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On target for sustainable deer management?

An independent briefing paper on the role of the revised Code of Practice on Deer Management in supporting the delivery of the nature restoration provisions of the Natural Environment (Scotland) Act 2026

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Scottish Environment LINK Deer Group**



Scottish Environment LINK the voice for Scotland's environment



Registered office: 13 Marshall Place, Perth, PH2 8AH. A Scottish Charity No. SC000296.

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Acknowledgements

This report was commissioned by the Scottish Environment LINK Deer Group and produced by Dr Jessica Lynch Boucher, JLB Consulting with graphic and editorial contributions from Katherine Taylor. The work took place between March-August 2026.

The author acknowledges the considerable input and support received from Scottish Environment LINK Deer Group members: Duncan Orr-Ewing, Alan McDonnell, Bruce Wilson, Charles Dundas, Nora Casey, Thomas Widrow, Dan Watson, and Mike Daniels. The author also appreciates the generous contribution of time and input from 13 Scotland based interviewees. Additional contributions from the seven experts from the author's international systems thinking and conservation practice network are also greatly appreciated.

The author notes that AI-assisted tools were used to help to support early-stage analysis and sense-making. These tools were used to help surface patterns, themes, and areas of resonance or tension across complex topics. They did not replace human listening, judgment, interpretation, or relationship-based work. All synthesis and framing were carried out by the author with care to accurately reflect the substance, range, and nuance of the input received. Scottish Environment LINK's AI Policy was carefully adhered to. Responsibility for confidentiality, judgment, and care remains fully with the consultant.

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Technical Summary

This briefing paper utilises a systems thinking approach to analyse the revision of the Code of Practice on Deer Management (the ‘Deer Code’) in the context of the Natural Environment (Scotland) Act 2026. The analysis identifies the Deer Code as a critical leverage point within a complex policy ‘ecosystem’, serving as the operational link between primary and secondary legislation and practical implementation.

Methodologically, the study employed a literature review, systems thinking analysis, and interviews with over 20 primary and secondary end-users. It identifies 14 recommendations to inform the revision of the Deer Code. The briefing paper also introduces systems thinking tools such as: the Iceberg Model, causal loop diagrams, system archetypes, and leverage points, to highlight how underlying patterns, structures, and mental models contribute to persistent over population of deer in Scotland despite decades of voluntary efforts.

A central recommendation is the operationalisation of the 6ZB grounds for intervention (nature restoration). The paper argues for a more transparent escalation ladder, moving from involvement (advice) to intervention (Section 7 agreements) and finally regulation (Section 8 Control Schemes or Section 10 Emergency Measures), supported by clearly defined and communicated criteria and thresholds. Furthermore, the paper advocates for an outcome focused approach, utilising Herbivore Impact Assessments (HIA) to provide empirical evidence for regulatory triggers. By codifying ‘must, should, and recommended’ actions and establishing formal revision cycles, the revised Deer Code can mitigate systemic delays and align local management with national targets for woodland expansion and carbon dioxide sequestration.

1. Introduction

This work was commissioned by the Scottish Environment LINK Deer Group. The purpose was to provide timely input to NatureScot to inform the revision of the statutory Code of Practice on Deer Management (hereafter referred to as the ‘Deer Code’). Our ambition is that the revision of the Deer Code will enable it to provide further clarity and guidance towards our collective targets and the activities needed to reach them. The work was informed by a literature review, systems thinking analysis, and unstructured interviews with over 20 primary and secondary end-users¹ of the Deer Code.

The Deer Code interprets and translates a complex ‘ecosystem’ of: (i) strategies, plans, visions, frameworks, and programmes; (ii) primary legislation (Acts); and (iii) secondary legislation (orders, rules, and regulations). It also signposts end-users to Wild Deer Best Practice Guidance and Statutory Guides, helping to clarify and define the ‘rules of the game’ and inform practical action towards sustainable deer management.

The Deer Code is also used to guide when NatureScot can and will trigger the use of its statutory powers, which include: (i) involvement (for example: advice and assistance); (ii) intervention (for example: Section 7 Control Agreement), and/or (iii) regulation (for example: Section 8 Control Scheme or Section 10 Emergency Measures).

The purpose of this briefing paper is to examine how the revision of the Deer Code can ensure that it supports clarity on, and delivery of, the nature restoration provisions in the Natural Environment (Scotland) Act 2026.

¹ Primary and secondary end-users are defined and categorised in **Section 4** below.

2. Systems Thinking Approach

This briefing paper uses a systems thinking lens to look at the context, role, and revision of the Deer Code. An initial high-level systems thinking analysis of sustainable deer management in Scotland was undertaken ([Appendix A](#)) to help inform this work. This exploratory analysis was intended as a starting point to demonstrate how a systems thinking approach could support the Deer Code revisions by identifying feedback loops, system archetypes, and potential leverage points. This is not intended to represent a comprehensive or participatory systems analysis, which is highly recommended as a next step.

Systems thinking differs from linear thinking, which focuses on isolated cause-and-effect relationships. Systems thinking focuses on the underlying patterns, structures, and mental models that shape a systems behaviour over time.

“You can see some things through the lens of the human eye, other things through the lens of microscope, others through the lens of a telescope, and still others through the lens of systems theory. Everything seen through each kind of lens is actually there. Each way of seeing allows our knowledge of the wondrous world in which we live to become a little more complete” – **Donalla Meadows, Thinking in Systems: A Primer**

Sustainable deer management² is a complex topic that touches upon several different economic, social, and environmental public benefits. These elements of the sustainable deer management system in Scotland are interconnected, and feedback loops exist between them that create patterns, structures, and behaviours over time that can be observed and influenced.

Systems thinking tools such as: (i) the iceberg model; (ii) behaviour over time graphs; (iii) causal loop diagrams; and (iv) systems archetypes, can help to identify different potential leverage points for change. To be most effective these tools are best used as part of a participatory process. The analysis used here is a ‘starter for ten’ in such a process. It is intended to point towards some areas of interest/importance that emerged from the initial analysis and to showcase the potential value of a future participatory approach undertaken with end-users of the Deer Code.

² Managing deer to achieve the best combination of benefits for the economy, environment and communities for now and for future generations (Deer Code, SNH, 2011).

Donella Meadows outlines different places to intervene in a system (leverage points) in her 1997 essay³ and her book 'Thinking in Systems: A Primer'. These are (in increasing order of effectiveness):

12	Constants, parameters, numbers (such as subsidies, taxes, standards).
11	The sizes of buffers and other stabilizing stocks, relative to their flows.
10	The structure of material stocks and flows (such as transport networks, population age structures).
9	The lengths of delays, relative to the rate of system change.
8	The strength of negative feedback loops, relative to the impacts they are trying to correct against.
7	The gain around driving positive feedback loops.
6	The structure of information flows (who does and does not have access to information).
5	The rules of the system (such as incentives, punishments, constraints).
4	The power to add, change, evolve, or self-organize system structure.
3	The goals of the system.
2	The mindset or paradigm out of which the system — its goals, structure, rules, delays, parameters — arises.
1	The power to transcend paradigms.

Donella Meadows identified 'the rules of the system' as one of the most powerful leverage points for creating lasting change. The revision of the Deer Code (as the 'rules of the game') represents a significant opportunity to influence how sustainable deer management is understood and practised across Scotland. It is not a silver bullet, nor can it alone address the complex social, ecological, and economic factors that shape deer management; however, alongside complementary changes to incentives, information flows, governance, culture, and shared goals, a clearer and stronger Deer Code can provide an important catalyst for the wider systems change needed to achieve sustainable deer management.

The revision of the Deer Code is therefore not simply an update to guidance; it is an opportunity to reshape the fundamental rules of Scotland's deer management system, helping to create the conditions in which sustainable deer management can become the norm rather than the exception.

³ <https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/>

3. The Policy Context

Finding the ‘right balance’⁴ for sustainable deer management in Scotland has been difficult to define, agree, reach, and maintain. It is important to recognise the considerable resources that have been committed over many decades towards finding the ‘right balance’, which is ultimately a dynamic and resilient state achieved through the voluntary approach to the management of Scotland’s wild deer.

“Human-wildlife coexistence is a dynamic state in which humans and wildlife co-occur in resilient communities and ecologically viable populations, sustained in socially acceptable ways through just institutions and fair processes that enable co-adaptation, adaptive management, and negotiated solutions to keep negative impacts or conflicts at acceptable levels.”

– IUCN SSC Human-Wildlife Conflict & Coexistence Specialist Group (HWCCSG)

To appreciate the context that the Deer Code sits within, this section provides ‘maps’ of the diverse policy landscape. These conceptual diagrams highlight the complexity and dynamism of the ‘ecosystem’ and attempt to show that the parts are connected and interdependent. The different elements of the sustainable deer management policy context in Scotland are depicted in **Figure 1**. The Deer Code interprets and translates these elements to inform practice.

⁴ Right balance is a term that is used throughout the Deer Code and will be important to define.

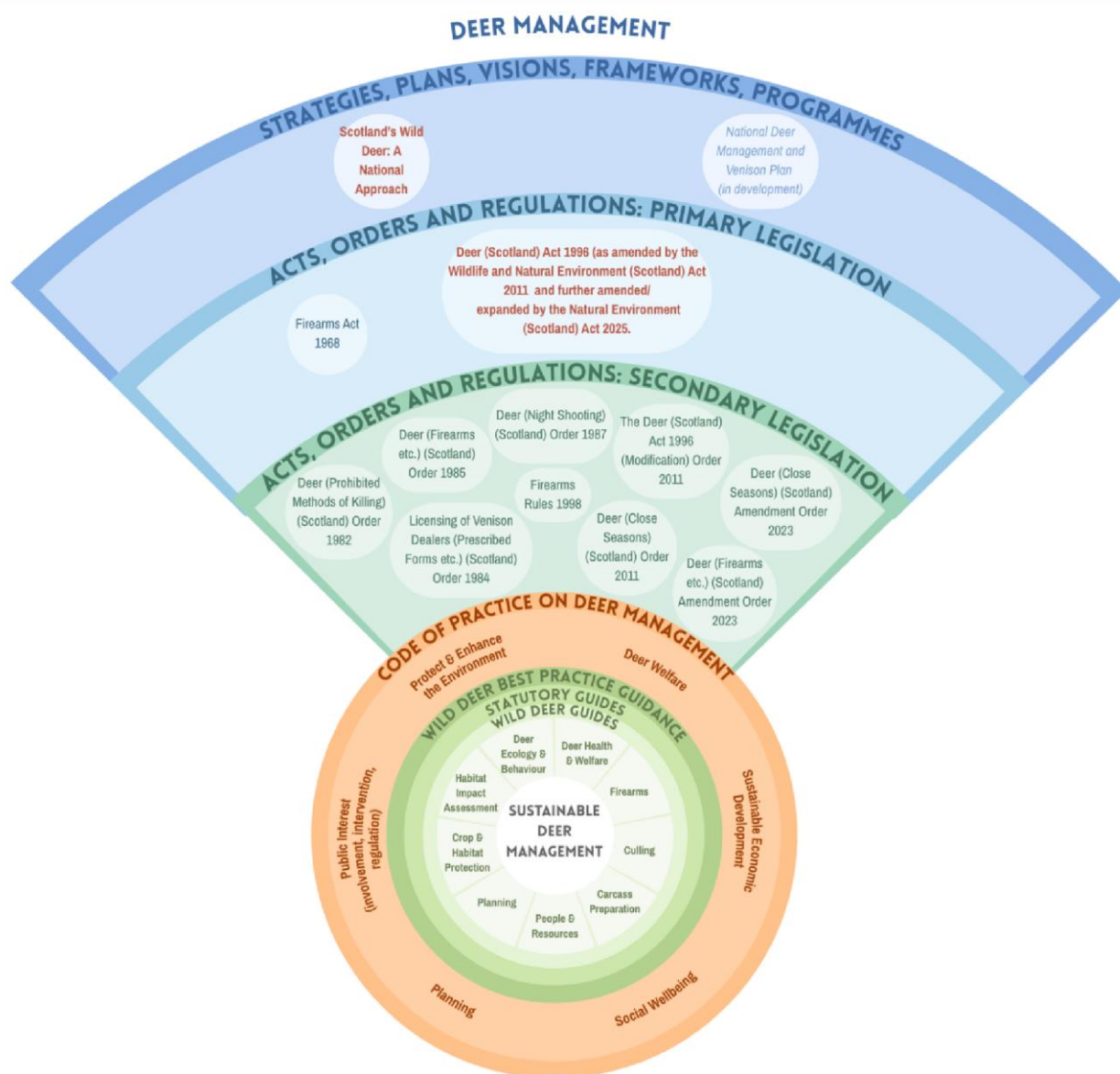


Figure 1. The sustainable deer management policy context (burgundy text = of particular importance/relevance to this briefing paper).

Figure 2 outlines the diversity and complexity of interdependencies between the Deer Code and other: (i) strategies, plans, visions, frameworks, and programmes; and (ii) acts, orders, and regulations (primary and secondary legislation) in Scotland.

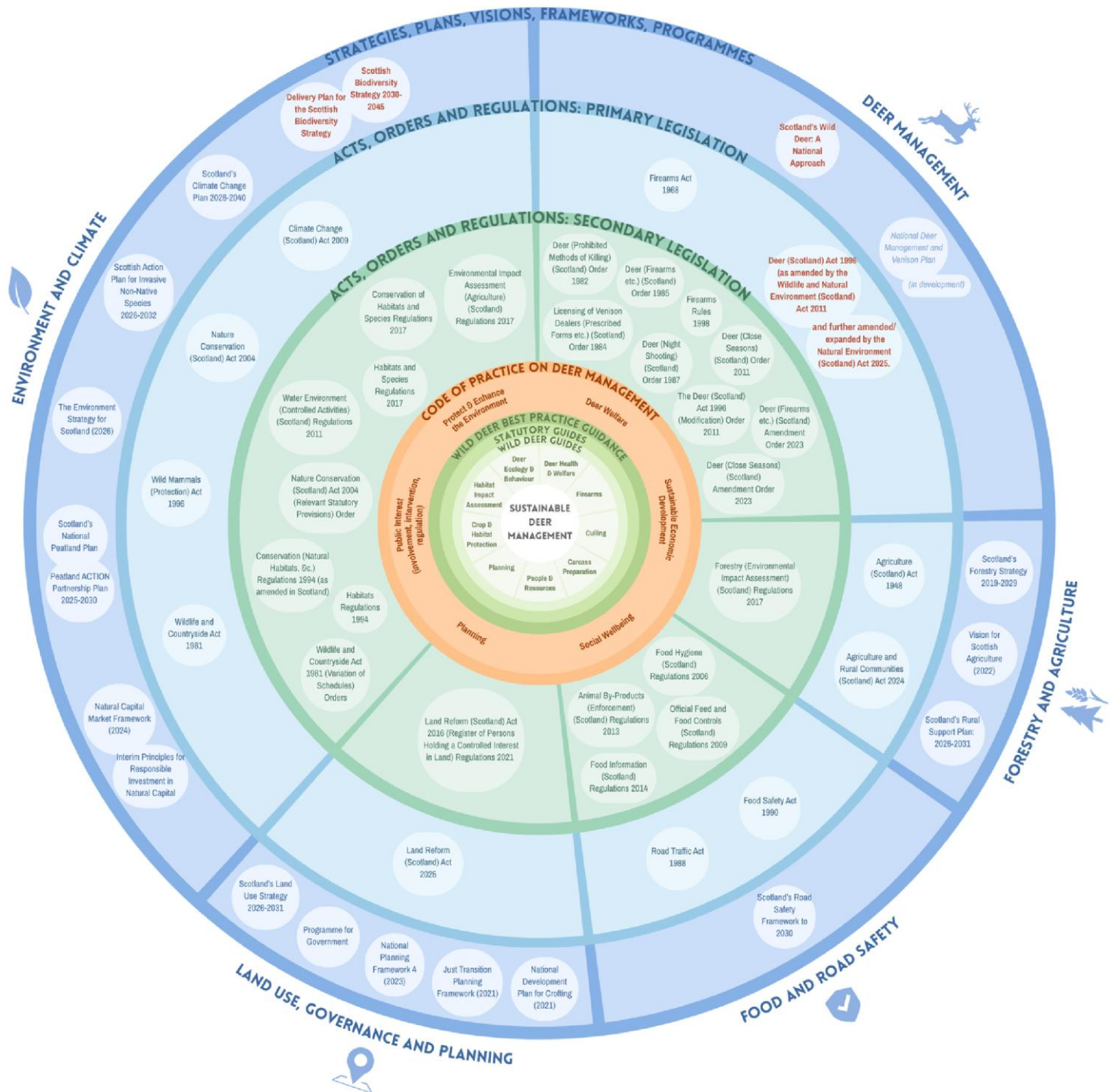


Figure 2. Sustainable deer management in Scotland within a complex and interconnected policy context. Elements with burgundy colour are highlighted for their particular relevance and importance in relation to the revision of the Deer Code.

The policy landscape is a highly integrated ‘ecosystem’ with important interdependencies. No single element, from high level strategies, plans, visions, frameworks, and programmes to acts, orders, and regulations (primary and secondary legislation), can achieve its objectives in isolation.

By seeing and understanding the whole ‘ecosystem’ and the interdependencies, stakeholders can ensure that sectoral goals in forestry, agriculture, and public safety are consistent with broader national climate, biodiversity, and land use strategies and plans, resulting in a more resilient and systemic approach to land management and land use change.

In this multi-level framework, the Deer Code serves as a vital operational link translating complex primary and secondary legislation, while also signposting to the Wild Deer Best Practice Guidance and Statutory Guides, to inform practical actions on the ground.

It is notable to acknowledge that deer management was a feature of almost all party manifestos for the 2026 Scottish Parliament Election, demonstrating that deer management is of national significance and is linked to many areas, including: nature restoration, woodland protection and expansion, climate objectives, biodiversity recovery, rural livelihoods, and community benefit.

Scottish National Party

“To protect our native woodlands from threats we will support firm deer control incentives, implement a national deer management and venison [plan].”

Scottish Labour

“Work in partnership to deliver sustainable deer management, continuing incentive pilots and supporting community initiatives to supply venison to local markets.”

Scottish Greens

“Implement strategic management of Scotland’s out-of-control deer population so that the environmental damage of overgrazing is minimised, with new incentives to support land managers who reduce deer numbers on their land.”

Scottish Conservatives

“Deer overpopulation has caused huge problems for gamekeepers and land managers. Scottish Government legislation often makes gamekeepers’ lives more difficult, so the Scottish Conservatives would take a different approach by developing policy in consultation with land managers so we can achieve wildlife management goals.”

Scottish Liberal Democrats

“Increase woodland cover by working with partners including land managers and environmental organisations to tackle damaging overgrazing by deer, enabling young trees to grow, supporting rural employment and boosting the low-carbon wild venison market.”

4. Understanding Who Uses the Deer Code

Who is the Deer Code for?

“If you own or manage land where wild deer are found, or manage wild deer on someone else’s land, the Code of Practice on Deer Management applies to you [...] This Code is to help everybody who owns or manages land on which wild deer occur and those who manage wild deer on someone else’s land to deliver sustainable deer management.”

– Code of Practice on Deer Management (2011)

There are a number of different end-users of the Deer Code. This section aims to categorise and define both primary and secondary end-users of the Deer Code so that the revisions can be best tailored to their contexts and needs. Below primary end-users and secondary end-users are defined and visualised.

Primary end-users (see **Figure 3**) are system actors the Deer Code is explicitly for, those who directly make operational decisions about deer and land management. These primary end-users:

- Manage deer and land.
- Commission and/or undertake deer control.
- Employ and/or contract stalkers.
- Assess deer impacts. o Participate in deer management planning.
- Make operational decisions where the Deer Code is directly relevant.

Primary end-users can be found under three main categories: (i) landowners, (ii) land managers; and (iii) collective management groups.

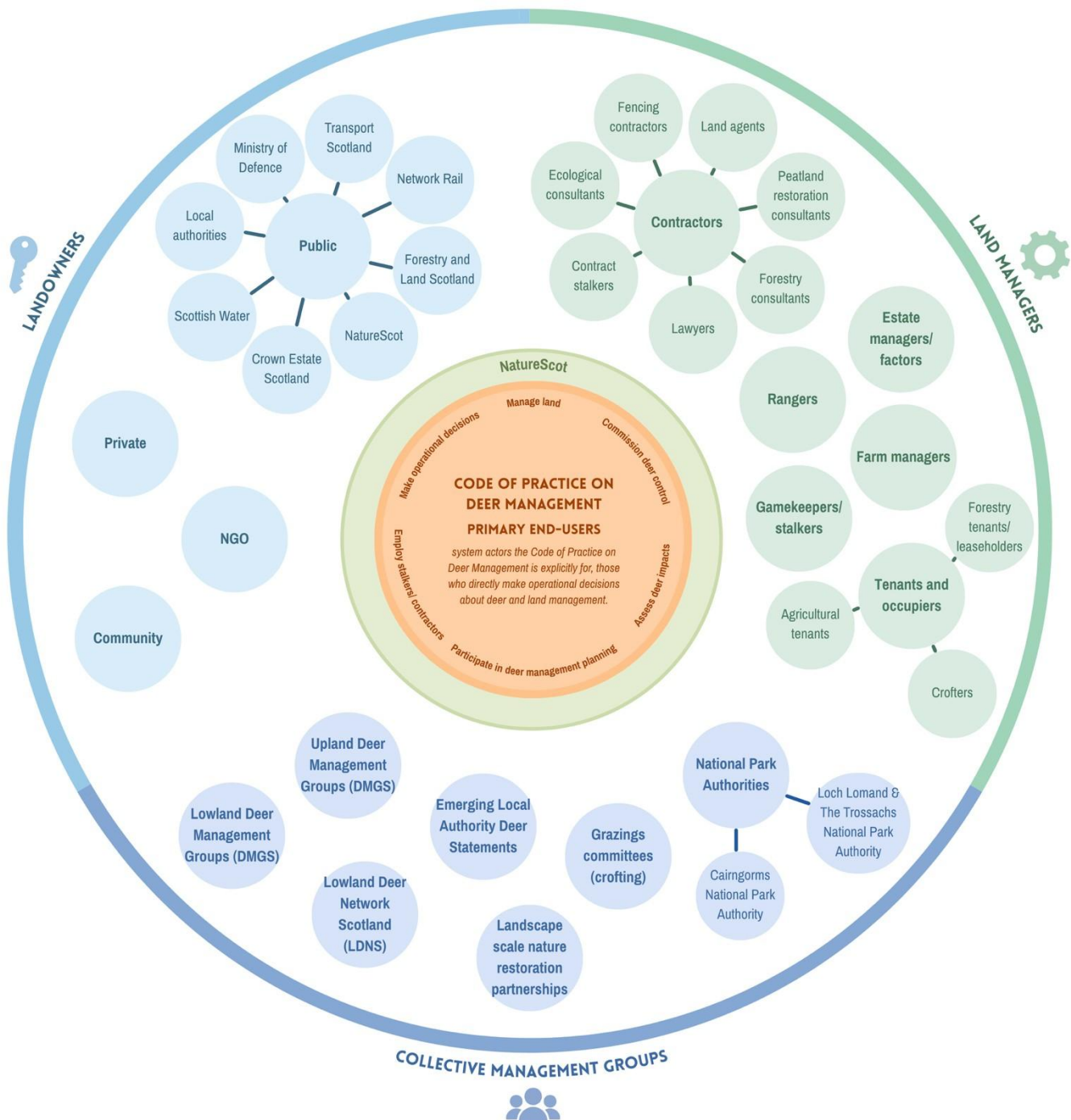


Figure 3. Primary end-users of the Code of Practice on Deer Management.

Secondary end-users (see [Figure 4](#)) are system actors that are not the direct audience but who influence, are affected by, interpret, enforce, educate, or rely on the Deer Code. Those who use the Deer Code to judge, influence, or structure decisions made by others. Members of these secondary end-user groups may also own/manage land and be primary end-users. These secondary end-users influence, interpret, scrutinise, support, or are affected by the Deer Code, but do not necessarily operationally apply it day-to-day.

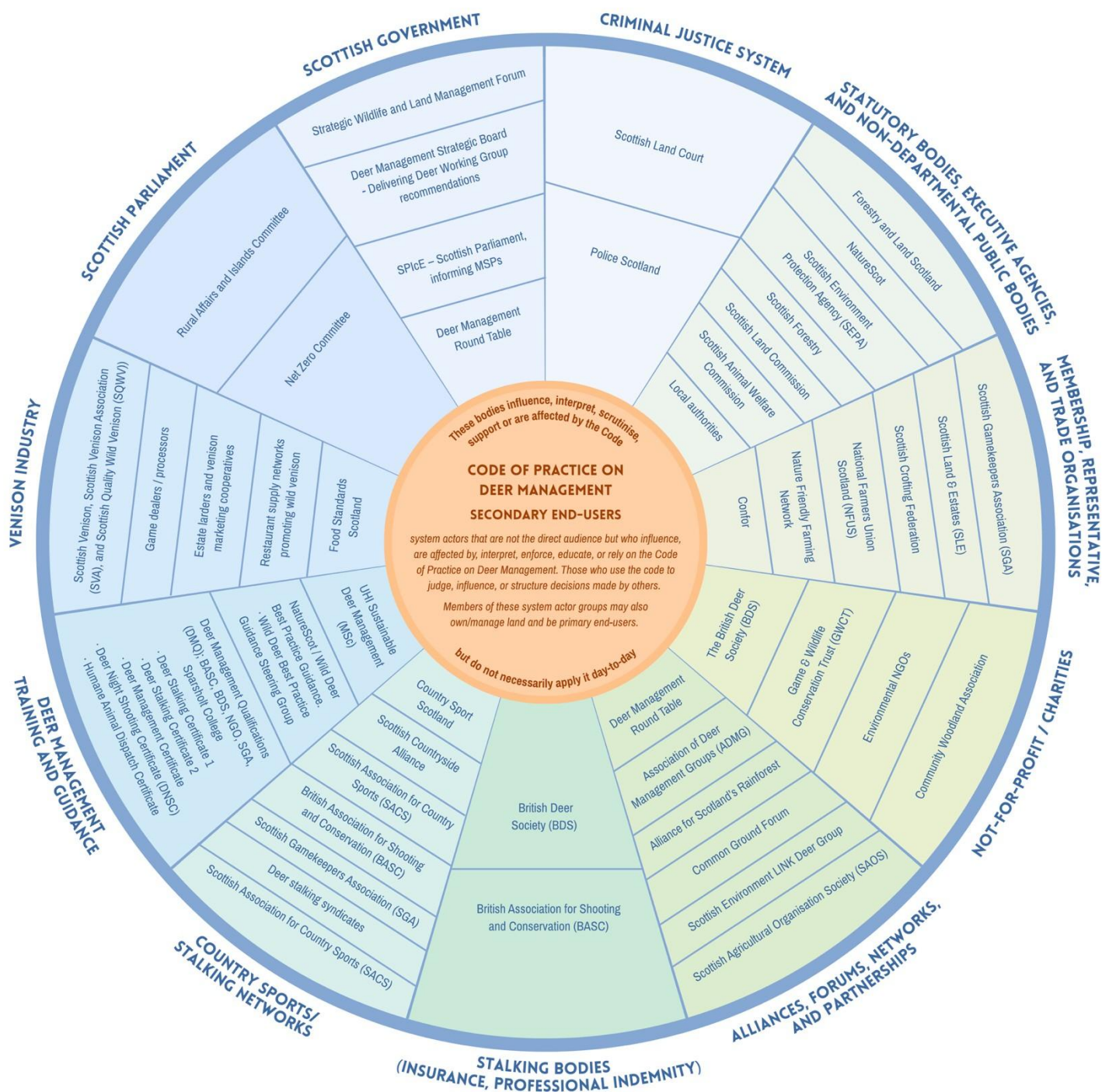


Figure 4. Secondary end-users of the Code of Practice on Deer Management.

The diversity of both primary and secondary end-users presents some challenges for the revision of the Deer Code. Those responsible for deer management operate across a wide range of scales, organisational structures, objectives, and world views. End-users therefore approach the Deer Code with different priorities, assumptions, concerns, and expectations regarding what constitutes sustainable deer management.

Interviews undertaken as part of this analysis suggest that relatively few end-users regularly read or directly refer to the Deer Code itself. This finding may indicate that the Deer Code is missing the target audience in terms of relevance or influence. This highlights the importance of considering if and how the Deer Code sets out the 'rules of the game' and if and how it stands alone as a document that is clear and concise about what end-users must consider and do.

Different end-user groups may require different levels of information, detail, and support. A landowner seeking to understand their responsibilities, a professional stalker making operational decisions, a Deer Management Group developing a management plan, a regulator assessing compliance, and a community organisation seeking to understand local deer management activities, are all likely to engage with the Deer Code in different ways.

Greater clarity regarding when and how the Deer Code should be used, how it relates to associated statutory guidance and Wild Deer Best Practice Guidance, and what actions are expected in different circumstances would improve understanding and implementation. Without such clarity, there is a risk that end-users fill information gaps with assumptions, inconsistent interpretations, or competing narratives, potentially reducing confidence in the Deer Code and limiting its effectiveness.

The concept of an end-user journey may provide a useful lens for the revision process. Consideration could be given to how different end-users first encounter it, the questions they seek to answer, the decisions they are making, and the additional guidance or tools they require at different stages. Re-designing the Deer Code and associated guidance around these end-user journeys could help ensure that information is accessible, useful, and relevant to the diverse range of system actors involved in deer management.

5. Learning from Other Codes

The interviewees were asked about other codes of practice and/or standards that they felt could provide some transferrable lessons learned to inform the revision of the Deer Code. This resulted in the following list:

- Scottish Outdoor Access Code
- SEPA Controlled Activities Regulations (CAR)
- Highway Code
- United Kingdom Forestry Standard (UKFS)
- Code of Practice for Agreeing and Managing Agricultural Leases
- Non-native Species Code of Practice
- The Muirburn Code
- Forest Stewardship Council (FSC)
- Key Biodiversity Area Standard

The analysis of these other codes and standards revealed learning opportunities that could help to ensure that the revisions of the Deer Code help it to become a more effective policy instrument within this complex system.

Across all of the comparator codes and standards reviewed, the strongest examples combine clear behavioural expectations with transparent governance, regular reviews, consistent implementation, and strong explicit links to wider policy objectives.

One of the clearest lessons is the importance of clarity, accessibility, and consistency in communicating expectations. The Scottish Outdoor Access Code and the Highway Code both demonstrate how statutory codes can shape behaviour when responsibilities are clearly articulated and communicated in ways that are understandable to diverse audiences (for example using practical examples or scenario-based case studies). The distinction between legal requirements and recommended practice is particularly important, particularly through clear thresholds for intervention and escalation pathways. Greater use of visual aids, case studies, decision-support tools, and audience-specific guidance could help transform the Deer Code from a document that primarily signposts end-users to responsibilities into one that describes specifics and actively supports implementation (see [Figure 5](#) and [Figure 6](#)).



Figure 5. Adapted diagram from the Scottish Regulators' Strategic Code of Practice⁵.

⁵ <https://www.gov.scot/publications/scottish-regulators-strategic-code-of-practice/>

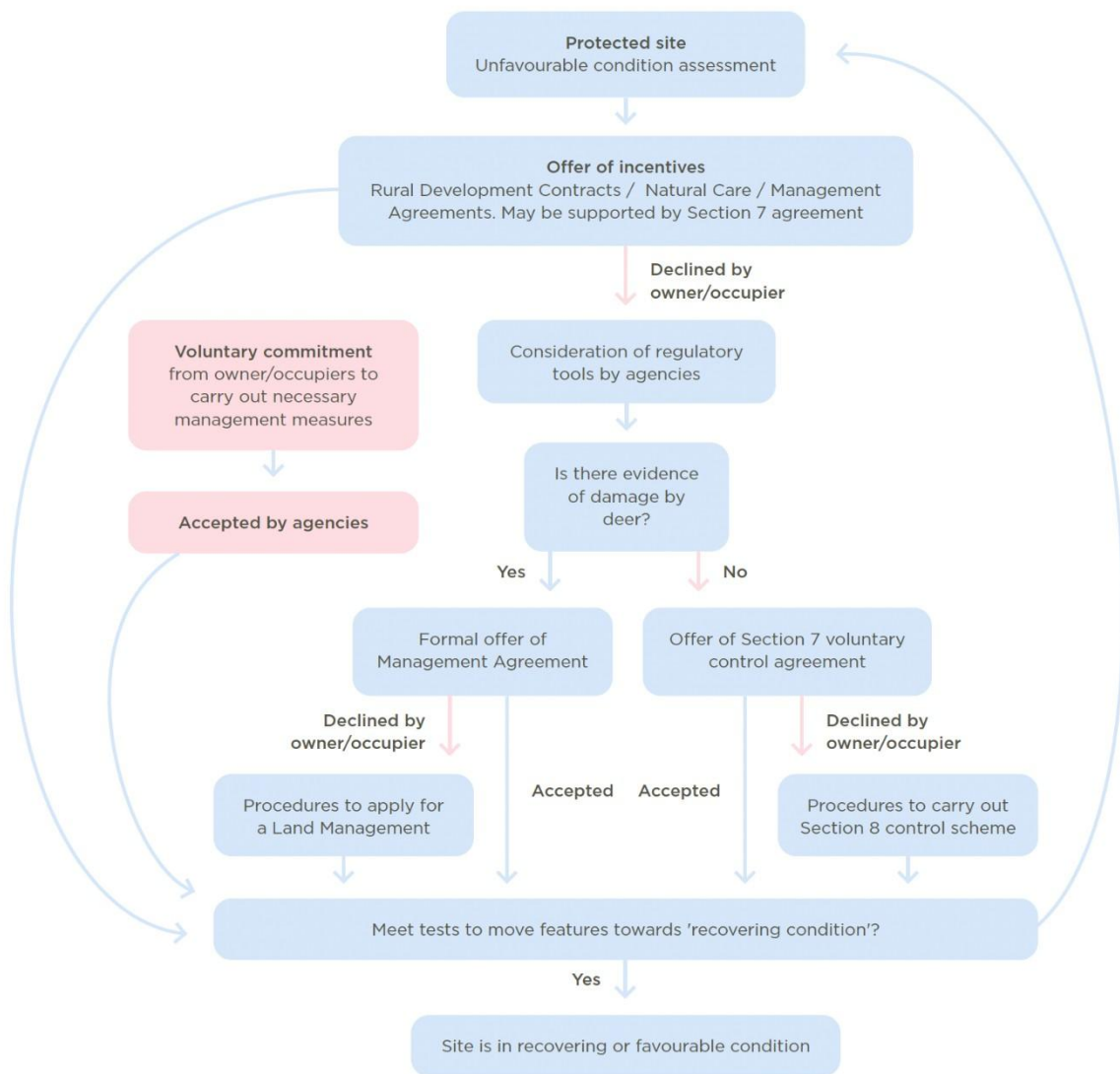


Figure 6. From Statutory Guide – Deer Impacts (2) on Protected Areas (suggested edits: at the top – change to ‘condition assessment, is the site in unfavourable condition’ – yes or no. If no – recommend development of some mechanism for celebrating success – what good looks like.

The importance of good governance and stakeholder engagement was apparent in many of the comparator codes, which helped to build legitimacy and buy-in. Some examples demonstrate that implementation effectiveness is strengthened when codes are subject to transparent review processes, regular updating, and meaningful stakeholder participation. In contrast, the Deer Code has historically been reviewed infrequently. Given the significant changes introduced through the Natural Environment (Scotland) Act 2026, consideration could be given to establishing a more structured and regular review cycle, supported by transparent monitoring and evaluation, and careful outreach and communication about changes.

A further lesson concerns accountability and outcomes. Across the comparators reviewed, there is a growing emphasis on demonstrating that desired outcomes are being achieved rather than simply encouraging good intentions or procedural compliance. This reflects wider trends in environmental governance towards evidence based regulation, adaptive management, and outcome-focused delivery. As the policy context for sustainable deer management increasingly emphasises woodland protection and expansion, peatland restoration, biodiversity recovery, climate objectives, and public interest outcomes, the revised Deer Code could place greater emphasis on what sustainable deer management is intended to achieve and how progress can be evidenced.

Together the comparators suggest that the most effective contemporary codes combine clear expectations, transparent governance, regular review, practical implementation support, and a strong focus on outcomes. The opportunity for the revised Deer Code is therefore not simply to update guidance in response to legislative change, but to strengthen its role as a policy instrument that helps land managers, deer managers, public authorities, and other stakeholders understand, interpret, and deliver their responsibilities within Scotland's evolving environmental and land-use framework.

Questions to ask:

Could a land manager identify exactly what actions they are expected to take by reading the Deer Code?

- what is recommended? Encouraged to.
- what is expected? Should.
- what is required? Must.

Does the Deer Code:

- specify triggers/thresholds?
- identify indicators of success?
- explain how compliance will be assessed?
- explain how progress will be monitored?

6. Scenarios: Involvement, Intervention, and Regulation

The Deer Code (Chapter 5) and the Wild Deer Best Practice Guidance (Statutory Guides) provide details on NatureScot's role(s) in sustainable deer management. NatureScot's approach starts from involvement (this is the foundation of the voluntary approach) moving to more direct intervention, and finally to regulation (**Figure 7**). The need for discretion and flexibility is understood; however, additional clarity (particularly related to the new nature restoration powers) on the categories, criteria, and thresholds for involvement, intervention, and regulation are essential for all end-users to help inform their planning and decision making. The grounds for triggering intervention and regulation must be well understood and clearly communicated and could be in the form of a range of evidence required to allow for flexibility and/or discretions.

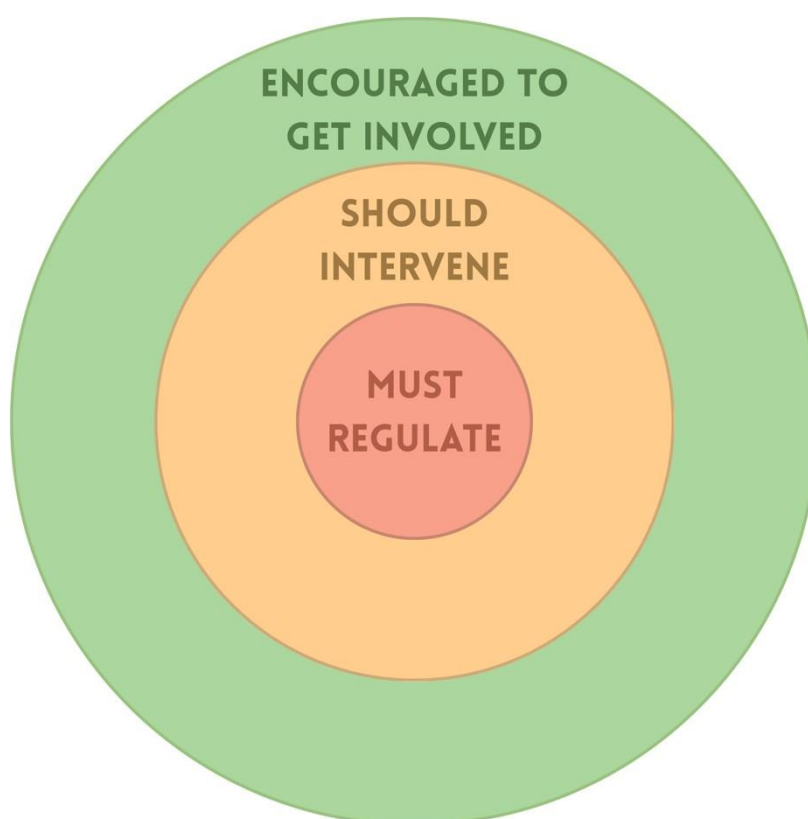


Figure 7. Nested simple depiction of how NatureScot is encouraged to get involved (initial approach and the majority of the effort and focus), should intervene (when involvement is not enough), and must regulate (when intervention fails) for sustainable deer management in Scotland.

Table 1 provides the beginnings of scenarios where it would be helpful to gain clarity on if/how NatureScot would get involved, intervene, or regulate under 6ZB. Further detail on key stakeholders and additional context is required to really bring them to life.

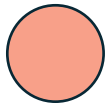
Table 1. Basic introductory scenarios for involvement, intervention, and regulation under 6ZB grounds for intervention: nature restoration.

Context	Scenario
NatureScot is encouraged to get involved (advice and assistance) (risk emerging, collaboration still functioning) 	Landscape scale peatland restoration collaboration Several neighbouring estates are collaborating to restore their degraded peatlands. Restoration activities are linked to Scotland's climate targets, the National Peatland Plan, and are enabled through natural capital projects (Peatland Code). Deer densities are too high for successful restoration, mainly due to heavy trampling causing erosion. Land managers are interested and willing to collaborate but require further advice and assistance. NatureScot gets involved early on to help coordinate monitoring, deer counts, discuss incentives, and facilitate discussions with less willing land managers about increasing deer culls through the local Deer Management Group(s).
	Woodland expansion via natural regeneration Native woodland expansion around a community owned and managed woodland. A Community Woodland Association membership partnership is establishing natural regeneration corridors through neighbouring land to improve biodiversity connectivity and flood resilience. Neighbouring land managers and deer managers recognise and appreciate that deer browsing pressure may be an issue to the success of the project. They invite NatureScot to advise on monitoring, incentives, population modelling, cull targets, before regeneration begins to fail.

NatureScot should intervene using voluntary Section 7 Control Agreement (evidence of ongoing failure or insufficient cooperation) 	Riparian woodland restoration A major riparian woodland restoration project, funded through a mix of public grants and private investment, aims to improve salmon habitat, water quality, and flood resilience. Deer browsing is suppressing woodland establishment across several land ownership boundaries. One or two land managers continue to maintain deer numbers that are incompatible with the agreed objectives of the other neighbouring landowners, undermining progress. Following involvement, NatureScot intervenes further to establish a voluntary Section 7 Control Agreement.
	Mountain woodland and transition habitat restoration A partnership of private estates, public agencies, community landowners, and conservation organisations is working to restore mountain woodland, woodland edge habitats, and natural treelines across a high-altitude landscape. The project contributes to Scotland's biodiversity and climate adaptation objectives by reconnecting fragmented habitats, improving ecological resilience, and supporting natural processes at the woodland–mountain transition zone. Several land managers have reduced deer numbers and are beginning to see recovery of palatable tree species. However, neighbouring estates continue to maintain higher red deer densities associated with sporting management. Browsing pressure across the wider deer range is preventing trees from successfully establishing outside fenced exclosures, leaving restoration highly fragmented and dependent on expensive and ultimately ineffective fencing. Monitoring shows that natural recovery across the open hill is unlikely to occur without broader changes in deer management. NatureScot therefore intervenes to coordinate stronger landscape-scale deer reduction measures, align management expectations across neighbouring estates, and pursues formal agreements before restoration objectives fail.

NatureScot must regulate using Section 8 Control Scheme or Section 10 Emergency Measures

(clear threat to nature restoration, voluntary measures exhausted or urgency requires direct action)



Rainforest restoration

A group of west coast estates contain fragments of internationally important rainforest habitat, including ancient Atlantic oakwoods and rare rainforest bryophyte and lichen communities. Public funding via Forestry Grant Scheme, the Nature Restoration Fund, and the Rainforest Restoration Fund have supported rainforest restoration activities, including: *Rhododendron ponticum* removal and woodland restoration and expansion across the landscape. Despite a longstanding Section 7 Control Agreement being in place, several neighbouring estates continue to maintain high deer densities to support their sporting objectives. Habitat monitoring over many years shows that browsing pressure continues to suppress regeneration of the most palatable rainforest tree species, leaving only the least palatable non-native species to establish. Deer fencing has been used extensively but has become increasingly ineffective and expensive, with breached and ageing fences failing to protect recovering woodland. Despite repeated involvement/intervention, Deer Management Group engagement, and targeted funding support, the wider deer management system continues to prevent rainforest recovery and expansion. NatureScot therefore moves to regulatory measures via a Section 8 Control Scheme to secure sustained reductions in deer impacts across the affected area.

	Caledonian pinewood restoration A landscape scale project containing significant fragments of Caledonian pinewood has received public funding to remove non-native conifers from plantation on ancient woodland sites (PAWS) to restore native pinewood structure and ecological function. A longstanding Section 7 Control Agreement has sought to maintain deer densities at levels compatible with woodland recovery, but habitat monitoring over many years shows that browsing pressure remains sufficiently high to suppress regeneration of Scots pine and associated native species such as rowan, birch, aspen, willow, and juniper. Following the recent removal of nonnative trees, large areas of suitable habitat have been opened up, creating a rare and time-limited opportunity for natural regeneration from nearby native seed sources. However, monitoring indicates that emerging seedlings are being heavily browsed and that this restoration window is likely to be lost if grazing pressure is not reduced immediately. Despite repeated involvement and intervention by NatureScot, Deer Management Group engagement, and targeted funding support, agreed outcomes have not been achieved through the Section 7 agreement. Given the imminent risk of losing a unique opportunity to restore ancient woodland at scale across multiple landholdings, NatureScot determines that there is an urgent threat to nature restoration objectives and exercises its Section 10 Emergency Measures to secure rapid reductions in deer impacts across the affected area.
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Questions to ask:

- When is it expected/reasonable to expect involvement, intervention, or regulation from NatureScot?
 - If so, why?
 - If not, why not?
- What is the history of involvement, intervention, and/or regulation effectiveness? What has worked where and why? What has not worked where and why? It is important to hear from the NatureScot Wildlife Management Officers directly.

There are a number of different categories, criteria, and thresholds that can trigger NatureScot involvement, intervention, and regulation; however, these are not shared or communicated openly and transparently to end-users through the Deer Code or Statutory Guides.

“Systems of information-feedback control are fundamental to all life and human endeavour, from the slow pace of biological evolution to the launching of the latest space satellite...Everything we do as individuals, as an industry, or as a society is done in the context of an information-feedback system.”

– Jay W. Forrester, *Industrial Dynamics*

It is important to develop and share a framework to help operationalise the grounds for intervention and regulation, to provide clarity, consistency, transparency, proportionality, and defensibility. The categories, criteria, and thresholds should be collaboratively developed with primary and secondary end-users. A simple outline example of what this could look like is shown in **Table 2**. The aim of a framework like this is to provide confidence to primary and secondary end-users regarding: categories of grounds for intervention, operational criteria, indicative thresholds for escalation triggers (including evidence expectations).

Table 2. Grounds for intervention – damage by deer (6ZA) and nature restoration (6ZB).

Categories	Criteria	Thresholds / Triggers
6ZA Grounds for intervention – damage⁶ by deer		
This ground is met if measures require to be taken in relation to the management of deer: (a) for the prevention of further such damage or injury, (b) for the remedying of such damage, or (c) for the prevention of such danger or potential danger.		
A: Damage to woodland	A1: Ancient Woodland	For example: WHIA shows moderate to heavy impacts on palatable species for two years in five.
	A2: Commercial Forestry	For example: WHIA shows moderate impacts on native broadleaves included in a commercial forestry design plan.
	A3: Native Woodland Creation	For example: WHIA shows moderate impacts on trees in their first 5 years.
	A4: Montane Woodland	For example: WHIA shows moderate impacts on

⁶ ‘Damage’, as used throughout the Deer Act is defined as ‘a change in state that is regarded as detrimental to legitimate objectives’.

		palatable species for two years in five.
B: Damage to agricultural production, including any crops or foodstuffs	B1: Commercial Crops	
	B2: Foodstuffs	
	B3: Pasture	
C: Damage to the welfare of deer	C1: Body condition	
	C2: Overpopulation	
	C3: Compromised Deer	
D: Damage, whether directly or indirectly, to the natural heritage or environment generally	D1: Nationally or Internationally Important Feature(s)	For example: HIA and trampling impacts relevant to the habitats concerned
	D2: Statutory Designated Site(s)	
E: Damage to public interests of a social, economic or environmental nature	E1: Habitats Enhanced with Public Money	For example: HIA and trampling impacts relevant to the habitats concerned
	E2: Public Interests (Biodiversity, Climate, Culture, Access)	For example: HIA and trampling impacts relevant to the habitats concerned – e.g. trampling impacts showing damage to peatland surface layers above x% of the peatland area.
F: Injury to livestock, whether by serious overgrazing of pastures, competing with any such livestock for supplementary feeding, or otherwise	F1: Overgrazing Competition	
	F2: Supplementary Feedback Competition	
G: Danger or a potential danger to public safety	G1: Deer Vehicle Collisions	
	G2: Human Deer Conflict/Risk	
6ZB Grounds for Intervention: nature restoration This ground is met if, in relation to a particular area of land, deer or steps taken or not taken for the purposes of deer management are, or are likely to, prevent or reduce the effectiveness of work, a project or natural process that-		
H: Preserves, protects, restores, enhances or otherwise improves the	H1: Natural Regeneration	For example: WHIA shows moderate to heavy impacts on palatable species for two years in five.

natural heritage or environment	H2: Peatland Acrotelm Intactness	
	H3: Natural Processes	
	H4: Montane and Mountain Woodland	For example: WHIA shows moderate impacts on palatable species for two years in five.
	H4: Riparian Woodland	For example: WHIA shows moderate to heavy impacts
		on palatable species for two years in five.
I: Is for, or contributes to, a relevant target, strategy or plan relating to the environment, climate change or biodiversity that applies in Scotland*	I1: Biodiversity	
	I2: Climate Change	
	I3: Land Use	
	I4: Forestry	
	I5: Peatland	For example: HIA shows impacts that are preventing natural bog vegetation from growing.
	I6: Invasive Non-Native Species	
	I7: Agriculture	
	I8: Planning	
	I9: Just Transition	

*(a) a target is relevant if it is set by, under, or in pursuance of an enactment, (b) a strategy or plan is relevant if: (i) it is required by an enactment, or (ii) it is published by the Scottish Ministers or a public body with functions relating to natural heritage or the environment.

Areas and datasets that could be explored by NatureScot to develop scenarios and clarity on where they will prioritise intervention under 6ZB:

- Deer Management Priority Areas⁷ (under review)
- Scottish Biodiversity Strategy⁸ – Landscape Scale Exemplar Projects
- Scottish Biodiversity Strategy – Areas of Focus
- Scottish Biodiversity Strategy – Landscape Scale Projects led by Local Partners
- Priority Catchments for Nature Restoration to Support Climate Change Adaptation⁸

⁷ <https://www.nature.scot/professional-advice/land-and-sea-management/managing-wildlife/deerscotland/managing-deer-climate-and-nature/deer-management-priority-areas>

⁸ <https://www.nature.scot/doc/scottish-biodiversity-strategy-delivery-plan-action-21>

⁸ https://www.hutton.ac.uk/wp-content/uploads/2023/12/Prioritising-Catchments-for-Restoration-Report-Supplementary-Material-Final-v9-18-7-25-for-Publication_Combined.pdf

- Nature30 sites
- Trees for Life Priority Ancient Woodland Connectivity Mapping
- Future Woodlands Scotland Ancient Woodland Mapping Tool (ghost woodlands)⁹

Questions to ask:

- How to create suitable expectations on timescales?
- How to balance the need for urgency with what is practical?
- How to allow for a range of evidence to allow flexibility and discretion, while still being clear, meaningful, and useful?

NatureScot is best placed to develop the categories, criteria, and thresholds; however, they may already have internal thresholds that have not been shared publicly.

- Could these be shared to help inform the revisions?

⁹ <https://futurewoodlands.org.uk/a-new-tool-to-identify-ghost-woodlands/>

7. Recommendations

Due to the context of sustainable deer management in Scotland, the Deer Code has to work hard to maintain legitimacy, meaning the following are essential:

- Transparent evidence.
- Procedural fairness.
- Consistency.
- Clear consultation.
- Visible accountability.

There is a need to balance flexibility, scientific uncertainty, collaboration, and enforceability. These tensions create some design challenges for the revision of the Deer Code.



NatureScot are encouraged to:

- Update the description of the purpose and function of the Deer Code in relation to the wider policy and guidance context it sits within and communicate this purpose and function proactively to primary and secondary end-users.
- Increase end-user engagement related to the revision of the Deer Code and its use(s).
- Update the Deer Code reference list to include contemporary research and reports, including but not limited to:
 - Scottish Environment LINK. 2020. Managing deer for climate, communities and conservation¹⁰.
 - Scottish Environment LINK. 2023. Saving Scotland's Rainforest: managing the impact of deer¹¹.
 - Common Ground Forum. 2021. Finding the common ground on sustainable deer management. Assessment Summary. Centre for Good Relations.
- Define key terms, including:
 - Legitimate Objective(s).
 - Nature Restoration.
 - Assessment of Damage.
 - Right Balance.
 - 'When NatureScot is Satisfied' (from Statutory Guides).
 - Tipping point (where a negative impact is of a scale and significance that it amounts to damage).

¹⁰ <https://www.scotlink.org/wp-content/uploads/2020/01/Managing-Deer-for-climate-communitiesand-conservation-2.pdf>

¹¹ <https://www.scotlink.org/wp-content/uploads/2023/06/Deer-Report.pdf>

- Recognise the unintended consequences of ‘delays’ in the system (cost, confusion, inaction), particularly the delays between primary legislation, revision of secondary legislation, related guidance, and then action on the ground.



NatureScot should:

- Clarify when they will get involved, intervene, or regulate, including categories, criteria, and thresholds that are collaboratively negotiated/developed with endusers.
 - this will help to avoid misinterpretation of the Deer Code and ensure the fair and proportionate use of legislation, where required.
- Clarify when they will not get involved, intervene, or regulate, for example:
 - where adaptive and collaborative management is already working,
 - where restoration failure is temporary,
 - where evidence is weak,
 - where multiple public interests conflict,
 - or where restoration objectives are aspirational rather than strategically significant.
- Develop a Statutory Guide dedicated to 6ZB grounds for intervention – nature restoration.
- Update signposting throughout the Deer Code, while also providing some of the translation/interpretation directly within the Deer Code itself so that it also stands alone. Current frequency of cross referencing and signposting is confusing and unhelpful for end-users.
- Learn from other codes:
 - Codify categories, criteria, and thresholds.
 - Make the escalation ladder even more explicit.
 - Embed co-production and formal revision cycles/processes.
 - Develop a communications and outreach plan, not just a policy document.
 - Align with both incentives and regulatory consequences.
 - Ensure transparency and consistency in enforcement.



NatureScot must:

- Communicate and enforce clear timescales for action with consequences for inaction enforced.
- Address the challenge that the resources and infrastructure required to achieve sustainable deer management is grossly underfunded (both internally within NatureScot and externally for end-users of the Deer Code).
- Recognise and reward best practice, developing case studies for ‘what good looks like’, particularly on publicly owned and managed land to strengthen public bodies modelling best practice.
- Collaboratively identify and address key system traps/archetypes and identify strategic leverage points for change (see [Appendix A](#)).

Appendix A – Systems Thinking Analysis

Step 1. Understanding the System Introduction to Systems Thinking: different and complementary ways of seeing and thinking

There are many different reasons for using systems thinking. In this case/context, applying systems thinking principles and tools are used in the hopes that it can help us all to achieve better results with fewer resources in more lasting ways (Stroh, 2025).

Systems thinking can be used to:

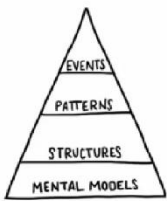
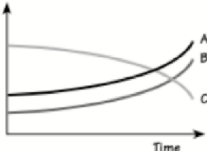
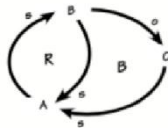
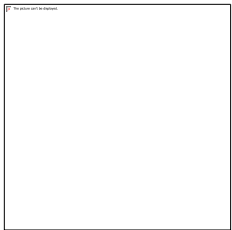
- See the big picture and current reality more clearly.
- Work with external stakeholders to develop solutions that are more likely to benefit all parties over time.
- Deepen understanding of the problems you want to solve. o Address problems rather than symptoms.
- Identify strategic interventions that best leverage limited resources.
- Think more clearly about why problems persist despite your best efforts to solve them.
- Anticipate and avoid long-term negative unintended consequences of proposed solutions.

The basics (see Table A1).

- The definition of a system:
 - A system is an interconnected set of elements that is coherently organised in a way that achieves something. A system must consist of three things: elements, interconnections, and a function or purpose.
 - Systems can be embedded/nested in systems (sub-systems), which are embedded in yet other systems: galaxy, solar system, the earth, a forest, a tree. A nation, a region, a landholding, a deer.
- Begin with defining the boundaries of the system and a dissection of its parts/elements (reductionist, unholistic, static, but an important starting point):
 - Decide on system boundaries.
 - Outline the parts/elements of the system.
 - Define and plot key behaviour over time (BOT) graphs, looking at them over different time horizons.
- Putting the parts back together, to show how they interconnect, highlighting the basic operating unit of a system: the feedback loop.
 - If you see a behaviour persisting over time, there is likely a mechanism creating that consistent behaviour – a feedback loop.

- Balancing and reinforcing feedback loops.
- Outline the connections and causal relationships.
- System models (particularly collaboratively developed causal loop diagrams) can help to showcase interconnections, identify root causes of problems, predict future system behaviour, and uncover unintended consequences of decisions.
- System traps – archetypes.
- Identify the common patterns and behaviours.
- Leverage points for change.
- Opportunities for change.

Table A1. System thinking tools.

The Iceberg Model	Behaviour Over Time (BOT) Graphs	Causal Loop Diagrams	System Archetypes
			
Encourages systemic thinking and helps to contextualise an issue or event as part of a whole system. The iceberg allows you to see the hidden patterns, structures, and mental models underlying the issues or event. The deeper you go under the surface, the higher the potential for reshaping system behaviour (leverage points¹²).	Used to diagram the behaviour of variables over time and gain insights into interrelationships between variables. They help to shift the focus away from isolated events and reveal the underlying patterns/trends driving a system.	Used in conjunction with behaviour over time graphs, causal loop diagrams help to identify reinforcing (R) and balancing (B) processes and feedback loops and structures.	Helps to recognise common recurring system patterns and Structures (stories/traps), such as ‘Shifting the Burden’, ‘Fixes that Fail’, and ‘Limits to Growth’. These help to identify possible leverage points where small shifts can make big changes.

* Images from ‘A beginners guide to systems thinking’.

¹² Donella Meadow’s Leverage Points: Places to Intervene in a System.
<https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/>

The iceberg model is an excellent place to start (see [Figure A1](#)), highlighting how we tend to focus on the things we can see above the surface of the water and how important it is to examine the unseen.

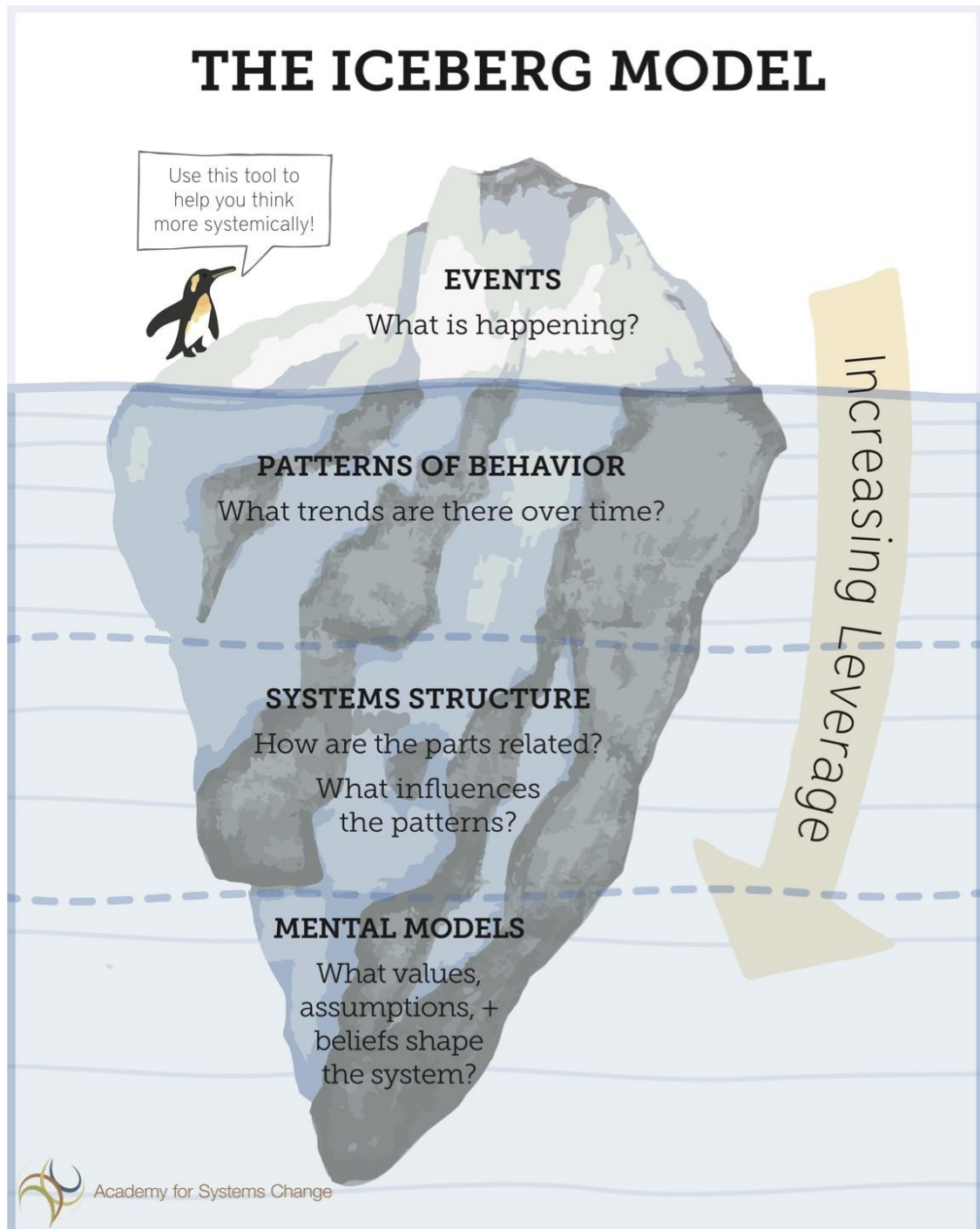


Figure A1. The iceberg model from the Academy for Systems Change.

Step 2. System Elements and Interconnections

Identify patterns and behaviour of these elements over time.

Identifying the elements of a system is a good place to start, as they are often visible and tangible things.

You can divide elements into sub-elements, and then sub-sub-elements; however, you can then quickly lose sight of the system. You can't see the forest for the trees! Best to look for the interconnections, the relationships that hold the elements together. Many interconnections in systems operate through the flow of information.

This is a heuristic tool and is inherently incomplete/imperfect. The purpose is to showcase complexity, interconnections, unintended consequences of changes, and archetypes. This would ideally and most meaningfully be developed through a participatory process.

Using the Code of Practice on Deer Management (2011) to help set the boundaries of the system (and this analysis), some of the most interesting and important elements of the deer management system in Scotland emerged. Note: these were identified using a desk-based literature review and explored during a series of semi-structured interviews. First identifying key elements but more interestingly and importantly, the interconnections. Please ask for more information about the key elements if this may be of interest/relevance to your work.

Important note: a system generally goes on being itself, changing only slowly if at all, even with complete substitutions of its elements, as long as its interconnections and purposes remain intact.

Questions to ask:

- Can you plot key elements (variables, factors) over time?
- What keeps repeating, what is maintaining the pattern over time?
 - Not the ones that are reacting to it.

Step 3. System Interconnections – Feedback Loops

Identify system structure, balancing and reinforcing feedback loops. It is important to consider delays in the system! **Figure A2** showcases some key environmental (green), social (blue), and economic (orange) feedback loops in the deer management system in Scotland.

How to read the figures:

It is important to note that these diagrams serve as illustrative examples based on a series of assumptions about cause-and-effect relationships. While some of the depicted relationships are well-established, others warrant further quantitative analysis and research that fell beyond the scope of this paper.

The arrows between variables represent cause-and-effect relationships (causal links).

A positive polarity sign ('+') or same ('s') next to an arrowhead represents a positive causal relationship (i.e., an increase in one variable causes an increase in the other variable or a decrease in one variable causes a decrease in the second, all things equal).

A negative polarity sign next to an arrowhead ('-') or opposite ('o') represents a negative causal relationship (i.e., an increase in one variable causes a decrease in the other variable, or a decrease in one variable causes an increase in the second, all things equal).

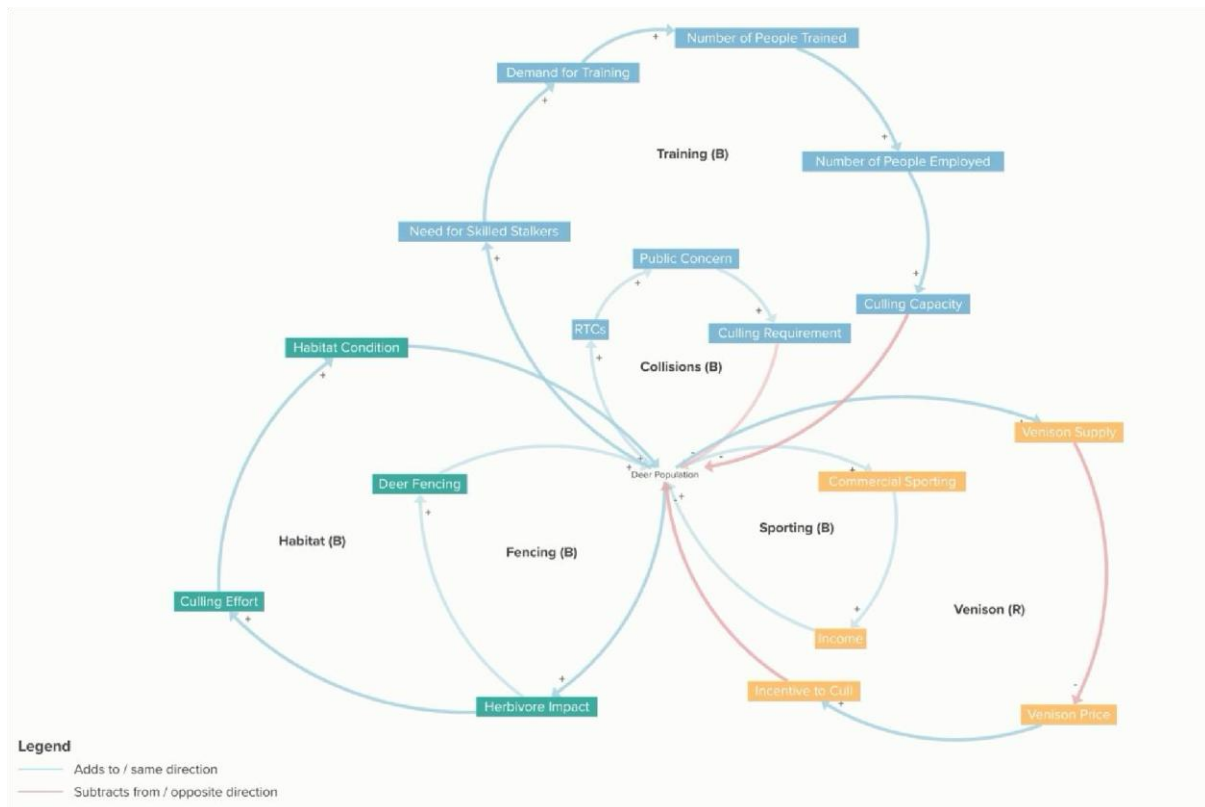


Figure A2. Causal loop diagram of some environmental (green), social (blue), and economic (orange) feedback loops identified during the analysis. B= Balancing and R= Reinforcing.

Questions to ask:

- What is the system trying to do?
- What patterns of behaviour is it producing over time?
- Zoom in and zoom out: what reinforces or balances the behaviour?
- What other balancing and reinforcing loops are (or could be) driving behaviour?

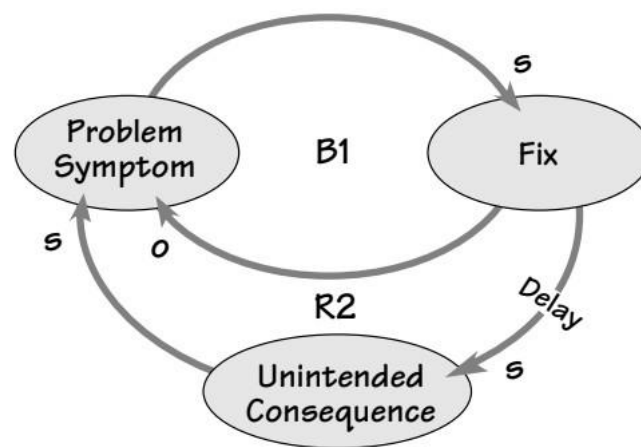
The deer management system in Scotland has multiple functions/purposes, which creates a complicated set of feedback loops that are important to examine.

Step 4. System Archetypes

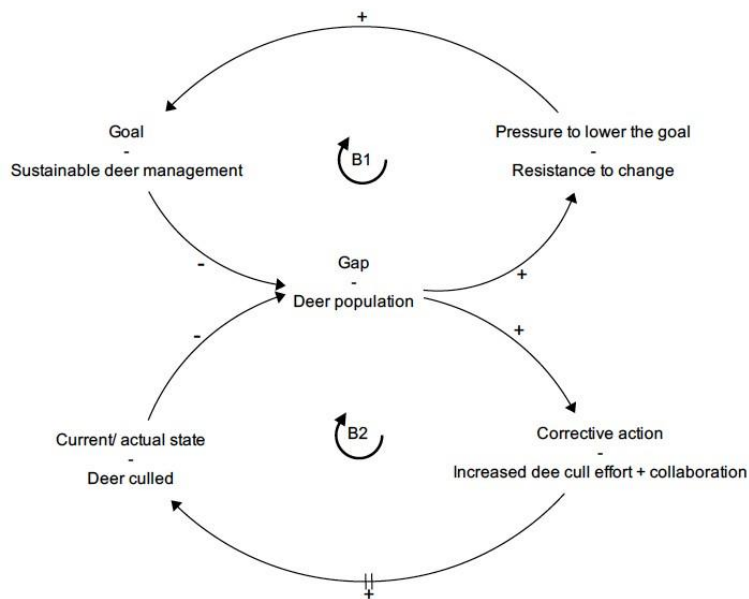
System archetypes¹³ help to recognise common recurring system patterns and structures (stories/traps), such as 'Fixes that Fail', and 'Drifting Goals', and 'Limits to Growth/Success'. These help to identify possible leverage points where small shifts can make big changes. Below are a few examples to illustrate how system archetypes can be identified and used to help 'see' the system more clearly.

Fixes that Fail

In a 'Fixes That Fail' situation, a problem symptom cries out for resolution. A solution is quickly implemented, which alleviates the symptom. However, the solution produces unintended consequences that, after a delay, cause the original problem symptom to return to its previous level or even get worse. This development leads us to apply the same (or similar) fix again. This reinforcing cycle of fixes is the essence of 'Fixes That Fail'.



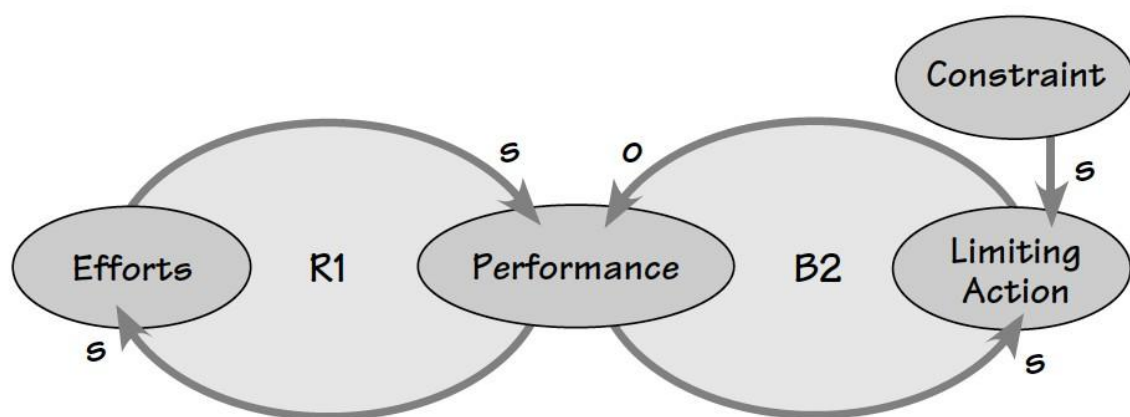
¹³ Daniel H. Kim and Virginia Anderson. 2011. Systems Archetypes Basics.

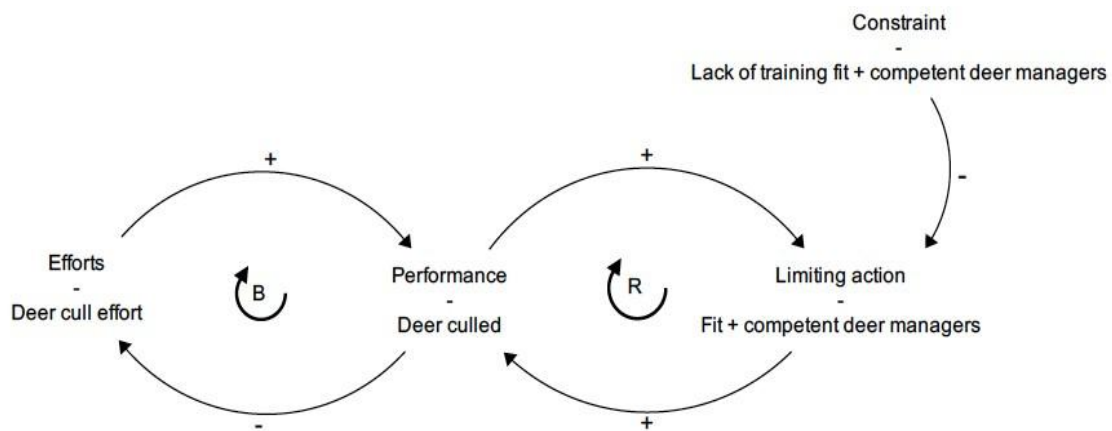


When desired ecological outcomes are difficult, delayed, contested, or politically uncomfortable to achieve, pressure grows to redefine what counts as ‘success’ rather than correcting performance.

Limits to Success/Growth

In a ‘Limits to Success’ scenario, growing actions initially lead to success, which encourages even more of those efforts. Over time, however, the success itself causes the system to encounter limits, which slows down improvements in results. As the success triggers the limiting action and performance declines, the tendency is to focus even more on the initial growing actions.





Step 5. Leverage Points for Change

Donella Meadows outlines different places to intervene in a system (leverage points) in her 1997 essay¹⁴ and her book 'Thinking in Systems: A Primer'. These are (in increasing order of effectiveness):

12	Constants, parameters, numbers (such as subsidies, taxes, standards).
11	The sizes of buffers and other stabilizing stocks, relative to their flows.
10	The structure of material stocks and flows (such as transport networks, population age structures).
9	The lengths of delays, relative to the rate of system change.
8	The strength of negative feedback loops, relative to the impacts they are trying to correct against.
7	The gain around driving positive feedback loops.
6	The structure of information flows (who does and does not have access to information).
5	The rules of the system (such as incentives, punishments, constraints).
4	The power to add, change, evolve, or self-organize system structure.
3	The goals of the system.
2	The mindset or paradigm out of which the system — its goals, structure, rules, delays, parameters — arises.
1	The power to transcend paradigms.

¹⁴ <https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/>

Donella Meadows identified 'the rules of the system' as one of the most powerful leverage points for creating lasting change. The revision of the Deer Code (as the 'rules of the game') represents a significant opportunity to influence how sustainable deer management is understood and practised across Scotland. It is not a silver bullet, nor can it alone address the complex social, ecological, and economic factors that shape deer management; however, alongside complementary changes to incentives, information flows, governance, culture, and shared goals, a clearer and stronger Deer Code can provide an important catalyst for the wider systems change needed to achieve sustainable deer management.

The revision of the Deer Code is therefore not simply an update to guidance; it is an opportunity to reshape the fundamental rules of Scotland's deer management system, helping to create the conditions in which sustainable deer management can become the norm rather than the exception.