

ExCASES Mission

Paws for Thought

**Adopting a standardised, holistic approach
towards managing the impacts of dog
walking on the environment in the UK**



**University
of Exeter**



National Trust



**Natural
Environment
Research Council**

Paws for Thought: An ExCASES mission

Adopting a standardised, holistic approach towards managing the impacts of dog walking on the environment in the UK

Dogs are important to the lives of many people in the UK, and dog walking is a popular activity that encourages people to exercise, providing physical and psychological benefits to them and their animals. Ownership of a dog is positively associated with the amount of time people spend outdoors. However, the presence or behaviour of dogs can have adverse effects on wildlife and ecosystems. With an estimated 12.5 million dogs in the UK this impact could, in some places, be substantial. Managing interactions between dog walkers, wildlife, other domestic animals, and other people is a major priority for land managers. In this document, we highlight considerations and make recommendations intended to support a more consistent approach towards facilitating and managing sustainable and equitable coexistence. These were co-developed with experts, practitioners, policy makers and professional bodies and individuals.



Paws for Thought

Adopting a standardised, holistic approach towards managing the impacts of dog walking on the environment in the UK

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A lush green forest scene. In the center, a wooden birdhouse with a white number '5' is attached to a tree trunk. The foreground is filled with vibrant green ferns and clusters of small purple flowers. The background shows more trees and dense foliage.

ExCASES

1. ExCASES

ExCASES is part of the RENEW project – a Natural Environment Research Council (NERC) funded partnership between the University of Exeter and the National Trust that takes a ‘people-in-nature’ approach towards the challenges of biodiversity renewal. The role of ExCASES is to undertake agile work (which we term ‘missions’) on pressing biodiversity renewal issues. The work can consist of original research, participatory process, and the synthesis of existing knowledge, with the aim of creating impactful outputs for real change. The ExCASES approach is based on collaboration across disciplines and sectors, co-design with stakeholders, and agile delivery. Paws for Thought is one of these missions.

Paws for Thought involved a rapid evidence review to collate evidence from the academic and grey literature on the impacts of dog walking on wildlife and habitats in the UK. This evidence formed the basis for engagement and collaboration with landowners and managers, conservation and animal welfare organisations, access and recreation practitioners, and people working in the canine sectors (Appendix I), through a deliberative, participatory process. During this process we used the technical information from the evidence review, in conjunction with practitioner knowledge and experience, to identify key problem areas and develop effective intervention strategies. We explored the needs and expectations of different users, and conceptualised a holistic approach towards tackling the issues, prioritising efficacy, sustainability, and equitability. This document supports the main mission report.



The need for a more consistent approach towards managing coexistence between people, dogs, wildlife and the environment



2. The need for a more consistent approach towards managing coexistence between people, dogs, wildlife and the environment

An important outcome of the mission was cross-sectoral recognition of the potential of environmental harms arising from dog walking, and consensus that current approaches towards managing the environmental impacts of dog walking lack consistency. Across the UK organisations and land managers adopt a range of different approaches to planning, signage, messaging, and codes of conduct. This causes confusion for dog walkers and leads to frustration and poor uptake. While there is some excellent work being done, the wide spectrum of delivery hampers consistent application of best practice. Participants felt that a nationally coherent and standardised approach is required to improve confidence, compliance, and to establish and manage expectations around access and responsible behaviour.

In response, we have drawn on the input, insights, and sharing of best practice between stakeholders engaged in this mission to produce recommendations and guidance for a standardised approach towards appraising the issues, planning, and actioning interventions. This guidance aims to achieve the following:

i) Support an evidence-based approach towards interventions

Fundamentally, we advocate adopting an evidence-based approach to managing interactions between people, dogs, wildlife and habitats. We used our rapid evidence review (table 1; for more detail of the review and evidence outputs, refer to the main report) as a starting point for prioritising and optimising intervention strategies. Where knowledge gaps exist, or evidence is sparse or contested, it is important to both take a precautionary approach, and to undertake and/or support further research to gather data and test interventions, bolstering the knowledge base.

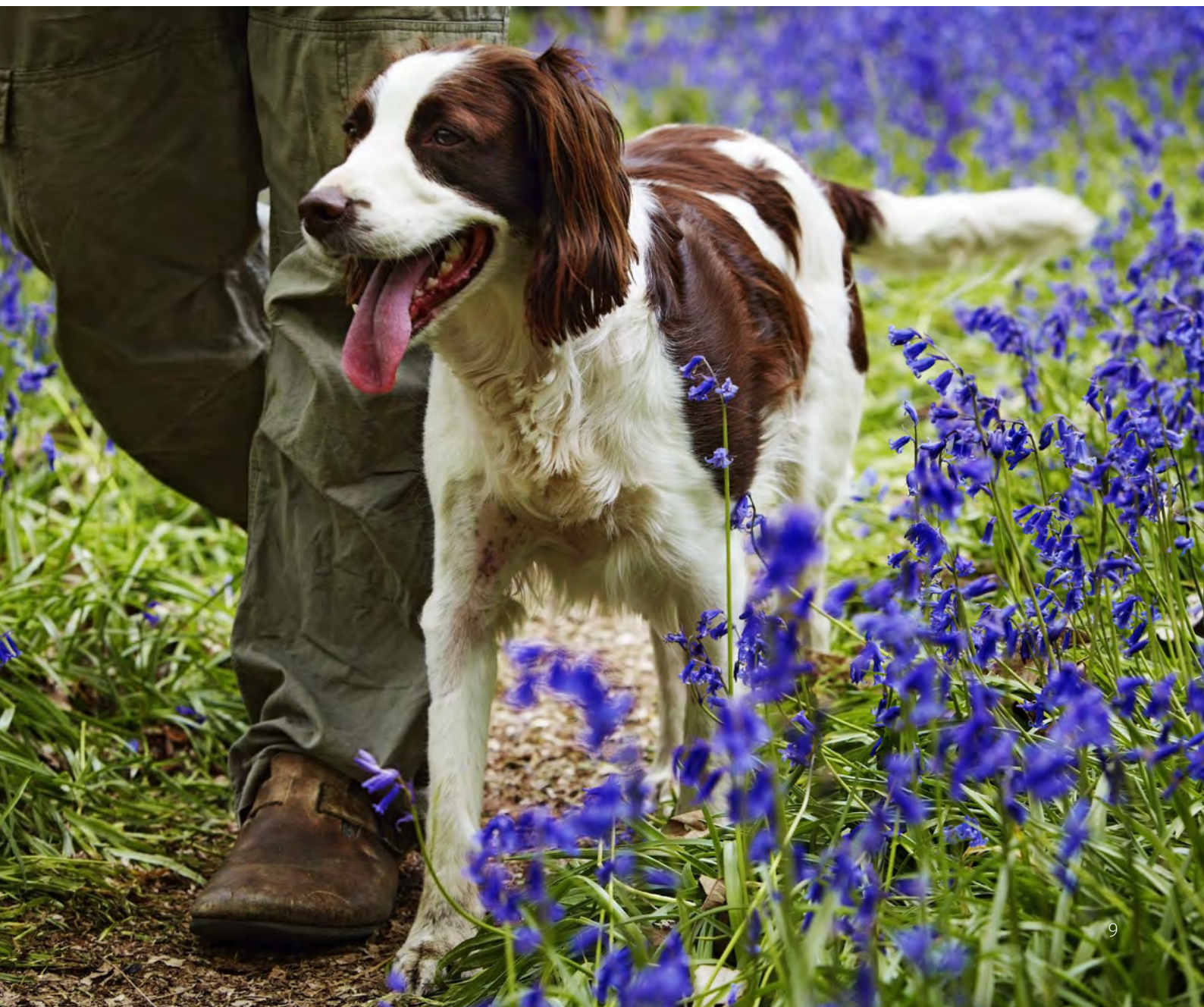


ii) Support a holistic approach towards appraising coexistence issues

There is a diversity of stakeholder interests concerned with the interactions between people, dogs, wildlife and the environment across varying scales and contexts. These all interact with external social, ecological, economic and political factors. Achieving effective, equitable solutions within this complex space requires a holistic approach. To support this, we advance an adapted One Health¹ framework, the central objective of which is to support and promote health equity and resilience for communities of people, dogs, wildlife, and habitats, across generations. Resilience in this context means the ability to withstand, adapt to, and recover from, challenging circumstances or events.

iii) Support a standardised approach towards managing coexistence

We make recommendations for a consistent, standardised zoning approach based around a 'traffic light' pawprint system of access, to clearly identify what activities are expected and where. Zone designations and criteria are articulated, and interventions to support zoning have been synthesised from the sharing of best practice and innovation by stakeholders involved in the mission process, and from drawing on the literature. Whilst intervention methods may vary in relevance and applicability across contexts and scales, the access criteria for green, amber and red zones should be consistent.



2.1. A three-phase approach

We recommend the following three phases, when working through identification of the issues and management interventions (fig 1).

- i) Phase 1** Gather evidence to understand the potential range and nature of environmental impacts and how these may be affected by landscape context, especially in relation to dog densities and levels of exposure for different habitats, species and protected areas.

- ii) Phase 2** Undertake a setting-based appraisal of the needs of different users in order to identify: 1) health and resilience needs - where they intersect, synergise or create conflict or tension, 2) potential interventions, and to target these efficiently in order to maintain maximum range of benefits for all parties, and 3) opportunities for collaborations and engagement within focal communities to co-design and deploy solutions.

- iii) Phase 3** Once the setting/system has been evaluated and mapped, planning should spatially group suites of appropriate intervention methods to derive and create clear 'zones' to identify where activities can be undertaken.



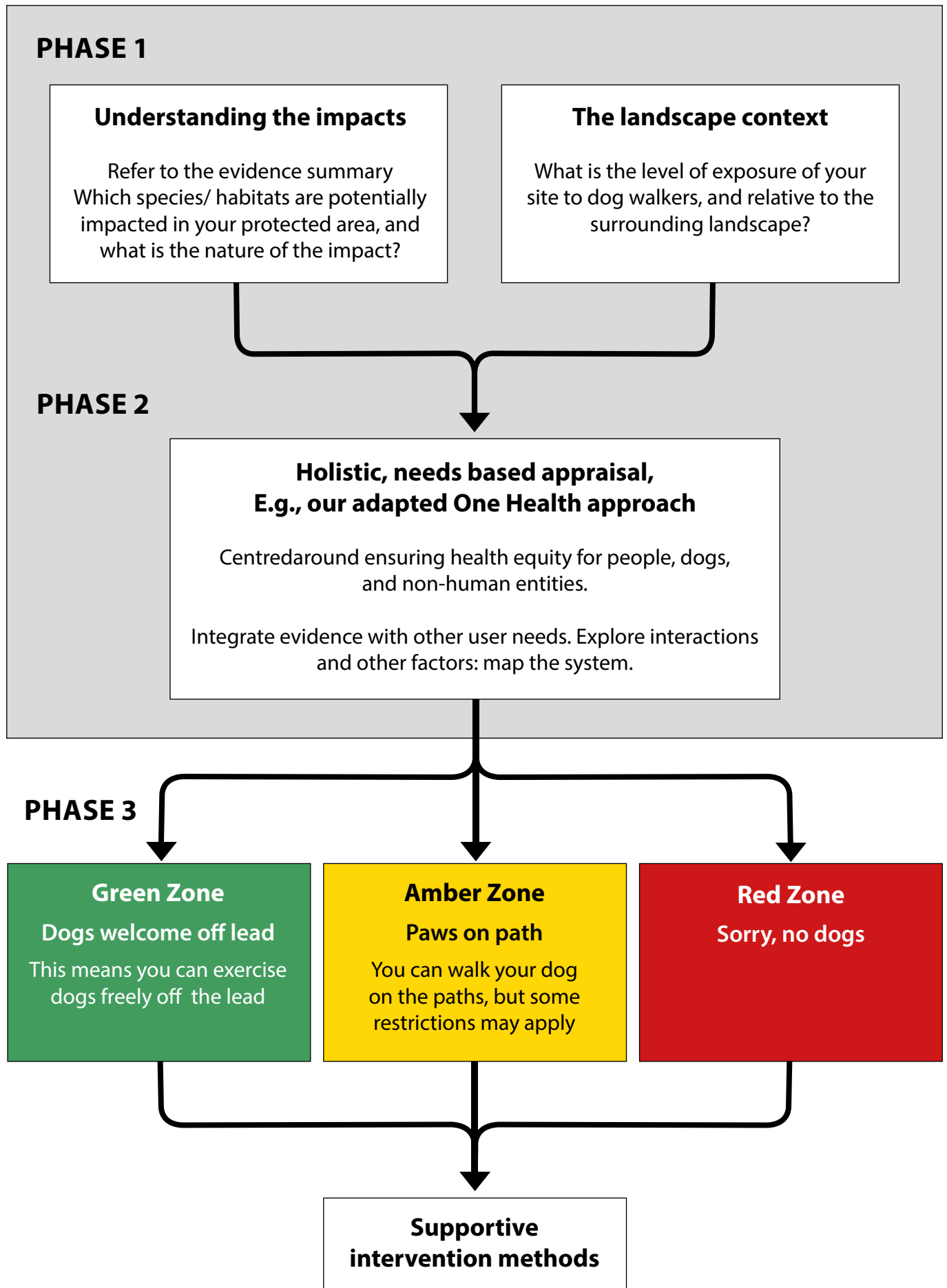


Figure 1 A three-phase approach for supporting the planning of interventions to manage coexistence between people and dogs, other users, wildlife and habitats. The first two phases involve understanding and holistically appraising issues and interactions within a system or setting. The third phase involves planning an effective zoning approach towards managing coexistence.

A close-up photograph of a fluffy, light brown dog, possibly a Papillon or a similar breed, sitting on a green lawn. The dog has long, wavy fur and is looking directly at the camera. A black leash is visible on the left side of the frame. The background is a blurred green field.

Phase 1:

**Understanding the impacts
and the landscape context**

3. Phase 1: Understanding the impacts and the landscape context

Fundamentally, we advocate for evidence-based decision making. This requires interrogation and appraisal of the evidence, and a spatially explicit understanding of the potential effects of dog walking for different habitats, protected areas and species, across the landscape.

3.1 Evidence of impacts

We conducted a rapid, semi-systematic evidence review of the impacts of domestic dogs on biodiversity in the UK. The review disclosed 43 pieces of evidence and identified 13 impact categories (table 1).



The review primarily involved a literature search using Web of Science and Google Scholar. The search was parametrised to exclude studies relating to free ranging/roaming dogs, and wild/feral dogs, which were not thought relevant for the UK context, where the great majority of dogs are associated with an owner and are accompanied on walks. The results were then filtered manually to exclude studies from outside the UK, but exceptions were made for studies in comparable socio-ecological contexts outside of the UK, and for studies from other countries that reported findings for species found within the UK.

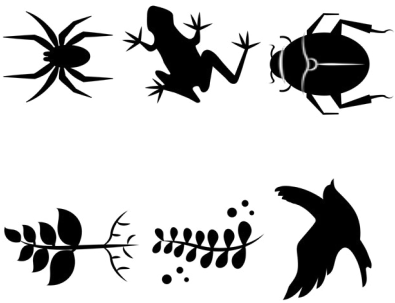


We did not cover the socio-economic and cultural impacts of dog walking (both positive and negative) nor the environmental footprint of keeping and feeding a dog. We recognise that these encompass important considerations for conservation, such as interactions with livestock and people's access to and enjoyment of greenspace. We did, however, explore these aspects with stakeholders during participatory workshops as part of the mission. For the full outputs from evidence review, and for detail on how the evidence was appraised with stakeholders during the participatory workshops, refer to the main report.






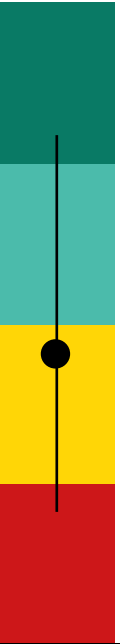
The following table summarises the main findings of the rapid evidence review that we undertook and shared with participants during the mission.









Table 1 A summary of the rapid evidence review of the academic and grey literature. The review identified 13 different types of impact. These are presented with the number of contributing pieces of evidence; a topline summary of the impact and key points from the evidence; the taxonomic group studied/affected; and the outcome of a Balanced Evidence Appraisal Method (BEAM; Christie et al., 2023). BEAM was developed as an intuitive approach towards appraising the balance of evidence of an assumption when the situation being explored is complex, and the types of evidence are diverse. BEAM appraises where the balance of evidence lies for each assumption, which in this case, are the topline evidence summaries for the impacts.

Impact (no. pieces of contributing evidence & references)	Evidence summary	Taxa studied	BEAM outcome (balance of evidence)			
Displacement of wildlife (n=17) 5, 6, 7, 11, 14, 17, 20, 21, 22, 24, 25, 26, 27, 29, 36, 37, 39	<p><i>The presence of people and dogs can negatively affect the distribution of wildlife, excluding them from their preferred habitats.</i></p> <ul style="list-style-type: none"> Disturbance by people and their dogs can exclude wildlife from their preferred sites for foraging, nesting, and resting, which can have impacts at the population level, in terms of abundance and distribution. However, several studies suggest that wildlife can become habituated to, or tolerant of disturbance, demonstrating a mediated response to people and dogs. 		Refutes	Mixed	Weakly supports	Strongly supports
Shedding flea and parasite treatments (n=4) 15, 31, 32, 42	<p><i>Spot-on flea and parasite treatments can enter freshwater habitats, exposing wildlife to harmful insecticides.</i></p> <ul style="list-style-type: none"> Fiprinol and imidacloprid pesticides, which are used in parasite treatments, are toxic for invertebrates and vertebrates. They can be shed from, or washed off dogs, and find their way into aquatic ecosystems. The greatest sources of transmission are from bathing dogs after treatment, and from owners washing their hands - imidacloprid and fiprinol are detectable from hand washing 28 days after a treatment. This is a UK-wide issue, and is most acute near densely populated areas, and within 2km of wastewater treatment plants, where concentrations of fiproles can greatly exceed toxicity limits. However, there is uncertainty over the bioavailability of these compounds (the extent and rate at which the compounds enter the bodies and systems of wildlife in freshwater). 					

Impact (no. pieces of contributing evidence & references)	Evidence summary	Taxa studied	BEAM outcome (balance of evidence)
Species richness (n=4) 7, 8, 11, 35	<p><i>Disturbance by dogs can reduce species richness, i.e. the number of species present</i></p> <ul style="list-style-type: none"> Through physical disturbance and damage to vegetation, dogs can simplify habitat structure and niche availability, reducing species diversity, particularly in comparatively enclosed spaces such as ponds. Concentrated excretion of waste may alter terrestrial floral diversity through eutrophication. There is evidence (from France) that even low levels of disturbance can lead to a reduction in the abundance and diversity of forest birds. 		<div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div>
Nutrient enrichment from faeces and urine (n=4) 7, 8, 11, 35	<p><i>Consistent exposure to dogs can change vegetation species assemblages by eutrophication.</i></p> <ul style="list-style-type: none"> Eutrophication from dog urine and faeces can significantly increase soil fertility, though the effect is likely localised to areas of consistent use. In these areas of consistent use, soil nitrogen and phosphorus are elevated, which can lead to changes in the floral community - particularly when the native flora prefers acidic soil. 		<div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div>
Physiological stress response (n=4) 4, 13, 34, 38	<p><i>Disturbance by dogs can cause an elevated physiological stress response in wild animals</i></p> <ul style="list-style-type: none"> Anthropogenic disturbance (people, or domestic dogs associated with people) can cause an elevated physiological 'stress' response for individual animals. Acute stress is part of an adaptive 'fight or flight' response, but persistent disturbance can cause chronic stress, which can undermine fitness and survival. 		<div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div>

Impact (no. pieces of contributing evidence & references)	Evidence summary	Taxa studied	BEAM outcome (balance of evidence)
Disease transmission (n=5) 1, 9, 12, 23, 40	<p><i>Dogs can be vectors for several important diseases, facilitating their transmission between wild animals, the environment, and people</i></p> <ul style="list-style-type: none"> • Dogs can be vectors for several important pathogens (Canine Distemper Virus, Leishmania sp, and Toxoplasma sp), potentially transmitting them to, and receiving them from, wild animals. • In urban areas with fox populations, there is the potential for transfer of helminths (parasitic worms) between dogs and foxes, and then between dogs and contaminated environments, to people. • Dog faeces represent a widespread contaminant of public parks, with the potential for transfer of Toxocara (round worm) to people. The severity of contamination is variable across locations, but the issue is prevalent and widespread across the UK and Ireland. • For bathing water, even small amounts of dog faeces can contaminate large areas to the point where they fail bathing water compliance tests. 	  	<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div>  </div>
Nest success (n=10) 2, 16, 18, 19, 21, 22, 26, 27, 28, 30	<p><i>Disturbance by dogs can reduce hatching success and chick survival for ground nesting birds</i></p> <ul style="list-style-type: none"> • Disturbance in of itself does not necessarily impact nest success. However, disturbance can operate synergistically with other environmental variables (e.g., inclement weather, sub-optimal habitat, and exposure of nests to predation) to reduce hatching and chick survival. • The severity of impacts can increase with increased frequency of disturbance events. • Some studies report disturbance but no impact on nest success or fledgling survival, whilst there is evidence of density dependent effects, where birds that select disturbed sites have higher nest success and reproductive output through reduced competition. 		<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div>  </div>

Impact (no. pieces of contributing evidence & references)	Evidence summary	Taxa studied	BEAM outcome (balance of evidence)
Physical disturbance of terrestrial flora (n=1) 8	<p><i>Regular use by dogs can alter vegetation structure through trampling, reducing structural heterogeneity</i></p> <ul style="list-style-type: none"> Regular use by dogs can potentially affect vegetation structure through trampling, reducing structural heterogeneity. In the contributing study (an urban dry grassland), this had no effect on endangered species or sand lizards, but decreased spider diversity, and was associated with the increased occurrence of invasive species. 		<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>*Less than 4 pieces evidence</div> </div>
Physical disturbance of ponds (n=2) 11, 42	<p><i>Dogs can reduce species abundance and diversity in ponds through physical disturbance</i></p> <ul style="list-style-type: none"> Dogs can reduce species abundance and diversity in ponds through physical disturbance, by trampling vegetation, amphibian spawn, and stirring up sediment. This can displace wildlife, negatively impact the reproduction of invertebrates and amphibians, and reduce taxa diversity. 		<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>*Less than 4 pieces evidence</div> </div>
Disturbance from barking (n=2) 33, 34	<p><i>Wild animals react to barking in the same way they would react to the presence of a predator</i></p> <ul style="list-style-type: none"> Dog barking can elicit predator avoidance responses from wildlife, though there is the potential for habituation in some contexts (e.g., coots in an urban wetland). For howler monkeys, barking elicits an escape response and an acute physiological stress response, where the strength of response is positively correlated to the intensity and proximity of the barking. 		<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div>*Less than 4 pieces evidence</div> </div>

Impact (no. pieces of contributing evidence & references)	Evidence summary	Taxa studied	BEAM outcome (balance of evidence)
Adder predation (n=1) 43	<p><i>Dogs are a predator of adders on heathland</i></p> <ul style="list-style-type: none"> • Dogs were the most common predator of model adders on managed and unmanaged heaths. • The frequency of attacks significantly increased closer to paths and were more frequent on heaths with higher numbers of dog walkers. • Of 770 model adders deployed over 10 days, 26% were attacked - the majority by dogs. • It is not clear whether other carnivores, e.g., foxes, might have been responsible for some attacks. 		<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div> *Less than 4 pieces evidence </div>
Vector for invasive species (n=2) 8, 11	<p><i>Dogs can facilitate the spread and establishment of invasive species</i></p> <ul style="list-style-type: none"> • Dogs can facilitate establishment of invasive species by carrying seeds or fragments of plants between locations and creating openings for these species through their disturbance of the existing vegetation. • This can occur in both terrestrial and aquatic habitats. 		<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div> *Less than 4 pieces evidence </div>
Coprophagia - animals eating dog faeces (n=1) 41	<p><i>Dog faeces can be a source of food for wild animals</i></p> <ul style="list-style-type: none"> • Dog faeces potentially represent a calorific source of food for wildlife, which can provide a predictable alternative to wild prey, or provide a source of food when preferred prey is scarce or unavailable. • The ecological effects of this are unknown; the contributing study, from native woodland in the Cairngorms National Park, reports that dog faeces represent a potentially significant source of calories for foxes. 		<div> <div>Refutes</div> <div>Mixed</div> <div>Weakly supports</div> <div>Strongly supports</div> </div> <div> *Less than 4 pieces evidence </div>



3.2 Dog densities across the landscape

Dog densities vary across the landscape, throughout the UK. This variability will affect prioritisation of intervention approaches, and the co-ordination of strategies across land holdings. We have created an ArcGIS map and dashboard that allow scrutiny of this variance, though currently we only have data on dog densities for England.

We produced the map using dog density data in England from Aegerter *et al.* (2017³; Fig 2), joined to an Ordnance Survey km2 shapefile. We use protected area data from Natural England and the UK Centre for Ecology and Hydrology Land Cover Map typology (Table 2). To make the map manageable, we restricted the types of protected area to RAMSAR, Special Protected Areas (SPAs), Special Areas of Conservation (SACs), Special Sites of Scientific Interest (SSSIs) and Important Bird Areas (IBAs; Table 3). This also reflects and responds to a prioritisation of impacts on bird species from the evidence review and amongst stakeholders in the process. Single sites can have multiple or overlapping protected designations. For a more detailed methodology, refer to Appendix II.

Table 2 UK CEH Land Class Mapping aggregate categories (with a description of their constituents), and protected area designations with a short description.

UKCEH Land Cover Map land class aggregates	Constituents
Arable	Arable
Built up areas and gardens	Urban; Suburban
Coastal	Littoral rock; Littoral sediment; Supralittoral rock; Supralittoral sediment; Saltmarsh
Coniferous forest	Coniferous forest
Deciduous forest	Deciduous forest
Freshwater	Freshwater
Improved grassland	Improved grassland
Mountain, heath and bog	Inland rock; Heather; Heather grassland; Bog
Saltwater	Saltwater
Semi-natural grassland	Acid grassland; Calcareous grassland; Fen; Neutral grassland
Protected Area designation	Description
Special Protected Areas	SPAs are protected areas for birds in the UK
Special Areas of Conservation	SACs include habitat types and species considered to be most in need of conservation at a European level (excluding birds) <i>SPAs, together with SACs, form the UK's national site network.</i>
RAMSAR	Wetlands of international importance
Important Bird Areas	Areas identified against an in internationally agreed set of criteria as being globally important for the conservation of bird populations
Sites of Special Scientific Interest	Areas of land or sea in the UK that are protected for aspects of their wildlife, geology, and/or cultural heritage

The protected area shapefiles were given a 1.5km buffer, based on a reported average dog walk length of 3km (assuming a 'there and back again' walk). We do not account for travelling to a location for walking dogs, though for context we present data on this from Natural England's People and Nature survey. From the map we can infer pressures from dog walking on protected area types and different land class designations in England, at various scales (from site level, to region, to national).

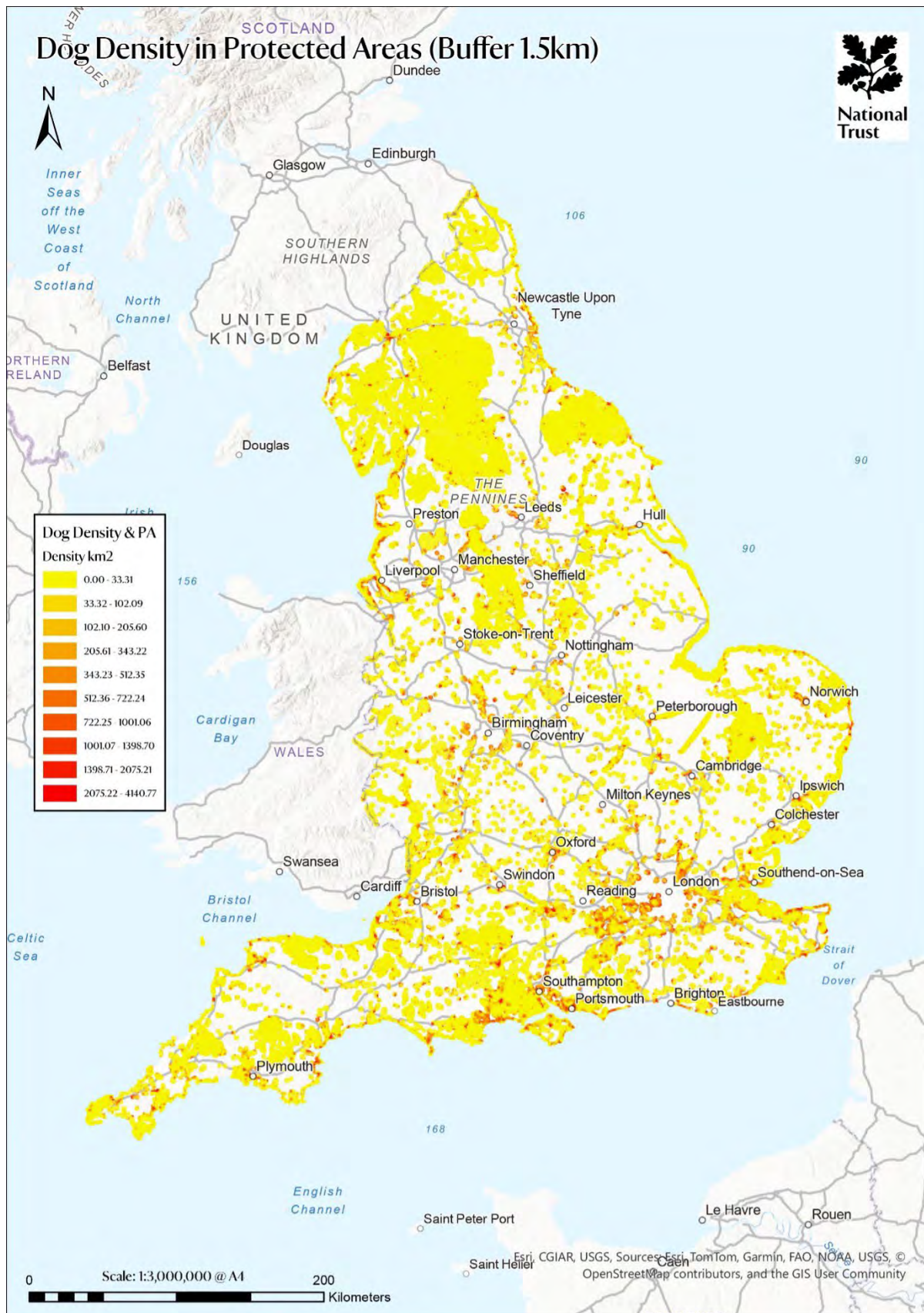


Figure 2 Dog density data (per km²) that intersects with protected areas (SAC, SPA, SSSI, RAMSAR and IBAs; table 2) in England. The dog density data was derived from Aegerter *et al.*, 2017, and protected area data from Natural England. The map does not display dog density data outside of protected areas. This is a static map, i.e., it does not account for people travelling with their dogs. From the map we can infer levels of exposure for our focal protected area types, collectively, in England. Each protected area shapefile has a 1.5km buffer, to reflect an average dog walk of 3km (assuming a 'there and back again' walk).

3.3 Dog densities and Protected Areas in England

In England, the highest densities of dogs are associated with built up areas and gardens, coastal, and semi-natural grassland land classes (Figs 3, 4 & 5). For built up areas and gardens, dog densities are substantially greater in the London region (Fig 5), while for coastal protected areas, they are highest in the South West, South East, and North West (Fig 5). Generally, dog densities in protected areas are higher in London for most land classes compared to other regions (Fig 5).

Figure 3 The average density of dogs (per km²) across all designated protected areas (SAC, SSSI, RAMSAR, SPA, and IBA; table 2) and non-protected areas in England, by UK CEH Land Cover Map class.

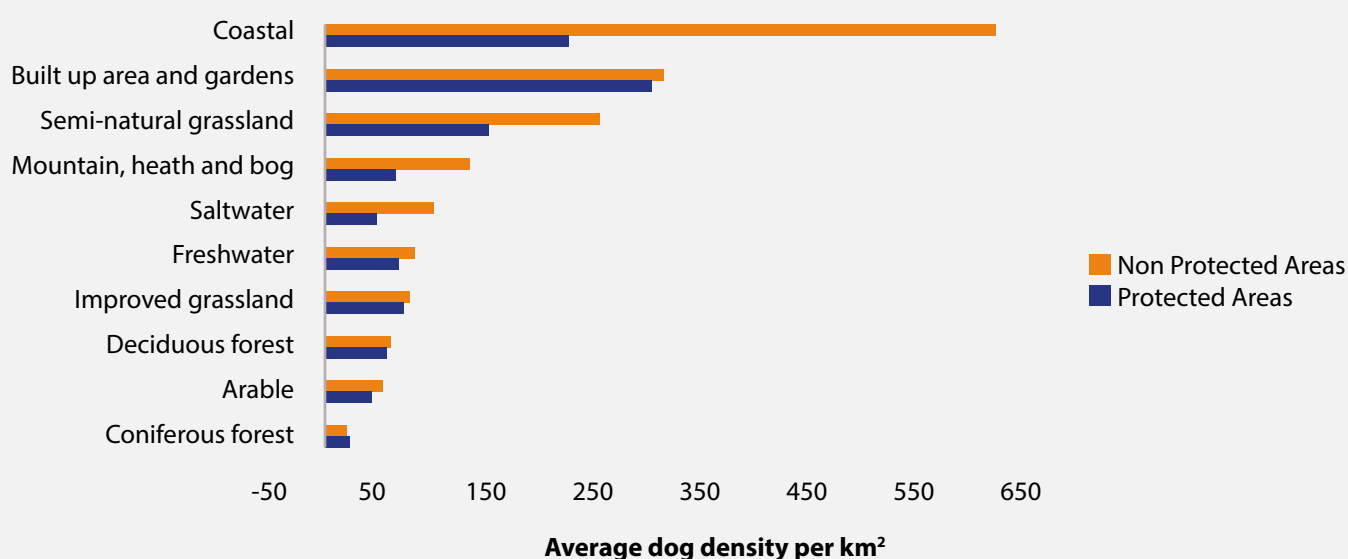


Figure 4 The average density of dogs (per km²) for five designations of protected area, by CEH Land Cover Map classes. The protected sites are Special Areas of Conservation, Sites of Special Scientific Interest, RAMSAR wetland sites, Important Bird Areas, and Special Protected Areas (table 2).

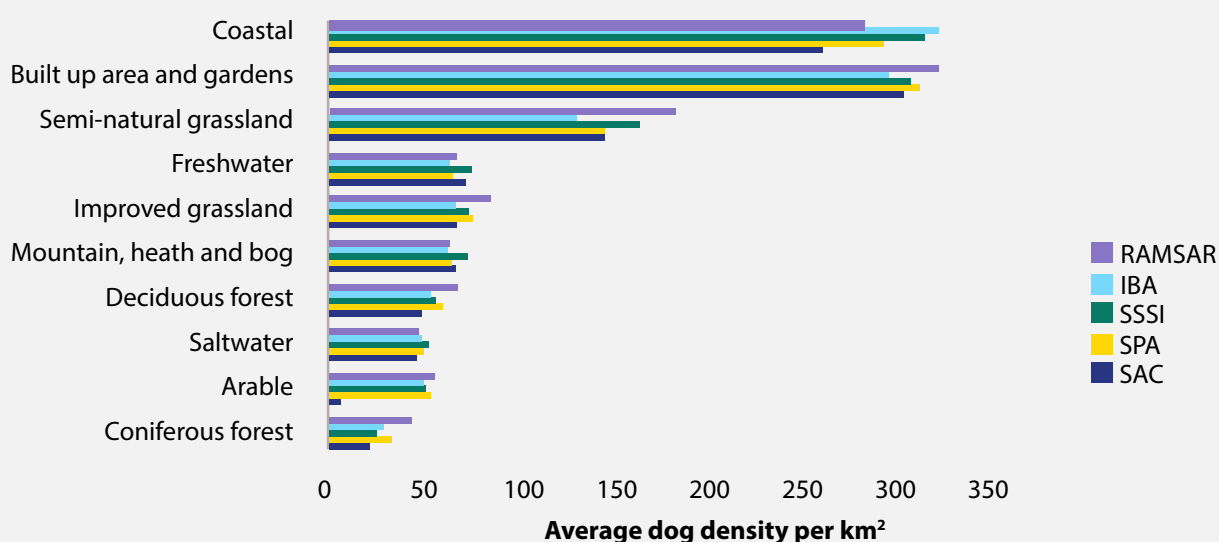
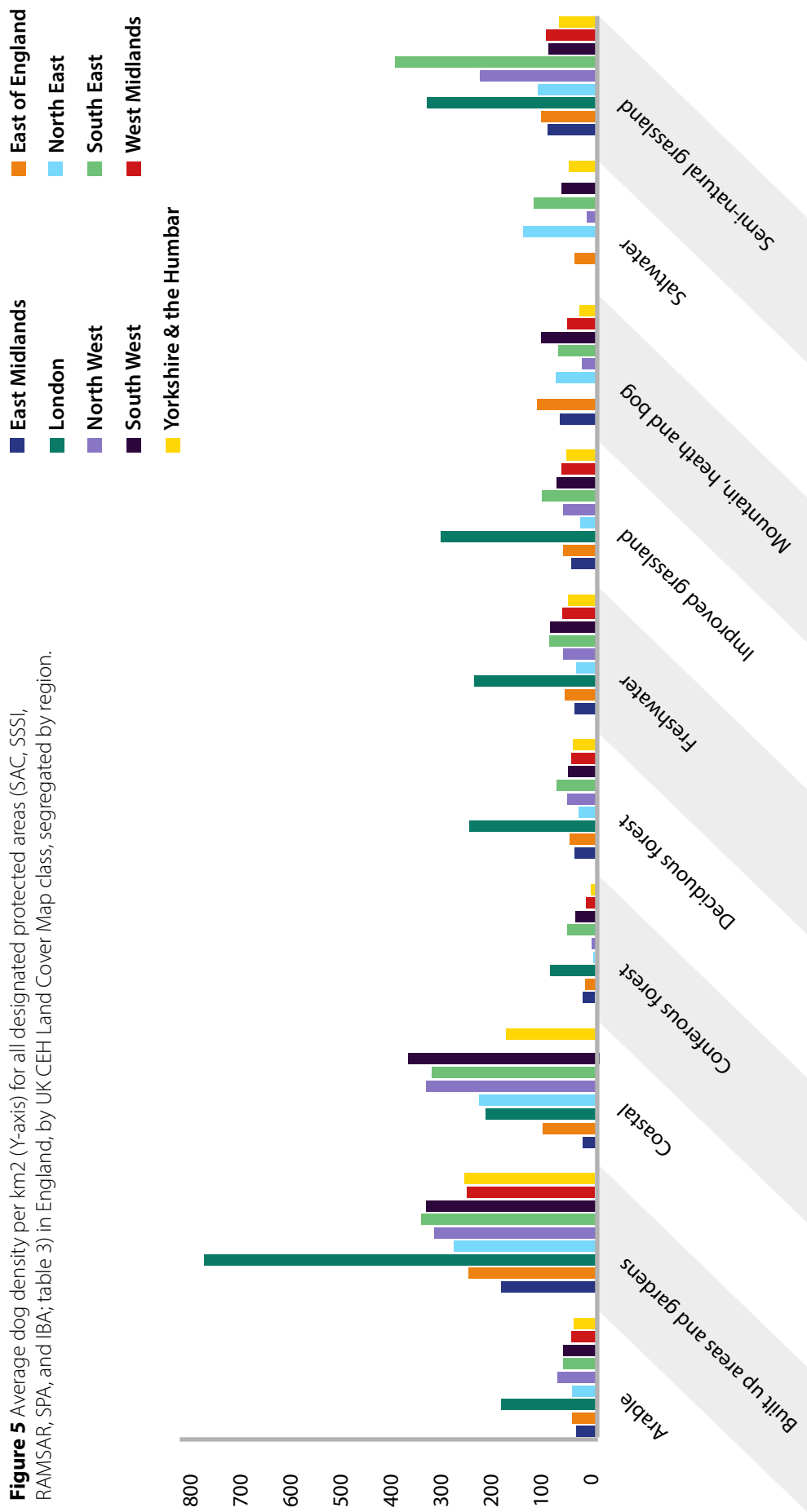


Figure 5 Average dog density per km² (Y-axis) for all designated protected areas (SAC, SSSI, RAMSAR, SPA, and IBA; table 3) in England, by UK CEH Land Cover Map class, segregated by region.





3.4 Insights from Natural England's People and Nature Survey

Natural England's People and Nature survey gathers evidence and trend data about people's access, understanding and enjoyment of nature, and how it contributes to wellbeing. The survey has run once a year from 2020 to 2024 (details on the methodology can be found [here](#)). We have drawn out information on dog ownership to support interpretation of the interactions between dog walking and the environment. The number of respondents to the survey questions varies (this is reported in the figures), and we cannot assume that every respondent who indicates they are a dog owner takes their dog with them when they visit greenspaces.

We highlight the following insights from the 2020-2024 survey data, for respondents who are dog owners:

- Most survey respondents visit urban green spaces and fields and farmland. In comparison to respondents without a dog, proportionately more dog owners visit fields and farmland, woodlands and forest, and nature/wildlife reserves (fig 6a).
- Significantly more people who owns dogs visit woodlands and forest, and fields and farmland, compared to people without dogs (fig 6a).
- 74% of dog owners cite walking as an activity on their visits to green spaces, and for 49% of respondents, walking is the main purpose of the visit. 24% of dog owners include wildlife watching as an activity on their visits, though this is only the main activity for 7% of dog owners (Fig 6b)
- The majority of dog owners (66%) visit green spaces for between 30 minutes and 2 hours (Fig 6c)
- 43% of dog owners travel less than a mile to access green space, whilst 46% of dog owners travel between 1 and 10 miles. 10% travel between 11 and 50 miles to visit green spaces (fig 6d)

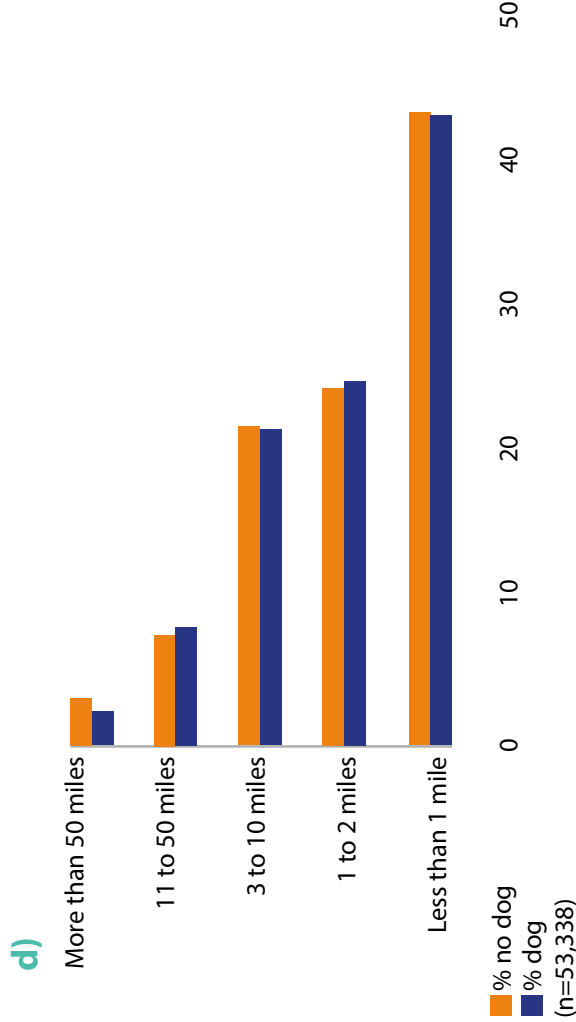
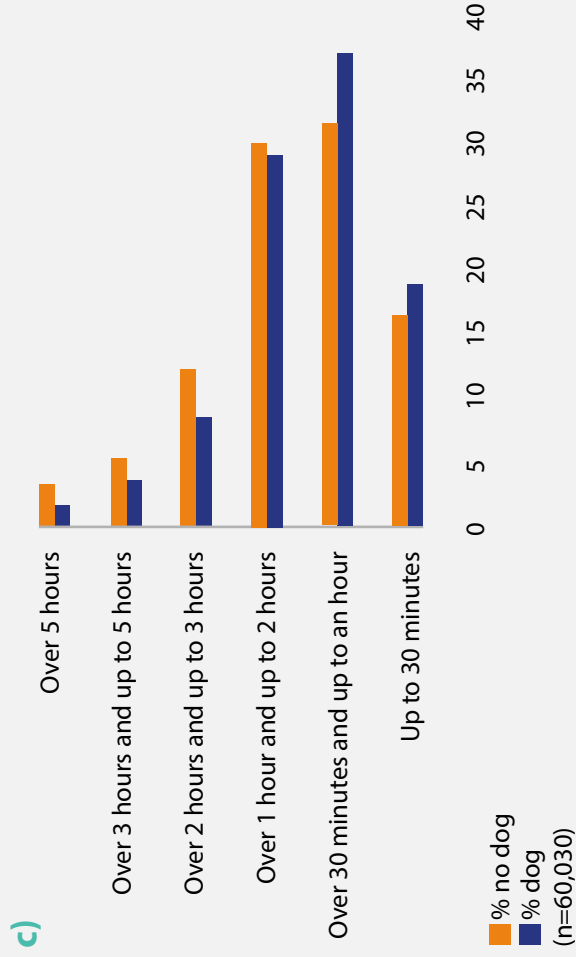
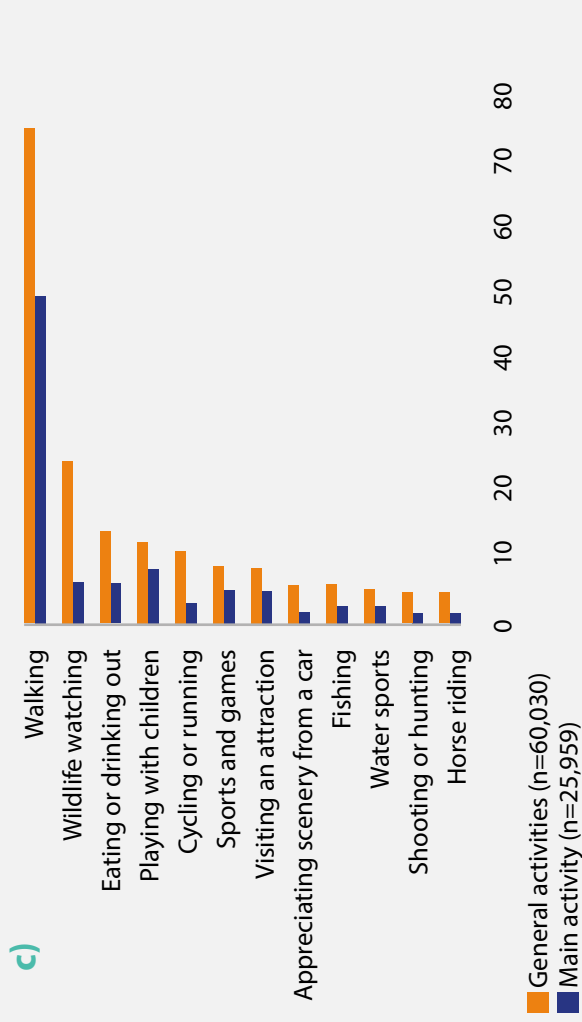
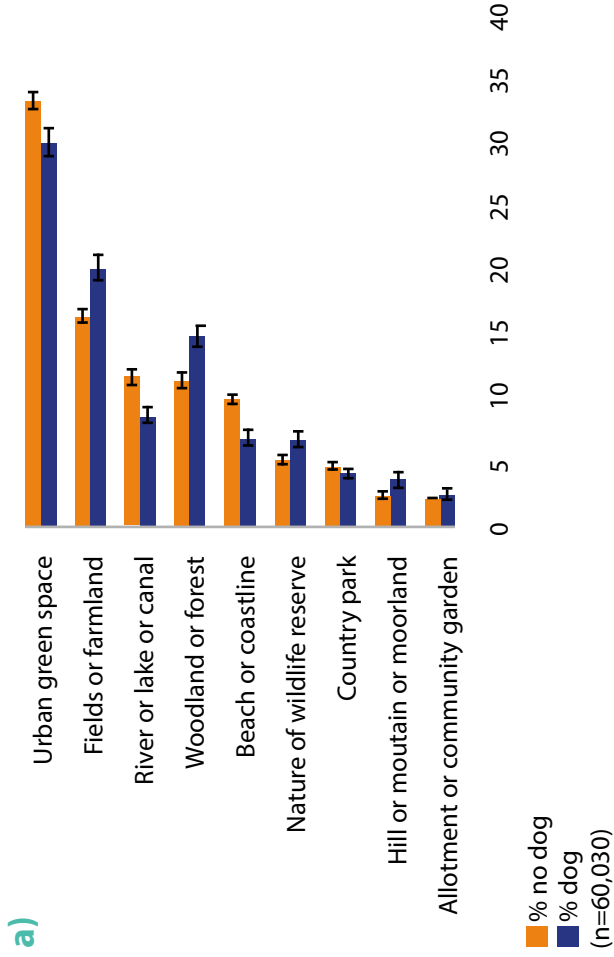


Figure 6 Data from Natural England's People and Nature survey, 2020–2024. a) Type of greenspace visited (n=60,030), with confidence intervals. b) General and main activities undertaken on a visit to greenspace (n=25,959). c) Duration of visits to greenspace (n=60,030). d) Distance travelled to visit greenspace/s (n=53,338).



3.5 Interpreting the data

There are some initial observations we can make from the data at a national level:

- Regardless of which protected area type is the focus (SSSI, SPA, SAC, RAMSAR, or IBA), the pattern of use of protected areas by dog walkers for different land classes is consistent.
- The highest dog densities are associated with built up areas and gardens around urban centres; this is important when considering, for example, the evidence associated with potential disease transmission in urban parks, and domestic sites as major sources of parasiticide contamination.
- London and the South East has higher average dog densities associated with open, arable and grassland protected sites. This is important when considering, for example, the impacts of dog walking on southerly distributed farmland birds of conservation concern, such as stone curlew.
- Protected coastal sites in the North West, South West, and South East have higher average densities of dogs compared to other regions; this is an important consideration for southern distributed shorebirds, waders, and migratory species that overwinter in England's main estuaries and estuarine habitats.
- The levels of use by dog walkers for protected sites may be underestimated from the mapping, as it doesn't account for people travelling to sites with their dogs. We see from the People and Nature survey that approximately 30% of respondents with dogs travel between 3 and 50 miles to visit greenspaces. The mapping provides a static appraisal, when in practice dog densities will fluctuate temporally and seasonally.
- Wildlife in the uplands may encounter dogs less frequently relative to wildlife in lowland areas and the coast, though species specific sensitivities will be important (e.g., waders such as curlew that feed on the coastline during the winter but raise young in the uplands over the spring/summer).
- Whilst we focus to some extent on protected areas, there is obviously wildlife outside of these, and habitats/sites that provide refuge and connectivity within the landscape but are not protected. It is important not to discount non-protected land when considering the impacts of dog walking. For example, the average density of dogs in non-protected coastal sites is significantly greater than for all other land classes, for both protected and non-protected sites, highlighting an acute pinch between the presence of people with dogs and wildlife in populated coastal areas.



Phase 2:

**Undertaking a holistic appraisal
of the issues in a setting**

4. Phase 2: Undertaking a holistic appraisal of the issues in a setting

Before making management site-based decisions, it's important to thoroughly evaluate the broader context and specific issues. This helps to understand impacts, interactions, identify what evidence is needed, and prioritize actions. To support this, we have trialled, and subsequently recommend, an adapted One Health framework.

4.1 Employing an adapted One Health framework

Mission stakeholders agreed that only promoting a nature conversation message has had mixed success in changing dog walker behaviour, and that it is important to consider wider social and other aspects. There are several approaches to mapping socio-ecological systems to understand coexistence issues in a given setting. For example, Doherty *et al.* (2017²) suggest that greater uptake by communities may be achieved by integrating human health and animal welfare objectives into dog walking management, rather than focusing solely on biodiversity conservation.

In our practitioner workshops we incorporated consideration of health and community resilience aspects using an adapted One Health framework (after Stephen *et al.*, 2023³; fig 7). This approach emphasizes the interconnectedness of human, animal, and environmental health. It promotes responsible dog walking practices that minimise negative impacts on wildlife and ecosystems while enhancing the physical and mental well-being of both dogs and their owners. This encourages collaboration among veterinarians, ecologists, and public health professionals to create guidelines that balance the benefits of dog walking with the need to protect biodiversity, aiming to promote health equity and resilience for communities of people, dogs, wildlife and habitats, across generations. shared with participants during the mission.



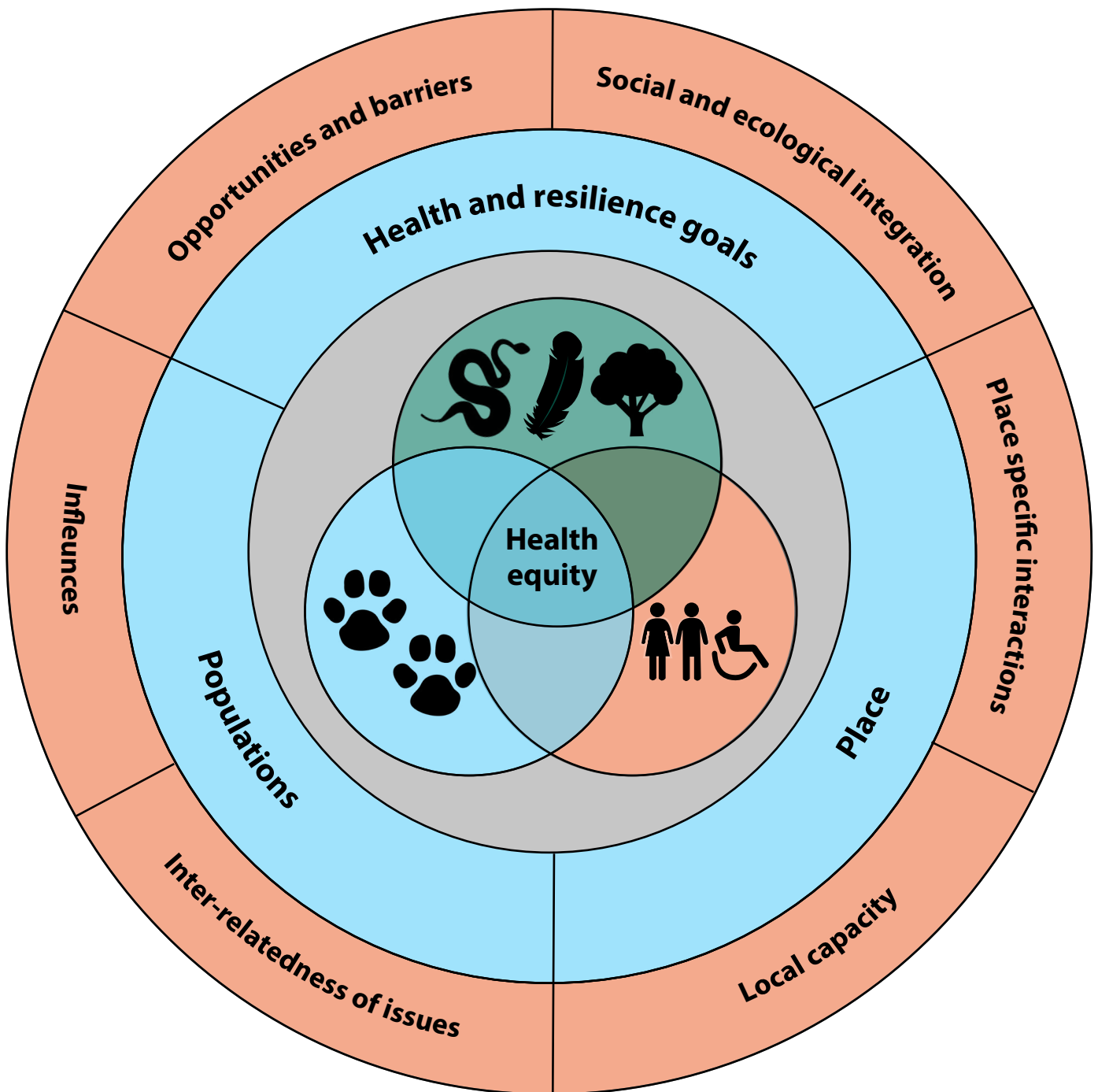


Figure 7 A One Health framework, adapted from Doherty *et al* (2017), to aid and facilitate the holistic appraisal of coexistence between people, dogs, wildlife and habitats, and to identify and target effective interventions to mitigate impacts and promote coexistence. The central premise of the framework is to ensure health equity across shared communities of people, dogs, and non-human entities, over generations.

4.2 Testing the approach

We tested the approach with practitioners during a participatory workshop, applying the One Health framework to three hypothetical scenarios which varied in complexity and scale: 1) a 50-hectare Nature Reserve, 2) a 1200-hectare Country Park, and 3) a 50,000-hectare National Park (fig 8). Participants were facilitated through the process using guiding questions (table 3), producing outputs that mapped their discussion and working through of the questions (fig 9 and table 4). The activity lasted 40 minutes and was not intended to be exhaustive, but to trial progression through the framework.

One Health focus		Guiding questions
Populations	Inter-relatedness of issues	What are the health and resilience issues for the populations in the setting, and how do they relate to each other?
	Influencers	Which are the key populations that influence the health and resilience issue/s in the setting?
Health & resilience goals	Social & ecological integration	What are the social and ecological goals for the populations in this setting?
	Barriers & opportunities	Where do the enablers and impediments for meeting these goals overlap between people, dogs, wildlife and habitats?
Places	Place specific considerations	What are the intersecting determinants of human, dog, and environmental health that are unique to this place?
	Local capacity	What is the local capacity for collective actions leading to improvements in community (human and non-human) health and resilience in this setting?

Table 3 Guiding questions for working through the different focusses of the adapted One Health approach used with participants in the Paws for Thought mission process; undertaking a holistic exploration and assessment of the health equity needs of different populations within a given setting.

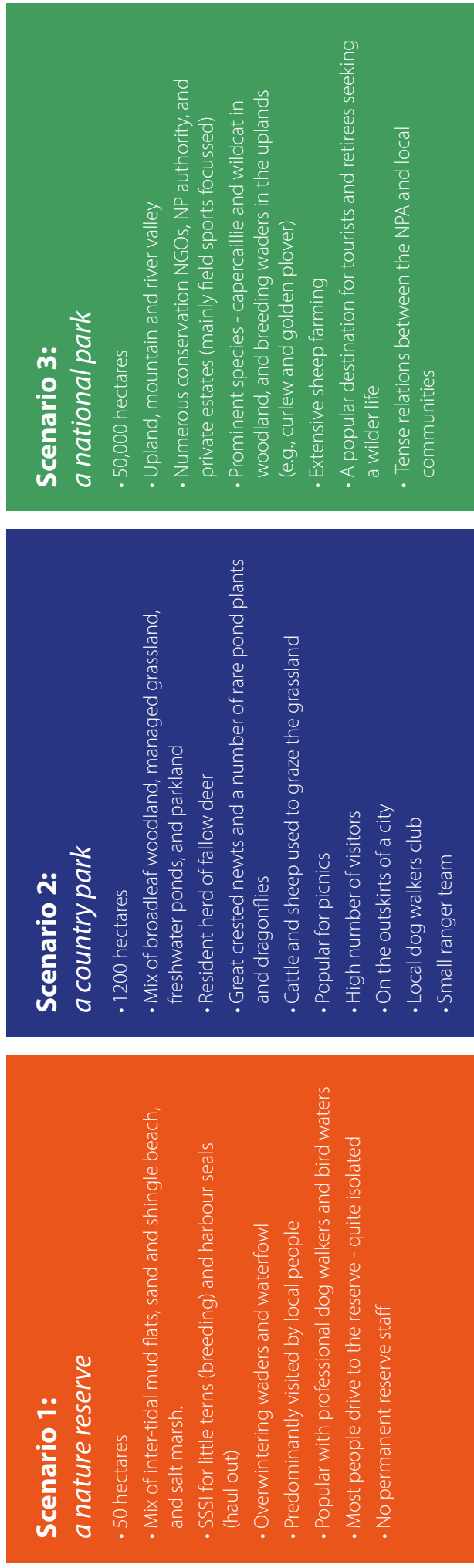


Figure 8 Three hypothetical scenarios used with participants in Workshops 1 of the Paws for Thought process. These scenarios were used to trial an adapted One Health approach towards supporting coexistence between people, dogs, wildlife and habitats; exploring the needs of different users, and where these needs intersect.

Scenario: Country Park (1200 hectares)

One Health focus		Guiding questions
Populations	Influencers	<ul style="list-style-type: none"> • Fallow deer, bat species, amphibians, freshwater invertebrates, livestock (sheep and cattle) • Ticks and parasites • Ancient trees with associated flora (e.g., rare lichens) • Invasive species • Dog walkers, commercial dog walkers, other recreationists, families and children
	Inter-relatedness of issues	<ul style="list-style-type: none"> • Access to greenspace for exercise and engagement with nature, and disturbance of wildlife • Conflicting interactions between different users (e.g., dog walkers and people avoidant of dogs) • Interactions between dog walkers, livestock, people and wildlife • Health, safety and disease risk interactions (parasite vectors, dog waste/parasiticide contamination, wildlife, livestock, water and people) • Woodland/ancient tree management with access/immersive experience and wildlife conservation (e.g., sensitive bat roosts and bird nesting sites) • Deer management (lethal control) and dog walking; interactions between deer, livestock, and people with dogs
Health & resilience goals	Social & ecological integration	<p>Social</p> <ul style="list-style-type: none"> • Free, easy access to safe greenspace (free parking, bins and waste disposal, café, toilets) • Provision of experiences; recreation, education, inspiration, culture, and history • Provision of clean air and water • Social groups and network spaces • Off-lead areas to exercise dogs • Secure spaces for dog training/anxious dogs • Secure spaces with no dogs <p>Ecological</p> <ul style="list-style-type: none"> • Protected species designations and obligations: bats, amphibians, freshwater invertebrates and rare pond habitats • Ancient trees and associated flora • Allowing space for spontaneous regeneration/self-regulation of biodiversity • Providing structurally complex habitats • Providing refuge spaces for wildlife, with connectivity between habitats

Scenario: Country Park (1200 hectares)

One Health focus		Guiding questions
Health & resilience goals	Barriers & opportunities	<p>Enablers</p> <ul style="list-style-type: none"> • Education and information provision; valuing of nature • Habitat management; intelligent route design • Zoning approach (off-lead, on-lead, restricted access); natural barriers, sacrificial areas, and signage • Regular and safe waste disposal • Community welfare narrative and messaging (wildlife, people, dogs and livestock) • Ranger team presence <p>Impediments</p> <ul style="list-style-type: none"> • Refuge space requirements for wildlife versus access to 'wild' spaces for people • Site location and popularity – limited capacity for restrictions, close to major urban centre • Maintaining connectivity across 'zones' of different usage • Diversity of users, and conflicts of use • The attractiveness of rare/important/sensitive features; ancient trees, ponds, cattle, deer etc. • Ticks in unmanaged vegetation; parasites generally • Opportunism of wildlife; utilising human sources of food. • Behavioural responses of wild animals and livestock to people and dogs; stress and fear-based reactions
	Place specific considerations	<ul style="list-style-type: none"> • The use of conservation grazers to maintain grassland habitats • Historical fallow deer herd, requiring management (culling) • Numerous ancient and veteran trees • Nationally and locally rare habitat; freshwater ponds • Close proximity to major urban centre; culturally and demographically diverse visitors, and range of recreational/social activities: EDI considerations • Multiple local dog walking groups • Significant, popular site for commercial dog walkers • Local resource for schools and community groups
Places	Local capacity	<ul style="list-style-type: none"> • Opportunities for local sense of ownership and agency within communities; guardianship, wardening, and conservation volunteering opportunities • Funded ranger team; education, outreach, engagement and patrols • Numerous local interest groups; great potential for collaborations and outreach • Potential for support/collaboration with local dog trainers/behaviourists • Funding and collaboration opportunities with community health programmes • Local canine business opportunities



4.3 Reflections on the One Health approach

The process worked well for the small and medium scale scenarios but was more challenging for the larger scenario, due to its scale and complexity (although some aspects from the other scenarios were nested within it). We present the key points that were identified and summarised for the County Park scenario in table 5, as an example output (produced by workshop participants in 40 minutes, with facilitation support).

Following the One Health framework enabled participants to:

- Identify the health and resilience needs of people, dogs, species and habitats in their focal scenario/setting
- Identify impacts, and consider how multiple impacts could interact
- Identify systemic and thematic issues that underly symptomatic problems
- Identify connections and overlapping priorities between different stakeholders. E.g., where funding, resources and expertise could be pooled, shared, or better co-ordinated.
- Identify opportunities for collaborations and co-benefits within and across communities
- Consider and balance trade-offs around intervention strategies, e.g., between access and conservation objectives
- Identify knowledge gaps and evidence needs

In combination the OH framework enables a 'systems map' to be developed which captures and balances the desired outcomes for the health and wellbeing of people and dogs alongside biodiversity conservation objectives. The delivery of these outcomes then needs to be planned in a spatially explicit manner to identify clear areas that require different approaches for management to be delivered. This should lead to more equitable outcomes and support action and communications, which has greater penetration and receptivity within the dog owning community.

Application of the framework could be approached in two ways following assessment of the evidence and the landscape context: 1) with a focal site already in mind, or 2) following identification of geographic areas or habitats with high levels of sensitivity or dog walking, and then identifying a particular site or collection of sites to focus on.

The framework has the advantage in that it is primarily site or place-focussed but can be scaled up. For example, an OH plan can be derived for a single site (e.g., a local nature reserve) but nest within an OH plan at the landscape or regional level, encompassing multiple sites. In this way, collaboration across land holdings under different ownership is encouraged and facilitated, creating more joined-up and coherent solutions. An OH approach also has the advantage of and potential to intersect with existing UK government OH focusses, e.g., [for vector-borne diseases](#) and sustainable food systems (UK Government's [One Food](#) programme).

Overall, the participants found the One Health paradigm useful but noted that to be most effective it requires adequate time for exploration, and ideally facilitation support. We strongly recommend the involvement of interdisciplinary expertise in this type of appraisal, to effectively identify and integrate social and ecological factors.

Phase 3:

Applying a standardised zoning approach



5. Phase 3: Applying a standardised zoning approach

5.1 The rationale for a standardised zoning approach

It was felt important by participants that a more standardised, national approach towards planning and implementing interventions be adopted. A consistent and coherent zoning approach supports this and provides clarity over how people are expected to manage their dog in a given zone. This would mean that regardless of where a dog walker finds themselves, they will understand what is required of them, and this will be consistent wherever they go.

A number of organisations and projects already employ zoning approaches. For example, Holkham Estate, following consultation with the local community, have reduced impacts to sensitive wildlife and habitats through a seasonal zoning plan using a traffic light system. Other organisations (e.g., Dorset Dogs) employ a traffic light pawprint system which was originally developed by Hampshire County Council. We advocate these zone criteria, and the use of the pawprint icons (Fig 10). We have adapted the amber zone criteria with a re-emphasis towards 'paws on paths' over 'dogs on lead' in response to mixed evidence of the efficacy of leashing to reduce disturbance^{4,5,6}, and from the recommendations of participants in the process. We do not exclude the option for a dogs on lead restriction in amber zones if felt necessary in some circumstances, e.g., around livestock, or when there is no alternative but close proximity between dog walkers and sensitive species or other users.

It is important to emphasize that zoning can, and arguably should be, temporally and seasonally responsive or flexible. For example, a beach might shift between green, amber or red depending on the time of day or season, in response to, for example, bird nesting or seal pupping seasons; the emergence of reptiles in the warmer hours of the day; or the presence of migratory birds in the winter. Responsive and well justified flexibility is likely to be better received and respected than blanket, unresponsive designations. It is also important to engage with communities around the planning and intended implementation of zoning, as this affects their access and experience – this will lead to more sustainable outcomes and was strongly advocated by process participants. Following Phase 2 (OH assessment), opportunities and priorities for engagement and consultation with relevant interest groups and communities will have ideally been identified.



Seasonal and temporal flexibility



Dogs welcome off lead: this means you can exercise freely off the lead. Please always keep your dog in sight and do not allow them to chase or disturb other visitors, wildlife or grazing animals. Please look after the area by picking up and binning your dog waste.



Welcome to dogs with 'paws on paths': You can walk your dog in this area but because of, for example, vulnerable wildlife on the ground or grazing animals, please keep to the paths. In some places, this might require putting your dog on a lead. Please look after the area by picking up and binning your dog waste.



Sorry, no dogs: Children's play areas, sport pitches, some parts of fields or fields/ sites with year-round grazing animals and their young, or very sensitive wildlife, are likely to fall into this category.

Figure 10 A traffic light pawprint system developed by Hampshire County Council, for supporting an easily interpretable zoning system. Zone designations can change temporally, e.g., at different times of the day, or seasonally, e.g., reptile emergence, bird and/or seal pupping seasons.



5.2 Zoning considerations
























Workshop participants felt it was important that net access for dog walkers is not reduced, given the currently limited options around public access in the landscape. Arguably, limited access underpins the overall issue – as people and protected areas/designated habitats are pinched together in a landscape dominated by private ownership (particularly in England, Wales and Northern Ireland – Scotland has a much greater degree of open access, provided people behave responsibly). The aim of zoning should therefore be demarcation of space and permitted activity, rather than reduction in opportunity (accepting that restrictions will be necessary where there are substantive and evidenced negative impacts for dogs, people or wildlife).

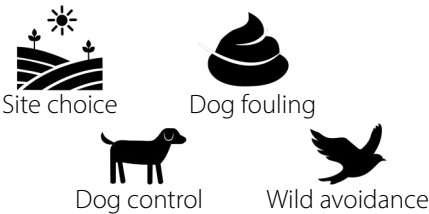

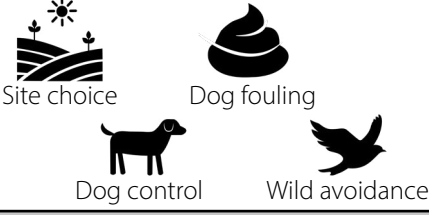

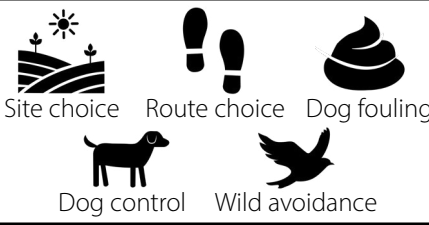

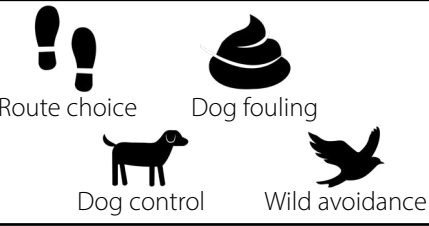

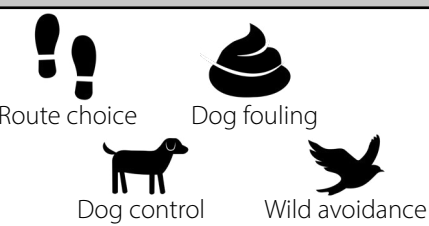

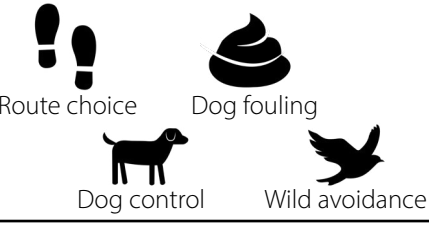

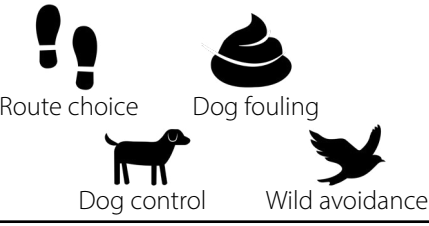

Where access to certain areas is either restricted (red and amber zones) or becomes contingent on paws on paths or dogs on leads (amber zone), opportunities to create green zones and Suitable Alternative Natural Greenspaces (SANGS) should be fully explored to encourage uptake. It is important that, if alternative sites for dog walking are identified and advocated, that these sites have a level of equivalence in terms of quality and ‘feel’ to more nature-rich sites with restrictions.

Zoning will require trade-offs between the interests of different users and populations; these trade-offs will have been identified and deliberated on in earlier phases of the appraisal (evidence, landscape context, and One Health phases). It is important that land managers understand local access legislation and rights, e.g., the Countryside and Rights of Way Act ([CROW, 2000](#)), to avoid implementing change of access that conflicts with the law and people’s rights.

The sections below highlight intervention methods that support a zoning approach. Firstly, we present a summary of the efficacy of different intervention types from a literature review produced for Natural England by the Behavioural Insights Team (table 5). For further explanation of the summarised information in the table, refer to their full report ([Baynham-Herd, Barker & Park, 2021²⁵](#)). We then expand on some of these headline intervention methods with evidence from the literature, and best-practice insights and recommendations from practitioners engaged during the mission process and workshops.

Table 5 Evidence summary, from a report for Natural England by the Behavioural Insights Team (Baynham-Herd, Barker & Park, 2021). The table was derived from a literature review by BIT of the different intervention types for key target behaviours, with references (refer to section 7, references), and an appraisal of the strength of evidence supporting the intervention types. During the participatory workshops, participants shared best practice insights and suggestions for the intervention types highlighted by asteriks.

Intervention type	Target behaviour	Evidence
Physical		
* Alternative space ^{7, 8, 9}	 Site choice	 Unknown
* Path & habitat manipulation ^{10, 11, 12, 13, 14, 15}	 Route choice	 Effective
* Affordance cues (e.g., site design, to subtly direct footfall) ^{16, 17}	 Route choice	 Effective
* Providing amenities ^{18, 19}	 Site choice	 Unknown
	 Route choice	
	 Dog fouling	
Cognitive		
* Education ^{20, 21, 22, 23, 24, 25}	 Site choice	 Mixed
	 Route choice	
	 Dog fouling	
	 Dog control	
	 Wild avoidance	
* Training ^{26, 27}	 Dog control	 Effective
	 Wild avoidance	
* Signage ^{28, 29, 30, 31, 32, 33, 34, 35, 36}	 Wild avoidance	 Promising
	 Dog fouling	
	 Route choice	

Intervention type	Target behaviour	Evidence
Incentives		
Financial (e.g., rewarding positive behaviours) ^{37, 38}	 <p>Site choice Dog fouling</p> <p>Dog control Wild avoidance</p>	 <p>Mixed</p>
* Non-financial (e.g., conferring social prestige, such as local 'champions') ^{39, 40, 41, 42}	 <p>Site choice Dog fouling</p> <p>Dog control Wild avoidance</p>	 <p>Promising</p>
Enforcement		
* Regulation ^{43, 44, 45, 46}	 <p>Site choice Route choice Dog fouling</p> <p>Dog control Wild avoidance</p>	 <p>Mixed</p>
* Patrols ^{47, 48, 49, 50, 51}	 <p>Route choice Dog fouling</p> <p>Dog control Wild avoidance</p>	 <p>Effective</p>
Enforcement		
* Social marketing/ social media ^{52, 53, 54, 55, 56, 57}	 <p>Route choice Dog fouling</p> <p>Dog control Wild avoidance</p>	 <p>Effective</p>
* Stakeholder engagement (e.g., participatory mapping, consultation etc) ^{58, 59, 60}	 <p>Route choice Dog fouling</p> <p>Dog control Wild avoidance</p>	 <p>Promising</p>
* Citizen science (involvement in monitoring, or implementing interventions) ^{61, 62, 63}	 <p>Route choice Dog fouling</p> <p>Dog control Wild avoidance</p>	 <p>Unknown</p>

5.3 Physical interventions: Alternative space, habitat & spatial management

Manipulating spatial use can be an effective way to manage interactions and should be the first suite of intervention measures considered. The principal way to manage space is through sensitive route design, which can be supported by various methods (Table 6). Well-designed access can mitigate impacts and manage interactions without the need to explicitly instruct dog walkers on what they can and cannot do, reducing the potential for reactivity.

It is important that if/when access is restricted to certain areas, efforts are made to avoid a net loss of opportunities for dog walkers. This might entail trade-offs between protected areas with restricted access and sacrificial areas, or the bespoke creation of dog friendly routes and sites that are equivalent in 'feel' to restricted areas.

Table 6 Physical intervention methods, and the applicable zone/s for those interventions

Method	Applicable Zone		
Create alternative sites , such as Suitable Alternative Natural Greenspaces (SANGs): Facilitate and encourage easy access by offering free parking and toilet facilities. Within these sites, provide safe, enclosed areas for training (such as practising recall) and for socialising dogs. Provide free dog poo bags and water stations/cleaning areas.			
Route design : Plan access and paths to avoid sensitive or restricted areas whilst providing an enjoyable, immersive experience for dogs and their handlers. You should aim to provide an experience that is equivalent in quality or 'feel' to the restricted area. Line of sight is an important consideration for making spaces feel safe.			
Sacrificial areas : This could be an area adjacent to a carpark to encourage defecation outside of sensitive sites, or smelly strips of vegetation along the edges of paths to incentivise dogs to stay on or directly adjacent to paths. It might also include splash ponds specifically for dogs (with easy access and maintained free of hazards).			
Natural and symbolic barriers : Discourage roaming from paths or accessing sensitive water bodies, e.g., using gorse, hedges, living fences (e.g., wicker), stone ⁶⁴ or wooden walls ⁶⁵ . For coastal sites, low wooden fences can be effective ^{66, 67}			
Zoning water bodies : In-water wicker barriers can be effective at demarcating zones in water, whilst still allowing the free movement of wildlife. Use of dog friendly zones can be incentivised by easy access (e.g., a beach), and maintained free of hazards (e.g., entanglements, debris etc).			
Scent cues : Incentivise dogs and their handlers to stay on paths, e.g., 'Sniffaris' or 'smelly signposts' (RSPB). This also enriches a dog's walk.			
Provide supportive infrastructure for dog-friendly routes, e.g., poo bins, site maps (with location of poo bins, walk timings etc), rest areas/benches and viewpoints.			
Create more refugia for wildlife			



5.4 Signage

Signage is one of the most widely used, cost effective methods employed to try and manage the behaviours of dog walkers⁶⁸ to communicate site specific conservation and land use priorities, and other considerations (e.g., presence of livestock). Land managers report a preference for using signage^{69, 70}, and signs have been demonstrated in some cases to be more effective than information on websites⁷¹. It was the general perception of workshop participants that good, effective signage already exists and there is no need to re-invent the wheel, but that there's a lack of consistency across land managing stakeholders around style, content, tone, and messaging. This creates confusion for dog walkers who would benefit from a more coherent approach.

Whilst it's perhaps ambitious to advocate that all land managing stakeholders across the UK adopt the same blueprint for signage (particularly as signs must reflect and adapt to local context and organisational branding etc), there are principles common to the signs employed by projects that are perceived to be demonstrating best practice that could, if adopted, create a level of consistency.

Recommendations around sign design and content have been synthesised from the input of workshop participants, some of whom represent projects and organisations perceived to employ signage most effectively (table 7). They represent points of general agreement, if not total consensus. Participants perceived that the most effective signs have been designed around understandings of human behaviour and psychology, which reflects the findings and recommendations from academic research^{72, 73, 74, 33, 76}. Not all the recommendations can be incorporated into a single sign, but various combinations of the recommendations can be integrated for different contexts and needs.

Table 7 A synthesis of participant input from the Paws for Thought mission and academic literature around recommendations for optimising signage.

Design and tone	Content
<ul style="list-style-type: none"> • Tone: Workshop participants felt that dog walkers often feel unfairly targeted and penalised. The framing, tone and language of signs should be positive, affirmatory, and communicate gratitude for compliance. • Directive framing: Whilst the tone should be positive, re-search suggests that for a specific ask, a negative framing can be more effective than a positive one³¹ (e.g., “Please don’t go off the established path” as opposed to “Please stay on the established path”). • Eye catching: People become ‘sign blind’ if signs are not eye catching, easy to process, and don’t reflect changing circumstances – so ensure signs are attractive and engaging. Larger signs, and those placed near to where you want to influence behaviour, are more effective³⁴ • Short: Signs should use short messages and employ eye catching imagery; dog related images are perceived to be most engaging. • Informative: Where possible signage should be informative and explanatory. • Images: Images of people doing the right thing (e.g., walk-ing their dog on a lead) are effective. 	<ul style="list-style-type: none"> • Signs must be relevant; keep them updated, dynamic, and timely, and make sure to remove them if/when they are no longer relevant (e.g., the end of the breeding season for birds). • Provide clear information on the times and dates/seasons when restrictions apply, also mak-ing it clear when they do not, or when restrictions end. • Clear alternatives: If communicating restricted access, then make sure to highlight suitable, accessible, and ideally equivalent alternative walks – make it easy for people to choose an al-ternative. • Code of conduct: On entry to a site (e.g., in the carpark), highlight a general, easily memora-ble dog walking code of conduct. • If a sign is highlighting a health and safety risk (‘keep your dog safe’), be careful not to exag-gerate or villainise (e.g., highlighting the risk of an adder bite). • Relatable information: If a sign is recommending sensitivity towards a protected species or habitat, or highlighting restricted access, include information about the species/habitat be-ing helped and ensure the information is relatable (e.g., “waders need to rest and recover after such long journeys”) • Consider personal connection, detailing the impact and including and a personalised ask (e.g., ‘Farmer X keeps ewes with their lambs here, and requests...’). • Attributes: Research suggests that the addition of an attribute, such as “you and your dog’s presence frighten the sheep”, can be more effective than just an instruction³² • For some signs, consider design by children (and combine with a personalised ask from the children). • Poo bin locations: Consider providing information on the location of poo bins, such as ‘how far is the next bin?’, and in conjunction with ‘how long will this walk take you?’. • QR codes: There’s only so much that can go on one sign, particularly if the emphasis is on short messages and eye-catching imagery - include QR codes to further information (e.g., al-ternative dog friendly walking routes).



5.5 Cognitive interventions: Information, education and training

5.5.1 Information and education

With participants from the conservation, canine, and access sectors, we explored the perceived levels of awareness of dog owners towards the impacts highlighted by the evidence review. Generally, participants perceived awareness to be low for most of the impacts (for more details on this, refer to the mission process report, section 4.2). However, they felt that the issues were not too complex to understand if communicated effectively and that dog owners were generally receptive to information that supports responsible behaviour, if framed in an empowering way, rather than hectoring or vilifying dog walkers. There is considerable potential to work with stakeholders and representatives within the canine sector to co-design communications and increase the reach and penetration of messaging. Our Good Walk for All infographic is an example of how impacts could be communicated to dog owners, in conjunction with some simple measures to mitigate them. This is freely available or use.

Framing impacts as coexistence issues, with ramifications for collective wellbeing and community resilience (e.g., around disease transmission, freshwater contamination, and biodiversity loss), might have more traction than a purely conservation message.



5.5.2 Social media

Signs are most effective when they act as nudges. Ideally, dog walkers should have an awareness of local sensitivities, and general responsible dog walking considerations before they arrive at their walk. Workshop participants made some recommendations around communication strategies to try and achieve this. They felt that managers could make better use of technology when communicating with dog walking communities. It was perceived that social media platforms can be useful, and can:

- Provide a channel for information exchange between managers and communities
- Provide and publicise links to resources
- Create peer groups, and a sense of community and allyship
- Leverage social norms, celebrating responsible dog walking behaviour whilst highlighting undesirable behaviour (such as poo bags hung in trees)
- Empower members to share their experiences in their own voice (acting as voluntary advocates or local 'champions')

Clearly there are also sensitivities about engaging through social media. Discourses can easily become polarised, creating 'us versus them' dynamics, or the targeting of individual people rather than undesirable behaviours. Also, while fostering a sense of peer group can be advantageous in establishing collective norms, it can potentially be exclusionary of marginalised groups and people who do not engage via social media. Managers must be careful to navigate these challenges and develop a suite of methods for engaging diverse people and communities.

During the workshops participants commented on the increased role of social media influencers, particularly on Instagram and Tik Tok. Participants perceived that influencers can be problematic when they broadcast irresponsible behaviour, but have substantial reach. Working with influencers or publicly recognisable figures on messaging around responsible dog walking could be effective at scale. For example, campaigns for improving the quality school meals by Jamie Oliver, and for stopping the discard of by-catch from fishing, by Hugh Fearnley-Whittingstall, successfully captured public attention, raised awareness, and led to change.



5.5.3 Phone apps for dog walkers

Another option that participants felt had potential was a phone app for dog walkers; this could be particularly effective in supporting a standardised zoning approach. An app has the advantage of being accessible on the go (if a person has their phone and signal), enabling access to online resources and guidance for local walking routes or when exploring a new area. An app for dog walkers could include:

- Information on zone designations (the traffic light system, with pawprint icons)
- An interactive map/s with walking routes, and information associated with those routes (e.g., demarcation of zones, specific wildlife considerations, parking availability, toilet locations, dog friendly facilities etc).
- Live updates on seasonal considerations (e.g., nesting birds and reptile emergence) and land management operations that will affect walks (e.g., grazing or tree felling operations).
- Links to educational resources (e.g., the [Wild Seas Wales](#) animations, or guidance on the environmentally friendly use of [spot-on flea treatments](#)).
- Dog friendly businesses
- Accredited dog service providers
- Dog training information and links (e.g., puppy classes, recall training etc).
- The ability to link up with other dog walkers to form social groups (for dogs and for people)
- Interactive games and fun content

Apps can be expensive to develop and require time and resources to maintain and update, which might be prohibitive for small organisations and projects. Rather than develop an app from scratch, there are existing interactive maps aimed at dog walkers which could serve as transferable models, such as those produced by [Driving with Dogs](#) (national) and [Dorset Dogs](#) (regional). In terms of creating consistency and setting coherent standards, apps could link in with national mapping tools such as Ordnance Survey or the [Slow Ways](#) national network of walking routes.



5.5.4 Training

Training can be an effective way to encourage responsible, nature friendly dog walking behaviours. Several project-level representatives at the workshops employ dog behaviourists and trainers to work directly with dog walking communities. Training opportunities are made available through drop-in sessions, video recordings and guidance on websites or over social media, organised events, and/or through pop up presence at busy sites. An important consideration here, is that those involved in engagement should, ideally, be dog owners and be accompanied by their dogs when engaging with people.

There is significant potential to engage with the professional dog walking community to advocate responsible, environmentally friendly dog walking practices. Currently, the potential impacts on wildlife and the environment are little appreciated by the professional dog walking community. Resources could be shared with training providers and educators and incorporated into accreditation schemes and training. During the workshops, there was appetite from education providers in the canine sector for information and content that could be incorporated into training materials for dog behaviourists and canine professionals. There is opportunity for something akin to 'nature champions', which could prove an incentive for professional dog walkers in terms of brand recognition and credibility.

5.6 Enforcement

5.6.1 Regulation

Regulation and licensing emerged as an intervention approach, mainly in relation to commercial dog walkers and trainers, but also for dog owners. This was the most divisive topic discussed, with some organisations feeling that some form of licensing was necessary and would deliver benefits, whilst others felt that licensing was either not feasible, unequitable, or not desirable (or all three), and that initiatives focussing on positively reinforced behavioural change were achieving success without enforcement. It was felt that this aspect needs further attention. We convened a specific focus group to gather and share stakeholder's views, synthesising the pros/opportunities and cons/challenges. This synthesis is presented in the main report.

Regulation through registration schemes was perceived by some participants as being more feasible than licensing. Some projects have established charters for professional dog walkers, which promotes best practice (e.g., New Forest National Park Authority: Professional Dog Walkers' Charter – New Forest National Park Authority). In signing up to, and adhering to a charter, professional dog walkers receive accreditation which infers integrity to their brand, the idea being that this provides a competitive advantage over other dog business providers who are not signed up to the charter (and leverages those who are not signed up, to sign up).

5.6.2 Wardens

The presence of wardens was perceived to be effective in achieving compliance with zone requirements, on the assumption that dog walkers being more likely to behave responsibly if they feel they are being observed. For some organisation staff, this role is part of their broader ranger/warden duties, whilst other organisations and projects have staff specifically focussing on coexistence between dog walkers, other users, and wildlife and the environment. Practitioners highlighted that whilst the primary role of wardens is to promote and encourage compliance, this should be incorporated into a broader role involving education and outreach, stakeholder and community engagement, and field monitoring. If perceived solely as an enforcement role, the presence of wardens could be felt by dog walkers as antagonistic and/or an exclusive show of power.

Stakeholders highlighted the expense of employing and deploying staff. However, if wardens are effective, and have a broader remit than simply enforcement, then this option is arguably an effective use of resources, particularly in sensitive areas with high levels of use.

5.6.3 Public Space Protection Orders and Community Protection Notices

Public Spaces Protection Orders (PSPOs) are legal orders implemented by Local Authorities that restrict how people can use public spaces to prevent anti-social behaviour. These have been applied in cases of conflict in public spaces between dog walking/dog presence and the wider community, e.g., consistent issues with dog waste on playing fields or public parks. Workshop participants highlighted that PSPOs are theoretically only used when there is a community health and safety prerogative, not for environmental impact, and they can have the adverse effect of displacing dog walking activity to other, sometimes more environmentally sensitive sites.

Community protection notices (CPNs) are designed to stop a person aged 16 or over, business, or organisation, committing antisocial behaviour which spoils the community's quality of life, and can be used in cases of irresponsible dog ownership. Some workshop participants felt that this targeted tool was more proportionate than a blanket PSPO, which can unfairly prohibit responsible dog owners. In both cases, these tools are designed for public spaces and are less relevant for environmental impacts (currently), and are arguably a last resort when other interventions have failed.



Closing

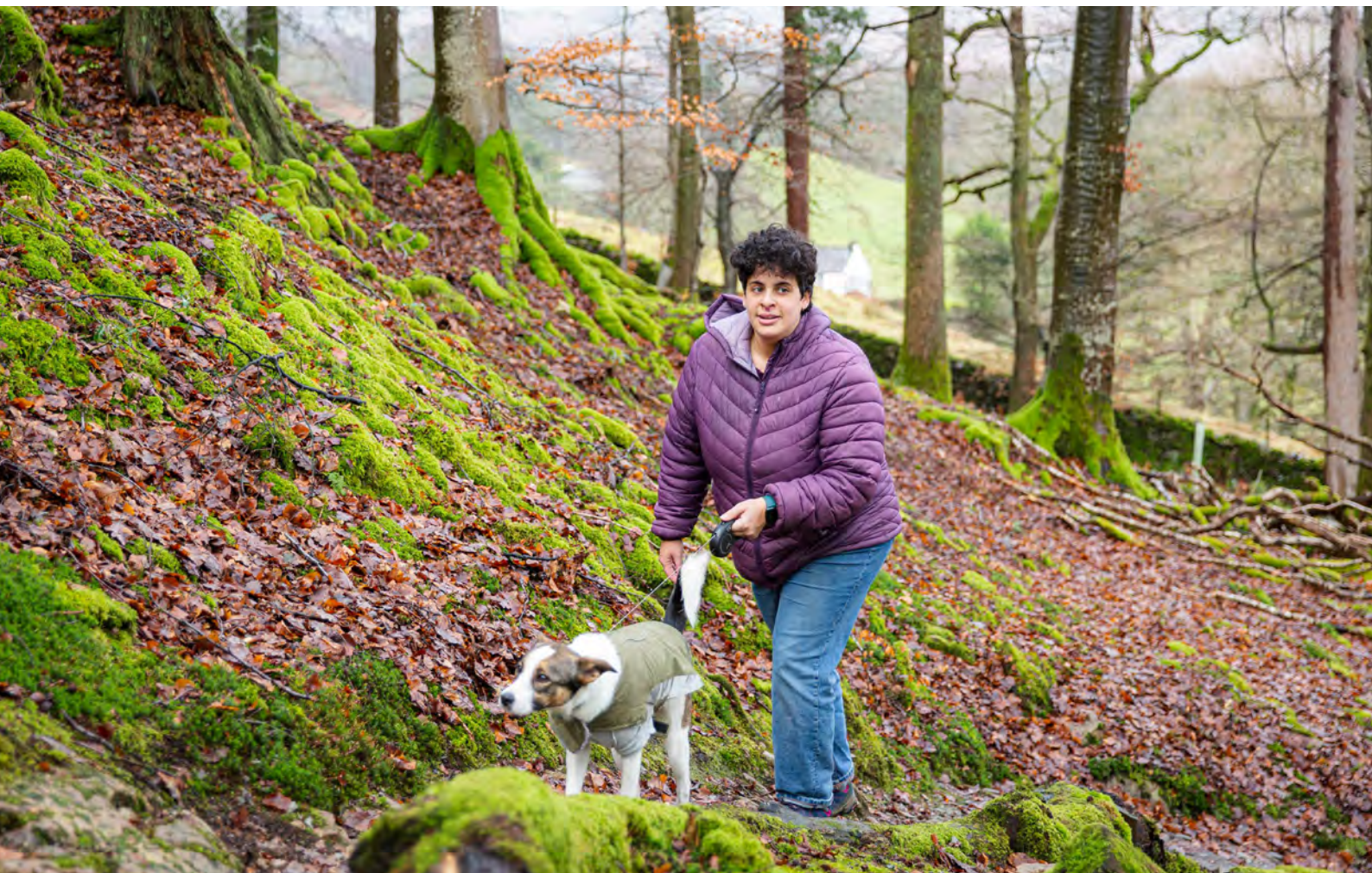
Remarks

6. Closing Remarks

Based on our evidence review and the mapping of the dog density intersects with protected habitats, negative impacts on the environment are likely from dog walking activity, and the scale of dog ownership means that these are likely to be widespread throughout the UK, though varying in extent and severity. While there are knowledge gaps around some aspects, of this issue, there is good evidence for (what practitioners perceive to be) the most important impacts for biodiversity conservation, on which decisions for implementing interventions and managing interactions can be based.

We emphasise that whilst we have highlighted impacts that will predominantly be interpreted as being negative, it is important not to vilify dogs and their guardians, nor overlook the importance of dogs for people's health and wellbeing. Our One Health framework approach emphasises a holistic appraisal of issues in a setting, which includes identification of positive behaviours and dog-owner-wildlife benefits, with the central emphasis being to achieve health equity rather than purely ecological, conservation objectives. The impacts of dog walking on the environment cannot be treated in isolation of wider socio-economic and cultural factors, or interventions are unlikely to be fair or sustainable.

A common and standardised national approach to zoning is desirable and has widespread support. We have highlighted that there are a range of available measures to support zoning which are being successfully applied by the leading innovators in this field. Interventions need to be deployed in concert, and sensitively, with community engagement and support, to have the most impact and buy in. We hope that by following the three-phase approach outlined in this guidance, managers and other stakeholders will be able to collaboratively design strategies underpinned by evidence and best practice, to promote a more equitable coexistence between people, dogs, wildlife and the environment.





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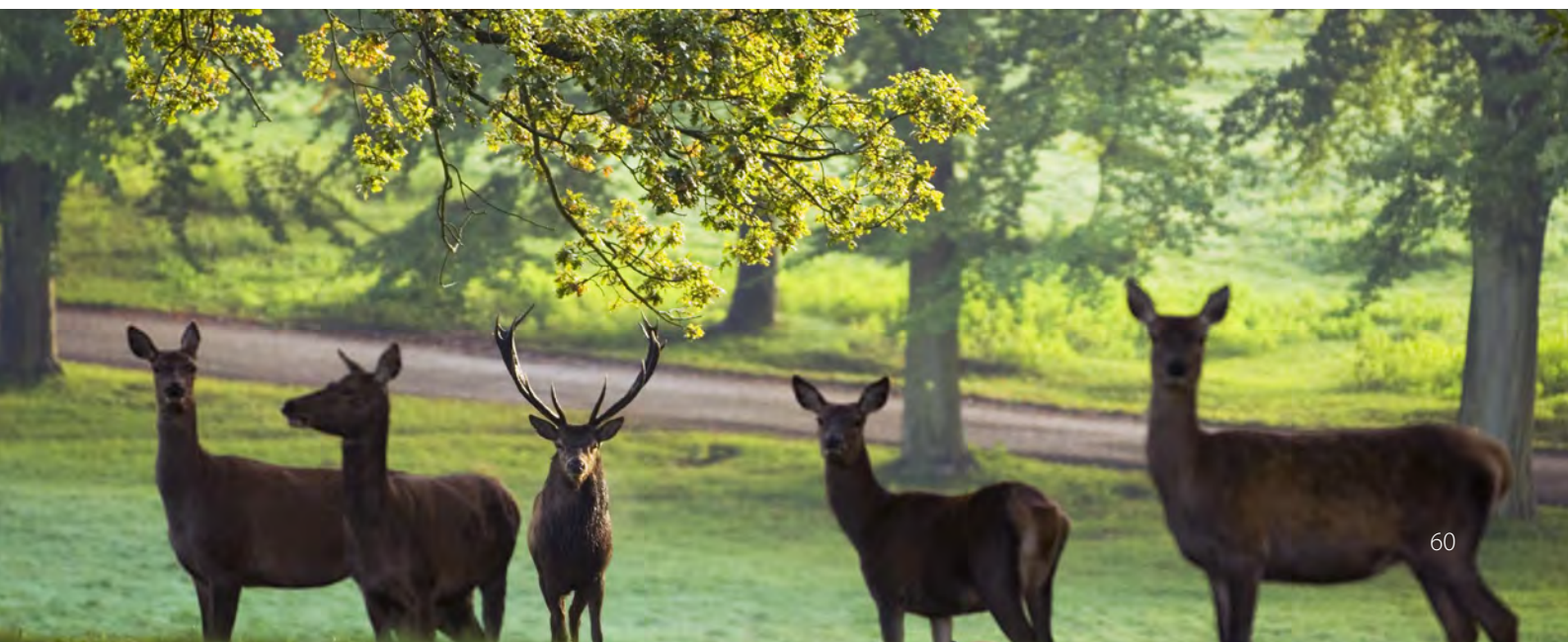


Appendices

8. Appendices

8.1 Appendix I: Stakeholders engaged in the Paws for Thought mission

Paws for Thought: process contributors	
Sector	Organisation
Statutory	Natural England, NatureScot, Natural Resources Wales, Forestry England, All-Party Parliamentary Dog Advisory Welfare Group
Conservation	National Trust, The Wildlife Trust, Freshwater Habitats Trust, RSPB, British Trust for Ornithology, National Trust Scotland, Woodland Trust, Mammal Society, The Froglife Trust, New Forest National Park Authority, Youth4Nature, Zoological Society London
Academic	RENEW
Access and Recreation	Right to Roam, Nature Towns and Cities
Land Managers and Estates	Duchy of Cornwall, Holkham Estate
Animal Welfare and Canine Sector	RSPCA, Feline and Canine Sector Working Group, Dogs Trust, Registration Council for Dog Training Instructors, Stephen Jenkinson (Independent consultant & Kennel Club)
Regional Initiatives	Dorset Dogs, Bird Aware Solent, Birds & Recreation Initiative Poole Harbour, Thames Basin Heath Partnership, Pembrokeshire Coastal Forum, Cairngorms Capercaillie Project
Private Sector	Footprint Ecology, British College for Canine Studies, Driving with Dogs, Love Your Paws



8.2 Appendix II: ArcGIS mapping, dog densities and protected areas in England, UK.

The following points provide a more detailed summary of how dog density data in and around protected areas for England was produced.

- Dog density CSV joined to Ordnance Survey kilometre squared UK shapefile using common attribute of grid square reference.
- Grid squares containing no data deleted.
- Integer value added to the attribute table as alternative reporting method to the floating-point data.
- Using the National Trust regions of the north, the midlands and the east of England, the southwest and London & SE, grid squares for England only were extracted.
- Protected area shapefiles added and buffered by 1.5 kilometres maintaining both core and buffer separately for identification. The specific protected areas used for this study are RAMSAR, IBA, SSSI, SPA and SAC.
- Amalgamated protected area shapefiles including buffer areas used to clip grid square data to reduce file size. Remainder used to signify and report on areas with no protected areas.
- ArcGIS pro identity tool Iteratively used to split distinct areas for each of the five protected areas with attribute data for protected area type and protected area name added to each table.
- The five separate protected area tables merged into one dog density and protected area in England data set.
- New attribute for land cover added to the table. Using land cover data from UKCEH, GIS identity tool performed with dog density data to distinguish distinct land cover areas; land cover attribute added to the table.
- Broad habitat attributes calculated using coastal and transitional data from the WFD followed by RSPB upland areas using an overlay technique with the remainder being assigned as lowland areas.
- Similarly to the above National Trust regions assign to the data table using National Trust regional data set.
- The resulting data set contains approximately 1.2 million records but contains overlapping parcels due to the nature of overlapping protected areas. It was decided to present the data in this manner for simplicity and for ease of reporting. After data set was complete an area attribute (hectares) was added to the table and measured in British National Grid projection to allow accurate reporting in arc GIS online where datasets are prepared into a WGS projection and thus losing shape and length accuracy.
- Similar process followed for areas overlapping no protected areas identified and recording land cover data.



Datasets

- **Dogs per square kilometre**
<https://ckan.publishing.service.gov.uk/dataset/dogs-per-square-kilometre>
- **Land Cover Map 2020 (land parcels, GB)**
<https://catalogue.ceh.ac.uk/documents/0e99d57e-1757-451f-ac9d-92fd1256f02a>
- **Ordnance Survey 1km2 Grid**
https://github.com/charlesroper/OSGB_Grids/tree/master/GeoJSON
- **Protected areas**
<https://naturalengland-defra.opendata.arcgis.com/>
- **National Trust Region**
Internal Data (not publicly available)
- **RSPB Upland Areas UK**
<https://opendata-rspb.opendata.arcgis.com/maps/RSPB::uplands-uk-wfs/about>
- **WFD Transitional and Coastal Water Bodies Cycle 2**
<https://www.data.gov.uk/dataset/0f6c2aee-3f8e-476c-93df-e629881bd985/wfd-transitional-and-coastal-water-bodies-cycle-2-classification-2019>



ExCASES Mission

Paws for Thought

Adopting a standardised, holistic approach towards managing the impacts of dog walking on the environment in the UK

ExCASES is a 'solutions generator' designed to tackle issues facing biodiversity renewal that are not covered by RENEW's four core themes. It provides an agile, flexible mechanism to work collaboratively with partners, researchers, and organisations from diverse sectors on focused topics. This cross-cutting theme is run by an interdisciplinary team of researchers based at the National Trust and the University of Exeter.

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