Government and others will be able to develop and make policy choices and decisions in relation to wildlife disease management based on sound scientific evidence through better coordinated collaboration and responsibility sharing.'

### Scope

The scope of the strategy defined the issues and impacts where government would intervene, and which were considered an appropriate use of UK taxpayers' money.

The Great Britain AHWS (Defra 2004) clearly defines four key reasons for government to intervene in animal health issues: protection of human health; protection of domestic animal health and welfare; protection of international trade; and protection of society and the wider environment. Although these reasons are relevant to domestic animal diseases, they do not reflect all of the responsibilities that government has with regard to wildlife. Both domestic and European legislation requires the government to protect the environment and biodiversity. As diseases can affect wildlife species and therefore ecosystems, conservation is increasingly a reason to intervene in wildlife disease issues; however, a balance had to be achieved, as it is recognised that disease is a natural phenomenon and that native wildlife species have evolved to live with endemic diseases, and whereas individuals and local populations may be affected, this is part of natural ecology and is not a reason for government to intervene. It was therefore decided to add a reason for government intervention: protection of biodiversity and threatened species.

An important caveat was added: that government would intervene only when the impact was significant enough to cause a decline in the population viability of a species officially recognised as of conservation concern, or in a situation where the impact was so severe that a species could become threatened.

It also became apparent that there are many definitions of the term 'wildlife', with some people considering plants, captive or zoo animals or even exotic pets as falling into this category. Because of the array of existing legislation with regard to animals kept or owned by human beings, the following definition was agreed upon:

'This strategy includes native or non-native species of land or water animals currently free-living in England, whether resident or visiting migrants. It includes species with the potential to occur in the wild in the near future. Plants are excluded.'

Further consideration of the term 'health' was also required. The definition used in the strategy is:

'Wildlife health includes negative impacts on animals caused by infectious diseases, non-infectious conditions, poisons, toxins and contaminants.'

In the UK, animal health policy has been devolved to the independent administrations of England, Scotland, Wales and Northern Ireland; therefore, each country may, and indeed does, implement different policies and delivery arrangements. For various reasons, it was decided to confine the wildlife health strategy to England but to maintain communication and cooperation with the other administrations.

## Vision
The vision was defined and adapted as the stakeholder engagement and strategy development progressed and the appropriate outcomes became clearer.

'The over-riding vision for this strategy is for the disease status of wildlife to be considered and balanced with society's interests and responsibilities, including human health, economic activity, biodiversity, the health of kept animals, and the need for a responsible approach to human/wildlife interactions. This will be achieved by taking a holistic and co-ordinated approach to wildlife health across government and interested parties; taking a proportionate, risk-based approach to wildlife disease surveillance and prevention; and making appropriate and proportionate interventions where necessary'.

## Four-stage approach to wildlife health
The expert opinion, public consultation and workshop outputs were analysed and considered by the project board, and it was determined that the EWHS needed to provide a structured and transparent approach for assessing and responding to wildlife health issues in order to allow effective decision making. It needed to identify appropriate tools and techniques that could be utilised in this process, considering how existing processes and systems could be adapted for use in wildlife, thus allowing consistency and prioritisation with livestock health management. It also needed to identify areas of further investigation and development for the strategy's implementation stages.

A simple four-stage process was constructed (Fig 1). The stages were devised recognising separation of responsibilities and expertise. So, for example, surveillance and diagnosis of disease would be undertaken by field veterinarians working with laboratory scientists, whereas risk assessment and data analysis would be undertaken by epidemiologists, and decision making by policy officials. Each stage could then be developed and managed by relevant sectors but guided by the cohesive EWHS. At each stage, the document describes potential sources of evidence to be considered or techniques identified during strategy development that could be utilised. Finally, key actions were determined, which would be required to implement the EWHS.

## Threat detection and identification
The first stage is the recognition of potential threats. Four key methodologies were identified: horizon scanning, veterinary surveillance, laboratory diagnosis and population monitoring.

Horizon scanning has been defined by Defra (2010a) as 'The systematic examination of potential threats, opportunities and likely future developments which are at the margins of current thinking and planning. Horizon scanning may explore novel and unexpected issues, as well as persistent problems or trends'. Horizon scanning for diseases allows for early recognition of potential threats, risk assessment and planning of mitigation actions. Potential sources of information include both official disease reports, such as those from the OIE, and unofficial disease reporting forums such as ProMED (International Society for Infectious Diseases 2010). Little work has been undertaken on horizon scanning methodologies specifically for wildlife diseases. A particular recommendation from the work undertaken by Foresight was that governments should investigate the potential benefits and uses of horizon scanning as a component of their disease surveillance programmes (Foresight 2010).

Veterinary surveillance is defined as the ongoing collection and collation of information about disease, infection or intoxication in a defined animal population for the purpose of detecting changes in the effects of disease on the defined population (Defra 2003). Defra has funded wildlife surveillance through the VLA's Diseases of Wildlife Scheme since 1998 (VLA 2010).

Recommendations for improving veterinary surveillance in England are described in the VSS (Defra 2003), and progress with its implementation was reported in 2007 (Lysons and others 2007). One of the major drivers for Defra to develop the EHWS was to implement the VSS with regard to wildlife species and, indeed, some progress had been made towards this; however, it was recognised that a full review of the Government's roles, responsibilities and objectives in relation to wildlife health was needed to pursue this. Stakeholders agreed that the work streams of the VSS (namely, strengthen collaborations, develop a prioritisation process, derive better value from surveillance information and activities, share information more widely and enhance the quality assurance of outputs) were directly relevant and should be adopted to guide further development of wildlife disease surveillance in England.

Laboratory testing of pathological samples from wildlife species is done, where tests are available, to identify the presence or absence of an infectious or a toxic agent. In wildlife species, this is not always straightforward as the test is often not validated for wildlife species and may have poor sensitivity and specificity, making interpretation difficult (Artois and others 2001, Stallknecht 2007). This has an impact on the rapid identification and confirmation of diseases, and therefore has consequences for human health, livestock health, conservation, trade and food security.

Population monitoring, including assessment of both the density and distribution of wildlife over time, allows for an alternative approach to disease surveillance to be adopted. Although the three abovementioned techniques assume that a negative impact on wildlife health has been identified and then aim to characterise it, population monitoring identifies that there is a negative impact on populations, which may or may not be related to health, and indicates that further investigation is necessary to confirm that a disease or toxin is causing the effect. Population monitoring is particularly important for identifying threats to small populations of wildlife species. This technique is not used frequently in domestic animal disease, and the data are often collected by organisations that do not routinely work with disease issues and therefore do not recognise the value of the data for this purpose.

A clear route of escalation of potential wildlife disease risks from those who have identified them to those who can respond and initiate actions is essential. An understanding of the information required by decision makers in order to respond to risks with appropriate and proportionate mitigations is key to moving on to stage 2 in the process. Even more fundamental is ensuring that escalation is directed at the appropriate decision makers who understand and 'own' the potential risks identified. The issues identified are discussed below.
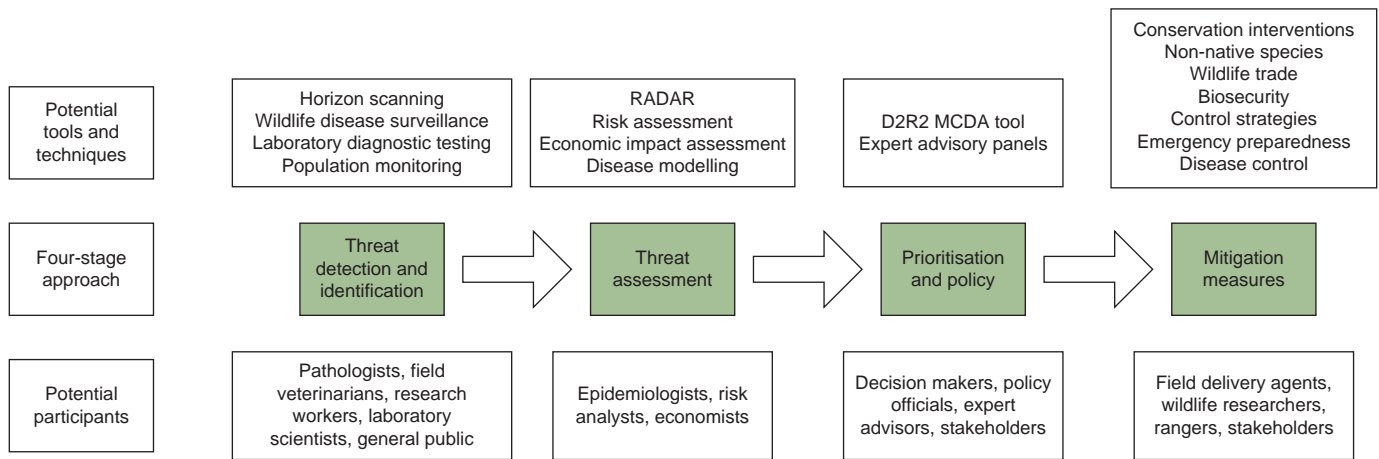
FIG 1: Four-stage approach of the England Wildlife Health Strategy showing potential tools and participants. D2R2 MCDA Disease briefing, Decision support, Ranking and Risk Assessment Multi-Criterion Decision Analysis Tool

## Threat assessment

The evidence collected in stage 1 must then be collated and analysed so that the impact of the threat can be assessed in a scientifically sound and transparent manner. This often involves combining information from a number of sources using specific and specialised techniques. At this stage, the potential risk factors and drivers of the identified wildlife health threat need to be considered. These may include habitat alteration and land use, animal movements, climate change, population pressures, and anthropomorphic effects such as international trade and the introduction of non-native species (Daszak and others 2001, Mörner and others 2002, Williams and others 2002, Kuiken and others 2003).

As part of the VSS, a surveillance information management system called RADAR (Rapid Analysis and Detection of Animal-related Risks) has been developed (Defra 2010b). The system links, collates and analyses data from many different sources. The reports produced highlight the risks and distribution of animal diseases and their risk factors. This tool can be used for analysing wildlife data provided by a range of stakeholders. RADAR includes geographical information systems that facilitate risk mapping. Epidemiological investigations gain strength from being able to incorporate information about the proximity of relationships between animals at risk and the spatial distribution of risk factors (Pfeiffer and Hugh-Jones 2002). Challenges include data use and confidentiality, data quality and technical integration of data collected in different systems.

Risk assessments are routinely used for veterinary policy making in England. Risk assessments consider the likelihood of specific scenarios occurring and the consequences resulting from the event. Defra veterinary risk assessments are presented in a consistent format to allow comparison between issues and include veterinary technical information, legislative requirements and public values (Defra 2010c).

An additional tool is disease modelling, which uses defined assumptions to allow calculation of scenario probability and impact or the feasibility and effectiveness of mitigation measures. This can be combined with cost-benefit analysis, which allows assessment of the cost-effectiveness of different policy decisions or mitigation actions.

## Prioritisation and policy development

The complete, processed information must then be considered and prioritised against numerous other risks that the public, livestock, the economy and biodiversity are exposed to. As part of implementation of the VSS, a multi-criteria decision analysis support tool for prioritisation has been developed. This is based around disease profiles that contain key information. These are written, peer-reviewed and validated by experts. The profile information is then scored and a ranking produced against the government's reasons for intervention from the AHWS. The Disease Briefing, Decision Support, Ranking and Risk Assessment Tool (D2R2) will be used where possible to assist in prioritising interventions by Government and to ensure a transparent and consistent process for policy making (Defra 2010d).

A number of technical expert advisory groups are utilised in order to formulate recommendations for decision makers with regard to livestock and human health. These groups include representation from government departments and agencies with responsibility for identifying, assessing and mitigating the high-priority risks. In many groups, external experts participate. The groups ensure that the scientific evidence is of sufficient quality and completeness for decision making.

It is essential to not only base policies on wildlife health on sound science but also to consider ethical and social factors that affect stakeholders (Artois and others 2001). Final decisions on interventions would be taken by senior decision makers, or, on occasion, government ministers, using the evidence and expert recommendations provided.

## Mitigation measures

Once a decision to intervene has been made, it must be ensured that action is appropriate and proportionate and that responsibilities are shared fairly between government and others. The EWHS outlines the high-level approaches that can be considered, the potential transmission pathways that should be considered and the tools and legislation that could potentially be used to minimise disease risks.

Preventing disease from entering wild animal populations is the most efficient and cost-effective way of managing wildlife disease (Wobeser 2002). It is therefore necessary to consider sources of introduction of disease into wildlife populations. Translocation of wildlife for conservation, agriculture and hunting occurs on a global scale with the inherent risk of disease introduction (Mörner and others 2002, Williams and others 2002). Captive breeding and reintroduction programmes could also pose a risk if sufficient care is not given to disease screening before release (Cunningham 1996). The introduction of non-native species into the wild has been demonstrated to be a high-risk activity; examples include the introduction of pox virus into native red squirrels by the carrier grey squirrel (Sainsbury and others 2000).

Global trade in wildlife provides transmission mechanisms for disease outbreaks (Karesh and others 2005). International importations in to the UK are undertaken according to the trade rules set down by the European Commission and OIE, which operate to reduce the risk of disease transmission. These are applied to the majority of mammals and birds.

Once a disease has entered a wildlife population, biosecurity measures can be implemented to prevent onward transmission to livestock, and disease prevention guidance can be provided to reduce exposure of human beings to zoonotic wildlife diseases (Wobeser 2002).

The active control of disease in free-ranging wildlife is an emerging field, and disease control programmes must be planned within a series of practical constraints. The primary decision is to determine

the desired outcome – either elimination or management of the disease within defined limits (Wobeser 2002). Each disease scenario will be very different, and therefore it is beyond the scope of the strategy to define which techniques should be used. The options available, at a high level, are population management or clinical treatment (Artois and others 2001). Population management may involve manipulation of population size, structure or contact between host species using culling, fertility control, translocation or restriction (Artois and others 2001). Veterinary clinical interventions are technically constrained by the availability of suitable drugs or vaccines and efficient delivery to a high enough proportion of the affected population (Wobeser 2002).

The EWHS recognises the challenges faced when attempting to mitigate wildlife disease and recommends the development of wildlife-specific contingency plans for diseases of concern that could involve wildlife. Development of these plans allows for the identification of knowledge gaps and, therefore, identification of where further collection of evidence or disease surveillance could usefully be undertaken (Wobeser 2002). It also allows confirmation of roles and responsibilities during a disease outbreak and, as a result, delivery arrangements can be planned.

## Communication

Communication regarding the development and implementation of the strategy was considered in a separate work stream. Diseases of wildlife are of concern to the general public and generate considerable coverage by the media (Kirkwood 1993, Artois and others 2001). It is essential that the public and stakeholders have access to well-balanced, accurate, scientific information, including the work that government undertakes or funds on their behalf. Transparent decision making, supported by accessible science, should ensure that the links between wildlife diseases and national biological security, trade, conservation and public health are clear.

A wide range of stakeholders undertake work independently or in partnership with government, and well-managed information exchange is a key tool for horizon scanning, disease surveillance and collection of scientific research.

## Implementation and publication

For each component of the four-stage approach and the communications work stream, a high-level implementation plan was developed (Defra 2009).

The draft strategy was circulated widely for comment and input with the final version being endorsed by three government departments and 19 agencies or public bodies. The EWHS was published in June 2009 following final approval by both the Chief Veterinary Officer and Defra ministers (Defra 2009).

The strategy has generally been welcomed by stakeholders and has received several positive reviews in the specialist press, but some disappointment that it does not specifically address individual diseases has been expressed. It was considered that each disease issue will require managing in a specific manner due to different reasons for intervention, populations of concern, techniques available and resources allocated. Although the principles set out in the EWHS are applicable, a single generic solution to the impact of wildlife disease is not feasible. Concern was also expressed in relation to funding. Whereas all sources of funding are under pressure from the current stringent fiscal circumstances, implementation of the EWHS should realise benefits through harnessing synergies between potential delivery agents and the introduction of a more efficient approach to decision making in this area by appropriate utilisation of the four-stage approach described above.

## Conclusion

This article describes the development of the EWHS from initial concept through to publication. The framework described here provides a generic approach to wildlife disease issues and outlines potential tools or techniques required to apply this. The strategy recommends additional work and areas of investigation that could further develop and improve identification, assessment and mitigation of wildlife diseases in England. This work will be undertaken during the implementation process.

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