

# BRITAIN'S NATIONAL HEDGEHOG CONSERVATION STRATEGY



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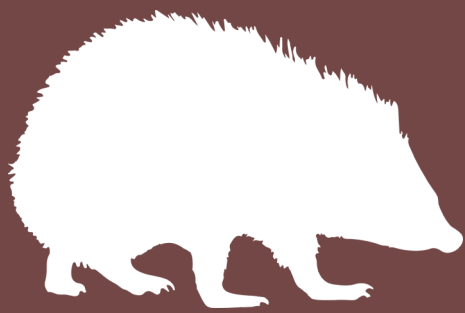
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*Front cover image courtesy of Hedgehog Champion Christopher Morgan*

## VISION STATEMENT

**“It’s 2053...  
Wild hedgehog  
populations are  
thriving from towns  
to countryside,  
supported through  
our combined actions,  
meeting the needs of  
people and nature.”**



# FOREWORD

## Megan McCubbin, patron of The British Hedgehog Preservation Society

The humble hedgehog is an iconic part of British nature and culture, evoking a sense of nostalgia and connection to the wild. It's a species we all know and love, so it's especially devastating that this once common animal has become a scarcity. This newly developed National Hedgehog Conservation Strategy brings together sophisticated research and diverse stakeholder expertise, to achieve a bold ambition: to restore hedgehog populations so the species is once again a common sight in both urban and rural areas. Their steady but extreme decline has been driven by a number of interconnected threats. But it's not all doom and gloom – we have solutions, it's just a case of implementing them. By conserving hedgehog habitat and addressing habitat fragmentation, while meeting the needs of people, we can give our prickly friends a real chance to make a comeback.

Through the identification of key threats, and holistic approaches to better understand and act on them, this strategy acts as a framework for collaboration among policymakers, conservationists, rehabilitators, landowners, and communities. Coordinated efforts at local, regional, and national levels are paramount to

safeguarding this welcome garden visitor and achieving long-term success. I have happy recollections of exploring the woods and watching in awe as a hedgehog emerged from the bushes, wandering off for an evening of foraging. I hope this strategy will start to turn the tide for hedgehogs so that future generations can discover and connect with them as I once did.



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# EXECUTIVE SUMMARY

West European hedgehogs (*Erinaceus europaeus*) are small, mainly insectivorous mammals that are native across much of Britain and are known to be in decline. Despite protection under Schedule 6 of the Wildlife and Countryside Act 1981, the latest *State of Britain's Hedgehogs* report (Wembridge *et al.*, 2022) demonstrates widespread losses, with the steepest declines in rural areas and a possible stabilisation of urban populations. The species is classed as Vulnerable to extinction in the UK by the IUCN Red List and was made a priority conservation species under the UK Biodiversity Action Plan (BAP) in 2007.

People's Trust for Endangered Species (PTES) and The British Hedgehog Preservation Society (BHPS) have been leading on hedgehog conservation in Britain for several decades and began their partnership work on the species in 2011. The two organisations work together to produce the *State of Britain's Hedgehogs* reports and to run [Hedgehog Street](#), a public engagement campaign, among other activities. Both organisations recognised a need for improvements to their existing conservation strategy document for hedgehogs and wanted an approach with more detail, quantitative objectives, and comprehensive stakeholder engagement and support.

In 2022, PTES and BHPS engaged the services of the International Union for Conservation of Nature's (IUCN) Conservation Planning Specialist Group (CPSG) to assist with the production of a new conservation strategy for hedgehogs in Britain via a collaborative, stakeholder-led process. This comprised a one day threat analysis workshop in January 2023, involving 18 stakeholders and a subsequent three day strategic workshop in April 2023, which brought together 30 stakeholders. For both workshops, participants were drawn from a diverse range of backgrounds, including NGOs, government agencies, the animal rehabilitation sector, the farming community, national infrastructure bodies, and academics.

The six threats to hedgehogs identified as priorities to address in this strategy over the next ten years are:

1. **Decrease in availability and distribution of natural food and associated habitat**
2. **Increased vehicle collisions**
3. **Unintentional mortality and stress due to human intervention**
4. **Accidental death and misadventure**
5. **Toxin accumulation**
6. **Genetic isolation**



by Hedgehog Champion Christopher Morgan

Within each of these threats, there is a degree of complexity and uncertainty, and a need for additional information. This is the nature of almost all conservation actions and we have attempted to walk the line between collecting enough data to reduce uncertainty versus risking inaction and the “paralysis by analysis” that must be avoided given the current biodiversity crisis. In the 10-year span of this strategy, it is not realistic to aim to tackle all identified threats to hedgehogs hence the prioritised list above. It is likely that many readers of this document will have their own thoughts on additional threats that could have been included; predation by badgers is a good example of a threat that was discussed at length by multiple stakeholders over the production of this document, but has not been included as an individual threat. This is because identifying the requirements for a sustainable relationship between the two species will be an integral element addressed in the first threat. We explain this and the research already undertaken to address the complex relationship in more detail on pages 15 to 38. In addition, not all threats are equal; the six threats listed above are all identified as priorities, but there can be no doubt that some will be having a bigger impact on hedgehog populations than others and the impact of a given threat will differ between rural and urban environments.

It is important to note that this document is a conservation strategy and not an action plan. As such, it presents potential actions that might be taken, but none of these are finalised and a formal action or delivery plan will be required for each goal in this strategy document. It is also a national document under which more localised action plans can be developed where needed.

Taking the work outlined in this document forward over the next ten years will require effective governance. The delivery of the

strategy will be driven by a PTES and BHPS-led management team and project staff. A steering group will provide oversight and evaluation of strategy delivery, and the management group will be supported by advice from themed working groups. This governance structure will bring together the available expertise on hedgehogs in Britain while ensuring dedicated, paid staff are focused on delivering the strategy on the ground.

This process has demonstrated that there is a huge amount of knowledge available on hedgehogs and the threats they face, but has also highlighted that there are many areas of uncertainty in hedgehog conservation. The research priority section of this document identifies where more information is needed to improve the efficacy of hedgehog conservation. Efforts are needed to improve our understanding of hedgehog habitat requirements, basic demography and causes of mortality, the effect of supplementary feeding and release from rehabilitation facilities, and the population genetics of Britain’s hedgehogs. The identified research priorities are designed to guide research efforts and funding allocation for British hedgehogs over the next ten years.

With the publication of this document, we have an agreed strategy to conserve hedgehogs in Britain over the coming decade and clarification of research needs to support hedgehog conservation much further into the future. Now the real work to safeguard one of our most iconic small mammals begins.



# CONTEXT

West European hedgehogs (*Erinaceus europaeus*) are a much-loved, iconic species, frequently topping polls of Britain's favourite wildlife (e.g. BBC Wildlife Magazine poll 2013). Their iconography is linked to human culture spanning thousands of years; in Britain, the species was mentioned in the plays of Shakespeare in the 16th century. Despite its adaptability and ongoing public affection, this once common mammal has suffered significant declines in recent decades. Survey data indicate that rural hedgehog populations remain critically low in places (Wembridge *et al.*, 2022), and that while differences have emerged between urban and rural areas, overall the species continues to struggle. Common species are often a good reflection of the quality of our

wider environment; when such species - like hedgehogs - start to disappear, we should all be concerned.

The *State of Britain's Hedgehogs* reports, published every three to four years by PTES and BHPS (Wembridge *et al.*, 2022), uses wildlife survey data to paint a vivid picture of how hedgehog populations are changing. Early reports in 2011 and 2015 showed a historical decline across the species' range in Britain, with widespread losses occurring over several decades. More recently, survey data have revealed differences across rural and urban landscapes, with a slower decline in the latter. Suburban gardens and greenspaces increasingly appear to be a stronghold for the species compared with



by Hedgehog Champion Christopher Morgan



farmland. The 2022 report, which analysed data spanning four decades from five different wildlife surveys, showed that while rural hedgehog populations continue to decline by between 30 and 75% across different areas since 2000, the decline of urban hedgehogs has plateaued, with early signs of improvement.

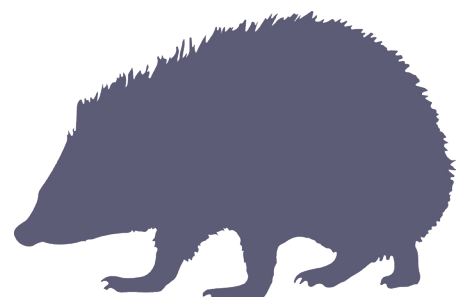
Hedgehogs face numerous pressures and the challenge in addressing the threats is magnified by the fact that the interplay between these diverse issues is not well understood. Threats are varied in scale and impact, from road mortality and declines in natural invertebrate prey, to garden accidents involving strimmers and lawn mowers. The key threats however, are principally related to habitat loss, degradation and fragmentation, as a consequence of an ever-changing, human-modified landscape.

Despite ongoing petitions and lobbying campaigns by PTES, BHPS and others, the species' legal protection remains comparatively weak. The animal itself is protected from abuse, harm and capture by certain methods, under Schedule 6 of the Wildlife and Countryside Act 1981, but threats to hedgehog habitat are not addressed, and no legal or other imperative exists for developers to survey for the species or mitigate habitat loss. In 2020 hedgehogs were listed as Vulnerable in the inaugural Red List of Britain's Mammals (Mathews & Harrower, 2020), a higher threat category than its global status where the species is considered Least Concern.

BHPS and PTES have led the charge to conserve hedgehogs in recent years. Through collaborative research, targeted conservation and a dedicated public awareness campaign, [Hedgehog Street](#), much has been achieved to address knowledge gaps, form critical partnerships, disseminate information, and raise nationwide concern for the species. Hedgehog Street actively engages the public in hedgehog conservation through encouraging simple garden modifications

and building community efforts. Individual 'Hedgehog Champions' are recruited to rally their neighbours to the cause; the campaign now boasts over 125,000 local champions. Wider partnership collaborations spearheaded by the two charities include work with farmers, land managers, housing developers and other key stakeholders. These efforts have inspired numerous local initiatives to conserve hedgehogs by other organisations including The Wildlife Trusts and various local voluntary conservation groups.

Despite determined efforts to address the various threats facing hedgehogs, the decline in their overall population continues. A wider, more targeted and concerted effort is needed to halt their decline and to ensure this popular species becomes abundant, with sustainable populations across Britain once again. This national conservation strategy was produced with process design and facilitation support from the [Conservation Planning Specialist Group](#) (CPSG) of the International Union for Conservation of Nature's (IUCN) Species Survival Commission (SSC) in collaboration with a diverse group of stakeholders (covering sectors including housing, farming, land management, transport and wildlife rehabilitators). It aims to unify and strengthen existing conservation efforts, while engaging many more people, groups and industries in scaled-up efforts working towards practical goals and research priorities. This strategy, which will evolve as new research findings become available, will act as a framework and reference point for all actions relating to hedgehogs in Britain.



# CHALLENGES AND OPPORTUNITIES

An expert Political, Economic, Social, Technological, Legal, and Environmental (PESTLE) analysis was conducted as part of the threat analysis workshop to examine the forecast future landscape for hedgehogs in Britain. For threats, status in some areas and potential solutions, this analysis was based on evidence as much as possible, and expert opinion where evidence was not available. A summary of that analysis is presented here to add context to the strategy.

There are a variety of factors that create foundations for the recovery of hedgehogs within Britain. Hedgehogs do benefit from some limited legal protection under Schedule 6 of the Wildlife and Countryside Act 1981, the Animal Welfare Act 2006 and the Animal Health and Welfare (Scotland) Act 2006. Policies that support the species are likely to receive a favourable response from the general public due to their popularity. However, care would be needed to ensure any policies are not detrimental to wider stakeholders, for example land managers incurring additional costs. Growing public awareness of climate change and the steep decline in biodiversity is also contributing to a general sense of a need to care for the environment and promote more sustainable, wildlife friendly behaviours. Despite ongoing austerity measures, Britain remains a relatively wealthy country and could be in a position to provide more resources to support national wildlife conservation efforts. Hedgehogs themselves are a useful fundraising ‘poster animal’, at least for animal welfare organisations and conservation charities working with the species. This may be an opportunity that could be further capitalised on to support conservation

efforts and because hedgehogs are widespread and relatively generalists, their conservation could have wider conservation benefits in both urban and rural areas.

New technology is making it easier and more effective to monitor and track hedgehogs and so fill important knowledge gaps on the species. Forthcoming research on hedgehog population genetic structure and monitoring studies in Britain could also address knowledge gaps in hedgehog ecology. Wildlife programmes using some of this technology (e.g. BBC Springwatch) provide a powerful public awareness and engagement tool. Social media platforms create opportunities for correct information sharing and for getting the public involved in data collection (‘citizen science’). The move towards low emission vehicles and reduced speed limits in key areas could present a benefit to hedgehogs, as for other wildlife, and less danger from living close to roads in built-up areas.

Experts agreed that it was likely that because hedgehogs are generalists, this could make it easier to provide suitable habitat for the species to thrive in. Although it was acknowledged that this could also present a challenge since their habitat requirements fall outside acknowledged, and therefore greater protected, areas of higher biodiversity. Agri-environment schemes and ‘rewilding’ projects should present opportunities for further habitat creation and better connectivity between existing habitat to be established. Uncertainty remains over whether there will be a move towards higher food production to alleviate food insecurity resulting in further reductions in habitat availability and quality or conversely whether support from Environmental Land Management schemes, and equivalent payments in Wales and Scotland, sees more farms adopting a regenerative approach that takes unproductive areas out of production. Lack of hedgerow management can cause hedges to degenerate in quality, and intensification in terms of elevated chemical



use, heavy machinery that compacts soil, and increased cropping could all lead to a decrease in food availability for hedgehogs across the wider countryside. However, new hedgerow options in the Sustainable Farming Incentive (SFI), Sustainable Farming Scheme (SFS) and a similar approach in Scotland could see wider uptake of hedgerow management practices that increase and benefit biodiversity. These changes to agri-environment policies may lead to uncertainty in the short to medium-term, especially given the lack of detail currently being shared publicly on these policy updates, which could lead to decreased uptake by landowners.

There is no protection in law for hedgehog nesting sites. Full protection under Schedule 5 has been considered, but it is unclear how it

would operate in practice for such a widespread, generalist species. Further complications could arise because hedgehogs are an invasive non-native species on multiple Scottish Islands. Current government moves to reduce 'red tape' surrounding environmental protection legislation could pose further threats to hedgehogs, as with other species. For example the Retained EU Law (REUL) Bill which is now an Act of Parliament, makes it easier for present and future governments to weaken or remove legal protection of species, habitats and the environment with limited consultation and without appropriate parliamentary scrutiny.

As predators, hedgehogs can and do have serious ecological impacts when introduced by people into areas where they are not native, especially



*by Hedgehog Champion Christopher Morgan*

on islands. In Scotland invasive non-native hedgehogs are thought to have caused severe declines in ground nesting bird populations, some of which are of global importance. Such impacts are difficult and expensive to effectively tackle – it is critical that hedgehogs are not introduced into the wild as non-native species, especially on islands.

The drive for more infrastructure and housing stock both now and in the future poses a potential threat to hedgehogs and suitable habitat for them to occupy. The ongoing housing crisis could result in a significant increase in housebuilding without good public transport links and therefore require substantial associated road-building, car use and habitat loss. New housing also often lacks garden space designed to promote wildlife, instead providing overly sterile environments with more manicured, manageable gardens that can result in lower diversity in plant species and structure. The lack of legal protection for the species reduces the impetus to undertake research on it, and so research efforts tend to fall to charities to fund. However, examples of well-designed developments such as the RSPB/ Barratt Homes collaboration at Kingsbrook could present opportunities and demonstrate how to improve habitat for hedgehogs and other wildlife on newbuild sites.

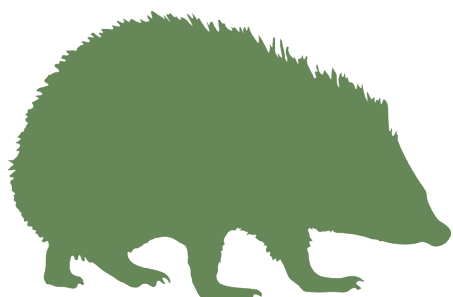
New policies requiring biodiversity net gain (BNG) provisions to be made in England as part of the Environment Act (2021) offer opportunities for biodiversity enhancement and connectivity as a consequence of further development. The potential for benefits to hedgehogs is currently unclear as BNG relates predominantly to

‘valuable’ habitats, which could exclude areas hedgehogs commonly use for foraging and nesting, such as scrub and grassland.

Negative media publicity regarding potential zoonoses (even if misinformed) could quickly damage public tolerance of hedgehogs (recent examples: Salmonella, MRSA, SARS-CoV2). Further misinformation shared about the ecology, feeding, rescue, and care of hedgehogs on social media could hamper priority conservation efforts for the species. In addition, the popularity of the species can lead to anthropomorphism resulting in misguided and unnecessary human interventions. There is no regulation of the wildlife rehabilitation sector in England and Wales and no legislation to control the translocation of rehabilitated hedgehogs on mainland Britain. Regulation of the sector in Scotland (The Animal Welfare (Licensing of Activities Involving Animals) (Scotland) Regulations 2021) is still in its infancy; impacts resulting in any changes have yet to be documented.

Technological advancements mean that more people spend time in the ‘virtual world’ potentially providing a disconnect with the natural world. Some new technologies can also be directly harmful to hedgehogs, e.g., some designs of robotic lawnmowers. Many others, such as ultrasonic rodent/cat scarers, are unevaluated but might be problematic and impact hedgehogs.

There is good evidence for some impacts, for example the busy road network on hedgehog mortality and population connectivity in Britain, one of the most fragmented countries by roads in the world. However, the lack of solid evidence of the impacts of other perceived threats to the species, at a population level, hamper efforts to challenge current practices in both the rural and urban environment. It is, for example, difficult

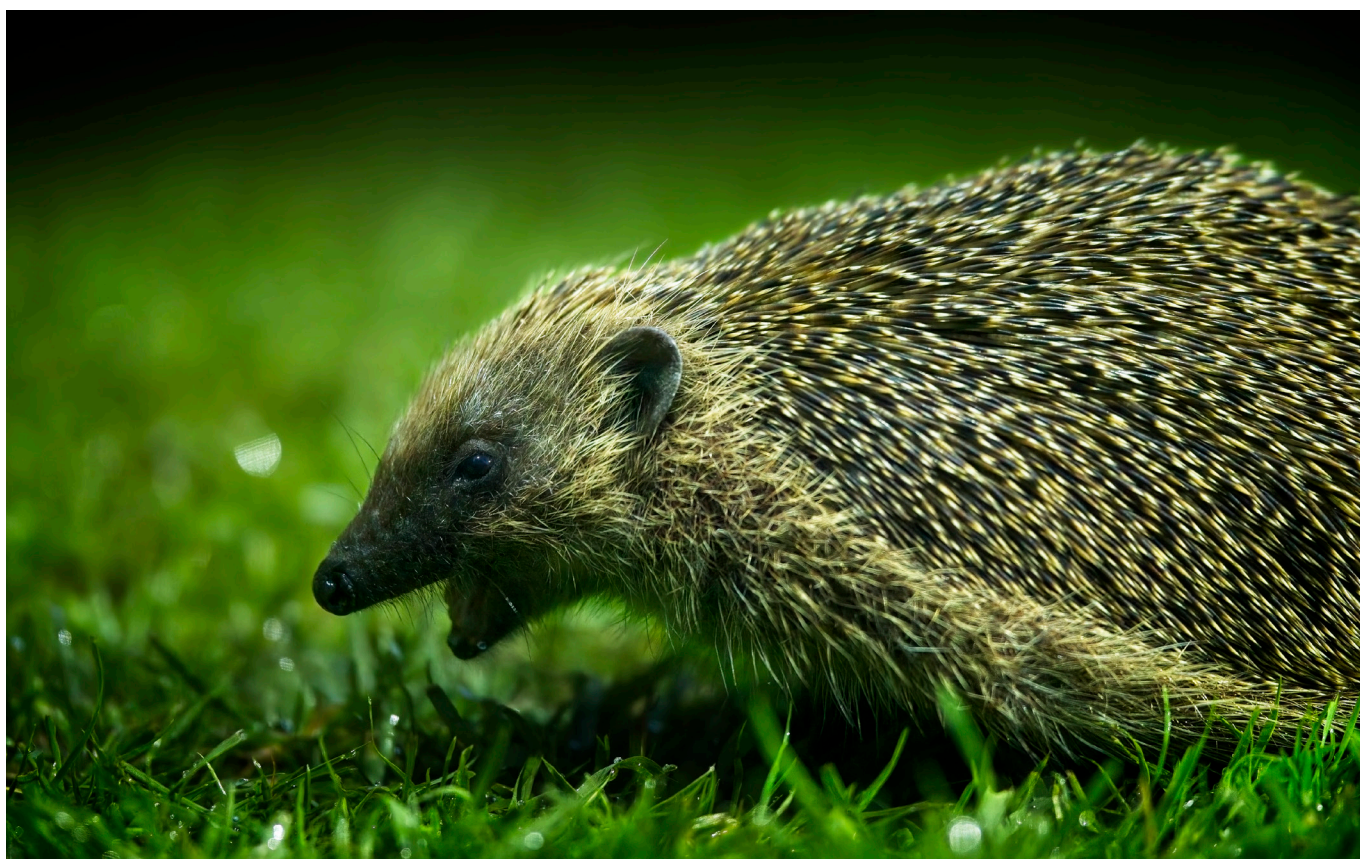


to disentangle the possible lethal and sub-lethal effects of the numerous environmental pollutants found in hedgehogs (e.g., heavy metals, flame retardants, PCBs, agrochemicals and rodenticides).

The relationship between hedgehogs and badgers is a sensitive issue and research findings need to be interpreted with care. Badgers predate hedgehogs, but they feed mainly on soil invertebrates, such as earthworms and beetle larvae. These invertebrate prey are also favoured by hedgehogs. This competition for the same food, coupled with predation and avoidance behaviours, may result in fewer hedgehogs in areas where badger numbers are high. Clear, evidence-based messaging is therefore particularly important to avoid “demonising” badgers, which have co-existed alongside hedgehogs for millennia. Efforts to understand

what landscape-level habitat features will support populations of both species, alongside other land uses, should be prioritised.

Although it is difficult to fully predict the impacts of climate change on hedgehogs, more extreme and erratic weather patterns, for example increasing periods of drought, are rapidly becoming more common. These patterns could well lead to further macroinvertebrate food reduction, and possible changes in the hedgehog host-parasite relationship as a result of increased temperatures. Increasingly wet winters, resulting in frequent flooding, might compound the risk of drowning during the winter hibernation period. The trend towards milder winters may also result in more frequent arousal from hibernation resulting in depletion of fat reserves, leading to poorer body condition and a potential impact on reproduction and survival.



*by Hedgehog Champion Christopher Morgan*

# PROCESS

The work to produce this strategy was facilitated by Helen Taylor and Jamie Copsey in line with [CPSG's species conservation planning principles and steps](#) and organised in collaboration with a cross-stakeholder Organising Team (see p.2). The process was divided into two workshops in 2023, both of which involved a diverse range of stakeholders coming together to collaborate on better conservation outcomes for hedgehogs in Britain. The two workshops ran as follows:

## Threat analysis workshop - 19<sup>th</sup> January 2023

The threat analysis workshop was held over one day and involved 18 stakeholder participants (see Appendix) from a variety of academic institutions as well as government, non-government, and industry organisations. Via a combination of presentations, group mind mapping exercises, development of threat maps, and knowledge gap identification, the group built a detailed picture of the threats facing hedgehogs in Britain and how those threats were thought to be interconnected. The results of this workshop were used to inform the threat prioritisation process that took place during the larger strategy workshop. The full methodology and results of the threat analysis can be viewed in the [Hedgehogs in Britain Threat Analysis Report](#) (Taylor & Copsey, 2023).

## Strategy workshop - 26<sup>th</sup>-28<sup>th</sup> April 2023

The main strategic workshop was held over three days and brought together 30 stakeholders (see Appendix) (including those who participated in the threat analysis workshop) from NGOs, professional institutes, academia, government agencies, public services, along with farming, land management and industry to collaborate on a strategy for conserving hedgehogs in Britain. The workshop was divided into several sections, including development of a shared vision statement for hedgehogs in 2053; prioritisation of the threats to hedgehogs identified in the previous workshop and selection of threats that would be tackled in this strategy cycle; development of goals and strategies designed to mitigate the priority threats; and identification of future research priorities to address key knowledge gaps. Sub-groups within the sessions

worked on specific threats and associated goals and strategies and those groups continued to work together virtually in the weeks following the workshop to consolidate their ideas. The results of the workshop were then collated and drafted into a strategy document, which was circulated around the Organising Team and then the wider stakeholder group for comments and revisions, resulting in this final version of the strategy.



*by Hedgehog Champion Christopher Morgan*

# VISION 2053

*Wild hedgehog populations are thriving from towns to countryside, supported through our combined actions, meeting the needs of people and nature.*

Our vision will be realised when:






- ▶ Optimal hedgehog densities are reached in all suitable habitats they live in, across Britain, where they naturally occur and are not an invasive non-native species.
- ▶ There is sufficient, suitable and well-connected hedgehog habitat across urban and rural landscapes.
- ▶ Genetic diversity is maintained or enhanced across Britain's hedgehog population.
- ▶ Hedgehogs are supported so they can range freely, unless essential temporary admission to human care is required.
- ▶ The collective efforts of individuals and cross-sectoral partnerships work synergistically to nurture hedgehog populations from cities and towns to the countryside.
- ▶ Solutions are sought that promote the coexistence of humans and hedgehogs.

Please see Appendix for full details of success criteria.



# THREATS, GOALS AND STRATEGIES

A list of direct threats was identified during the threat analysis workshop (Taylor & Copsey, 2023). Following consolidation and prioritisation (see Appendix A2 for full details), six priority threats were selected for consideration in this strategy, more detail on each can be found throughout the section:

 <b>THREAT 1</b>	<b>Decrease in availability and distribution of natural food and associated habitat</b>	 <b>THREAT 2</b>	<b>Increased road mortality</b>
 <b>THREAT 3</b>	<b>Unintentional mortality and stress due to human intervention</b>	 <b>THREAT 4</b>	<b>Accidental death and misadventure</b>
 <b>THREAT 5</b>	<b>Toxin accumulation</b>	 <b>THREAT 6</b>	<b>Genetic isolation</b>

Prior to, during, and after the workshop, there was much discussion regarding the role of badgers in hedgehog population trends, with concerns raised about the impact of badgers on hedgehogs. Badgers predate hedgehogs and compete with them for shared soil invertebrate prey items, such as earthworms and beetle larvae. Considering this dietary overlap, the impact of badgers is intrinsically linked with the highest priority threat of decreased natural food and has been addressed as such throughout the strategy, rather than as a separate threat category. The ambition is to identify what constitutes good habitat and associated natural food to support both hedgehogs and the species they share their ecosystem with, including badgers.

Each threat is accompanied by:

- > **Goal statement(s):** These describe what changes are needed to counteract each threat and the desired result.
- > **Strategies:** These explain how each goal will be achieved.
- > **Potential action(s):** These are examples of tangible work that could help implement the strategies.
- > **Success indicator(s):** These are mechanisms that will be used to monitor the actions and their consequences.



More detail and the context of each threat, and the goals and strategies designed to address these, are presented below. Under each strategy is a list of potential actions to take. These are not exhaustive, but rather examples of potentially suitable actions that could be used to carry out a given strategy, but will need to be finalised within a separate action or delivery plan.



## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT

Hedgehogs rely on macroinvertebrates as a food source and this group is known to be in decline due to a combination of factors including climate change, habitat loss, and widespread pesticide use. Further evidence is needed to understand exactly how and where this decline in prey impacts hedgehogs, particularly on a population level. Decreases in food availability were considered to potentially impact hedgehog survival and reproduction, and also in areas force individuals to travel further through an increasingly fragmented and hazardous landscape to forage adequately. A clearer understanding of what constitutes healthy hedgehog habitats is required. Additionally, determining the landscape features and management practices needed to support healthy populations of hedgehogs, and other species, alongside land-use practices that also meet the needs of people. It is envisaged that trials of various practices will be undertaken through case studies, with resulting evidence providing guidance for best-practice measures in future.

This was agreed to be one of the most complex threats to tackle for hedgehogs and is linked to another complex issue: habitat fragmentation. As a result, this threat has multiple goals and strategies associated with it and urgent research requirements.



*by Hedgehog Champion Christopher Morgan*



## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT



**GOAL 1A: Improve habitat connectivity across the countryside to enable hedgehogs to move easily in order to meet their resource needs and also to facilitate gene flow on a macro scale.**

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**STRATEGY:** Establish wildlife corridors by increasing the number of well-connected, wildlife friendly farms, and improving the habitat along other rural land networks, including railways and roads, across Britain.

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**POTENTIAL ACTIONS TO TAKE:**

- Ensure advisory bodies and expert consultants have knowledge and information on hedgehogs to facilitate the species' inclusion in planning for incentive schemes (such as the Agri-Environment Climate Scheme in Scotland, Environmental Land Management Schemes (ELMs), Farmer Clusters and the Nature Friendly Farming Network in England, the Habitat Wales and Sustainable Farming Schemes in Wales, and any successors to these schemes).
- Support the implementation and uptake of effective incentive schemes, mechanisms and approaches to encourage nature friendly farming and information sharing in a strategic manner, using hedgehogs as a focus.
- Work with Network Rail, transport authorities and other land managers to facilitate the wildlife friendly management of their land, contributing to their biodiversity action plans.

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**SUCCESS INDICATOR:**

- An increase in the number of well-connected nature friendly farms and the amount of land managed in a wildlife friendly way by other agencies (such as Network Rail and National Highways) across Britain, supporting robust, well-connected hedgehog populations with demonstrable gene flow.



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## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT



**GOAL 1B: Create widespread habitat connectivity throughout villages, towns and cities to allow movement of and access for hedgehogs, meeting their resource needs and facilitating gene flow.**

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**STRATEGY:** Reduce barriers to movement and increase permeability in the built (urban, suburban and village) environment.

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### POTENTIAL ACTIONS TO TAKE:

- Engage communities to take action in private gardens and communal areas that are important for hedgehogs by increasing the number of Hedgehog Champions working on a neighbourhood level.
- Engage more developers to change practice to ensure all new developments are permeable and have hedgehog friendly habitat in communal areas.
- Engage fencing companies to offer hedgehog friendly products as standard.
- Promote positive changes in planning policy to facilitate hedgehog movement and ensure changes are implemented effectively.
- Work with Local Planning Authorities to capture hedgehog movement in the aims of their Local Nature Recovery Strategies (LNRS) (in England, and similar initiatives in Wales and Scotland).

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### SUCCESS INDICATORS:

- An increase in connectivity for hedgehogs throughout the built environment measured through number and length of hedgehog highways reported through the Big Hedgehog Map and developer partnerships.
- Policy change implemented to secure connectivity measures in all new developments.
- People value hedgehogs in the built environment and do what they can to improve habitat and connectivity within their neighbourhoods on a community level.
- An increased number of hedges created with appropriate species throughout the built environment.
- Demonstrable gene flow through the wider hedgehog population.



## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT



**GOAL 1C: Enhance plant diversity (both structural and species), complexity, and availability in the urban environment to increase macroinvertebrate diversity and abundance, and hence hedgehog foraging resources.**

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**STRATEGY:** Raise awareness of the ecological benefits of and encourage increased planting of diverse plant species in public greenspaces and in private gardens.

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### POTENTIAL ACTIONS TO TAKE:

- Influence developers and land managers to modify planting and greenspace management practices through targeted awareness campaigns, training courses and guidance.
- Influence members of the public to alter gardening habits in private gardens to retain and increase plant diversity through existing campaigns, new guidance and incentivised encouragement e.g. Hedgehog Street competitions.

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### SUCCESS INDICATOR:

- An increase in plant diversity and availability in urban and suburban areas, in private and public green spaces, leading to an increase in macroinvertebrate diversity and abundance resulting in an increase in hedgehog abundance and occurrence across a wide range of urban habitats.





## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT



### GOAL 1D: Increase the amount of quality, functioning, and connected habitat within the countryside to increase the carrying capacity for hedgehogs.

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**STRATEGY:** Promote and encourage the strategic creation of wildlife friendly habitat on farms and across the wider countryside, that will benefit hedgehogs, funded by existing and upcoming public and private schemes.

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#### POTENTIAL ACTIONS TO TAKE:

- Work collaboratively with government agencies to prioritise and raise the profile of hedgehogs within agri-environment scheme options.
- Influence responsible authorities leading Local Nature Recovery Strategies (LNRS) in England (and equivalents in Scotland and Wales) to prioritise nature recovery and habitat creation for hedgehogs.
- Encourage and incentivise farmers and land managers to create strategically placed hedgehog friendly habitat through the uptake of government-funded schemes including the Agri-Environment Climate Scheme in Scotland, Countryside Stewardship Facilitation Fund in England, and the Habitat Wales Scheme and Sustainable Farming Scheme in Wales.
- Encourage and incentivise farmers, landowners and land managers to create strategically placed hedgehog friendly habitat through the uptake of other opportunities such as biodiversity net gain.

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#### SUCCESS INDICATOR:

- A quantifiable increase in strategically located hedgehog habitat with evidence of hedgehog occupancy at robust, sustainable densities.



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## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT



**GOAL 1E: Increase macroinvertebrate (hedgehog prey) diversity and abundance by encouraging and supporting the responsible and targeted use of insecticides, molluscicides and anti-parasitic veterinary medicines that impact ground and soil environments.**

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**STRATEGY A:** Encourage and assist a significant and pragmatic overall reduction in the risks and impacts associated with insecticide and molluscicide use across the wider countryside.

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### POTENTIAL ACTIONS TO TAKE:

- Raise awareness of and help substantially increase the uptake of integrated pest management (IPM) systems by farmers and land managers.
- Contribute to the prioritisation of and encourage wide uptake of agri-environment schemes (Agri-Environment Climate Scheme in Scotland, Environmental Land Management Schemes (ELMS) in England and the Habitat Wales and Sustainable Farming Schemes in Wales), and private funding opportunities (e.g. Local Enterprise Networks LENSs).

### SUCCESS INDICATOR:

- Measurable decrease in the risks and impacts associated with pesticides (insecticides, herbicides, fungicides) used in the farmed environment and an associated measurable increase in hedgehog macroinvertebrate food in a variety of environments.

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**STRATEGY B:** Encourage and assist a substantial reduction in the risks and impacts associated with pesticide use in public green spaces, allotments and private gardens.

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### POTENTIAL ACTIONS TO TAKE:

- Work with garden centres, other suppliers and manufacturers to better understand and raise awareness of the negative impacts of pesticides in private gardens, allotments and public green spaces.
- Encourage reduction in the risks and impacts associated with pesticide use in private and public areas in urban and suburban landscapes by working with Local Authorities & other organisations such as Pesticide Action Network (PAN-UK).

### SUCCESS INDICATORS:

- A clearer understanding of the impacts of pesticides used in public and private greenspaces.
- A widespread change in attitude towards the use of harmful pesticides for private and commercial use.
- Measurable decrease in the impacts and risks of pesticides in private gardens and public green spaces.



## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT

**STRATEGY C:** Encourage and assist a substantial reduction in the risks and impacts associated with widespread use of potentially harmful veterinary medicines (POM-V, POM-VPS, POM), particularly in rural areas, and a more targeted/considered approach based upon clinical need.

### POTENTIAL ACTIONS TO TAKE:

- Work with the Royal College of Veterinary Surgeons (RCVS), the British Veterinary Zoological Society (BVZS) and individual veterinary practitioners and farm advisors through established networks to raise awareness of the use of veterinary medicines in hedgehogs and other non-target species.
- Support efforts to ensure responsible, veterinary-prescribed and clinically necessary use of antimicrobials (anti-parasitic, antibiotic, antiviral and antiprotozoal drugs) in particular, in accordance with legislation.

### SUCCESS INDICATORS:

- Widespread change in attitude towards the use of veterinary medicines, in particular antimicrobials.
- Measurable decrease in the use of antimicrobials.





## THREAT 1: DECREASE IN AVAILABILITY AND DISTRIBUTION OF NATURAL FOOD AND ASSOCIATED HABITAT



### GOAL 1F: Provide greater legislative support for hedgehogs and their habitats.

**STRATEGY:** Elevate the status of hedgehogs within legislation and policy decisions so they are considered in planning decisions and agri-environment schemes, ensuring no net loss or further fragmentation of their habitat.

#### POTENTIAL ACTIONS TO TAKE:

- Continue and increase campaigns for legal or other protection of hedgehogs through devolved and central governments.
- Engage with parliamentarians to raise the profile of hedgehogs and adhere to existing legal obligations. For example section 7 of the Environment (Wales) Act 2016 which stipulates all reasonable steps must be taken to maintain and enhance living organisms included in any list published under this section.
- Aim for hedgehog population data to be included within species abundance and extinction targets within the Environment Act 2021 (England).
- Work to ensure the equivalent mechanisms in the Scottish Biodiversity Strategy and Natural Environment Bill (in consultation) have regard to hedgehogs.

#### SUCCESS INDICATOR:

- Hedgehogs are routinely considered within planning decisions, prioritised within Local Nature Recovery Strategies (LNRS) in England (and similar in Wales and Scotland) and included and prioritised within agri-environment and similar schemes.







## THREAT 2: INCREASED VEHICLE COLLISIONS

Roadkill numbers in GB for the period 2001-04 were estimated to be 167,000-335,000 annually (Wembridge *et al.*, 2016); more recent estimates of the time carcasses remain on the road (Moore, 2023) suggest the upper limit of this estimate. Rural populations are thought to have declined by up to 75% since this period, suggesting current annual roadkill numbers to be around 115,000, equivalent to an eighth (12.5%) of the estimated GB population. There was a clear understanding among the workshop delegates that vehicle collisions are an important

threat to tackle for hedgehogs, with increased urbanisation cited as one of the drivers and transition zones from higher to lower speed restrictions being found to be roadkill hotspots. Although it is unknown whether reduced vehicle speeds will result in significantly reduced rates of hedgehog roadkill, and that further research is needed, it was agreed that traffic calming measures should be implemented and monitored in areas with higher incidences of hedgehog roadkill, to better understand their effectiveness.





## THREAT 2: INCREASED VEHICLE COLLISIONS



### GOAL 2: Reduce road collisions and secure hedgehog meta-populations across the wider landscape.

**STRATEGY:** Reduce vehicle speeds where appropriate to allow hedgehogs to move safely through the landscape.

#### POTENTIAL ACTIONS TO TAKE:

- Work with local authorities to implement widespread, appropriate physical traffic calming measures in likely hedgehog roadkill zones and areas impacted by fragmentation, prioritising lower cost measures (e.g., rumble strips) in rural transition zones and higher cost measures (e.g., chicanes) in future/new housing developments.
- Align traffic calming measures with new national measures to increase 20mph zones.
- Communicate the benefits to human safety from traffic calming measures to gain buy-in from the public.
- Take advantage of LNRS planning to identify risk areas and opportunities for improvement and mitigation.

#### SUCCESS INDICATORS:

- An increase in the number of local councils agreeing to support and build the necessary traffic calming measures resulting in reduced speed of vehicles.
- Increasing levels of public support for hedgehog-specific traffic calming measures.
- A measurable reduction in the number of hedgehogs hit and killed on the roads.
- Roads are permeable to hedgehogs.





### **THREAT 3: MORTALITY DUE TO HUMAN INTERVENTION (UNINTENTIONAL, INCLUDING SUPPLEMENTARY FEEDING AND ADMISSION TO CARE)**

This threat encapsulates all the well-intentioned human interventions towards hedgehogs that may have positive or negative consequences depending on the circumstances. Hedgehogs are a popular species that many people want to help and that can provide accessible wildlife viewing opportunities in backyards and gardens. However, it is recognised that some actions by the general public may be detrimental, not all rehabilitation facilities are of an equal

standard and that hedgehogs are sometimes removed from the wild and admitted to facilities unnecessarily by concerned members of the public. While supplementary feeding may be important in helping hedgehogs survive lean times, unintended consequences such as non-infectious and infectious disease transmission, aggression between hedgehogs, and predation are possible negative outcomes.





### THREAT 3: MORTALITY DUE TO HUMAN INTERVENTION (UNINTENTIONAL, INCLUDING SUPPLEMENTARY FEEDING AND ADMISSION TO CARE)



### GOAL 3: Reduce the risk of human interventions causing unintended mortality and morbidity in hedgehogs while supporting the benefits.

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**STRATEGY A:** Shift the public focus from provision of anthropogenic to natural food and inform the public of responsibility of supplementary feeding (e.g., practices to avoid disease transmission), whilst further investigating the impacts, potential downsides and how to reduce the associated risks.

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#### POTENTIAL ACTIONS TO TAKE:

- Create a communication strategy and campaigns to raise awareness of the importance of natural invertebrate food for hedgehogs and ways to increase abundance and diversity in domestic gardens and wider green spaces.
  - Hedgehog Street and other key stakeholders to alter messaging and, while not dissuading people from supplementary feeding, shift focus from anthropogenic food to natural food and promote messaging through campaigns, social media and press releases.
  - Inform the public of their responsibility and how to reduce potential downsides of supplementary feeding where possible.
  - Potential negative effects such as dependence, disruption of natural cycles and risk of disease transmission to be researched to better inform advice offered in the long-term.
- 

#### SUCCESS INDICATOR:

- Measurable increase in householders already offering supplementary food also incorporating additional wildlife friendly garden features to increase invertebrate diversity and abundance.
- step change in public attitudes towards feeding hedgehogs.

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**STRATEGY B:** Establish regulated, professional wildlife rehabilitation sector to improve health and welfare of hedgehogs, and benefit wild populations.

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#### POTENTIAL ACTIONS TO TAKE:

- Campaign for legislative change to establish a regulated, professional wildlife rehabilitation sector.
  - Update and circulate evidence-based best-practice guidelines around when to admit hedgehogs into care, and when to release them.
  - Create a universal, open access rehabilitator database to collect robust data.
- 

#### SUCCESS INDICATORS:

- Collection of hedgehog rehabilitation data through the development of a national wildlife rehabilitation database.
- Regulation and approval of wildlife rehabilitators on a national register, alongside an educated and engaged veterinary profession.



### THREAT 3: MORTALITY DUE TO HUMAN INTERVENTION (UNINTENTIONAL, INCLUDING SUPPLEMENTARY FEEDING AND ADMISSION TO CARE)

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**STRATEGY C:** Improve the general public's understanding of hedgehogs and their ecology to reduce inappropriate interventions and combat conflicting information from unsupported sources.

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#### POTENTIAL ACTIONS TO TAKE:

- Create awareness campaigns and resources centred around hedgehog ecology (breeding, hibernation etc).
  - Establish an expert panel of rehabilitators.
  - Agree criteria with rehabilitators and other key stakeholders for when the general public should intervene with wild hedgehogs.
  - Address conflicting information directly to warn of dangers of intervention.
  - Establish centralised, trusted information sources.
- 

#### SUCCESS INDICATORS:

- Notable reduction in posts containing misinformation around hedgehogs on social media.
- Reduction in hedgehogs being brought to rehabilitators when not necessary.
- Further evidence-based collaborative statements and guidance supported by several organisations.



*by Hedgehog Champion Alison Austwick*



## THREAT 4: ACCIDENTAL DEATH AND MISADVENTURE

Data and anecdotal evidence from vets and rehabilitation facilities suggest that injuries and deaths from encounters with garden machinery, ponds, and bonfires have an impact on Britain's hedgehog population. Site clearances for development and building works are also thought to be a problem for the species. This threat is considered to require a two-pronged approach that targets the industry level (i.e., developers and manufacturers of garden machinery) and the public who are catered to by developers and who use garden machinery.



by Hedgehog Champion Christopher Morgan



**GOAL 4: Encourage widespread awareness and human behaviour change to reduce the risk of accidents and misadventure in hedgehogs.**

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**STRATEGY A:** Raise awareness of hedgehog accidental deaths with industry partners and land managers.

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### POTENTIAL ACTIONS TO TAKE:

- Work with industry partners and stakeholders to meet legislative requirements and gain recognition for good work through existing schemes (e.g., 'caring for the environment' within Considerate Constructors scheme).
  - Emphasise hedgehog safety measures in existing training courses and literature.
- 

### SUCCESS INDICATORS:

- Reduction of hedgehogs being admitted to care following accidents outside domestic gardens, as measured by hedgehog care database when developed.
- Inclusion of hedgehog safety policies in existing schemes.
- Increase in industry partnerships.



## THREAT 4: ACCIDENTAL DEATH AND MISADVENTURE

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**STRATEGY B:** Bring about behavioural change in gardeners (and potentially self-employed gardeners) and homeowners to minimise accidents with hedgehogs in a garden setting.

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**POTENTIAL ACTIONS TO TAKE:**

- Research examples of successful widespread behaviour change and adapt relevant elements to hedgehog safety message.
  - Organise far-reaching, collaborative ‘Think Hedgehog’ campaigns with industry partners and diverse stakeholders.
  - Explore ways to reach new audiences.
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**SUCCESS INDICATOR:**

- Reduction of hedgehogs being admitted to care following accidents in domestic gardens, as measured by hedgehog rehabilitator database when developed.



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**STRATEGY C:** Support efforts to encourage equipment manufacturers/industry/retailers to take action to reduce accidental death in hedgehogs.

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**POTENTIAL ACTIONS TO TAKE:**

- Work with industry partners to modify products to be safer for hedgehogs; include guidance on hedgehog friendly use, incorporate hedgehog criteria into product safety checks, and raise awareness of hedgehog safety with customers.
  - Where possible support the development and integration of wider wildlife friendly safety measures that would have broader impacts including for hedgehogs.
- 

**SUCCESS INDICATORS:**

- Increase in ‘hedgehog safe’ products on the market and hedgehog safety warnings.
- Inclusion of hedgehog safety advice on or within product packaging as standard.



## THREAT 5: TOXIN ACCUMULATION

The two kinds of toxins captured in this threat are plastics and rodenticides (with pesticide use being covered under Threat 1). Rodenticides have been found in hedgehogs during necropsies and microplastics have also recently been detected in various organs of hedgehog carcasses. Both are known to be harmful in other small mammal species. Studies have also found heavy metals and further xenobiotics in hedgehogs which could be impacting health and/or reproductive fitness (Rasmussen, 2024). What remains unclear is the specific negative effects of these toxins in hedgehogs and what might constitute harmful and lethal doses (see research priorities section), as well as population-level impacts.



**GOAL 5: Reduce the impacts and risks associated with widespread use of chemicals, found in substances such as rodenticides and plastics, which can result in unsustainable impacts on hedgehog populations.**

**STRATEGY A:** Support and raise awareness of existing nationwide and local schemes that encourage behavioural change, and policies that lead to legislative change that together result in the reduction of plastics in the environment.

### POTENTIAL ACTIONS TO TAKE:

- Use inclusive approaches to collaborate with existing projects, programmes and schemes to clean up litter and change behaviours around the use of plastics and disposal of litter.
- Identify opportunities to influence policy on plastic reduction and waste collection.
- Engage with opportunities to educate the public and encourage community action in addressing waste and litter (e.g., promote litter-pick volunteer days with Help our Hedgehogs-focus).

### SUCCESS INDICATORS:

- Reduction of plastics found in the environment.
- Single use plastics banned and replaced with environmentally friendly alternatives.
- Widespread behavioural change and community collaboration results in reduced litter in the environment.







## THREAT 5: TOXIN ACCUMULATION

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**STRATEGY B:** Support and encourage the control of rodent pest populations via alternative measures to toxin-based pest control and encourage responsible, targeted use of rodenticides where elimination of toxins is not possible.

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### POTENTIAL ACTIONS TO TAKE:

- Engage with opportunities to promote the use of non-toxin based pest control measures.
- Encourage changes to policy/law to limit the public purchasing rodenticides.
- Work with wider stakeholders and existing efforts to ensure that advice to avoid the use of products that are found to have unsustainable impacts on hedgehog populations is incorporated into best practice guidelines for professionals where hedgehogs are present.
- Use inclusive approaches to collaborate with existing projects, programmes and schemes to change behavioural attitudes around the need for the use of rodenticides and encourage practices that reduce the need for rodenticides instead.

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### SUCCESS INDICATORS:

- Reduced prevalence of rodenticides in hedgehog populations.
- Policy change to limit public purchase of rodenticides.
- Updated best practice guidelines for responsible use of rodenticides where hedgehogs are present.
- Rodenticides only available for use by trained professionals.
- Step change in public attitude towards desire to use rodenticides in a domestic setting.



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## THREAT 6: GENETIC ISOLATION

When a population becomes isolated (i.e., individuals from other populations cannot migrate into it), genetic diversity in that population will tend to erode and there is an increased chance of inbreeding (mating between relatives). As genetic diversity is important for adapting to changing circumstances (e.g., disease, climate change) and inbreeding can lead to the expression of harmful genetic traits,

genetic isolation can have serious consequences for a population. This threat is closely linked to habitat fragmentation, which can prevent hedgehogs from moving through the landscape and thus limit migration between populations. As Goals 1a and 1b under Threat 1 covered the main drivers of genetic isolation, this threat is recognised as a priority, but does not have separate goals or strategies associated with it.



# CURRENT RESEARCH PRIORITIES

## PRIMARY AUTHORS DR RICHARD YARNELL AND DR NIGEL REEVE

### Overview

Key research priorities identified to fill knowledge gaps that will inform conservation work for hedgehogs and guide research funding allocations.

Table 1. Key research

RESEARCH PRIORITY	BRIEF OVERVIEW
1. Identifying healthy hedgehog habitats	Need to understand what features support healthy populations of hedgehogs, and other species, in different habitat types and responses of hedgehogs to localised habitat changes.
2. Basic demography and causes of mortality, including: toxicity, accidents, and roadkill	There is a clear need for basic data on birth rates and juvenile survival in hedgehogs, and the movement of individuals through the landscape. Additionally, clear figures on death rates of various life stages due to environmental toxins, accidents, and roadkill, the effects of these factors on demography, and effective mitigation strategies are all required.
3. Feeding	Data are needed on the extent of supplementary feeding of hedgehogs across Britain to allow research into how this may be affecting hedgehog population sizes and demographics.
4. Rehabilitation	Questions remain regarding the medium- to long-term fates of individual hedgehogs released from rehabilitation centres, which would help inform best practice release strategies for rehabilitated hedgehogs. Data from rehabilitation centres could also prove informative for better understanding of hedgehog ecology and life history traits.
5. Genetics	There is a need to identify smaller, isolated populations of hedgehogs and evaluate the usefulness of genetic rescue translocations for these populations. Genetic data are also key to understanding what features may be acting as barriers to hedgehog dispersal and connectivity.

The conservation strategy and any resulting actions will aim to be effective at the population, rather than individual level. Therefore, the priorities deemed the most urgent with wide applicability were ranked the highest.

## RESEARCH PRIORITIES IN DETAIL

### 1. Identifying healthy hedgehog habitats

Research has improved our understanding of hedgehog distribution, with hedgehogs more frequently found in association with suburban areas rather than the wider countryside. However, questions remain as to the factors driving these associations. For example, are hedgehog numbers affected by insect prey abundance, the extent of supplementary feeding, or habitat diversity and structure? Linked to these basic ecological questions are those related to what actions will work to increase the hedgehog population. For example, do

more biodiverse gardens and agri-environment schemes lead to increases in hedgehog density in a given area?

With the advent of biodiversity net gain (BNG) initiatives, the development of new agri-environment schemes and the potential for widespread habitats to be transformed, there is an opportunity to investigate how hedgehog populations respond to localised habitat change through before and after, or Before After Control Impact (BACI), studies. These opportunities should be used by researchers to help our understanding of how hedgehogs will fare in face of these changes.

Much research has focused on the relationships between badgers (the hedgehog's main predator and a key competitor) and hedgehog population decline. As with many predator-prey relationships, it is complex, not least due to the multiple interactions between predator and prey and their shared food resources. In



2016, a national survey using footprint tunnels investigated hedgehog and badger presence at 261 rural sites across England and Wales (Williams *et al.*, 2018). The study found that while hedgehog presence was negatively correlated with badger sett density, evidence of hedgehogs was found in a comparatively low proportion of all sites surveyed, regardless of badger presence. In addition, a lack of badger setts in 38% of sites indicated that wider issues in the rural landscape were adversely affecting both species. This study also found that hedgehogs were positively affected by the presence of built land such as housing, which can act as a refuge from the problems associated with rural landscapes.

A more recent study at Nottingham Trent University examined how environmental factors including prey availability and overall habitat quality affect the relationship between badgers and hedgehogs in the rural landscape, and which are the most important factors for facilitating their co-existence. Results of this study will be published in due course. A better understanding of the circumstances in which both species co-exist will help inform better habitat management practices, as would further information about general competition with other invert-specialist species when food resources are low.

[The National Hedgehog Monitoring Programme](#) (NHMP) aims to provide regional and habitat specific density estimates. These will offer insights into how habitat features and land use, and the presence of other species relate to hedgehog density. Data gathered annually through the NHMP offer an opportunity to explore how changes in these sites affect hedgehog density over time. However, there is also an urgent need to understand what habitat management actions are needed and at what scale to improve hedgehog population size and survival, ideally within a more controlled environment, through a BACI study.

## 2. Basic demography and causes of mortality

Populations change due to births and deaths, and the immigration and emigration patterns of a species. Further research is needed to understand the factors driving all four elements in hedgehog populations. Data on birth rates for individual hedgehogs over time are limited. Questions relating to the circumstances that lead to multiple litters per year, and variance in survival of these litters is urgently needed, as is knowledge of survival rates during the first six to twelve months.

We also have very little understanding of how populations interact (the free-flowing movement and general migration between populations/habitat patches), and the mode and frequency of individual movement between populations. Such studies would help inform the importance of immigration and emigration between populations and their respective contributions to population change and persistence, and to what extent habitat fragmentation is playing a part.

Many causes of death have been identified for hedgehogs, but very few are contextualised in terms of their probability and whether changes in the likelihood of death will lead to a population response. The extensive causes of mortality were grouped into three sub-priorities: a) Toxicity, b) Accidents, and c) Roads.

### 2a. Toxicity

Several studies (e.g., Dowding *et al.*, 2010; Rasmussen *et al.*, 2024) have shown various levels of toxins being found in screened hedgehog carcasses, but despite many toxins being reported, few studies have been able to demonstrate that the toxins themselves caused or contributed to death. Therefore, research is needed to understand the lethal dosage of many toxins for hedgehogs, and whether there are any sublethal effects that

result from their build-up, such as impacts on reproductive fitness, behaviour, metabolism, and overall welfare. However, the most pressing questions are how many individuals are exposed to toxins, the route of exposure to xenobiotics, how many toxins cause mortality, and whether this results in population changes.

## **2b. Accident**

Vets and rehabilitation centres have data on a large range of accidental hedgehog deaths. The extent and frequency of these deaths, if high, could result in population decreases. If the risks associated with accidents can be identified, then specific interventions may prove advantageous. For example, if accidental strimming was found to be a major cause of death, then interventions could be targeted accordingly. However, many of the potential causes of accidental death are not reported in relation to the expected survival probability of individuals or the likelihood of death from accident. This makes it difficult

to identify which cause of death is having the most detrimental impact on the population and which interventions would need prioritising. For example, hedgehogs that drown in ponds or become tangled in netting don't make it to rehabilitation facilities, so those deaths are unrecorded. Therefore, long-term demographic data on survivorship and cause of death is required to determine the impact accidents have on hedgehog populations.

## **2c. Roadkill**

Roads are likely the biggest single cause of adult hedgehog mortality in Great Britain. Recent research into the impact of roadkill (Moore, 2023) shows that the impact on population growth rates depends on the size of the population, with large populations able to compensate for road mortality, whereas smaller ones can be seriously affected, further accelerating their decline. As a result of this research, roads were deemed a lesser priority than other causes of mortality by the strategic



working group. However, research gaps remain with regards to mitigation strategies for hedgehog roadkill. For example, how effective are road signs, speed bumps, and other traffic calming measures at reducing hedgehog roadkill rates and would the implementation of these in key areas increase population persistence?

### **3. Feeding**

Artificial supplementary feeding of hedgehogs by humans is a widely reported phenomenon and has been promoted to help hedgehogs. Key questions that require attention relate to the extent that feeding of hedgehogs occurs and how this varies across the country. With this information, it will then be possible to better understand the relationship between feeding and hedgehog population size (carrying capacity), behaviour (hibernation, movement) and reproductive fitness. There is also a question related to the nutritional value of supplementary foods and how beneficial or even harmful some of these may be. It is unknown how hedgehogs use supplementary food in relation to natural prey and how important artificial food is at certain times of the year. A well-designed experiment that carefully manipulates food provision could help us understand its effect on individuals and populations, from which good practice guidance on feeding hedgehogs in gardens can be developed and disseminated.

### **4. Rehabilitation**

Every year thousands of hedgehogs are cared for in captivity and released back into the wild once they are healthy. Release protocols detailing good practice have been developed by RSPCA and BHPS and are based on short-term radio tracking studies of animals translocated to novel areas, but the longer-term survival of translocated hedgehogs is unknown. Further

evidence is required to understand whether the current best-practice on releasing animals back to their own population to avoid problems with uncontrolled translocation, such as risk of disease transmission, results in the longer-term survival of a higher number of released hedgehogs. There is also an opportunity to better use rehabilitation centre data to inform demographic rates, such as lifespan, litter size and reproductive time periods, to an extent.

### **5. Genetics**

Concerns exist over small hedgehog populations becoming fragmented and isolated leading to a lack of genetic variability, increased inbreeding, and declining population viability. Past genetic studies (e.g., Becher & Griffiths, 1998) have suggested hedgehog populations may be fragmented and prone to inbreeding (mating between relatives), although current unpublished research into the genetic population structure in Great Britain at Nottingham Trent University preliminarily suggests a good level of gene flow between populations. Isolated and small populations need to be identified and research into the possible benefits of genetic rescue implemented, whilst wider research relating to the dispersal ability of hedgehogs and the habitat features that facilitate or hamper dispersal and connectivity between populations is also urgently required.

# GOVERNANCE STRUCTURE AND STEPS TOWARDS ACTION

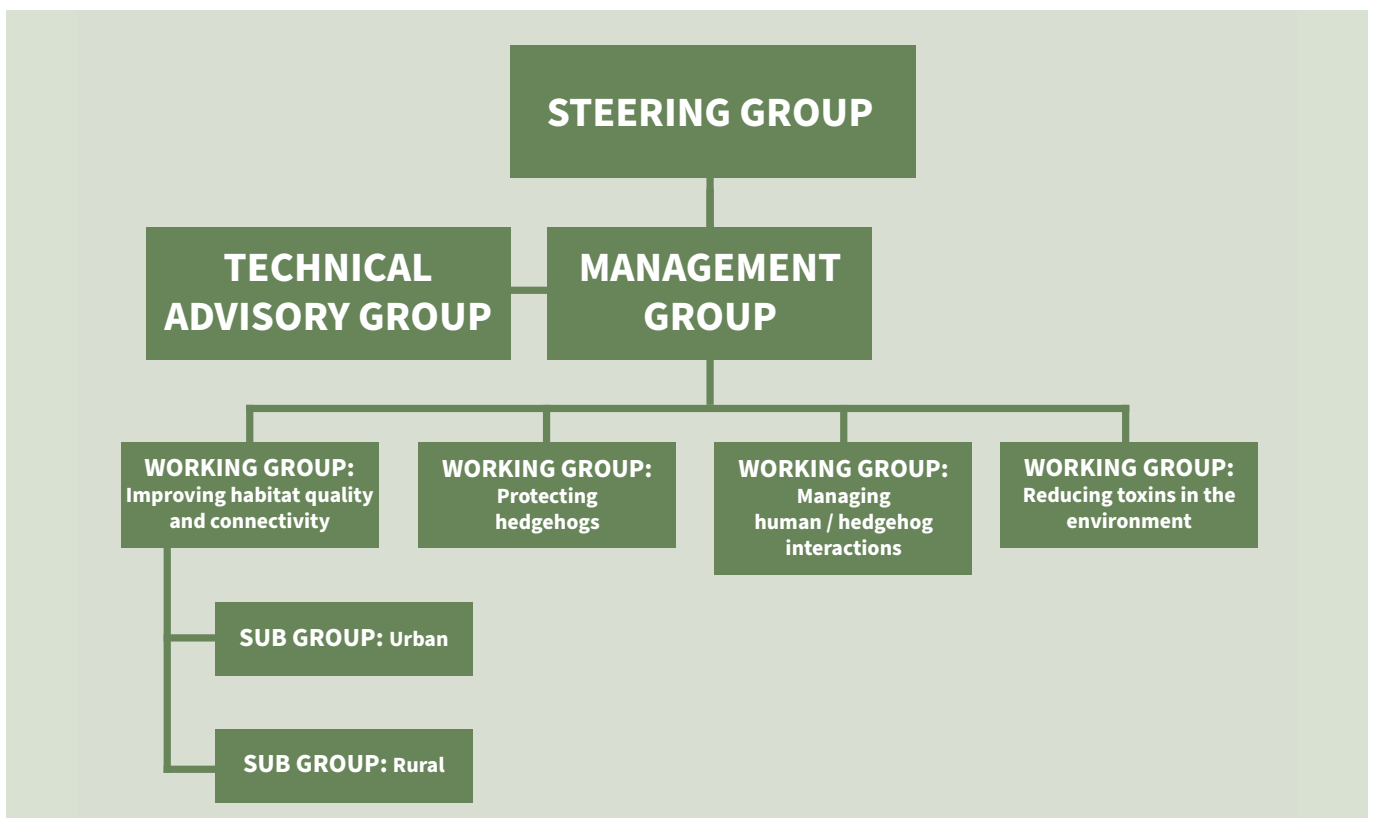
In discussions following the strategic workshop, PTES and BHPS representatives recognised that delivery of the strategy would require a clear governance structure and dedicated staff tasked with delivering strategy outcomes. A suggested governance structure is illustrated in Figure 1. This structure requires funding for two project officer posts, with the project officers tasked to focus independently on urban and rural issues, whilst working alongside PTES and BHPS staff to deliver action against the strategy on the ground.

It should be noted that this document is a strategy rather than an action or delivery plan. Thus an initial task for the project management team (with input from the working groups) will be to identify the priority actions required to deliver on the strategies identified as necessary to achieve the goals set out in this document. Creation of a delivery plan with SMART actions

and a clear timeline will be very useful in keeping all partners working on hedgehog conservation on track. Finalising membership of working groups and consulting with them on priority action points will also be a key early stage in delivering on the strategy.

Regular review of progress against the strategy will be important for effective delivery. New challenges or solutions may arise that render certain goals or strategies more or less relevant and the team involved in the governance of the strategy need to have the tools to recognise and adapt to these kinds of changes. A potential review timeline could involve a one year review, midpoint review, and end point review, before creation of a new strategy.

Figure 1. Provisional governance structure





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# APPENDIX

## A1: VISION STATEMENT TERMINOLOGY

Table 2: Full breakdown of terminology and indicators associated with vision statement.

Vision term	Definition	How we will measure it	What is our baseline?	What will success look like?
Wild	Free-ranging West European hedgehog	Reductions in well-intentioned but unnecessary admissions of hedgehogs to human care.	Inconsistent public messaging concerning when and how to provide direct intervention for hedgehogs.	Reconciliation of published advice on hedgehog care resulting in consistent messaging, broad public understanding of the nature of hedgehogs, and reductions in unnecessary interventions.
Thriving from towns to countryside	Achieving Favourable Conservation Status (FCS)[1]  Sufficient, suitable, well-connected hedgehog habitat within urban, suburban and rural landscapes	National Hedgehog Monitoring Programme and related robust surveys demonstrate optimal population densities at 1km <sup>2</sup> in appropriate land classes across Britain to achieve FCS.  Genetic studies indicate existing levels of genetic diversity within populations and provide means to conserve and promote this diversity where required.  Mapping and measuring hedgehog habitats at different spatial and temporal scales indicates there is an increasing availability of hedgehog-suitable habitat.	Widespread but declining suitable hedgehog habitat (~ 189,000km <sup>2</sup> ) and number of wild hedgehogs (est. 522,000 individuals[2]) across Britain, particularly in rural landscapes.  Populations are likely to be isolated and therefore at higher risk of extinction due to lack of suitable, well-connected habitat and fragmentation caused by roads and other infrastructure.	A demonstrable, widespread increase in suitable, well-connected hedgehog habitat across different land classes that results in a significant increase in current hedgehog numbers across their natural range in Britain.
Combined actions	Evidence-led, transparent partnerships and collective efforts	Scaling up in the number and distribution of engaged sectors and stakeholders (from organisations to individuals).  Mechanisms in place to engage and encourage synergies across stakeholder groups.	Varying national and regional partnerships between non-government organisations, local voluntary groups/ individuals and a range of sectors including development, land management, transport and local councils.  Dissemination of inconsistent messaging about hedgehogs by different parties hindering the spread of uniform and educated information.	Pro-active formulation of streamlined, consistent, coordinated partnerships with measurable actions and thorough distribution across different land classes and areas of Britain.
Meeting the needs of people and nature	Promoting the coexistence of humans and hedgehogs	Increased legal protection for hedgehog nesting sites. Increase in number of planning authorities ensuring hedgehog requirements are adequately incorporated into the design of all new developments and their green infrastructure.  New development delivering net gain in hedgehog habitat as part of wider gains for nature.  Increase in policies, interventions and financial support to promote hedgehog conservation and pro-hedgehog habitat attitudes.	Current legislation/ statutory duty is not effective in preventing hedgehog population declines and fragmentation of hedgehog habitats.  Hedgehogs are not actively prioritised/considered within the planning process.  Lack of evidence/ monitoring to inform effective habitat creation and management at scale to benefit hedgehogs.  Hedgehogs are viewed favourably by society, but knowledge of their needs is poorly understood.	The needs of hedgehogs are incorporated alongside wider native biodiversity into all farm management, food production, planning, development and management plans/ strategies, supported by legislation.  These plans and strategies provide a safe and healthy environment for people and hedgehogs.

[1] [Natural England definition of FCS.](#)

[2] Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A. and Shore, R.F., 2018. *A review of the population and conservation status of British mammals*

## A2: FULL PROCESS FOR IDENTIFYING PRIORITY THREATS

As part of the strategy design process, a separate threat analysis workshop involving a subset of the stakeholders who participated in the main strategy workshop was held in January 2023.

As a result, ahead of the strategic workshop, the group had already identified 23 direct threats to hedgehog persistence in Britain (i.e., threats that directly drive a decline in the hedgehog population via impacts on survival and reproduction) (Figure 2), and outlined the indirect threats and top level drivers that fed into these 23 threats (see [Hedgehogs in Britain Threat Analysis Report](#) (Taylor and Copsey 2023) for full details).

On the first day of the strategic workshop, the 23 direct threats identified at the threat analysis workshop were consolidated into 16 threats. Workshop participants were divided into two groups, who (blinded from the results of the opposite group) took turns to rank these 13 direct threats in two categories: 1. their perception of the severity of the impact that threat could have on hedgehog persistence, and 2. their perception of the impact that human stakeholders would be able to have on mitigating that threat. Ranking in each category was conducted via a dot vote system, with each participant having five dot votes to cast for each category. These votes could all be cast for one threat or split between up to five different threats. The votes were tallied and produced the ranking seen in Table 3.

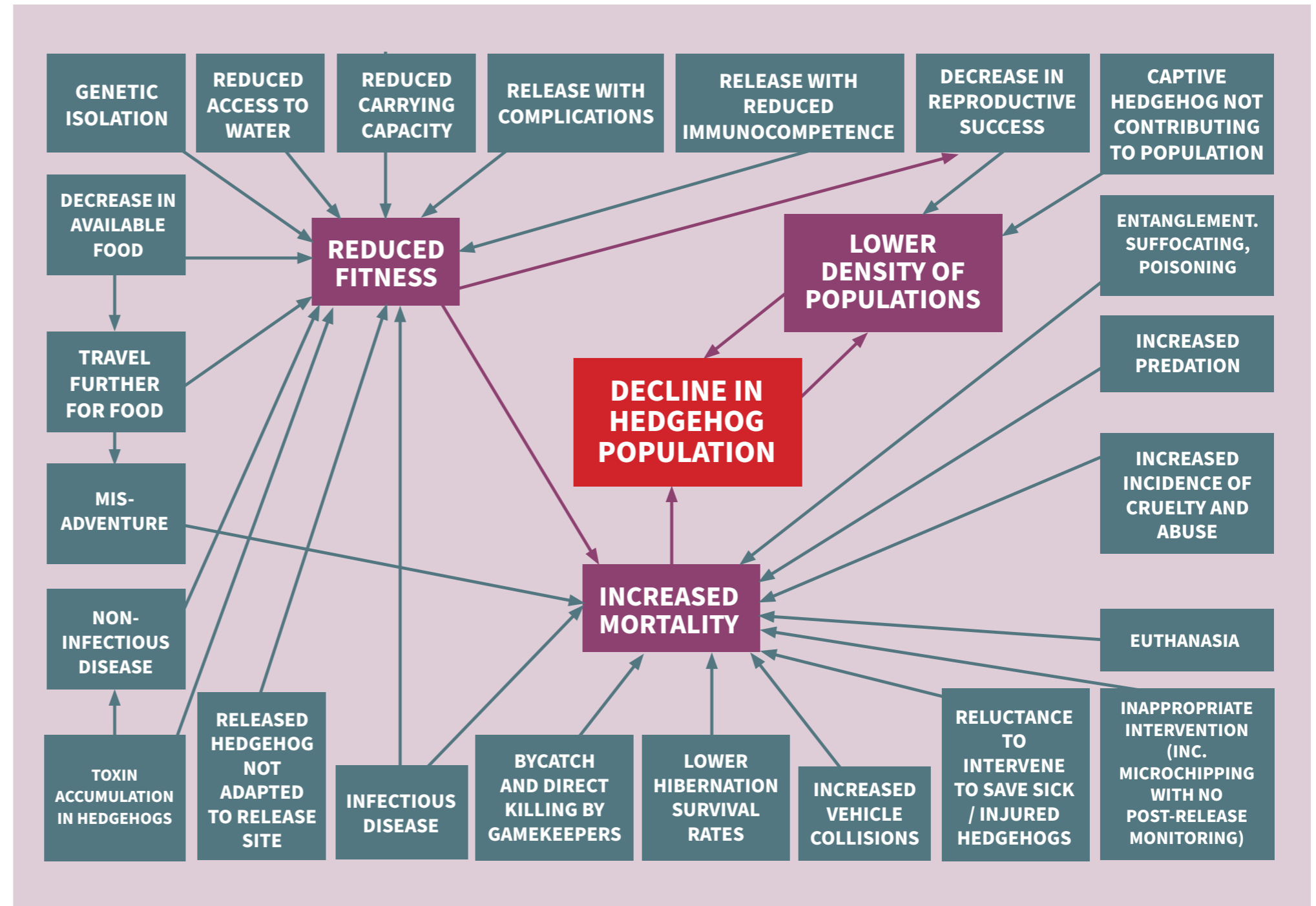
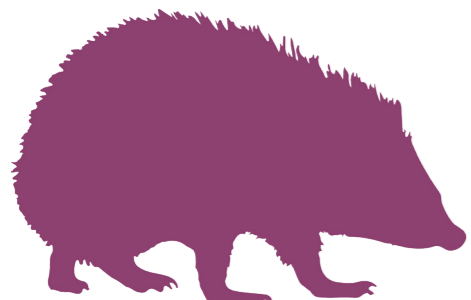


Figure 2: Direct threats (blue boxes) identified in hedgehog threat analysis workshop that lead to proximal drivers of decline (purple boxes). Note that some direct threats lead to other direct threats as well as to proximal causes of decline. Colour of arrows reflects the type of box the arrow is coming from.



**Table 3: A summary of the 16 direct threats facing hedgehogs and their prioritisation under two categories: column one: ranking according to greatest perceived threat to the UK hedgehog population and column two: ranking according to the greatest positive impact that can be achieved by addressing the threat. The third column shows the combined ranking scores. The threats in bold in the “combined” column are the six threats that were taken forward to be included in this strategy document.**

Threats ranked by <b>perceived impact on the hedgehog population</b> , from greatest to least	Threats ranked by <b>potential positive conservation impact</b> that can be achieved, from greatest to least	Threats ranked by <b>combined ranking scores from columns 1 and 2</b>
1. Decrease in availability and distribution of natural food	1. Decrease in availability and distribution of natural food	<b>1. Decrease in availability and distribution of natural food</b>
2. Increased vehicle collisions	2. Mortality due to human intervention	<b>2. Increased vehicle collisions</b>
3. Toxin accumulation	3. Reduced access to water	<b>3. Mortality due to human intervention</b>
4. Accidental death/misadventure	4. Accidental death/misadventure	<b>4. Accidental death/misadventure</b>
5. Genetic isolation	5. Genetic isolation	<b>5. Toxin accumulation</b>
6. Predation/competition	6. By-catch/killing by game keepers	<b>6. Genetic isolation</b>
7. Disease	7. Toxin accumulation	7. Reduced access to water
8. Mortality due to human intervention	8. Cruelty and abuse	8. Predation/competition
9. By-catch/killing by game keepers	9. Increased vehicle collisions	9. By-catch/killing by game keepers
10. Mistimed reproduction	10. Predation/competition	10. Cruelty and abuse
11. Low over-winter survival rates	11. Low over-winter survival rates	11. Disease
12. Reduced access to water	12. Disease	12. Low over-winter survival rates
13. Cruelty and abuse	13. Mistimed reproduction	13. Mistimed reproduction
14. Stochastic events	14. Stochastic events	14. Stochastic events
15. Decreased shelter	15. Decreased shelter	15. Decreased shelter
16. Decreased breeding due to decreased encounter rates	16. Decreased breeding due to decreased encounter rates	16. Decreased breeding due to decreased encounter rates

The following day, it was agreed that threats would be prioritised based on their combined score across both categories. It was also acknowledged that it would not be realistic to tackle all 16 threats in the time period of this first strategy. A group discussion session was held to decide where the cut off on threats to include should be, with the eventual conclusion that the top six threats would be addressed in this strategy document.

### A3: WORKSHOP PARTICIPANTS

Below we provide a list of the participants and their affiliated organisations, who attended the first threat analysis workshop (19<sup>th</sup> January 2023), and the second workshop in which the 2053 vision was developed (26<sup>th</sup>-28<sup>th</sup> April 2023).

Individual/organisation	Representatives	Present at workshop 1	Present at workshop 2
British Hedgehog Preservation Society (BHPS)	Nigel Reeve	✓	✓
British Veterinary Zoological Society (BVZS)	Elizabeth Mullineaux	✓	✓
British Wildlife Rehabilitation Council	Daniel Forman		✓
Forestry Commission England	Orlando Methuen-Campbell	✓	✓
Game and Wildlife Conservation Trust	Alice Midmer		✓
Gower Bird Hospital	Simon Allen	✓	✓
Hartpury University	Lucy Bearman-Brown		✓
Hedgehog Friendly Campus	Jo Wilkinson	✓	
idverde	Ross Bray		✓
Institute of Zoology	Chris Carbone	✓	✓
Institute of Zoology - Garden Wildlife Health project	Katharina Seilern-Moy	✓	✓
IUCN SSC CPSG (facilitation)	Jamie Copsey	✓	✓
Joint Nature Conservation Committee	Jem Powell	✓	
Joint Nature Conservation Committee	Julia Daly		✓
Mammal Society	Dawn Scott		✓
National Farmers' Union	Adam Briggs		✓
National Highways	Stephanie Ball		✓
Natural England	Claire Howe	✓	✓
Natural Resources Wales	Rebecca Clews-Roberts	✓	✓
Nature Friendly Farming Network	Patrick Barker		✓
NatureScot	Rob Raynor	✓	✓

Individual/organisation	Representatives	Present at workshop 1	Present at workshop 2
Network Rail	Aline Gomes		✓
Nottingham Trent University	Lauren Moore	✓	✓
Nottingham Trent University	Richard Yarnell	✓	✓
People's Trust for Endangered Species	Nida Al-Fulaij	✓	✓
People's Trust for Endangered Species and the British Hedgehog Preservation Society	Grace Johnson	✓	✓
Royal Horticultural Society	Helen Bostock		✓
Royal Society for the Protection of Birds	Robyn Stewart	✓	✓
IUCN SSC CPSG and Royal Zoological Society of Scotland (facilitation)	Helen Taylor	✓	✓
RSK Bio Census	John Daw		✓
Suffolk Wildlife Trust (retired)/Independent ecologist	Simone Bullion	✓	✓
Taylor Wimpey	Lizzie Eyre		✓
University of Cambridge/ Conservation Evidence	Silviu Petrovan	✓	✓
University of Oxford Wildlife Conservation Research Unit and Aalborg University (Denmark)	Sophie Lund Rasmussen		✓

## A4: ORGANISATIONS INVOLVED IN STRATEGY CREATION: LOGOS AND NAMES

(Note, participation in strategy creation does not equate to endorsement of all elements of the strategy)



British Hedgehog Preservation Society  
British Wildlife Rehabilitation Council  
British Veterinary Zoological Society  
Forestry Commission  
Gower Bird Hospital  
Game and Wildlife Conservation Trust  
Hartpury College  
Idverde  
Institute of Zoology – Garden Wildlife Health  
Institute of Zoology – Zoological Society of London  
IUCN SSC Conservation Planning Specialist Group (facilitation)  
Joint Nature Conservation Committee  
Taylor Wimpey  
Mammal Society  
National Highways  
National Farmers’ Union  
Natural England  
Natural Resources Wales  
Nature Friendly Farming Network  
NatureScot  
Network Rail  
Nottingham Trent University  
People’s Trust for Endangered Species  
Royal Horticultural Society  
Royal Zoological Society of Scotland  
Suffolk Wildlife Trust  
University of Cambridge  
University of Oxford Wildlife Conservation Research Unit (WildCRU)  
Aalborg University

## **A5: SUPPORT FROM ADDITIONAL ORGANISATIONS**

