

Werewolves to are-wolves?

Characterising key factors affecting public acceptance of a hypothetical Experimental Wolf Reintroduction in Scotland

Marta Lamorgese

Advisor

Luis Mundaca

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Tel: +46 – 46 222 02 00, Fax: +46 – 46 222 02 10, e-mail: iiiee@iiiee.lu.se.

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Abstract

The newest Scottish government Biodiversity Strategy prioritises control of overabundant deer populations. Ecological theory and real-life instances suggest an unorthodox deer management solution: wolf reintroduction (WR). Theoretically, wolves would prey on deer, thus alleviate grazing pressure on Scottish vegetation and help landscapes thrive. A fenced, experimental WR (EWR) would verify whether this trophic cascade would occur. The present study assesses the social feasibility of a hypothetical EWR in Scotland. Through semi-structured interviews and a survey, EWR acceptance and attitudes among salient countryside stakeholders (farmers; hunters; deer professionals; scientists; countryside residents; estate owners or managers & workers; ENGOs & civil society organisations) was assessed. Statistical analysis suggested that EWR attitudes are shaped by personal beliefs, emotions, and perception of EWR outcomes. In accordance with socio-psychological theory, pro-rewilding beliefs, social trust, and positive emotions increased EWR benefit perception while decreasing evaluations of risk and unwanted outcomes. Benefits and drawbacks assessments respectively positively and negatively correlated with EWR attitudes. However, due to a small sample size, conclusions on the antecedents of EWR attitudes are unreliable. Findings revealed considerable opposition to EWR underlined by socioeconomic, institutional and technical reasons. Mainly, rural actors thought EWR would not control deer but instead constitute a source of several negative consequences, and critiqued the wildlife management capabilities of Scottish institutions. Additional barriers to EWR were the disconnections of central decision-makers from rural realities, and of the general public from nature. Because of the apparently firm opposition of Scottish countryside communities, and the uncertain ecological & scientific value of EWR, the social feasibility of EWR in Scotland seems to be very low. However, social acceptance of other ecosystem restoration and rewilding interventions may be fostered by targeting citizens' personal values and emotions, and pursuing salient countryside stakeholders participation & engagement in the planning and implementation of landscape management projects.

Keywords: Ecosystem Restoration; Wolf Reintroduction; Public Participation; Ex-ante Policy Evaluation

Executive Summary

In alignment with United Nation nature conservation ambitions, Scotland has pledged to become Nature Positive (i.e., reverse downward trends of ecosystems quality) by 2030. The Scottish Biodiversity 2045 Strategy sets out plans to stop the ongoing degradation of landscapes and build ecosystem resilience through Ecosystem Restoration (ER) projects. Among the environmental priorities features a reduction of deer numbers. This is because while the hunting industry thrives from the presence of populous herds, the agricultural and forestry sectors suffer, and excessive deer densities undermine ER ambitions. Overgrazing suppresses vegetation, abundance and regeneration, to the point that deer are believed to jeopardise reforestation and habitats conservation in Scotland. Plus, public and private actors sustain substantial costs to deal with deer-damage and fund deer management, mainly through herd culling, year after year.

Ecological theory, case studies and research suggest a rather unorthodox solution to the Scottish “deer problem”, a solution with the twin benefit of driving the ER agenda further: reintroducing grey wolves, which went locally extinct over two centuries ago. The ecological mechanism that would in theory support the value of Wolf Reintroduction (WR) is called *trophic cascade*. As wolves would prey on ungulates and change their feeding habits, local plant species would be released from the excessive grazing placed on them. More plants mean more food for small-sized herbivores, consequently more prey for small-sized carnivores and carrion for scavengers. Wolf-deer populations dynamics modelling and extrapolations from secondary data suggest that wolves might drive such a trophic cascade in Scotland by controlling deer species numbers. Because the ecological impacts of WR in Scotland are uncertain and wolf return would surely drive socioeconomic drawbacks (e.g., livestock predation), researchers proposed that an ‘Experimental’ WR (EWR) should first be pursued. Wolves and deer would coexist in a fenced reserve, and their interactions’ long-term impacts on environmental quality monitored, to ascertain whether wolves could effectively contribute to Scottish nature recovery goals. Large Predators Reintroductions (LPRs) realisation and success is highly dependent on the acceptance and support of local communities. However, in Scotland, little is known about the social acceptance of EWR specifically, the factors and dynamics shaping salient stakeholders’ attitudes.

Therefore, the thesis at hand research aims at exploring the social feasibility of EWR in Scotland by focusing on the attitudes of interest groups, their determinants, and key points conducive to public acceptance. Three research questions guided the thesis:

- (1) What are the opinions of key Scottish countryside stakeholders towards a hypothetical EWR?
- (2A) What factors could be shaping the EWR attitudes of Scottish rural actors?
- (2B) What is the relative importance of such factors across the selected interest groups?
- (3) What are key points to integrate in the evaluation, design and planning of a fenced EWR that would minimise potential negative impacts and so improve the attitudes of salient stakeholders?

From a methodological point of view, the thesis built upon a literature review showing that whether an individual would support LPRs depends on their habits, contextual forces, personal capabilities, value & beliefs, and case-specific attitudinal factors. In the case of EWR, individuals’ attitudes should be determined by: their opinion of wolves, emotional response, trust in governmental institutions, perceived risks & outcomes, symbolic value attributed to wolf presence in Scotland, and the importance attached to the EWR issue. These EWR attitudes antecedents are theorised to interact with and modulate each other in attitude formation, and a questionnaire was developed to determine whether that is the case among Scottish stakeholders. The author administered the survey to the countryside stakeholders that would be most affected by EWR, or whose views should influence the intervention’s planning. Representative from each civil society group, members of relevant Scottish organisations, and scientists with

expertise in deer & wildlife management were also interviewed. The focus of these conversations was barriers to EWR acceptance, potential solutions, reasons to oppose or support the intervention, and broad thoughts on Scottish environmental management. In terms of methods for data analysis, survey answers were processed statistically, but because of a very small sample size ($n=17$), only by means of non-parametric and descriptive tests. Interview answers were processed through content analysis via thematic inductive coding, allowing themes and patterns to organically emerge, and linked to survey results.

The findings revealed a widespread, stark opposition to EWR realisation among the Scottish countryside stakeholders here involved. Participants believed that, in contrast with ecological theory and real-life instances, EWR would not likely yield positive outcomes such as deer control, environmental restoration and promotion of ecotourism, but would instead likely cause significant undesirable outcomes (i.e., livestock predation, distress to human communities, economic losses to farmers). Their negative EWR attitudes did not reflect a dislike of wolves, nor particularly high levels of fear. However, EWR elicited quite high degrees of concerns, and while emotional reactions to EWR were heterogeneous, both positive and negative feelings correlated with attitudes. Faith in the capabilities of Scottish environmental agencies to devise a safe, trustworthy EWR plan was very low and shared by all stakeholder groups. Social trust, affective reactions, risk and outcome assessments were interlinked. Feelings of awe & interest covaried with trust and perceived positive outcomes, whereas evaluations of risk levels & negative outcomes correlated with each other. Risk and negative outcome assessments also covaried with worry & fear, and had an inverse relationship with trust and positive emotions. The two individuals who reported positive EWR attitudes had specular response trends to the majority of the respondents in most variables measured. The fact that most stakeholders held polarised views and attached great personal importance to the EWR issue suggest that their stance is deep-rooted. Interestingly, outcome perceptions did not correlate with the attitudes of individuals attributing high importance, while emotions and symbolic beliefs did. Regardless, because of small and unrepresentative sample, it was not possible to assess causal relationships between EWR attitudes and hypothetical antecedents, and quantitative findings ought to be interpreted with caution, as preliminary explorations.

Few individuals raised pro-EWR arguments, which included provision of ecological & scientific benefits. However, multiple interviewees, including academics, sharply questioned whether the ecological insights EWR would generate on the ER potential of WR would be reliable. Anti-EWR arguments touched the technical, socioeconomic and institutional spheres, with the most common being (a) livestock predation, (b) wolves inability to possibly control deer, (c) the high chances of EWR not remaining experimental, and (d) mistrust in governmental capabilities. While farmers and deer professionals were most vocal about the first two criticisms, these arguments were proposed by a variety of stakeholders. Interviewees agreed that the main barrier to EWR realisation was the firm opposition of rural actors, driven by fear of wolves, lack of perceived benefits from wolf return to Scotland, the psychological toll of coexisting with these predators, and the disconnect of central decisionmakers from the needs of countryside communities. Paths towards social acceptance of EWR included developing adamant prophylactic and reactive wolf populations management plans, education campaigns on coexistence with this predator and the value of ER, and stakeholder participation in the evaluation, planning and implementation of EWR. However, the testimonials of the interviewees discredited the idea that wolves could help with deer control in Scotland, a major pro-EWR point, arguing that existing management methods and techniques are effective enough.

Indeed, culling rates $\geq 22\%$ of the total herd size have been shown to effectively drive down densities of open range red deer populations. However, in Scotland every private landowner can

choose management objectives, methods and intensity applicable to the deer populations populating their estates. Therefore, the “deer problem” exists at a local level, as shown by great variation in regional trends of deer populations growth. Research participants suggested that the root of localised deer overabundances is uneven culling efforts across Scotland, with ‘absentee landowners’ neglecting deer management either because they are private citizens that want to promote stalking rights sale, or they are multinational companies using the land as a carbon asset, as a site for reforestation projects that would offset their carbon footprint. The implication that carbon credits schemes in Scotland might have an ecological outcome as wide-impacting and negative as deer overabundance is warrants further investigation.

Given the uncertain ecological & scientific value of EWR, its socioeconomic drawbacks and geographically limited hypothetical benefits, the widespread and deep-rooted opposition of multiple salient stakeholders, and the low faith countryside actors had in environmental agencies capabilities of handling EWR, it is questionable whether the social feasibility of fenced wolf reintroduction in Scotland could be increased. The high importance participants attributed to the EWR issue indeed suggest that their views would resist change, and that educational campaign would not be somewhat ineffective. At the same time, research participants displayed clear interest and concern for the well-being of Scottish landscapes, suggesting that they would be open to less impacting ER interventions. However, Scottish practitioners ought to change their approach to environmental decision-making, from top-down to bottom-up, and pursue salient stakeholders & local communities’ participation in the planning, implementation and monitoring phases of landscape management interventions. Unless the divide between central policymakers – rural communities is healed, nature recovery programmes in Scotland might find opposition from local actors and not be as effective. Practitioners should also take in account that, as suggested by the present research, acceptance of environmental policies is influenced by emotional reactions and personal beliefs & values, especially when individuals attribute high personal importance to, or are unfamiliar with, the matter at hand. Such insights indicate that educational campaigns and information sharing may do little to change public opinion, whereas trust-building, changing affective reactions, and highlighting links between personal values and a given intervention may work better. Reproducing a similar investigation on the socio-psychological antecedents and dynamics of attitude formation with a larger sample size may advance debates on, for example, Eurasian Lynx reintroduction.

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Abbreviations

CR ‘Countryside resident’

DMA ‘Deer Management Area’

DP ‘Deer Professional’

ER ‘Ecosystem Restoration’

EWR ‘Experimental Wolf Reintroduction’

EWRA ‘Attitude towards Experimental Wolf
Reintroduction’

F ‘Farmer’

H ‘Hunter’

HERSP ‘Holistic Endangered Species
Reintroduction Paradigm’

LOMW ‘Landowner or Manager & Worker’

LPR ‘Large Predator Reintroduction’

NE ‘Negative Emotions (towards EWR)’

PE ‘Positive Emotions (towards EWR)’

PNO ‘Perception of Negative Outcomes (of EWR)’

PP ‘Participatory Process’

PPO ‘Perception of Positive Outcomes (of EWR)’

S & DP ‘Scientist and Deer Professional’

SB ‘Symbolic Beliefs’

WA ‘Attitude towards Wolves’

WR ‘Wolf Reintroduction’

WRA ‘Attitude towards Wolf Reintroduction’

1 Introduction

As the COP15 unfolded in Montréal, the importance of ecosystem restoration (ER)^a for meeting global biodiversity goals was reiterated. UN leaders have agreed to become Nature Positive by 2030, which is saying, to halt and reverse downward trends in biodiversity and ecosystem quality (COP15: Final text of Kunning-Montreal Global Biodiversity Framework, 2022). The updated version of the Global Biodiversity Framework explicitly states nature recovery ambitions and goals - see Target 2 and 4 for extended details (COP15: Final text of Kunning-Montreal Global Biodiversity Framework, 2022), and the UK was one of the greatest supporters of making biodiversity restoration an international priority. The Scottish government echoed such ambitions, releasing a statement of intent reiterating that 2020 is the UN Decade of Restoration, and sharing a desire to foster ER efforts throughout Scotland (Scottish Government, 2020). The Scottish Biodiversity 2045 Strategy furtherly develops Scotland's commitment to become Nature Positive by 2030, setting out specific targets and action plans to promote ER projects and build national ecosystems resilience (Scottish Government, 2022). Among the Scottish priority actions for 2030, figures improving woodlands biodiversity, marine ecosystem protection, and to “[...] *drive down and deliver substantially reduced deer densities across our [Scottish] landscapes*” (p. 40, Scottish Government, 2022).

Indeed, Scottish deer species (red; roe; fallow; sika) have been recently estimated to be 1 million individuals in total (Munro, 2021), despite yearly investments to diminish deer numbers (Deer Working Group et al., 2019). Recorded Scottish deer densities in woodlands (up to 40/km², Staines et al., 2008, as cited in Putman et al 2019; Apollonio et al., 2010) are far above what is thought to be ecologically ideal (<8/km², Andrews et al., 2000; Sandom et al., 2012). Ungulates overabundance is detrimental to the public (e.g., via increased likelihood of vehicle collision and Lyme disease incidence), private actors (e.g., due to agricultural damage), and the well-being of Scottish ecosystems (Deer Working Group, 2019). Because they exert substantial grazing pressure, high deer densities can locally suppress plant species abundance, diversity, and woodland regeneration. All in all, deer overabundance can undermine reforestation and similar nature recovery projects (Miller, 2000; Palmer & Truscott, 2003; Manning, 2009).

Wolf reintroduction (WR) in the Scottish Highlands has been pointed at as a potential solution to the “deer problem” (Sandom et al., 2012). Scientific research and ecological case studies suggest that wolves could bring deer populations down to ecologically preferable densities of <8/km² (among others: Nilsen et al., 2007; Beschta & Ripple, 2016; Bull et al., 2019). By doing so, wolves would not only release Scottish ecosystems from the pressure of overgrazing, which could in turn foster landscape-level ER, but also relieve the Scottish government from the logistic & financial burden of programming yearly culls and dealing with deer-related damage (Nilsen et al., 2007; Manning et al., 2009; Sandom et al., 2012; Bull et al., 2019). However, despite such potential benefits, the Scottish parliament and NatureScot, the national environmental agency formerly known as Scottish Natural Heritage (SNH), are not exploring WR. Negative public attitudes are regarded as the main socioeconomic reasons for that (Times, 2009; SCOTLAND: The Big Picture, 2020;2020-b).

^a Briefly, ER interventions aim at conserving & enhancing ecosystem resilience by bringing ecosystems, as well as their biotic and abiotic components, towards the best possible condition (Scottish Government, 2022). Examples would be reverting human-made structural modifications to habitats (e.g., de-straightening river channels) or reintroducing a locally extinct species (e.g., beaver in the Netherlands).

In the rest of this chapter, I will detail the issue of deer overabundance and how WR could theoretically address it, so to explore the scientific foundation for this rewilding intervention and related socioeconomic aspects. Then, I will examine whether an experimental WR (EWR) could be a first, crucial step forward for Scotland-wide WR. Lastly, I will delineate the research problem that the present thesis aims to address, along with scope, limitations, important ethical considerations and expected audience of interest.

1.1 Are wolves a solution for Scotland's nature recovery goals?

1.1.1 Background

Deer overabundance is thought to plunge its roots in the disappearance of wolves, their natural predator and year-long source of mortality, over 200 years ago (SCOTLAND: The Big Picture, 2021a). Loss of habitat due to anthropogenic activities like logging had initially controlled deer numbers, but by the 19th century red deer fully adapted to the open hill habitat, with little to no woodland cover, typical of modern-day Highlands (Deer Working Group et al., 2019). From that moment onwards, red deer continued expanding all over Scotland, whereas reforestation efforts and the logging industry provided suitable habitat for sika, roe and fallow deer herds to thrive in. Red deer densities went up to 40/km² in forested areas (Staines et al., 2008; Apollonio et al., 2010), and past estimates for non-forested areas ranged between 12 and 20 deer per km² (Staines et al., 2008; Apollonio et al., 2010). A recent, more thorough analysis of open-hill red deer densities showed an overall steady increase from the 1960s until the year 2000, followed by a slight decrease and stabilisation of average densities at about 10/km² (Albon et al., 2019). Population censuses in 2014 reported between 590,000 to 700,000 deer in total among the four species, with red deer being the most populous, counting between 360,000 and 400,000 individuals (Scottish Natural Heritage, 2014). Representatives from Forestry and Land Scotland shared their most up-to-date estimates of total deer numbers in Scotland being up to 1 million (Munro, 2021).

Excessive deer densities significantly and negatively impact Scottish ecosystems because they exert excessive grazing pressure on local floral assemblages (Nilsen et al., 2007). Red deer is held responsible for impairing the regeneration of native woodlands and commercial forestry by browsing on tree saplings and impeding their maturation (Palmer & Truscott, 2003; Manning et al., 2009). In turn, low vegetation diversity and abundance undermine the productivity of higher trophic levels, prevent local biodiversity from thriving, and reduce the quality of abiotic conditions (Miller, 2000; Hobbs, 2009; Manning et al., 2009; Gwynn & Symeonakis, 2022). Deer species also compete for resources with sheep and livestock during winter and have contributed to extensive loss of heather moorland cover - a habitat of high conservation priority due to its unique biota (Clutton-Brock et al., 2004).

The threat that deer overabundance poses to Scottish ecosystems was recognised by the government in the 1950s, when the first control measures were introduced (Sandom et al., 2012). Recent legislation includes the UK Government's Deer (Scotland) Act of 1996, the Scottish Government's Nature Conservation (Scotland) Act of 2004, and multiple pieces of national Scottish strategies (e.g. Forestry Commission Scotland, 2006). In 1996, the Deer Commission for Scotland was formed to direct the management efforts - i.e., yearly culling and hunting campaigns, of governmental and private bodies. Even though man-led efforts can effectively decrease deer abundances (Putman et al., 2019), deer populations have not yet been brought down ecologically desirable density - i.e., <8/km² (Andrews et al., 2000; Munro et al., 2021).

The public and private sectors face ongoing expenditures, as exemplified by Table 1-1, covering the 2016 deer-related costs amounting to over £64 million. To contextualise these costs, compensations for red, roe and fallow deer damage amounted to ~€685,000 only in Italy (2004

data by Carnevali et al., 2009), a country that is almost four times the size of Scotland. By contrast, over £14 million were spent for compensation in Scotland in 2016 (Table 1-1). It is reasonable to assume that the more deer roam in Scotland, the higher the costs to citizens, private and public actors for deer-damage. However, deer are not a ‘pest’ in Scotland, but a valuable economic resource to rural communities thanks to the venison meat market, ecotourism and recreational stalking (Macmilan & Philips, 2008; Putman et al., 2019).

Table 1-1. ‘Summary of deer-related expenditures in 2016 according to Scottish Natural Heritage database.’

Description	Public or private cost	Estimated annual cost	Source(s)
Costs associated with damage by deer			
Tree damage	Private/public	Uncertain but significant	
Agricultural damage	Private/public	Uncertain not significant	
Damage to habitats	Private/public	Uncertain – difficult to monetise	
Deer vehicle collisions	Mainly public	£13.8 million	Langbein (2007)
Lyme disease	Mainly public	£0.5 million	Joss (et al., 2003)
Costs associated with managing deer			
Effects on public access	Public	Uncertain	
Operational and capital expenditure on deer management	Mainly private	£42.6 million	PACEC (2016); FES evidence to Deer Authorisation Panel (2016)
Fencing	Public	£4.8 million	Scottish Government (2013)
Other deer management via SRDP	Public	£0.8 million	Scottish Government (undated)
Monitoring, regulation and administration	Public	£1.5 million	Putman (2012)

Source: Deer Working Group et al., 2019.

Trophic rewilding, whereby a species is reintroduced in historical ranges to restore past trophic interactions and correlated ecosystem services, has been proposed as a solution to the Scottish “deer problem” (Manning et al., 2009; Bull et al., 2019). Specifically grey wolves, deer natural predators, would have to be reintroduced. According to Bull et al. (2019), re-establishing a population of this apex predator would (a) decrease the need for environmental management, and (b) significantly improve biodiversity, favouring landscape-level ER. In other words, wolves could help restore Scottish degraded habitats by effectively reducing deer abundance, and simultaneously alleviate the yearly expenses caused by deer species (as shown in Table 1-1).

1.1.2 The scientific case for WR in Scotland

By bringing wolves back to Scotland, ecological theory suggests a phenomenon known as *trophic cascade* could occur, whereby a change in a key trophic level affects the rest of the food web and local environment through ecological interactions (Campbell Biology, 2014). In the case of WR, the resulting trophic cascade is expected to be as following: the source of over-browsing (i.e., excessive large ungulates densities) is reduced if not eliminated; recruitment of floral species improves; soil and water quality, nutrient cycling improves; the additional cover and forage opportunities better small herbivores' survival; meso-predators obtain greater prey availability; and the carrion mass at the disposal of scavengers increase (Manning et al., 2009; Ripple & Beschta, 2012; Ripple et al., 2014). Overall, local biodiversity and nutrient cycling effectiveness would increase. Such outcomes clearly align with Scotland's ER and nature recovery goals (Scottish Government, 2022).

The above-described, desirable trophic cascade conducive to ER occurred in the Yellowstone National Park (YNP) 15 years after WR; wolf reappearance was identified as the root cause of such positive changes (Ripple & Beschta, 2012). Briefly, wolves had been eradicated from YNP in the 1920s, prompting substantial increases in large herbivores populations - mostly elks. In turn, this severely suppressed the abundance and diversity of plant species in Yellowstone. Soil quality and local biodiversity were negatively affected by elk's overgrazing, but culling programmes failed to reduce their numbers. Eventually, US authorities approved a WR programme in 1995. In the 15 years that followed, recruitment of woody species improved thanks to a considerable decrease in elk abundance and related herbivory pressure (Ripple & Beschta 2012). As vegetation abundance and diversity grew, the benefits rippled throughout the food chain, and the trophic cascade suggested by ecological theory effectively and swiftly occurred in YNP following WR (Beschta & Ripple, 2016).

Whether WR would have the same beneficial effects in Scotland that it did in YNP has been explored by numerous authors. Among others: Nilsen et al., 2007; Manning et al., 2009; Sandom et al., 2012; Bull et al., 2019. All of them led Scotland-specific research, and while they agree on wolf's potential for catalysing Scottish ER via deer reduction, these authors have differing opinions regarding how and when that would be the case.

Wolves would be able to reduce deer numbers through density-dependent (i.e., predation) and density-independent behavioural mechanisms (i.e., *landscape of fear*). The latter were overlooked by Nilsen (et al., 2007), Sandom (et al., 2012), and Bull (et al., 2019), who did not consider behavioural effects. By contrast, Manning and co-authors (2009) stated that the sole presence of wolves, regardless of packs' densities, could be enough to drive deer numbers down thanks to the instauration of a "landscape of fear". A landscape of fear means that herbivores exposed to the threat of predation forage less and less frequently, spend more time being vigilant, and avoid areas where predation risk increases due to low maneuverability (e.g., streams, riparian areas) or presence of hiding places for carnivores (e.g., thick understory) (Manning et al., 2009). Altogether, the consequences of the landscape of fear reduce the fitness level and the fertility of the herds (Creel et al., 2007). If wolves were to be brought back in the Highlands, a landscape of fear would be re-established. Scottish deer would develop heterogeneous spatial patterns of herbivory, enabling the regeneration of vegetation in the avoided habitats, and would overall forage less frequently, in turn kickstarting localised trophic cascades (Manning et al., 2009). Antipredator behaviour may additionally contribute to declines in deer abundance through lower nutrition and continuous stress, known to reduce immune responses and fecundity (Creel et al., 2007). By reviewing various studies and data from the YNP experience, Manning (et al., 2009) concluded that even low wolf densities can affect deer to the point of fostering the desired trophic cascade. However, Manning and colleagues (2009) drew their conclusions from secondary data and existing literature instead of modelling hypothetical changes in deer densities

and distribution following WR. Yet, modelling of ecological outcomes is crucial for ex-ante evaluations of interventions that, like WR, entail substantial, landscape-level modifications and long-term impacts, impacts affecting both human communities and wildlife.

Rather than secondary data, Nilsen (et al. 2007) and Bull (et al., 2019) drew their conclusion from the mathematical modelling of wolf & deer populations dynamics^b. Nilsen (et al., 2007) stated that if 3 packs of four wolves were reintroduced in the Highlands, their population would initially skyrocket (>150 wolves/ 1000 km²), then plummet and stabilise (ca. 25 wolves/ 1000 km²) after 60 years. At the same time, deer densities would sharply decline until plateauing at circa 5 deer/km² after 60 years, leading to economic profits for deer estates (Nilsen et al., 2007). Bull and colleagues (2019) modelling assessed that for wolves to achieve densities high enough to effectively control deer numbers through predation, the canids would have to be introduced in an area enclosed by a mildly permeable barrier, allowing for 20-35% dispersal rate (Bull et al., 2019). Such a measure would avoid wolf long-term extinction due to resource exhaustion, foster high pack densities, but also reduce conflict with rural communities (e.g., via sheep kills) and ameliorate the psychological distress to human communities (Bull et al., 2019). Simulation of wolf-deer populations dynamics corroborated that a trophic cascade may be triggered only by certain wolf densities (i.e., 15 packs/ 1000 km²) but authors admitted the threshold could be lower if the effects of behavioural prey control mechanisms, namely the landscape of fear, had been accounted for (Bull et al., 2019). Sandom (et al., 2012) also carried out wolf-deer populations modelling, following the work of Nilsen and colleagues (2007). Their analysis corroborated that placing wolves in a reserve boundary would rapidly (i.e., within 20 years) lead to wolf densities high enough to control deer, bringing ungulates down to <6 individuals per km² (Sandom et al., 2012). Authors stated that an area of ≥ 600 km² would suffice to establish a viable wolf population, as long as it was managed as a metapopulation. That is to say, by removing wolves when densities in the reserve are too high and introduce specimens if they become too low (Johnson et al. 2010; Sandom et al., 2012). Barrier permeability reduces risk of inbreeding, resources (i.e., deer and territory) overexploitation, and high disease transmissions (Sandom et al., 2012; Bull et al., 2019).

While most of these papers did not consider spatial patterns of wolf expansion in mainland Scotland upon reintroduction, a topic of relevance given the potential for wildlife-human conflicts, a recent research developed a Scotland-specific habitat suitability model (Gwynn & Symeonakis, 2022). Grampian Mountains and Highlands were found to be most suitable due to land cover type (e.g., arable land; pastures; forest...) and density of prey, human settlements and roads. Depending on model conservativeness, 10,130 to 18,857 km² of contiguous, suitable habitat were identified, enough to support 50 to 94 wolves pack (Gwynn & Symeonakis, 2022). Encouragingly, deer density negatively covaried with road or human densities while strongly correlated with wolf abundance, suggesting that the canids would expand in areas with scarce human presence (Gwynn & Symeonakis, 2022). However, it is questionable whether after country wide WR deer habitat preferences would remain identical or would instead start favouring high human densities areas where predation risk is lower – as it happened in North America (Hebblewhite et al., 2005; Beschta and Ripple, 2007). Such shifts in deer spatial usage would not only increase the need and costs of deer management, but also encourage wolf presence in more urbanised areas since they would follow deer presence - per Gwynn & Symeonakis (2022) model. Ultimately, these outcomes would severely undermine the public acceptance and, consequently, the overall feasibility of WR.

^b Intended as changes in abundance, distribution and density of deer and wolf populations as the species interact with each other and the surrounding ecosystems over time.

Local support is crucial for the success and realisation of WR (IUCN/SSC, 2013). Existing studies on Scottish countryside actors' attitudes towards WR revealed mostly negative attitudes (UK Wolf Conservation Trust, n.d.; Nilsen et al., 2007; SCOTLAND The Big Picture, 2022; 2022-b). A main reason for such opposition is fear of sheep predation, likely to be substantial in Scotland because of local shepherding practices (Nilsen et al., 2007; SCOTLAND The Big Picture, 2020;2020-b). Prior to consider WR, be it at a national level or within a boundary reserve as suggested by Manning (et al., 2009), Sandom (et al., 2012) and Bull (et al., 2019), socioeconomic conflicts should be addressed. For instance, sheep predation risk could be targeted through educating farmers on how to coexist with apex predators, or by drawing insights on wolf management from continental Europe. Over the last decades, wolves have been expanding in Europe, and the EU-funded LIFE Project pinpointed effective measures for preventative and responsive management of wolf-farmer conflicts (European Commission, 2013). Yet, Scotland presents such distinct land cover, climate, geographical features and shepherding practices from EU countries that comparisons are not entirely reliable (UK Wolf Conservation Trust, n.d.; SCOTLAND: The Big Picture, 2022-b; Gwynn & Symeonakis, 2022). Scotland-specific WR challenges ought to be understood.

1.1.3 Socioeconomic aspects of WR in Scotland

Because wolves disappeared from Scotland more than 200 years ago, present-day shepherding practices developed without the fear of predatory attacks. Sheep flocks roam freely and unsupervised in pastures throughout most of the year, being brought indoors only for harsh weather or lambing (NFU Scotland, n.d.; SCOTLAND: The Big Picture, 2020-b). Such husbandry practices are conducive to high predation rates (Wilson, 2004), meaning that freely reintroducing wolves in Scotland would cause a higher compensation burden than in countries where shepherding practices co-evolved with wolf presence (UK Wolf Conservation Trust, n.d.). Besides requiring public funding, compensation schemes have been criticized for their logistic and bureaucratic issues, such as difficulties in claim verification (SCOTLAND: The Big Picture, 2020-b). However, sheep farming in Scotland has been declining since 2008 (NFU Scotland, n.d.; Scottish Government, 2019). Considering that adaptive management practices can significantly reduce wolf attacks (Bautista et al., 2019), it is questionable how much of an economic burden livestock predation might effectively become.

An additional source of costs to taxpayers following WR would be the frequency at which problem individuals would have to be removed or relocated, since the species is known for long-distance travelling (UK Wolf Conservation Trust, n.d.). Unfortunately, the author could not find an existing assessment or quantification of hypothetical long-term wolf management costs in Scotland. Nevertheless, if wolves were to be reintroduced within a fenced reserve, it is arguable that conflicts with farmers, and corresponding costs, would be minimised compared to a nation-wide reintroduction (Bull et al., 2019). Plus, if they were equipped with GPS collars for automated tele-tracking, escapees would be more easily dealt with (Manning et al., 2009).

Likewise, no conclusive research on the economic benefits WR might lead to could be found. Nilsen (et al., 2007) suggested that by eliminating the need of hind culls, these carnivores may generate a £300 profit per deer stalking to estates. An additional economic incentive is ecotourism, as showcased by the additional \$30 million/year in revenue for wolf-related memorabilia and tourism generated by YNP since 1995 (SCOTLAND: The Big Picture, 2020-b). A major economic pro of WR would be fewer deer-caused damages to deal with following ungulate decline (see Table 1-1), but no quantification of such savings could be found. Therefore, the economics of WR remain uncertain. However, the cost-benefit ratio of WR does not seem to be the primary reason for the Scottish government uninterest in this rewilding intervention. In a 2009 interview, a SNH (now NatureScot) representative stated that country wide WR was not being considered due to lack of support from the general public and

widespread stark opposition from countryside actors (Times, 2009). Perhaps the NatureScot spokesperson referred to Nilsen (et al., 2007) survey of Scottish farmers, ENGOs, countryside organisations, urban and rural communities' attitudes towards WR (results summarised in Figure 1-1) while making such statement.

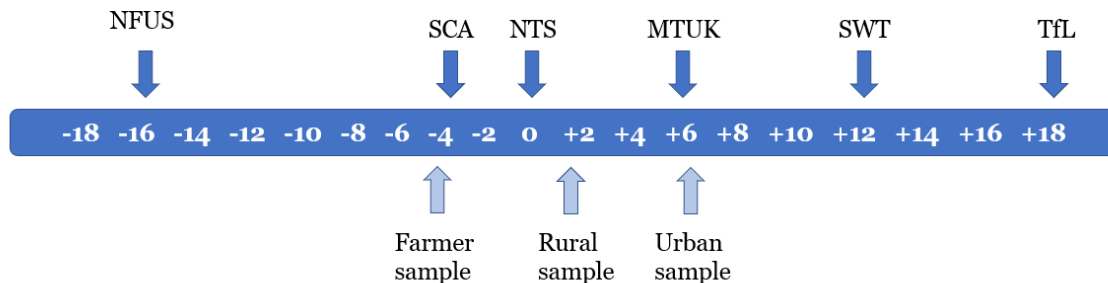


Figure 1-2. 'Attitude scores of 9 interest groups towards WR in Scotland'.

A higher score indicates greater support and vice versa to nation-wide Wolf Reintroduction in Scotland. "Urban Sample", "Rural Sample" and "Farmer Sample" were composed by private citizens, although the "Rural Sample" consisted of a mix of farmers and non-farmers. Other stakeholder groups include representatives from: National Farmer Union for Scotland (NFUS); Scottish Countryside Alliances (SCA); National Trust for Scotland (NTS); Mammal Trust UK (MTUK); Scottish Wildlife Trust (SWT); and Trees for Life (TFL). The latter three are ENGOs having biodiversity conservation and ER as core foci. Adapted from: Nilsen et al., 2007.

Only environmental bodies placing great emphasis on ER projects and biodiversity conservation reported a highly positive attitude towards WR, and urban respondents were more supportive of the idea than rural ones (Figure 1-1). Farmers, landowners, estate managers, and organisations representing countryside Scottish actors scored the lowest on the attitude scale (Figure 1-1). When asked, rural respondents reported that their major fear was for livestock predation, whereas they identified deer control and ecotourism as the main advantages of WR (Nilsen et al., 2007). Co-existence with large predators is known to generate psychological distress, but fear of wolves often does not reflect aggression statistics on humans or livestock (SCOTLAND: The Big Picture, 2022-b). Nilsen (et al., 2007) attitude findings align with a previous poll by Wilson (2004), who reported more negative views among individuals living and working in areas where wolves could expand upon reintroduction (i.e., rural residents vs urban residents).

1.1.4 Experimental Wolf Reintroduction: a way forward?

Since obtaining support from the public and countryside stakeholders is a prerequisite for WR to be considered by Scottish authorities, examining the acceptance of large predator reintroductions (LPRs) among Scottish citizens is crucial. A recent poll of 145 citizens revealed that 76% welcomed rewilding projects and over half WR specifically (YouGov, 2019; Scottish Rewilding Alliance, 2021). Besides relying on a minute sample, this 2019 survey did not tackle reasons for support and opposition, nor focused on social groups known to be against to WR. Structured investigations of the attitudes of countryside actors and residents are needed to verify whether there is a future for wolf reintroduction in Scotland.

While the scientific literature reviewed in section 1.1.2 suggest that wolves may catalyse Scottish landscape restoration in a similar manner to what occurred in YNP, and that Scotland has the habitat to house a viable wolf population, most authors do not support a country-wide reintroduction. Instead, Bull (et al., 2019), Sandom (et al., 2012), and Manning (et al., 2009) advocated for a controlled reintroduction in an artificially (e.g., man-made barriers) or naturally (e.g., an island) fenced area. These scientists deemed Experimental Wolf Reintroduction (EWR) as a necessary first step towards WR in Scotland. According to Sandom (et al., 2012) and Bull (et al., 2019), fencing would be a prerequisite for wolves to effectively reduce deer numbers to begin with. Manning (et al., 2009) highlighted instead a fenced reintroduction would enable scientists to easily monitor wolf–deer interactions, assess the (non-)lethal effects of the former species on the latter and the surrounding environment. Therefore, a fenced EWR would generate Scotland-specific ecological data, and so ascertain whether and how wolves could there yield the same positive environmental outcomes observed in YNP post-reintroduction (Ripple & Beschta, 2012). In essence, Manning (et al., 2009) propose that EWR could guide fact-based decisions regarding unrestricted wolf reintroduction in Scotland (Figure 1-2).

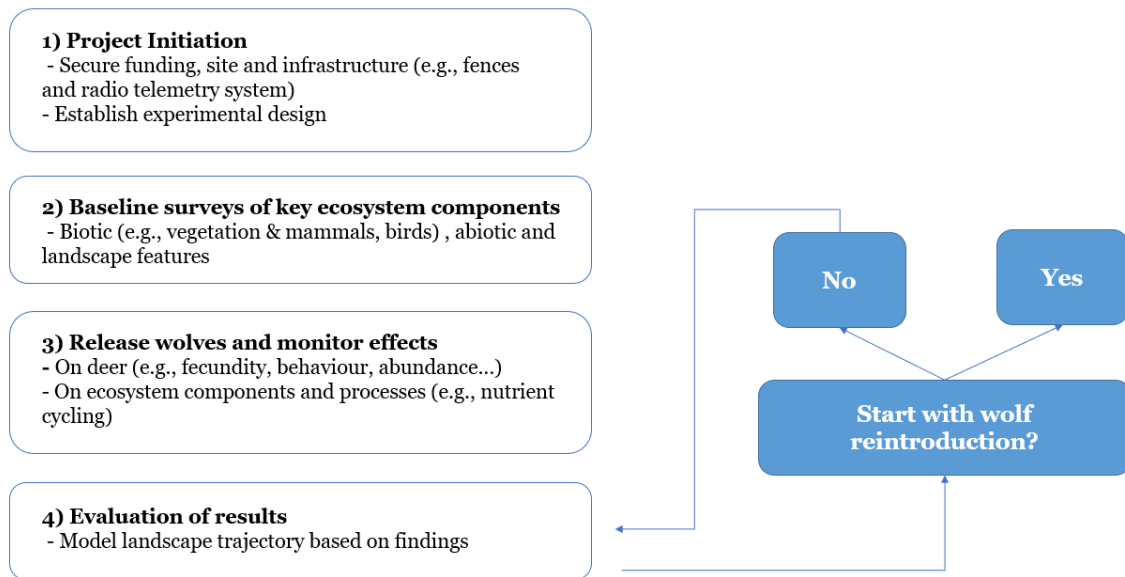


Figure 1-2. ‘Research pathway for Experimental Wolf Reintroduction in Scotland’.

Outline for an experiment to determine wolves’ ecological effects on Scottish ecosystems, to gauge whether these carnivores should be brought back outside of a controlled setting. If the decision was not to proceed with nation-wide reintroduction, EWR could be kept going to generate further insights on prey-predator-ecosystem dynamics.

Adapted from: Manning et al, 2009.

Additionally, fenced reintroduction could reveal, at a minor scale, the impacts on countryside communities caused by, for example, wolf escapees and consequential livestock predation, and changing deer numbers, allowing for the timely planning of management responses if WR was to then be pursued (Manning et al., 2009). A fenced EWR could also simplify wolf population management & monitoring and, most importantly, exert less of a psychological toll on rural actors than WR would. A long-term EW within a reserve boundary somewhat obviates to key issues that have so far prevented the Scottish government from furtherly consider WR: uncertainty of ecological effectiveness; conflict with farmers; opposition from the public and key stakeholders.

To the author’s knowledge, no previous study tackled the attitudes of Scottish citizens towards EWR, and existing research focuses on nation-wide reintroductions. Given that wolves could

theoretically contribute to the recovery of degraded Scottish landscapes by ameliorating the “deer problem”, which in turn would alleviate governmental expenses, and that local communities support is key for EWR to be considered by national authorities, such knowledge gap ought to be addressed. Investigating salient stakeholders’ opinions of EWR, the factors influencing their attitudes and contributing to social acceptance is crucial to move the discussion forward.

1.2 Aim and Research Questions

The overarching aim of the present thesis is to assess the feasibility of fenced EWR in Scotland from a salient stakeholders’ acceptance perspective. Rather than evaluating technical and scientific aspects, the author wishes to characterise Scottish countryside actors’ attitudes towards a hypothetical EWR, the underlying factors and reasons, and explore ways to ameliorate social acceptance. Thus, the thesis addresses whether civil, public and private Scottish rural actors would and could welcome an EWR project, plus key points to include in its evaluation, design, and planning to favour salient stakeholders’ acceptance and/or minimise impacts on local communities. The following research questions (RQs) guide the present study:

RQ1) What are the attitudes of key Scottish countryside stakeholders towards a hypothetical fenced EWR?

RQ2a) Considering current knowledge on large predator reintroductions (LPRs) and WR specifically, what factors could be shaping EWR attitudes of Scottish countryside actors?

RQ2b) What is the relative importance of the factors identified in RQ2a across selected stakeholder groups of interest?

RQ3) What are key points to be integrated in the evaluation, design and planning of fenced EWR so to minimise potential negative impacts and better stakeholders’ attitudes?

The RQs were tackled by administering a survey and interviewing representatives of selected Scottish countryside stakeholders. Interview and survey’s questions were based on a review of studies tackling interest groups’ attitudes on LPRs or WR, theories and frameworks for effective LPR design and the psychological dynamics behind attitude formation.

1.3 Scope and delimitations

The thesis presents a well-defined geographical scope: the Scottish countryside. Given limited material and temporal resources, data collection focused on the regions where a hypothetical EWR would be most likely to occur because of high habitat suitability (i.e., Highlands and Grampian Mountains, *per* Gwynn & Symeonakis, 2022), and a restricted list of interest groups. It follows that the views of stakeholder groups excluded from the mapping (see Chapter 3) were not captured. Moreover, although interest groups were selected with the intention of widening the breadth of needs, views and experiences captured by the thesis, the list of salient stakeholders involved (see Chapter 3) is not exhaustive. The author fully acknowledges that not every social reality of Scotland’s countryside was analysed, and that findings are intrinsically limited to the opinions of a restricted number of survey respondents and interviewees.

1.4 Ethical considerations

The research plan was reviewed against the criteria warranting an ethics board review at Lund University and was found to not need a review from the institution committee. Find below a brief discussion of the relevant ethical aspects.

1.4.1 Researcher honesty, positioning and personal integrity

The present research is not funded by an external organisation. Aside from the input of the thesis advisor Professor L. Mundaca, the research design, findings analysis & discussion are entirely the authors' own production. However, the author of the present thesis is aware of their favourable view of rewilding practices, stemming from bachelor studies in Zoology and an eco-centric worldview. To avoid and minimise the possibility of their personal stance biasing survey & interviews formulation and analysis, the following steps were taken:

- Tracking the instances in which the author's opinion emerged, to detail the type of interaction and potential consequences for research integrity.
- Actively analysing sources presenting counterarguments to EWR and / or authored by organisations notoriously against EWR (e.g., the NFUS).
- Asking an external, neutral party knowledgeable in qualitative research (i.e., five IIIIEE peers) to review the survey & interview questions and ensure that phrasing and content were not leading in any way.
- Proactively refraining from expressing their personal stance in interview setting.

Nevertheless, because the thesis focus is on Scottish stakeholders' **own** opinions and insights, the author believes their perspective on rewilding did not compromise research legitimacy and findings' reliability. In the Annex, the reader shall find a copy of the survey and interview protocol for them to review.

All the images, text and graphs used are either the author's original creation or were adapted from external sources. The original source of images, tables, and diagrams appears in their respective legends.

1.4.2 Ethical responsibilities to the subjects of research: consent, confidentiality, and courtesy

Participants were treated with fairness and respect, selected with no regard to their sex, gender, age, ethnicity, culture, religion, political and sexual orientation, appearance, and disability. Their privacy and personal freedom received the utmost respect.

Respondents to the questionnaire and interviewees were debriefed in advance regarding the content of these data collection activities, and were given either a consent form to sign (for interviewees) or survey instructions to ensure they fully understand the following:

- Participation is voluntary and anonymous. The only piece of information disclosed about individual participants is their pronouns, stakeholder group and/or organisation they are affiliated with.
- Information that the interviewee and respondents may indicate as confidential would not be included in the research.
- Participants may leave or end the interview at any time. Withdrawal entails that the information provided would not be included in the research.
- The purpose of the questionnaire and interviews was solely the writing of a Master thesis on the barriers to and acceptance of EWR in Scotland by rural interest groups. As such, the object of the study is the participants' individual opinions, or alternatively, insights on the organisation they represent.
- Participation to the study shall cause no distress, damage to participants' livelihood and well-being, nor put them at commercial disadvantage. Interviewees remained anonymous.

- The information was stored in a secure manner and processed in such a way that the identity of the individual could not be traced back from it in case of a security breach.

1.4.3 Outcomes

Due to the anonymity of the questionnaires and interviews, and the nature of the questions asked, there is no reason to believe that participation in the research would cause respondents to suffer distress, commercial disadvantage, or any other damage to their livelihood or well-being. The outcomes of this research cannot be foreseeably used in a way detrimental to the reputation, livelihood, dignity, and interpersonal relationships of the participants.

1.4.4 Data handling, storage, availability

Survey data was stored on the author's password-protected computer, and a pen drive as a backup archive. Interviews were recorded in their entirety, though information that the interviewee identified as strictly confidential was not transcribed. Transcriptions were stored identically to survey results. These files were accessed exclusively by the author, used for the sole purpose of this research, and will be stored for no longer than 3 years. Access to the archived data would be granted for research purposes only and after receiving permission from Lund University.

1.5 Audience

It is expected that the present research findings could be useful to organisations (e.g., Rewilding Britain; SCOTLAND: The Big Picture) interested in exploring WR, and more broadly species reintroduction, in Scotland or using Scotland as a case study. Moreover, Scottish organisations linked to governmental institutions (e.g., NatureScot, Land & Forest Scotland) would be provided with an up-to-date assessment of: public attitudes towards EWR and WR; factors underpinning EWR public acceptance; and additional points regarding landscape management and environmental decision-making. Lastly, the thesis would contribute to the body of literature exploring design of socially inclusive rewilding interventions, characterising the mechanisms of attitude formation and social acceptance of large predator reintroductions.

1.6 Thesis content outline

The thesis is composed of six, interconnected chapters.

- **Chapter 1 “Introduction”**. Details the research background, topic, aims, objectives, scope and limitations, expected audiences for the thesis and ethical aspects.
- **Chapter 2 “Conceptual Framework”**. Covers the key theories and concepts from academic literature that guided the research design and analytical framework.
- **Chapter 3 “Methodology”**. It elaborates on the research design, materials, and analytical process, including methods for data collection & analysis, the rationale for methodological choices, limitations and countermeasures.
- **Chapter 4 “Findings”**. Analysis of collected data following the three RQs and the conceptual framework, including an initial interpretation of the outcomes.
- **Chapter 5 “Discussion”**. Here, the main findings of the thesis are more discussed, contextualised and compared with existing literature.
- **Chapter 6 “Conclusions”**. Includes recommendations for practitioners and directions for future research.

The five chapters are followed by the Bibliography and Annex, containing supplemental documents detailing the data collection process: Stakeholder Mapping; Survey cover letter, closing instructions and items; Consent Form for Interviewees; Interview Protocol.

2 Conceptual Framework

In this Chapter, I review theories, concepts and frameworks from existing literature that guided the formulation of research questions, methodological choices, research design, and the findings' discussion.

2.1 The importance of non-biological considerations in species reintroduction projects

In the 80s, diverse authors proposed that until that point, most species reintroduction projects had been failing due to their almost-exclusive focus on ecological and biological aspects (Kellert, 1985; Griffith et al., 1989; Clark, 1989). Considerations of social, economic and political nature had been historically neglected, resulting in the planning of ineffective, unfeasible and mostly unsuccessful projects, to which Reading, Clark and Kellert (2002) developed a Holistic Endangered Species Reintroduction Paradigm (HERSP). Based on Reading (et al., 2002)'s professional experiences and academic research, the HERSP was intended to help in the design of effective reintroduction projects by making explicit the equally important, non-biological aspects of species reintroduction (Figure 2-1).

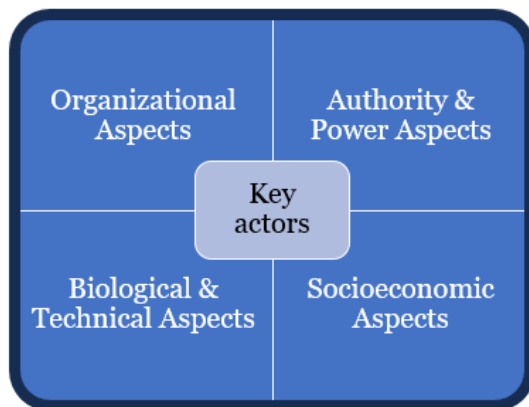


Figure 2-1. 'Holistic Endangered Species Reintroduction Paradigm (HERSP)' Reading and co-authors (2002) developed the HERSP to guide wildlife managers and scientific experts in the design of more effective species reintroduction programmes. Species reintroduction projects involve four types of aspects (organizational; socioeconomic; biological; authority & power-related), each bearing equal weight and being shaped – while shaping in return – the actions, attitudes and opinions of the Key Actors. This human component is therefore at the core of the HERSP.

Adapted from: Reading et al., 2002.

At the very centre of the HESRP are the “Key Actors”, the social entities touched and involved with the species reintroduction. For example, state and local environmental agencies, academic & research institutions, NGOs, salient stakeholders and the general public. Key Actors are the core of the HERSP because it is their attitudes, values, beliefs and actions what ultimately determine the outcome of reintroduction projects. Key Actors shape and are shaped in turn by four additional variables, intrinsic aspects to species reintroduction. Namely: biological & technical aspects; authority & power aspects; organisational aspects; and socioeconomic aspects (Figure 2-1). The former are the strictly scientific factors to be necessarily considered for species reintroduction, such as ecological traits, donor ecosystem characteristics, habitat considerations, relocation methods. Authority & Power aspects relate to the “political” sides of species reintroduction, to how power, control and authority over man-made and natural resources may be distributed across relevant stakeholders throughout the reintroduction process, and the consequential struggles. Organizational aspects encapsulate the logistics, bureaucratic and context-specific challenges that would arise from inter- and intra-agencies interactions. Socioeconomic aspects refer to the attitudes, norms, customs, and values of Key Actors, as well as the economic pros and cons that the reintroduction would bring about (Reading et al., 2002).

Following the HERSP, by examining the three non-technical aspects, the opinions and needs of Key Actors, how these interact, and then incorporating such non-scientific knowledge in the

design of reintroduction programs, the latter would be more likely to succeed. For animals as controversial as large predators can be, addressing socioeconomic factors, and especially public support of the reintroduction, becomes imperative (Hook & Robinsons, 1982; Tilt, 1989, in Reading et al., 2002). Numerous authors state that public acceptance of a given Large Predator Reintroduction (LPR) project, as well as widespread attitudes towards the predator species itself, determine whether the reintroduction would be actively or passively opposed, which is crucial for LPRs' short- and long-term success (among others, Bight, 1989; Bright & Manfredro, 1996; Meadow et al., 2005). Reading (et al., 2002) illustrate this point using the 1970s experimental timber wolf reintroduction in Michigan as an example. In that instance, the whole pack was killed by locals within a year, and a follow-up study suggested that future attempts would also fail as long as local communities would not be supportive of the intervention (Hook & Robinson, 1982; Reading et al., 2002).

The HERSP and the Michigan EWR example reiterates the importance of examining public support and salient stakeholders' attitudes for the EWR in Scotland, as well as the dynamics through which individuals may come to support hold a certain opinion of the intervention. To do so, one has to turn to socio-psychological studies and analyse relevant frameworks, concepts, and their empirical support.

2.2 Theories of public support and attitude formation

Public support of LPR (and by extension WR & EWR) is here intended as Stern (et al., 1999)'s 'policy support': the acceptance of restrictions and changes in existing behaviours that voting for a given environmental policy, and related interventions, entails. Benign attitudes towards the policy itself (in our case, EWR) and/or the policy object (in our case, wolves) among key stakeholders are conducive to policy support (Ghasemi et al., 2021). In other words, EWR policy support is the outward manifestation of positive EWR attitudes. Was the Scottish Government to pursue EWR, a substantial amount of land would become inaccessible, and surrounding communities would have to modify certain habits and behaviours to the presence of their new, 'wild' neighbours. Thus, widespread policy support (*sensu* Stern et al., 1999) and positive attitudes towards EWR and wolves are essential.

2.2.1 Socio-psychological antecedents of policy support

Then, how do people decide whether to support or oppose an environmental policy? Stern (et al., 1999) answered this question by developing the Value-Belief-Norm Theory (VBN). The VBN is a socio-psychological conceptual framework explaining how predisposition to engage in pro-environmental behaviours others than straightforward activism may arise. The behaviours touched by the VBN are environmental citizenship, private-sphere practices (e.g., purchasing decisions) and environmental policy support. In this section, I will discuss how the VBN theory can apply to policy support and the issue of EWR in Scotland.

As the name suggest, according to the VBN theory the socio-psychological antecedents to policy support are personal values, beliefs and norms. The three are placed in a causal chain, meaning that each can directly influence the following ones (Figure 2-2). The causal chain begins with values, the more stable components at the core of an individual's personality (Stern et al., 1999). The altruistic, egoistic and biospheric values of an individual affect three key beliefs: about the New Ecological Paradigm (NEP, a worldview highlighting the fragility of the ecosphere and how anthropogenic activities threaten it); awareness of Adverse Consequences (AC) the environmental issue in question can lead to that would have an affect on own self-interests; and

Ascription of Responsibility (AR), whether individuals believe that supporting the policy would truly contribute to the environmental cause. Then, these three beliefs can activate personal norms, a moral push that predispose people to manifest political support if they reckon that would be the “right thing to do”. In a later publication, Stern (2000) incorporated values, beliefs and norms under a single variable called “attitudinal factors”, stating that while the VBN theory explains how a generalised predisposition to act pro-environmentally arise, other policy-object specific attitudinal factors come into play. In the same paper, Stern (2000) describes three types of variables (personal capabilities, contextual forces, habits & routines) that interact with attitudinal factors and each other to determine how and if environmental policy support is displayed (Figure 2-2).

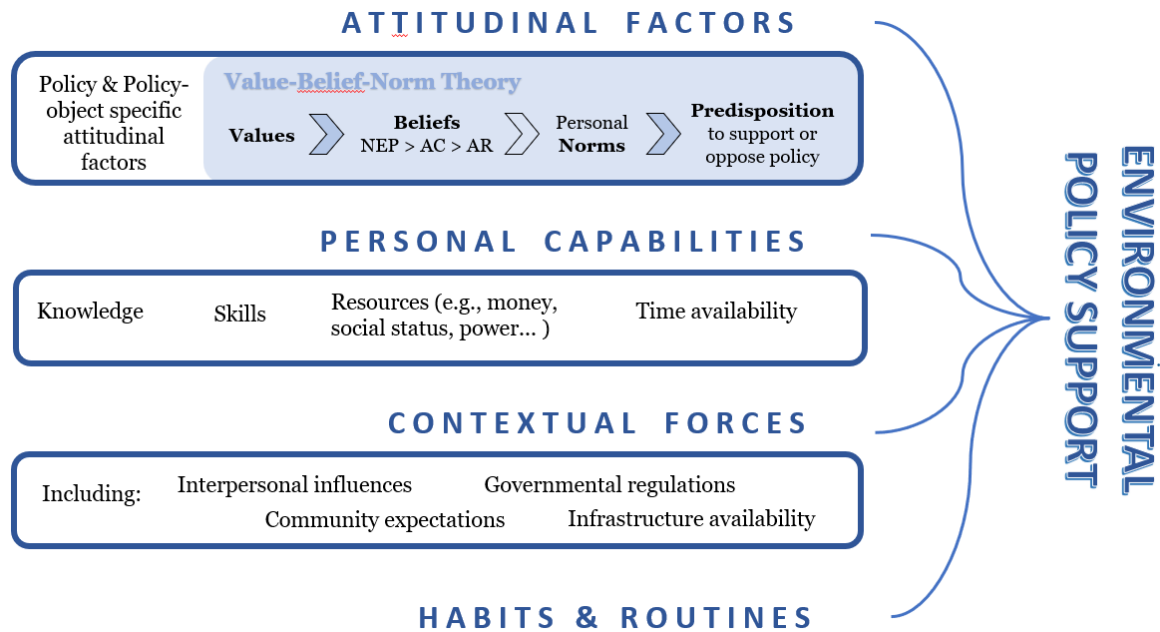


Figure 2-2. ‘The causal variables underlying Environmental Policy Support’

The diagram above synthesises the work of Stern (et al., 1999) and Stern (2000) to explain how individuals may decide to engage in certain pro-environmental behaviours, case in point, Support of Environmental Policy. Four variables interplay: attitudinal factors, personal capabilities, contextual forces, habits & routines. Stern (2000) states that attitudinal factors include a predisposition to the behaviour, which can be in turn via the Value-Belief-Norm (VBN) Theory - by Stern (et al., 1999). In the VBN Theory, three social-psychological factors are linked in a causal chain: Values (central, fixed components of an individual’s self); Beliefs (on the New Ecological Paradigm (NEP), awareness of Adverse Consequences (AC), and Ascription of Responsibility (AR)); and personal Norms (i.e., beliefs of what is the moral path of action). As Value, Beliefs and Norms interact, an individual may become predisposed to Support an Environmental Policy; however, policy- and policy-object specific attitudinal factors also shape the final stance (Stern, 2000).

Adapted from: Stern et al., 1999; Stern, 2000.

If we were to apply the VBN framework to the present thesis, the policy in question would be the realisation of the EWR project. We would postulate that EWR support would hinge firstly on Scottish stakeholders’ core values: do they care about the state of Scotland’s nature? Do they think of the environment as something important enough to make compromises? Then, whether they believe or not that a) wolves have a rightful place in Scotland’s ecosystems and hence should be brought back, b) without wolves, Scottish landscapes would continue degrading in such a way that their own self-interests would be threatened, c) manifesting their political support would contribute to the realisation of EWR in Scotland, and d) supporting EWR is the moral course of action. As for capabilities, habits & routines, and contextual forces, these would be directly linked to an individual’s stakeholder group of belonging, demographics and life

experiences. This begets the questions: what shapes the values, beliefs and norms underlying a person's inclination to support EWR? When it comes to accepting EWR, what are the additional attitudinal factors of relevance?

2.2.2 WR attitudes' components and their dynamics

Let us first operationalise “attitude”: a positive or negative inclination towards an object, concept or situation composed of cognitive and affective components, and originating from a collection of beliefs regarding the attitude-object (Meadow et al., 2005). In their 1996 study, Bright & Manfredi proposed and provided empirical evidence for a conceptual model describing the components, and their interactions, of public attitudes towards WR. In this section, I will discuss Bright & Manfredi (1996)'s model, complementing it with elements from socio-psychological research to provide a conceptual overview of how attitudes towards WR, and by extension EWR, are formed (Figure 2-3).

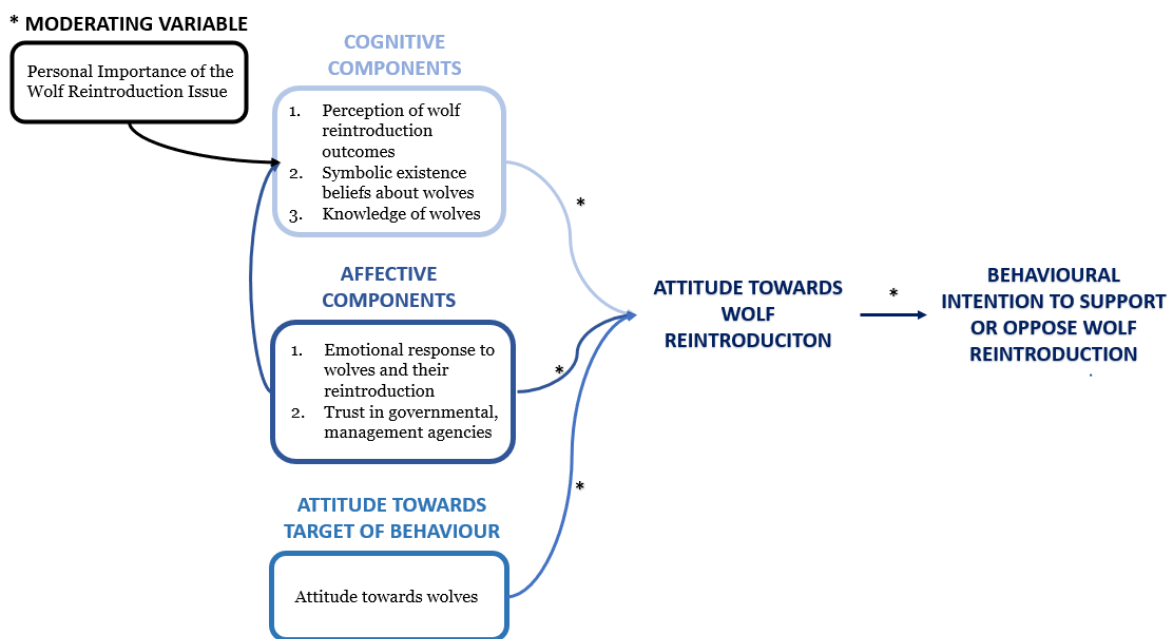


Figure 2-3. 'Conceptual model of Wolf Reintroduction (WR) attitude formation and influence on related behaviour'.

The diagram illustrates the factors underlying individuals' WR attitudes. The relative weight of the three antecedents to attitude (i.e., cognitive, affective components and attitude towards wolves themselves) is modulated by the level of personal importance attached to the WR issue, as signalled by the black asterisks (*). This variable also moderates how accurately attitudes predict behavioural expressions, specifically political support to WR realisation. Arrows indicate that a variable has a direct influence on another.

Adapted from: Bright & Manfredi (1996)

The opinion held towards wolves themselves, cognitive and affective components are the three antecedents to WR attitude, which, as previously discussed, underlies support or opposition to the intervention (Figure 2-3). Cognitive components are linked to mental reasoning and include: outcome perception, the self-directed benefits and risks individuals think WR would lead to; symbolic existence beliefs about wolves, the intrinsic value attributed to wolf existence and their well-being; objective knowledge of wolves, ecology and WR scientific aspects (Bright & Manfredi, 1996). Outcome perception relates to self-interests and social identification, meaning that if an individual thinks WR would produce significant benefits to themselves or their social group of reference, they would be more prone to welcome it, and viceversa if WR would

threaten their well-being, livelihood and self-interests. Affective components are linked to feelings, emotions, sensations, and heuristics, which are mental shortcuts used to pass judgements on situations or objects in a quicker and easier manner than by engaging in rational thinking (Slovic et al., 1980). Trust in the agencies responsible for EWR & WR and emotions elicited by wolves are the affective components, both known to positively influence EWR & WR attitude (Bright & Manfredi, 1996; Siegrist & Cvetkovich, 2000; Slovic et al., 2007).

The relative weight of the three attitude antecedents and attitude-behaviour consistency are determined by the importance (i.e., level of psychological significance, concern) an individual attributes to WR issue (Boninger et al., 1995; Bright & Manfredi, 1996). In their review of socio-psychological literature, Boninger (et al., 1995) highlighted how the higher the importance, the harder it is to change the attitude, also because attitude-relevant information would be processed in such a way to reinforce initial beliefs - a true positive feedback loop. Three elements contribute to attitude importance: self-interests, social identification with the group most affected by the attitude-object, and value relevance of the attitude-object (Boninger et al., 1995). Thus, stakeholders whose livelihood and lifestyle would be most affected by EWR, and individuals reporting particularly positive symbolic beliefs about wolves, should also report higher EWR issue importance. At the same time, because 'objective' facts (e.g., information on WR risks, benefits, and scientific aspects) about the attitude-object would be biasedly interpreted, individuals attaching great significance to the WR should rely more on values, symbolic beliefs about wolves, and emotions to form their attitudes.

Bright & Manfredi (1996) findings substantiates these concepts. Authors found that among people with high WR issue importance, attitudes are not only a better determinant of behaviour, but also are more strongly affected by symbolic beliefs and emotional response. By contrast, in individuals who attached less significance to the WR issue, knowledge and outcome perception were better predictors of WR attitudes. Also, attitude direction correlated with the evaluation of risks & benefits of WR. Potential benefits were evaluated more positively by those holding a benign view of WR, and potential risks as more hazardous by those with a negative stance towards WR (Bright & Manfredi, 1996). The latter finding could be ascribed to the aforementioned positive feedback loop, whereby attitude-relevant information like potential WR consequences is judged consistently with the underlying attitude. It also reflects the need of cognitive consistency discussed by Alhakami & Slovic (1994): individuals strive to maintain consistency in their belief system, so if they think negatively of a potential hazard-source, they pass harsher risks judgements to justify their negative attitudes, and vice versa.

Academic literature on the psychology of risk & benefit perception adds that this cognitive component can also be influenced by the affective elements listed in Figure 2-3, especially when individuals are unfamiliar with the source of risk & benefits or may lack relevant background knowledge (Siegrist & Cvetkovich, 2000). Early work by Slovic (et al., 1980) proved that when laypeople must judge the riskiness of a given hazard sources, their fatality estimates do not reflect actual rates but instead qualitative aspects of the hazard source. Risk level correlated with media coverage, suggesting that the availability heuristic (i.e., exposure to large amounts of or sensationalistic coverage of the hazard source leads to inflated likelihood, risk and frequency assessments) could contribute to the perceived-actual risk gap. Dreadfulness, uncontrollability, and unfamiliarity were most strongly associated with greater risk, suggesting the influence of emotional responses to outcome assessment. In a later publication, Slovic (et al., 2007) expanded the role of emotions in risk assessment and judgement-making, arguing that the latter are influenced by "affective heuristic". Affective reactions (i.e., emotions and feelings) to an object are immediate and automatic, predate cognitive appraisal and are comparatively less energy-consuming to form (Zajonc, 1980). Because of that, when the attitude-object is complex and relatively unknown, people would subconsciously rely on their emotional reactions rather than

engage in dispendious information processing to shape their attitudes. Slovic and colleagues (2007) further argue that the direction, positive or negative, and strength of the affective reaction can shape risk & benefits assessments, and exemplify this point with the findings of Alhakami & Slovic (1994): when individuals were asked to rate the risks of a sport activity, if they disliked it they tended to consider it high-risk, with the level of risk being correlated with the intensity of dislike. Alhakami & Slovic (1994) findings echoes the correlation attitude and risk vs benefit appraisal reported by Bright & Manfreda (1996).

Risks & benefits often present an inverse relationship, which Siegrist and colleagues (2000) postulated to be due to an underlying variable: social trust. Social trust refers to the trust placed in the institutions and individuals responsible for managing the hazard source, and Siegrist & Cvetkovich (2000) theorised it served as a heuristic for risk assessment among laypeople. In other words, when a person lacks the experience with and technical knowledge of a hazard source, and the capabilities to engage in cognitive assessments, they would appraise riskiness according to how much they believe responsible agencies would keep them safe via correct management (Siegrist & Cvetkovich, 2000). Social trust is rooted in Salient Value Similarity: believing that the person/entity in charge of hazard management holds the same values as importantly as the perceiver) and was found to correlate positively with perceived benefits and negatively with perceived risks of a given hazard source (Siegrist et al., 2000). In other words, social trust fosters benign appraisals of outcomes, leading to higher benefit and lower risk perception.

2.3 Scottish EWR-specific considerations.

To summarise the literature reviewed in this chapter and relate it to the EWR issue in Scotland:

- Reintroductions' design should address every aspect of the HERSP. Since wolves are known to cause livestock predation and distress to nearby communities, socioeconomic aspects and salient stakeholders' opinions should be given particular attention.
- On top of attitudinal factors, whether an individual may support a LPR project depends on their context, habits, and capabilities.
- Predisposition to support LPRs comes from the interaction of values, beliefs and norms (e.g., how much individuals think they would be negatively or positively affected) with other case-specific considerations. Self-interests promote issue importance, and in turn more adamant, resistant to change positions.
- Socio-psychological and empirical research showed that LPR outcome perception is an important component of related attitude, but when people are unfamiliar with the attitude-object, social trust, emotional reactions and other heuristic process prevail.

Given that wolves have been absent from Scotland for centuries and EWR has not been widely debated, EWR constitutes an unfamiliar & unknown hazard to Scottish rural communities. Therefore, it is expected that trust in management authorities and emotional reactions to wolves will correlate with risk vs benefit perception, and in turn affect EWR attitude. Stakeholder groups whose livelihood would be substantially impacted by EWR realisation (e.g., farmers, deer professionals, land estate workers & owners) and those individuals attributing great intrinsic values to wolf existence should also attach high importance to the EWR issue. Among these individuals, it is expected that attitudes would be more strongly shaped by affective reactions and value & belief systems. Since occupation and age are interlinked with the capabilities, habits and contextual forces referred to by Stern (2000), stakeholder groups' EWR attitudes might differ, and stakeholder groups might then present different levels of attitudinal antecedents – such as symbolic beliefs, perceived outcomes, and different dynamics.

3 Research Methodology

The approach and methods chosen to answer the RQs are here detailed and justified.

3.1 Research design

The research follows an inductive reasoning. The social feasibility of EWR in Scotland was assessed by examining key interest groups': attitude towards EWR; reasons and variables (e.g., psychological, economic, contextual factors...) underlying and/or shaping their stance; and EWR-specific concerns. The constructivist and transformative worldviews influenced the research design, whereby policymaking ought to be bottom-up, rooted in participatory processes where interest groups classically excluded from central decision-making are actively involved from the start in the intervention design, and salient stakeholders' needs & opinions are the foci of ex-ante policy evaluation (Creswell & Creswell, 2018). In the Scottish context, this means engaging countryside actors whose livelihood and well-being would be in-/directly affected by EWR. Because Scottish environmental authorities ought to integrate rural actors' needs in decision-making, understanding the EWR views of countryside actors is the very first step towards examining EWR social feasibility.

The research had a convergent, mixed-methods case study design. Following a stakeholder mapping and literature review to answer RQ2a, a survey was developed and administered to as many individuals as possible from the selected interest groups. Semi-structured interviews were carried out with at least one representatives of each salient stakeholder group. The main goal of the questionnaire was to address RQ1 and RQ2b. The semi-structured interviews focused on RQ3, and were designed to gain a nuanced understanding of the needs, concerns and thoughts of research participants on EWR, environmental interventions design & evaluation. The survey contained both open-ended (qualitative) and scalable (quantitative) questions. Qualitative answers from both survey and interviews were analysed through content analysis, so to pinpoint themes and patterns (Creswell & Creswell, 2018). Survey results and qualitative data were weaved together in an overarching narrative, to triangulate data sources. Overall, the research presents triangulation of data sources (peer-reviewed & governmental publications, stakeholders' insights), data collection methods (literature review, survey, interviews), and analytical processes (non-parametric & descriptive statistics, content analysis). Altogether, such triangulation ought to strengthen the thesis' results and conclusions (Creswell & Creswell, 2018).

3.2 Data collection

3.2.1 Stakeholder Mapping

To reiterate, the foci of the research were the opinions, views, needs, and concerns of Scottish countryside actors regarding EWR and landscape management. Because of limited time and resources, the author had to restrict the number of social groups involved. The selection was led by questions rooted in the constructivist and transformative worldviews:

- a) Whose livelihood and well-being would be most indirectly & directly affected by EWR?
- b) Which social groups are typically marginalised from the decision-making process of environmental interventions, yet often are at their receiving end?
- c) Who could influence the evaluation, design and implementation of EWR in Scotland?
- d) Which stakeholders should be included in the research process so to widen the breadth of social realities ultimately captured?
- e) Which stakeholder groups could be feasibly involved in the data collection and/or would be most interested in collaborating?

Following these criteria, the author identified seven interest groups from the civil, private, and public spheres: countryside residents; farmers; hunters; deer professionals (e.g., gamekeepers, wildlife managers); land estates workers, managers, owners; ecologists with expertise in wildlife management. On top of private individuals, four organisations were selected: ENGOs focusing on biodiversity issues – specifically, Tree for Life (TfL); the National Farmers Union of Scotland (NFUS), representing the interests of farmers and crofters; the Association of Deer Management Groups (ADMG), a national network coordinating regional deer populations managers and gamekeepers; and the Scottish Countryside Alliance (SCA), catering to the interests of countryside communities. In the “Stakeholder Mapping” table of the Appendix, the reader can find a thorough explanation of the rationale for inclusion of each interest group, along with a list of interviewees.

3.2.2 Literature Review

A literature review was carried out with a three-fold objective:

- Better understand the Scottish rural context
- Provide the basis to craft relevant survey and interview questions and answer RQ2a.
- Develop an understanding of broader literature to appropriately contextualise questionnaire and interviews answers.

The primary search databases were LUBSearch, Lund University’s online library, and Google Scholar. For practical reasons, paper-resources were excluded. No source of information was discriminated against *a priori*, but was included only upon verification of legitimacy. In order to counterbalance their positive rewilding opinion, the author made a conscious decision to explore the publications of organisations renowned for being against LPRs, such as the NFUS. The author prioritised studies based on real-life instances of LPR and WR, policy evaluation of rewilding projects, and analyses of WR public support & attitudes.

Search strings included:

- (“key factors”) AND (“public attitudes”) OR (“social feasibility”) AND (“large predator reintroduction”) OR (“wolf reintroduction”)
- (“rewilding”) AND (“Scotland”) AND (“sociocultural barriers”)
- (“wolf”) AND (“human wildlife conflicts”)
- (“Scotland”) AND (“deer management”) AND (“landscape restoration projects”)
- (“case study”) AND (“large predator reintroduction”) OR (“wolf reintroduction”) AND (“public acceptance”) OR (“social feasibility”)
- (“Scotland”) AND (“countryside stakeholders”) AND (“environmental intervention”) OR (“landscape management policy”)

After a first selection, the abstracts, executive summaries, and conclusions of each source were skimmed through. Documents lacking logic, clear language, solid methodologies, or relevance were eliminated. The author prioritised sources focusing on Scotland, wolf and other apex predators’ real-life reintroductions, and public attitude to WR or LPR. The remaining sources were then individually analysed through a synthesis matrix. Information was sorted in the following categories: factors affecting public acceptance and social feasibility of WR and LPRs; Scottish rural actors land use interests; hypothetical EWR attitudes and related concerns of Scottish rural actors; potential socioeconomic, institutional, and cultural barriers to EWR in Scotland. The synthesis matrix was used as the basis for questionnaire and interview content.

3.2.3 Survey

Items creation

Questionnaire were developed after thorough analysis of studies with a similar objective to the present thesis: understanding the factors and dynamics underlying public attitudes and support to WR & LPR. Common demographic factors affecting WR & LPR stance were found to be: residency (rural vs urban), age, occupation and stakeholder group (farmer vs hunter vs forester...). The literature discussed in Chapter 2 already highlighted psychological variables relevant to attitude formation: trust in governmental agencies, opinion of and symbolic beliefs towards wolves, importance attributed to the WR issue, risk & outcomes perception, and emotions elicited by the predator species. Author developed relevant survey items using the following studies as blueprints: Bath (1989), Bright & Manfredi (1996), Bath (et al., 2008), Ghasemi (et al., 2021), and Sakurai (et al., 2020). Phrasing and content similarities should be expected. The extensive peer-review undergone by the abovementioned 'blueprint' studies is encouraging for the accuracy and reliability of survey items here used. In total, 45 questionnaire items were developed, covering thirteen categories (average of four items per topic category):

1. Demographics – age, stakeholder group, county of residence.
2. Attitude towards wolves – whether respondents liked the animal itself.
3. Attitude towards WR – whether they approve of the idea.
4. Attitude towards EWR - whether they approve of the idea.
5. Compromise – whether their stance on EWR could change under different conditions.
6. Reasoning of EWR stance - open text.
7. Trust in governmental institutions – whether Scottish authorities could be trusted with the evaluation, design and management of EWR.
8. Symbolic beliefs towards wolves – whether respondents believed it was their duty to bring wolves back in Scotland and ensure the canids would thrive.
9. Personal importance of the EWR issue – the level of significance attributed to the topic.
10. Emotional reactions to EWR – negative (fear, worry/concern) and positive (awe, interest) emotions elicited by the idea of EWR.
11. Risk exposure – the threat level EWR would pose to pets, livestock, deer, wildlife and humans well-being.
12. Outcome perception – perceived likelihood and intensity of three positive (increased ecotourism; habitat regeneration; deer control) and negative (livestock predation; economic losses to farmers; distress to nearby rural communities) EWR consequences.
13. Key points for EWR design and evaluation – open text.

Items were reviewed by a group of 5 peers to ensure that wording was neutral, appropriate and not biasing. In the Appendix, the complete survey text, including cover letter and closing instructions, is provided. Importantly, the closing instructions allowed respondents to signal their interest in participating in a follow-up interview (see section 3.3.4). Categories 6 and 13 were open-ended to allow respondents to express their own opinion without being bound by pre-created answers (*per* Sakurai et al., 2020). By doing so, the author hoped to capture attitude-shaping factors and arguments that would have been otherwise left out, as well as gaining a nuanced understanding of interest groups insights. An item in category 12 required respondents to rank potential EWR outcomes according to what they deemed most important, whereas category 11 asked respondents to indicate who or what would be most threatened if EWR was realised (e.g., livestock, pets...).

The remaining categories were measured using a five-point scale in a Likert format (e.g., “strongly disagree” to “strongly agree”) or alternative formats (see Appendix). For consistency reason, regardless of the exact wording, the lowest number (1) was associated with the most

negative or least intense option, whereas the highest number (5) signalled greater positivity or intensity. A five-point scale was chosen over a seven-point scale to increase response rate and avoid overwhelming respondents (Babakus & Mangol, 1992). Given the length of the survey, the author deemed best using a palatable, easily understood five-point scale. To promote response rate, the author pledged to donate a £50 Amazon gift card to a randomly selected respondent – and respondents could join the raffle via email (see Appendix).

Sampling and survey administration

The survey was created on the free software Qualtrics and digitally shared with as many members of the selected stakeholder categories as possible. Participants were sampled in a non-random cluster sampling manner (Creswell & Creswell, 2018). Randomisation was deemed counterproductive because of time limits and precise data collection focus. The author reached out to PR and external communication officers belonging to the ADMG, the NFUS and the SCA, asking if it was possible to circulate the questionnaire among the organisation's members. To the author's delight, all three shared the survey link with their respective audiences, which encompassed all civil stakeholders interest groups (i.e., rural residents, farmers, hunters, deer professionals, estate workers and owners).

The author considered the possibility of searching social medias (e.g., Facebook and hunting forums) to find networking groups, pages and other clusters of civil society stakeholders (i.e., farmers, hunters, deer professionals, estate workers, and rural residents), to share the questionnaire with. However, this avenue was discarded to avoid undesired attention. Social media users are notorious for their tendency to use exaggerated and offensive language, express polarised views, and engage in antagonistic communication. To preserve their anonymity, avoid unnecessary discomfort, and prevent potential outliers to flood the dataset, the author preferred to avoid this sampling route.

3.2.4 Individual interviews

Semi-structured interviews (SSI, *sensu* Creswell & Creswell, 2018) were conducted with representatives of all interest groups (see Stakeholder Mapping in the Appendix), who were sampled in a purposeful, non-random manner. Scientific and public-sector interviewees were privately contacted through their personal or organisational emails, whereas civil society interviewees were contacted after they signalled their willingness to participate in the survey, for a total of 9 interviewees. It is important to note that the author did not manage to schedule an interview with an ADMG spokesperson, but nonetheless had the opportunity to talk with attendees (H2) and a regional deer manager part of the ADMG network (DP6). Also, the NFUS Member interviewed clarified that she was participating not as a spokesperson, but as a private citizen and farmer. Regardless, her knowledge of NFUS' aims, Scottish farmers needs and concerns is extremely valuable. By contrast, the author had the opportunity to interview spokespeople of Tree for Life (TfL), a British ENGO invested in biodiversity conservation and ecosystem restoration, and the Scottish Countryside Alliance (SCA). The unique expertise and perspective offered by each interviewee is briefly described in the Stakeholder Mapping, available in the Appendix.

Interviews were conducted in parallel with survey administration, either via phone calls or virtual meeting platforms (i.e., Zoom or Microsoft Teams) upon receiving a signed copy of the consent form (see Chapter 1 and the Annex for a full copy of the consent form). While a generalised thematic framework was developed (see "Interview Protocol" in the Annex), the author prioritised open-ended questions, flexibility, and proactive listening. The number, order and content of the questions were adapted to the interviewee and, when applicable, their survey

answers, before and throughout the interview. Choosing SSI gave the author the freedom of addressing questions spontaneously emerging during the conversation, allowed participants to clarify and elaborate their answers. Altogether, these contributed to a more nuanced understanding of the interviewee's experiences, thoughts and perspective. However, the author did not significantly depart from the original thematic framework so to not lessen the comparability of interviews. To counter social desirability bias, the author emphasised throughout the conversations they wished to hear the interviewee's own opinion.

3.3 Methods for data analysis

The data collection resulted in both qualitative (from category 6 and 13 of the survey; interviews) and quantitative (from the remaining questionnaire's categories) datasets. Identity of survey respondents is anonymous, they will be referred to according to stakeholder group: Farmer (F); Hunter (H); Deer Professional (DP), Land estate Owner, Manager or Worker (LOMW); and Countryside Resident (CR) for everyone else. Interviewees will be referred to following the codes in the Stakeholder Mapping (see Appendix).

3.3.1 Quantitative data (survey categories 1-5, 7-12)

For every variable, the author computed an index by averaging respondent's answers to the corresponding questionnaire items. Therefore, each survey participant was attributed a score in: Attitude towards Wolves (WA); EWR Attitude (EWRA); WR Attitude (WRA); social trust; Negative Emotional response (NE); Positive Emotional response (PE); Symbolic Beliefs about wolf return to Scotland (SB); importance attributed to the EWR issue; overall riskiness of EWR. Indexes ranged from 1, indicating the least intense or most negative score, to 5, the most intense or positive score. Respondents were divided in low and high importance group using mean scores of EWR Importance (= 4.2, see table 4-1) as a cutoff point. Perception of Negative and Positive Outcomes (PNO and PPO respectively) were elaborated following Bright & Manfredi (1996) methodology. First, multiply the evaluations of intensity and likelihood for each outcome; then, sum individual products, leading to a single score of PPO and PNO. PPO and PNO scores had a maximum of 75 (rating of 5 to likelihood and intensity in all three hypothetical outcomes). Age brackets were operationalised as Younger Adult (YA, 25-34 y.o.), Adult (A, 35-44 y.o.), Middle Age (MA 45-64 y.o.), and Elder (E, 65+ y.o.).

The final quantitative dataset amounted to only 17 usable data points (i.e., complete responses from residents in the Scottish countryside), unevenly distributed among age brackets (60% were aged 55+) and stakeholder groups (F = 4; H = 2; DP = 7; LOMW = 2; CR = 2). A power analysis (via G*Power Software, v 3.1.9.4 by Faul et al., 2007), showed that the sample was too small to be representative, and that parametric statistics would yield unreliable, inaccurate results. Consequently, the questionnaire was analysed by means of descriptive statistics, focusing on trends and patterns, and non-parametric tests (Kruskal-Wallis, Spearman correlations). Because dataset fallacies greatly constrain the extent to which the thesis could quantitatively address RQ2a & RQ2b, and undermine the generalisability of quantitative findings, questionnaire' analysis has an exploratory value only.

The threshold for statistical significance was set at .05, statistics were carried out using the R programming language in the software RStudio Desktop, version 1.1.383 (Team R.C., 2016). Five-number summaries were produced for EWRA & WRA, here treated as the dependent variables, and for their hypothesised antecedents, the independent variables: WA, Trust, NE, PE, Risk, PPO, PNO, SB, and Importance Score (IS). Because of non-normal data distribution, the interquartile range (IQR) was provided instead of standard deviation as a measure of datapoints scatteredness & variability. Whether stakeholder type, age and importance level could affect an individual's EWRA was verified through Kruskal-Wallis H test. A boxplot graph was

produced to visualise the distribution of EWRA scores across countryside actors. Likewise, dependencies between stakeholder type, importance group and independent variables scores were examined with consecutive Kruskal-Wallis H tests. Even though causal links between and within EWRA and antecedents could not be explored due to dataset limitations, it was possible to verify how they covaried using the Spearman correlation method. Spearman's correlation coefficient rho (ρ) ranges between -1 and +1, denoting a perfect negative monotonic relationship and a perfect positive monotonic relationship respectively. Correlation networks were created to help visualise inter-variable relationships.

3.3.2 Qualitative data (survey and interviews)

All interviews were recorded, digitalised and transcribed through Freesubtitles.ai, a free access AI-powered digital tool for audio files transcription. Answers to survey's categories 6 and 13 were collated in a separate file. Then, the qualitative data generated in the research process from both interviews and questionnaire was analysed with thematic inductive coding (Creswell & Creswell, 2018). Using the software NVivo, survey text answers and interview results were processed via open coding. By doing so, key concepts, themes and patterns concerning research questions were enabled to emerge organically from participants' answers. Deductive coding, whereby the author would have developed a codebook based on previous research and existing frameworks (Campbell & Campbell, 2018) was deemed incompatible with a core principle of the thesis: the constructivist worldview, prescribing that knowledge is produced through ground-up investigations of salient social groups perspectives and experiences. Emerging themes and patterns were then contextualised with desk research and quantitative survey results. When applicable, interviewees' answers were compared to their stakeholder-peers from the questionnaire, and vice versa.

4 Findings

Section 4.1 covers questionnaire analysis. First, description of trends & patterns across the dependent and independent variables. Then, the results of non-parametric statistical tests. Section 4.2 tackles: interviewees’ reasons for supporting EWR; for opposing EWR; points to consider in evaluation of EWR that would increase social acceptance; and other, miscellaneous topics that surfaced. In Chapter 5, cross-comparisons of quantitative (section 4.1) and qualitative (section 4.2) data will be discussed alongside contextualisation within the literature.

4.1 Survey results

4.1.1 Descriptive statistics

Most survey respondents held a starkly negative view of the intervention: 75% of the survey participants reported an EWR attitude (EWRA) score inferior to 2, while 50% had the lowest possible EWRA (Table 4-1). Farmers unanimously reported an attitude of 1 (Figure 4-1). Landowner, Manager and Workers (LOMW) and Countryside Residents (CR) responses were also homogenously negative – the former’s mildly less so (mean EWRA in LOMW = 2.3; mean EWRA in CR = 1.5). The apparent variability in attitude among Deer Professionals (DP) is caused by an outlier, who reported an extremely favourable stance (maximum EWRA in DP = 5). However, with a mean attitude of 1.9, deer professionals were the second strongest opponents to fenced wolf reintroduction. By contrast, the two Hunters (H) presented an EWRA index of 3 and 5, making this interest group the most welcoming to EWRA among the five considered. The fact that the only two individuals who were not neutral or against the intervention reported an attitude score of 5 (i.e., H2 and DP5), whereas the sample-wide average was only of 1.36, shows how polarising the topic of EWR can be.

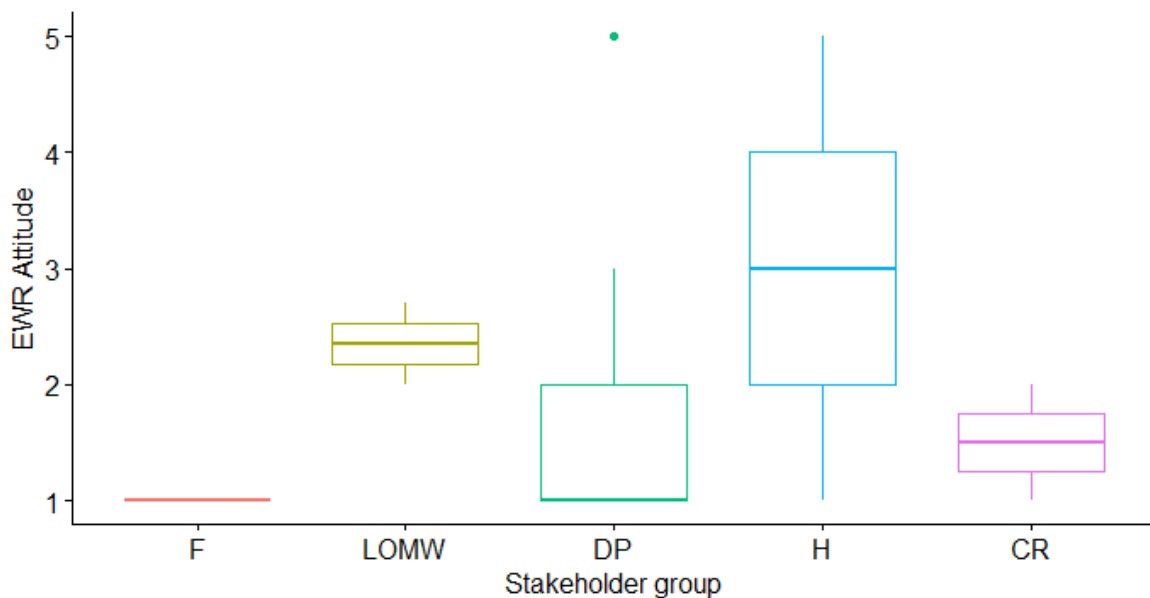


Figure 4-1. 'Reported EWR attitudes across Scottish rural stakeholders.' The boxplot illustrates the reported EWR attitudes of Scottish farmers (F), Landowner, Manager or Workers (LOMW), Deer Professionals (DP), Hunters (H) and Countryside Residents (CR). EWR attitude scores were derived from questionnaire responses, and range from 1 (extremely negative), to 3 (Neutral), and 5 (extremely positive).

WR attitudes (WRA) and symbolic beliefs (SB) about wolves showcased the same distribution trends of EWRA: very low, negative mean and median values (1.8 & 1 respectively) with significantly high outliers (Table 4-1). The negligible interquartile range of belief scores (IQR = 0.25, Table 4-1) suggests that there is a nearly perfect consensus among survey participants on the irrelevant symbolic value of wolf existence in Scotland. Similar trends appeared in wolf attitudes (WA) and affective reactions (fear and concern: Negative Emotions; interest and awe: Positive Emotion), although average scores were greater (WA = 2.9, NE = 2.9, PE = 2.5) and answers more heterogenous (IQR = 2, Table 4-1). Importantly, 13 out of 17 participants shared that if EWR was to be realised, their concern / worry would be at a maximum (=5, not shown in the Table).

Conversely, 75% of the participants attached great personal importance to the EWR issue (Q1 = 4.3), and scores tightly clustered in the upper range (IQR = 0.7, Table 4-1). The literature reviewed in Chapter 2 proposes that important attitudes resist change, meaning that the anti-EWR survey respondents would be set in their opposition. Author asked participants whether they would be more open to EWR if wolves would be equipped with tracking GPS collars, if farmers were guaranteed compensations for livestock predation, or if the reintroduction took place in a county other than their own. In accordance with the putative ‘crystallising’ effects of high importance, over 50% were indifferent to any compromise (not shown in Table 4-1), which either corroborates the inflexibility of important attitudes, or that the proposed compromise measures were not appealing enough.

Table 4-1. ‘Descriptive Statistics of variables of interest for understanding Scottish countryside actors’ EWR attitude’

	EWR Attitude (EWRA)	WR attitude (WRA)	Wolf attitude (WA)	Trust	Symbolic beliefs (SB)	Negative emotions (NE)	Positive Emotion (PE)	Importance of EWR issue (IS)	Risk	Perception negative outcomes (PNO)	Perception positive outcomes (PPO)
Minimum	1	1	1	1	1	1	1	1	2	8	5
1 st quartile (Q1)	1	1	2	1	1	2	1.5	4.3	2	30	10
Median	1	1	2.8	1.5	1	2.8	2	4.6	4	56	14
Mean	1.8	1.9	2.9	1.7	1.8	2.9	2.5	4.3	3.6	49.7	23.7
3 rd quartile (Q3)	2	2	4	2.2	1.25	4	3.5	5	5	65	22
Maximum	5	5	5	3.7	5	5	5	5	5	75	75
Interquartile range (IQR)	1	1	2	1.25	0.25	2	2	0.7	3	35	12

5-number summary and interquartile ranges of EWR & WR attitudes and 9 potentially underlining variables as found among farmers, countryside residents, deer professionals, hunters, landowners or managers & workers of Scotland. Apart from PNO and PPO, all variables were measured on an index scale ranging between 1 (most negative or least intense option) to 5 (most positive, most intense option).

Participants were asked to evaluate the likelihood and intensity (i.e., personal significance, degree of dreadfulness or positivity) of six hypothetical EWR outcomes: livestock predation, economic losses to farmers, distress to nearby human communities, increased tourism, deer control and fostering environmental quality. Even though a different scale was used to measure perception of negative (PNO) and positive outcomes (PPO), distribution patterns akin to those of WRA and SB were found (Figure 4-2). Most participants believed EWR would unlikely lead to benefits; even if it did, such desirable consequences would not be intensely advantageous (median PPO = 14, Table 4-1; Figure 4-2). A few individuals felt the exact opposite (maximum PPO score = 75, Table 4-1). Despite the presence of considerable outliers (Figure 4-2), potential drawbacks of EWR were consistently rated as more likely and intense than potential advantages (median PNO value = 56 vs Q3 of PPO = 22). However, survey respondents' judgements of negative outcomes were more varied than those of hypothetical benefits. As shown in Figure 4-2, evaluations of desirable consequences are clustered below a score of 20, whereas negative outcomes judgements are spread out along the x-axis.

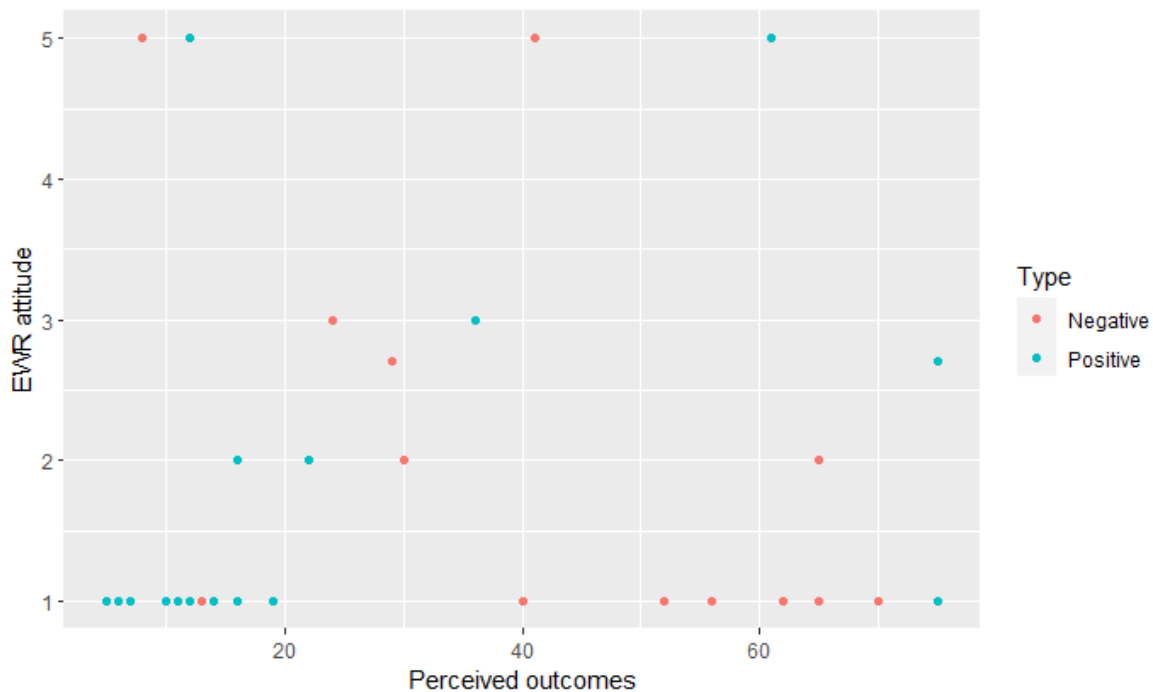


Figure 4-2. 'Perception of negative and positive outcomes in individuals with differing attitudes towards EWR' The scatterplot illustrates assessments of likelihood & intensity of hypothetical positive (in blue) and negative (in red) outcomes of EWR according to Scottish countryside actors' attitude towards EWR. Each individual was asked to rate three desirable (ecotourism, control of deer populations, supporting ecosystems health) and three undesirable (livestock predation, economic losses to farmers, distress to nearby human communities) consequences of fenced wolf reintroduction.

When asked to rank the six hypothetical outcomes according to personal significance alone, sheep & livestock predation was in first place the most frequently, followed by economic losses to farmers. Helping the environment to thrive was, on average, ranked third place - higher than distress to rural communities, indicating a clear concern from the participants towards the state of Scottish nature. The author found that ranking of outcomes and stakeholder group of belonging were disjointed, that is to say, no outcome was consistently ranked in a given places by a specific social group.

As expected from elevated PNO scores, the riskiness of EWR was also assessed to be quite high; no participant thought EWR would pose absolutely no threat to either deer & wildlife, livestock, pets, surrounding human communities and countryside workers (minimum Risk value = 2; median = 4; Q3 = 5, Table 4-1). EWR was judged to pose the greatest threat to livestock and the least threat to humans (not shown in the Table), but risk assessments were the most variegated among the variables here considered (IQR = 3, Table 4-1). On the contrary, there was a homogenous and generalised deep mistrust in Scottish institutions' ability to design or manage a safe, effective EWR. Only a fourth of the participants had a Trust index above 2, and the maximum was of 3.75 (Table 4-1). These observations hint that risk, trust, and outcome perception may be interlinked. The dependencies and correlations existing between EWRA, WRA and hypothetical antecedents, are presented and analysed in the following section.

4.1.2 Antecedents to EWR Attitude

Kruskal-Wallis H tests were conducted to examine the differences in EWR attitude according to age and stakeholder group. No significant differences were found between age brackets (chi square = 2.25, df = 3, $p = .52$) nor stakeholder type (chi square = 4.45, df = 4, $p = .35$). Thus, life experiences, cohort effects, professional capabilities & context do not seem to influence the stance of Scottish farmers, hunters, LOMW, deer professionals and countryside residents towards a hypothetical EWR. A series of consecutive Kruskal-Wallis tests revealed that trust in institutions, risk and outcome assessments, emotional reactions, wolf attitudes and symbolic beliefs were also not affected by an individual's social group or age cohort ($p > .05$ in all instances). In other words, the socio-psychological variables that are here hypothesised to underline an individual's EWR attitude do not differ among stakeholder groups nor age brackets. In turn, this might indicate the factors shaping EWR attitudes of Scottish countryside actors do not differ in their relative importance among stakeholder or age groups.

Because of small sample size, skewed stakeholder representation, and non-normal data distribution, the causal links between EWR attitude and hypothesised socio-psychological antecedents (WA; SB; PNO; PPO; PE; NE; Trust; Risk) could not be assessed. Instead, the author explored the relationships between and within independent and dependent variables using Spearman's correlation tests. As shown in Figure 4-3, EWRA & WRA were tightly and positively interlinked ($\rho = .71, p < .005$): the higher the opinion on fenced wolf reintroduction, the better the opinion on nation-wide reintroduction, and vice versa. Thus, participants thought of EWR and WR somewhat synonymously, with the implication that the socio-psychological factors shaping EWR attitudes would yield similar effects on attitudes towards nation-wide reintroduction. Spearman's rank correlations were then computed to see how an individual's SB, WA, PE & NE, PNO & PPO, social trust and risk assessments would relate to its views on fenced wolf reintroduction. Figure 4-3 showcases only the statistically significant ($p < .05$) correlations. Namely, those between EWRA and: affective reactions, outcomes perception, symbolic beliefs, and opinion on wolves themselves.

The higher the awe & interest (PE) reported by a person, the higher their EWR attitude ($\rho = .65, p < .005$). Conversely, concern & fear (NE) towards the intervention correlated with opposition, albeit more weakly so ($\rho = -.49, p < .05$). The direct relationship between PE and EWRA, and the concomitant inverse relationship between NE and EWRA, imply that positive and negative emotional reactions are inversely proportional. Similarly, perception of EWR drawbacks negatively influenced attitude ($\rho = -.56, p < .05$), whereas those who viewed EWR benefits as more likely and positive also viewed the intervention more favourably ($\rho = .56, p < .05$).

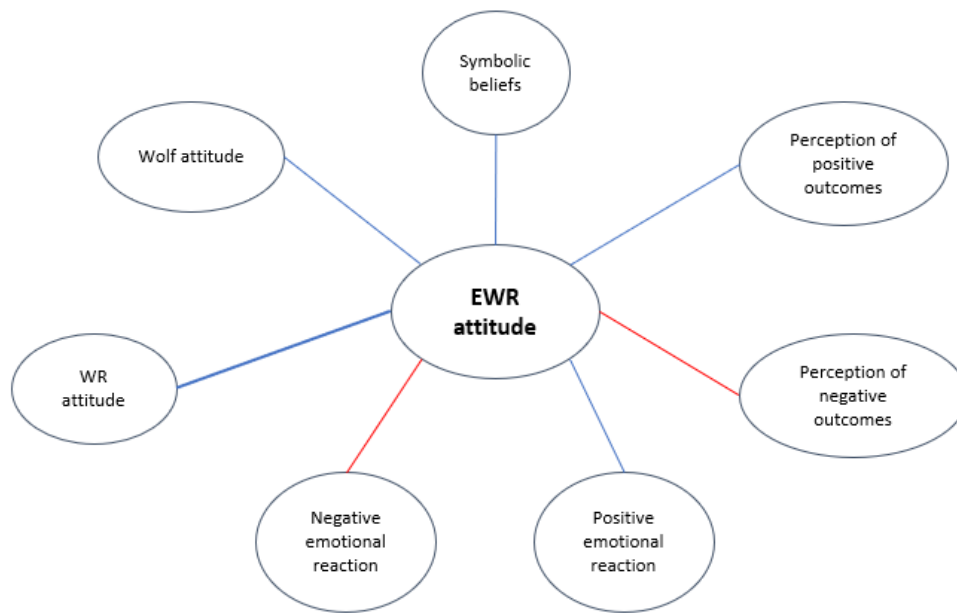


Figure 4-3. 'Significant relationship between EWR attitude, WR attitude and putative socio-psychological antecedents'
 The graph illustrates the variables EWR attitude scores correlated with at a statistically significant level ($p < .05$), following Spearman's correlation test and coefficient rho. Blue lines refer to a positive relationship, red lines a negative relationship. Line thickness indicates correlation strength (thin: Spearman's rho $\leq \pm 0.7$; medium: $\pm 0.7 < \text{Spearman } rho < \pm 0.8$).

Lastly, symbolic beliefs about wolves' existence in Scotland and overall appreciation of the animal itself significantly and identically covaried with EWR attitudes (SB & EWRA: $\rho = .59, p < .05$; WA & EWRA: $\rho = .59, p < .05$). The former is not surprising; the questionnaire items relating to symbolic beliefs addressed whether respondents felt it was their duty to bring wolves back to Scotland, and how much they valued their intrinsic existence within the country (see "Survey Items" in the Appendix). The latter correlation corroborates Bright & Manfreda (1996) conceptual model on WR attitude formation, in Chapter 2.

While trust in institutions and risk assessment did not statistically correlate with EWRA ($p > .05$ for both), the two variables were tightly interlinked with other antecedents (Figure 4-4). Trust covaried with PPO ($\rho = .53, p < .05$) and was inversely proportional to PNO, NE, and risk (Trust & PNO: $\rho = -.55, p < .05$; Trust & NE: $\rho = -.58, p < .05$; Trust & Risk: $\rho = .53, p < .05$). The relationships between Trust, Risk, perception of desirable and undesirable outcomes echo Siegrist & Cvetkovich (2000) findings, who postulated that trustworthy management agencies would lead the public to perceive unfamiliar hazard-sources – like EWR would be in Scotland – as less dangerous, while simultaneously favour greater appreciation of potential benefits. At the same time, risk significantly and directly correlated with worry & fear, as well as PNO (Figure 4-4). Both relationships were quite strong, presenting a correlation coefficient of $+ .71$ and $+ .77$ respectively. By contrast, risk assessments had a negligible negative association with positive emotional reactions ($\rho = -.38, p > .05$). Since NE were operationalised as worry/concern & fear, and PE as awe & interest, it seems logical that EWR riskiness would promote levels of the former but have no influence on the latter.

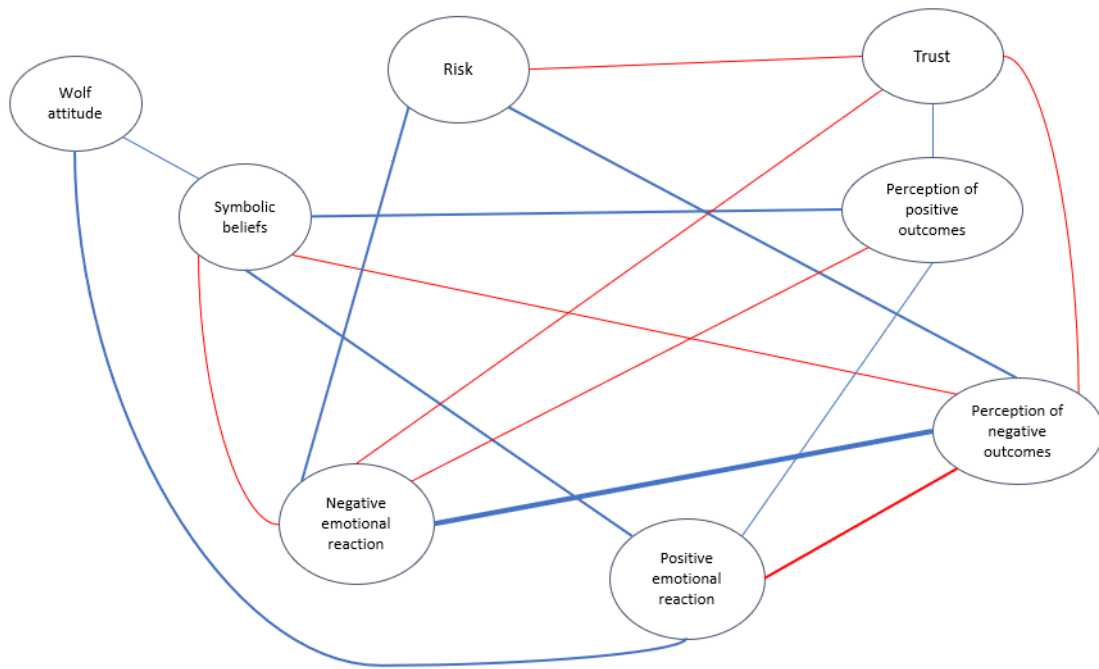


Figure 4-4. 'Correlation network between putative socio-psychological antecedents of EWR attitude'

The figure above shows the statistically significant ($p < .05$) Spearman correlations between the variables hypothesised to shape Scottish stakeholders' attitudes towards EWR. Blue lines indicate a positive relationship, red lines a negative relationship, whereas line thickness represents strength of correlation: thin line for a $0 < \text{Spearman's } \rho < \pm 0.7$; medium line for a $\pm 0.7 < \text{Spearman's } \rho < \pm 0.8$; thick line for a $\text{Spearman's } \rho > \pm 0.8$.

It is also reasonable to assume that the more a person likes wolves as animals, and the more they attach a symbolic value to wolves' presence in Scotland, the greater the awe & interest EWR would generate in them. So was the case, as proved by Spearman correlations (WA & PE: $\rho = .75, p < .001$; SB & PE: $\rho = .71, p < .001$). Symbolic beliefs also covaried with evaluations of potential benefits ($\rho = .65, p < .005$), and was inversely proportional to evaluations of negative outcomes ($\rho = -.55, p < .05$). The difference in strength of the SB & PPO relationship and the SB & PNO relationship could relate to the biasing influence of value & belief systems on cognitive appraisal discussed in Chapter 2. Individuals attaching personal value to wolves' existence in Scotland would rate EWR hypothetical benefits as more likely and positive for cognitive consistency: if they were to judge potential EWR benefits as unlikely or negligible, these individuals would somewhat undermine rational, cognitive justifications for the high symbolic value they attributed to wolf return to Scotland. In turn, outcomes assessments can fortify underlying attitudes, as suggested by the links between PNO, PPO, EWRA (Figure 4-3).

Additional reinforcing feedback loops are suggested by the specular relationships between PPO, PNO, PE and NE. The four variables were connected as follows: positive emotional reactions were directly proportional with perceived benefits ($\rho = .53, p < .05$) and inversely correlated with assessments of negative outcomes ($\rho = -.75, p < .001$); PNO also strongly and positively correlated with feelings of worry/concern & fear ($\rho = .84, p < .0001$), which in turn were inversely proportional to judgements of potential benefits ($\rho = -.51, p < .05$). In other words, affective reactions and outcome perception go hand in hand, covary in the same direction: the more negative the former, the more negative the latter. The transactional property also suggests

that PE & NE and PPO & PNO are negatively correlated. The fact that PE and PNO had a stronger relationship than NE with PPO, and that PNO & NE had the highest correlation coefficient, may be a consequence of questionnaire items wording. Indeed, none of the three hypothetical positive consequences of EWR participants were asked to assess (i.e., more tourism, deer control, promotion of ecosystems' well-being) relate to feeling awe or interest for wolves. By contrast, it is arguable that worry & fear would be elicited if any of the three hypothetical negative consequences of EWR mentioned (livestock predation; economic losses to farmers; distress to nearby human communities) would come to be. While the truthfulness of the differences in correlations' strength is uncertain, the interlinkedness of emotional reactions and outcome appraisal is of great interest; it reiterates the interconnectedness of affective and cognitive components in attitude formation, although the causality of such relationship could not be inferred.

A last consideration of interest lies in the differences between sample-wide and High Importance Group (Importance index ≥ 4.2) correlations of EWRA and its antecedents. Among individuals who attributed great personal significance to the EWR issue, appraisal of negative and positive consequences did not significantly correlate with their attitude (PNO & EWRA: $\rho = -.48, p > .05$; PPO & EWRA: $\rho = .42, p > .05$). In contrast, affective reactions to the interventions did (PE & EWRA: $\rho = .69, p < .05$; NE & EWRA: $\rho = -.59, p < .05$). Moreover, the relationship between symbolic beliefs and attitude scores was statistically significant ($p < .05$) and stronger in the High Importance group ($\rho = .64$) compared to sample-wide ($\rho = .59$). Even though these observations partially corroborate the modulatory effects of issue importance on attitude formation, whereby the affective and beliefs components would override the cognitive ones (Bright & Manfredi, 1996), their veracity is questionable. Indeed, the Low Importance Group counted only 3 individuals compared to the 14 of the High Importance Group. The sensible size difference renders comparisons dubious and inconclusive.

Overall, the survey clearly indicate that Scottish rural actors strongly and actively oppose EWR realisation, an intervention that they identify as a source of significant negative consequences to countryside communities, with minimal and uncertain potential benefits. While there was variation in EWR emotional reactions and perceived risk, participants were rather unanimous in their lack of trust in institutions, and their poor symbolic beliefs towards wolf reintroduction. EWRA and shaping factors (except PNO and WA) scores were rather uniform across all stakeholder groups. Another key consideration lies in the distribution pattern common to most variables: a tightly clustered majority with a couple of distinct outliers. Albeit it is not shown in the table, the outliers in EWR and WR attitudes, symbolic beliefs, emotional reaction, and outcome perception are the same individuals. In other words, it seems there are two mirroring patterns of response to the variables measured: one shown by the pro-EWR outliers, one by the anti-EWR majority. The statistical significance and direction of correlations within socio-psychological antecedents, showing that cognitive and emotional attitudinal factors are interlinked, support the existence of two patterns. However, the statistics here analysed might simply be an artefact of an insufficiently large and unrepresentative sample. Thus, the findings ought to be interpreted with caution; rather than conclusive, they are exploratory.

4.2 Acceptability of EWR

Qualitative answers from the questionnaire and SSIs findings are here analysed and categorised in broad, thematic areas: reasons provided to justify personal stance on EWR; barriers to EWR realisations; and points to consider in EWR design, evaluation and planning. Additional themes that emerged during content analysis are also presented. The interviewees identification codes are: F2; DP5 and DP6; H2; S & DP1 and S & DP2; members of the NFUS, SCA, and Tree for Life (TfL). Before going into details, some general comments are in order.

Firstly, the author observed that, in various instances, participants would mention problems, issues and concerns about nation-wide WR, not EWR. On the one hand, this suggests that WR and EWR are intrinsically entangled, to the point they cannot be separated – which was previously hinted at by the strong, direct correlation between WR & EWR attitude scores (in section 4.1.2). On the other, this hints that the author failed to ensure that the conversation did not veer from the topic of EWR. This point is discussed in Chapter 5 further.

Secondly, the findings revealed that not only Scottish actors think wolves could never control deer populations, but also that herbivores overabundance is solely linked to human activities and could be resolved with classic management measures. Some participants added that the “deer problem” is inexistent, contradicting the information discussed in Chapter 1. This important topic, which well undermines a major pro-EWR argument, is addressed in section 4.2.1 and in the Discussion.

Most importantly, out of the 22 survey respondents and interviewees, only 5 expressed pro-EWR points, only 3 reported a positive EWR attitude (DP5, TfL spokesperson, H2), and only one supported EWR (H2). The qualitative findings clearly indicate that Scottish countryside actors are overwhelmingly against EWR realisation, echoing the survey results, meaning that efforts to improve EWR public acceptance would be significantly uphill.

4.2.1 Arguments Against EWR

The arguments participants provided to justify their EWR stance touched technical & ecological, institutional, and socioeconomic aspects (Figure 4-5), almost perfectly mirroring the HERSP developed by Reading (et al., 2002). The absence of organisational reasons for opposing EWR aligns with the fact that no participant was employed by Scottish governmental agencies, environmental institutions, and other entities that would likely have to deal with the logistic & bureaucratic side of EWR if it was to actually be pursued.

Overall, no single anti-EWR argumentation dominated the discourse. The main points against EWR were the fact that it would cause distress to farmers due to livestock predation, that grey wolves could not possibly become deer management tools, that fenced reintroduction would inevitably lead to nation-wide WR, and a deep scepticism towards the Scottish government ability to design or manage the intervention safely & effectively (Figure 4-5). The latter two arguments were proposed by a greater variety of stakeholders, whereas farmers (F) and deer professionals (DP) were the sole civil society actors arguing that EWR could not help with deer populations control, and that the psychological toll it would take on farmers was a valid reason to oppose it (Figure 4-5). The difference in distribution could be explained by the fact that while untrustworthy environmental agencies and an unbound wild wolf pack can affect the interests of every rural actor, the inability of wolves to control deer numbers and livestock deaths affects DPs and Fs the most. Landowners, managers & workers (LOMW) and the SCA representative mostly ascribed their negative EWR view to socioeconomic reasons, whereas scientific experts with wildlife management experience (S & DP) attributed it to technical, ecological, socioeconomic aspects. Thus, self-interests, personal area of competence and/or expertise might constitute a foundation on which individuals base rational explanations of EWR attitude.

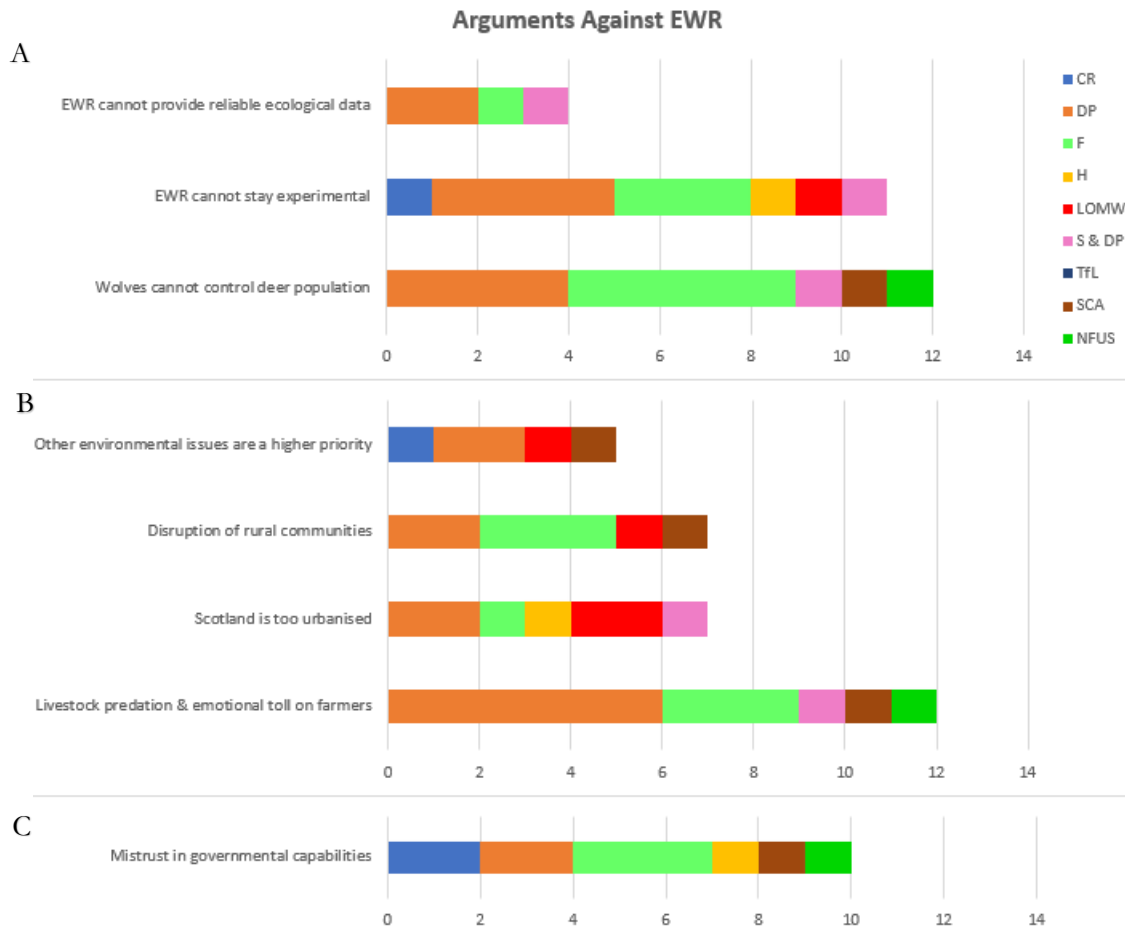


Figure 4-5. ‘Arguments against EWR’

The chart illustrates the major reasons participants ascribed their negative EWR attitude to, as well as frequency among stakeholder groups: countryside residents (CR), deer professionals (DP), farmers (F), hunters (H), land owners / managers / workers (LOMW), scientists with expertise in deer management (S & DP), and members of Tree for Life (TfL), the Scottish Countryside Alliance (SCA), and the National Farmers Union of Scotland (NFUS) organisations. The x-axis indicates the number of participants that mentioned each argument. Reasons to oppose EWR have been grouped in Technical & Ecological (A), Socioeconomic (B), and Institutional (C) sub-groups.

Technical & Ecological Arguments

From the survey and interview answers, it became clear that many stakeholders do not see wolves as relevant, let alone the solution, to deer overpopulation. The most popular anti-EWR argument was that **wolves could not resolve deer overpopulation nor contribute to deer management efforts** (“there is an argument that wolf reintroduction would help manage an uncontrollable deer problem in Scotland: that is untrue”, DP5). Two participants adduced this to deer (“deer are not grazing robots [...] they will learn how to avoid wolves”, DP6) and wolf (“wolves will not hunt deer as expected on paper”, DP4) behaviour. SCA representative and DP5 reiterated that only traditional, human-lead management measures can be effective, and have the additional advantage of being fully controllable – hence could not result in unintended consequences. DP5 further explained that because Scotland has virtually no pristine wilderness left, even if wolves were to be restricted to forested areas, they would still be too disturbed by humans to control deer. S&DP1 added that the ideas grey wolves are needed to help agencies with deer control, and that deer populations are spiralling out of control, are propaganda. Moreover, DPs and S & DP1 questioned whether there is deer overabundance in Scotland to begin with. The true nature of the “deer problem” was often brought up and is furtherly analysed in section 4.2.4.

A second, major factor contributing to participants' negative EWR views was their **scepticism that EWR could truly stay 'experimental' in the long-term**. At least one member of each stakeholder group shared that not only wolves could escape from the fence, causing disruption to nearby communities, perhaps breed with dogs, but also illegal releases outside of the allocated enclosure are likely to happen. Altogether, these would favour the establishment of a viable, free-roaming wolf population across the Scottish countryside. The NFUS Member and DP6 pointed out that it had already happened with beaver reintroduction in Britain, whereby rodents were released outside of the designated experimental location, and had established thriving, unfenced populations ever since. This popular argument, rooted in the uncontrollability of EWR and the unpredictability of human behaviour, highlights that uncertainty favours negative attitudes towards EWR.

Among others, S & DP1 highlighted that **EWR would be unable to produce the accurate, reliable ecological data necessary to draw science-based conclusions on the ecosystem restoration potential of WR**. According to this interviewee, a fenced reintroduction would create a non-dynamic system: since deer would be restricted in their spatial usage, they would be subjected to unnatural predation pressures. The predator-prey dynamics that would evolve within a fenced enclosure would therefore not mirror what would happen in nature, meaning that EWR would not resolve the uncertainties regarding WR effectiveness in driving Scottish landscape restoration. The danger of creating an artificial setting must be accounted for and tackled through thorough modelling of habitat – species interactions.

Socioeconomic Arguments

Socioeconomic reasons to oppose EWR were proposed by the greatest variety of civil stakeholders and were amongst the most frequently mentioned (Figure 4-5).

12 participants amongst DPs, Fs, S&DPs and the NFUS attributed their opposition to the **emotional distress EWR would cause to farmers because of livestock predation**. On the one hand, no fence is truly impenetrable; wolf escapees are likely to cause livestock deaths, especially in Scotland, where husbandry practices do not account for the presence of free-roaming large carnivores. On the other, wolf-caused livestock deaths are generally much lower than what believed by the public (see Chapter 1). Nevertheless, risk perception is biased by emotional reactions to the hazard and its source (see Chapter 2), and the killing of a sheep can significantly, negatively affect the mental state of their owner. In the words of F2, *“farmers keep their livestock safe: that’s your whole life, what you do”*. The SCA spokesperson weighted on this topic, expressing that mental health in rural Scotland is a delicate issue, with depression and suicide being rather commonplace. EWR would be an unwelcome, additional source of stress and anxiety, aggravated by the novelty of the danger it poses. Per Slovic (et al., 2007), unfamiliarity with hazard sources fosters harsh risk assessments, as well as more negative affective reactions.

Seven participants mentioned the following points: **Scotland is too densely populated and urbanised to accommodate wolves, and EWR would disrupt rural communities' habits, mental well-being and livelihoods**. A variety of stakeholders argued that EWR should not be pursued due to Scotland being *“[...] a domesticated country, even in rural areas”* (DP3). The widespread human presence would entail inevitable human-wolves conflicts and scarce suitable area for EWR to take place - albeit the latter is a technical aspect. The author found particularly interesting the point raised by F2: *“in the hundreds of years wolves have been absent, the environment has changed so much. [...] We can never go back to the vision of pristine Scotland held by pro-rewilding and environmentalists – impossible, given all the changes”*. The farmer argued that Scottish landscapes have developed in such a way that the space for society physically overlaps with nature's, yet

wilderness and civilisation are two spheres that should remain separate. To quote the interviewee further, “[...] *there are places where wolves have every right be – just not in Scotland*”. S & DP2 highlighted how those who argue WR would be as beneficial in Scotland as it was in Yellowstone, often overlook how substantially different their geographies are. The former is a completely mixed landscape of wild and urban, the latter is untouched, near pristine wilderness. The fact that most civil society groups agreed with these two arguments suggests, in the author’s eyes, a generalised reticence to accept the sacrifices necessary to realise large carnivores reintroductions. This relates to the disconnect from nature the public has according to participants (see section 4.2.3).

The last and least popular socioeconomic reason against EWR touches economic aspects. Specifically, a few participants suggested that **the funds for EWR should instead be allocated to more pressing environmental issues**. Protection of existing and endangered animal species, like ground-nesting capercaillie, and declining habitat of value, like peatlands, should be prioritised over predator reintroductions: “*Frankly I would prefer we spend our money conserving what little habitat we have left, for the benefit of the existing species, rather than spend any money bringing in an apex predator that Scotland doesn’t have the space to look after*” (LOMW1). The TfL representative commented that the conversation around EWR & WR, both unfeasible interventions that however receive a lot of media attention, distract from “*the many, less-charismatic species that are as valuable [for ecosystem restoration goals] as wolves, but receive less attention from media*”. Additionally, the TfL spokesperson highlighted that rewilding is about landscape-level habitat restoration, hence debates should be about maximising results. These comments are aligned with the interviewee lack of support towards EWR, thus do not contradict a positive EWR attitude.

Institutional Arguments

Among the top reasons to not support EWR appears **mistrust towards governmental agencies’ abilities to manage EWR in a safe and effective manner**. The prevalence of poor trust in institution in a sample dominated by negative EWR attitudes is consistent with the literature presented in Chapter 2, whereby social trust favours public acceptance of novel, risky governmental interventions. Survey respondents also felt a deep mistrust towards Scottish environmental agencies capabilities (see Trust scores in Table 4-1). Participants ascribed their mistrust to:

- **Poor experiences with previous faunal reintroductions.** Numerous interviewees brought up how governmental agencies failure to ensure beaver reintroduction in Britain would remain experimental, under their absolute control. Others discussed the damage caused by the White Tail Sea eagle upon reintroduction in northern Scotland. Raptors swiftly recovered and kept growing despite management efforts. Eagles started preying on lambs and practicing hunting on adult sheep, causing cuts on their backs that, because of the fur, often remained undetected, leading to infection and death. The NFUS Member highlighted that governmental efforts were unsuccessful in managing other species too - geese, badgers, deer, at the expenses of farmers. Thus, “*how could they [Scottish environmental agencies] possibly take on a challenge like EWR?*” (DP2).
- **Disconnect of central decision-makers from rural realities.** There was a widespread belief that Scottish policymakers and environmental advisors are detached from the concerns & needs of rural communities, which are usually brushed aside. The NFUS member shared that farmers do not feel listened to by the central government. Their statement finds explanation in a point brought up by S & DP2. According to the latter interviewee, the rural-urban disconnect exists, and it does so because of severely skewed population distribution. While most of Scotland’s territory is countryside, the majority of citizens – and therefore voters - are urban dwellers. Urban citizens often cannot fully appreciate the impacts that the environmental interventions & policies they vote for have on rural communities. The urban-rural divide was reported amongst survey

respondents too: “People who support ideas like [EWR] are urban dwellers who have no understanding of the countryside and believe that animals live in harmony like a Disney film (DP2); “White collar townies, environmentalists coming up with what is best for rural areas – it is gone beyond a joke now. [...] listen to those who live and manage the land, not those with a fancy degree please” (F3). Moreover, farmers, deer professionals and a countryside resident stated that central policymakers appear uninterested in learning from the knowledge countryside actors have of the land, insights that would aid the effective design of landscape & environmental management interventions. As F2 eloquently put it, “people see the results [of landscape management policies] only when something goes wrong; but people that actually live around can see immediately what is going on. [...] They [politicians] don’t want to hear us [countryside communities & farmers] or listen to knowledge from the countryside. Decision-makers understand numbers and reports, but it’s hard to convey a personal experience, because you would be relating memories, life experience, not a neat statistical analysis.”.

The widespread lack of faith in Scottish environmental agencies flags a significant issue for practitioners and policymakers. It suggests that the Scottish government and management bodies may be conducting insufficient stakeholder engagement, inadequately involving salient countryside actors, either directly or by explicitly addressing their needs, in the design of environmental interventions. The reported alienation of countryside communities from central policymaking in turn erodes their trust in Scottish institutions. From the words of the research participants, it seems that the untrustworthiness of Scottish authorities is not limited to EWR and LPR, but instead encompass all landscape management matters.

4.2.2 Arguments in favour EWR

The fact that the least common argument against EWR still counted more proponents (n= 4, Figure 4-5) than the most popular pro-EWR argument (n = 3, Figure 4-6) further highlights how stark the EWR opposition of Scottish rural actors is. No farmer, LOMWs, and six out of seven DPs could provide a single reason why EWR should be pursued. This can be partially ascribed to self-interest and social group identification: these stakeholders would be the most exposed to unwanted EWR consequences (e.g., wolf escapees, land requisition, psychological distress, altered deer distributions...). The scientific value of EWR is severely undermined by the absence of pro-EWR arguments originating from ecologists. Interestingly, every pro-EWR point relates to hypothetical benefits (Figure 4-6), whereas criticisms touched design and implementation (Figure 4-5), perhaps indicating an “end justifies the means” approach.

It is important to reiterate that among the 5 individuals who provided pro-EWR arguments, only three viewed EWR favourably (H2; TfL spokesperson; DP5). DP5 and the TfL spokesperson however clarified in their respective interviews that they did not support EWR *sensu* Stern (et al., 1999). DP5 was particularly outspoken about the problems EWR would cause and reasons to not pursue the intervention. While H2 was more optimistic, all three interviewees agreed that EWR is extremely unlikely to ever happen. The favourable EWR opinion of the TfL representative reiterates previous examination of Scottish public attitudes towards WR led by Nilsen (et al., 2007, Figure 1-1). During the interview, H2 shared that he had encountered wolves in the wild during a trip in North America, that he was filled with awe at their sight. This treasured memory indicates strong, positive emotional reactions to EWR and a favourable opinion of wolves themselves. Along with the eco-centric worldview H2 displayed throughout the interview, where he highlighted the spiritual benefits of being surrounded by nature and wildlife, it seemed that this interviewee has an innate predisposition to support rewilding & biodiversity conservation projects. Altogether, H2’s positive EWR attitude stems from his pro-environmental, pro-wildlife value & belief system. Similarly, DP5 displayed a kinship towards

the natural world, lamenting that the Scottish public had become mostly detached from nature – which suggests, once again, that high biospheric values and personal concern for wildlife underlie approval of EWR. His occupation as gamekeeper (see Stakeholder Mapping in the Appendix) would likely expose DP5 to the potential adverse consequences of EWR and may very well be a factor contributing to his lack of support of the intervention. However, the fact that DP5 had a positive EWR attitude but was nonetheless critical of its outcomes, and that TfL acknowledged issues with EWR realisation and results, show a decoupling of values and cognitive processes. In other words, possessing an eco-centric worldview and placing great personal significance to the protection of the biosphere does not entail blind support of EWR.

The ecological pros of EWR were said to be either **control of deer populations** (H2) or **insights on how deer would interact with large predators** (TfL). However, these points clash with S & DP1 criticisms of the reliability of the data EWR would generate (see section 4.2.1). One must here consider that neither H2 or the TfL spokesperson have the same academic and wildlife management knowledge of S&DP1. The words of S&DP1 entail that EWR ability of **dispel myths about the danger wolves constitute** is also dubious. To understand how H2 and TfL representative came to form their beliefs about EWR’s effects, the author turns to the literature discussed in Chapter 1, and the pro-rewilding beliefs of these interviewees. DP5 though EWR could potentially **reconnect people to nature**. The alienation of the Scottish public from nature and wildlife’s needs was identified as a significant barrier to EWR realisation.

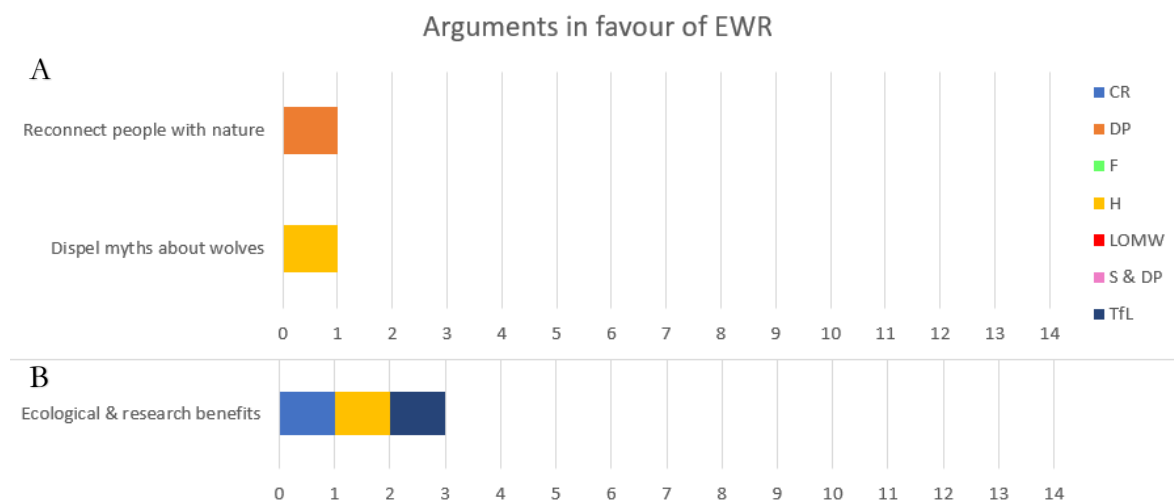


Figure 4-6. ‘Arguments in favour of EWR’. The bar plot illustrates pro-EWR points and relative frequency among: countryside residents (CR), deer professionals (DP), farmers (F), hunters (H), land owners/managers/workers (LOMW), scientists with expertise in deer management (S & DP), and members of Tree for Life (TfL), the Scottish Countryside Alliance (SCA), and the National Farmers Union of Scotland (NFUS). The x-axis indicates the number of participants mentioning each argument. Reasons have been grouped in Socioeconomic (A), and Technical & Ecological (B) sub-groups.

4.2.3 Barriers to EWR acceptance and potential solutions

Table 4-2 offers an overview of the socioeconomic and institutional barriers to EWR, plus ways to address them, identified by Scottish stakeholders. Interviewees were explicitly asked to elaborate on both EWR barriers and solutions, whereas questionnaire respondents only on the latter – i.e., key elements to integrate in design and planning. However, a few survey respondents spontaneously discussed existing barriers. In total, research participants identified four major barriers to EWR realisation; 8 out of 9 interviewees mentioned opposition from rural communities, half brought up legislative barriers. As for the suggestions from survey

respondents, over 80% tackled the socioeconomic sphere (Table 4-2). Anecdotally, the author noticed that interviewees with benign EWR attitudes spent more time addressing barriers and potential solution than those who opposed the intervention. Similarly, survey respondents with strongly negative attitudes (F2-3; H1; DP2, 3, 6; LOMW1-2; CR2) did not forward any point to better social acceptance. Instead, they used the text box provided to reiterate their opposition and/or anti-EWR arguments. These tendencies could be ascribed to the interdependency between attitude and cognition, whereby people strive to reconfirm views and beliefs through reiteration of rational arguments.

Table 4-2. Barriers and suggested solutions to EWR acceptance in Scotland'.
The content of the table was sourced from the answers of survey and interview participants.

Barrier	Suggested solution(s)
SOCIOECONOMIC	
Opposition from rural communities: <ul style="list-style-type: none"> ○ Fear of wolves ○ Lack of perceived benefits ○ Monetary compensations for wolf predations would not be enough ○ Alienation from decision-making process ○ Land-owners would not support EWR 	<ul style="list-style-type: none"> ○ Stakeholder engagement and stakeholder-centred management ○ Strong reactive and prophylactic management ○ Educational campaign ○ Trust building efforts from government ○ Build an economic case for EWR
Public disconnect from nature	<ul style="list-style-type: none"> ○ Value system shift
INSTITUTIONAL	
Lack of political support	N/A
Legislative issues	N/A

Socioeconomic Barriers & Solution

Opposition from rural communitie was the most frequently cited barrier to realisation of fenced wolf reintroduction. Numerous reasons, some of which accompanied by specific solutions, caused such opposition:

- **Widespread fear of wolves** (DP1; H2; TfL; S & DP1) because of demonisation of this animal, as well as lack of education about the actual dangers & implications of coexistence with wolves. DP1 stated that this fear was somewhat irrational, it clouds logical reasoning and impedes fact-based judgements on EWR. Such comment corroborates the existence of the affect heuristic, per Slovic (et al., 2007). **Educational campaigns and training on wolf coexistence** were pointed at by H2 and the TfL representative as the main ways to reduce such overinflated fear. Their suggestions align with risk perception theory: the more an individual is knowledgeable about the hazard

- source, the smaller the role of affective reactions in attitude formation and risk assessments, with greater reliance on objective measures of hazard level (see Chapter 2).
- **EWR does not provide clear economic and social benefits to rural communities**, whereas the adverse consequences countryside actors may suffer are evident and widely discussed. In other words, rural communities self-interest is to oppose EWR, not support it. The lack of clear advantages to countryside actors significantly undermines EWR acceptance (SCA representative). Interviewees with positive EWR views also highlighted that the socioeconomic benefits of EWR, such as eco-tourism and new job opportunities, are mostly neglected by proponents of the reintroduction. By **building a socioeconomic case for EWR**, more countryside stakeholders would come to see it favourably. Again, this suggestion echoes socio-psychological literature (Chapter 2): quantity & quality of self-affecting perceived outcomes shape attitudes and acceptance.
 - **Monetary compensations could not offset livestock predation**. Interviewees who own and care for livestock clarified that financial compensations could never make up for the psychological toll exerted by wolf predation. Farmers create emotional bonds with their sheep and cattle (NFUS Staff Member; F2; DP6); to quote DP5, livestock is not simple produce: *“livestock has been bred for generations. The wolves would not be attacking an animal, but a whole piece of heritage”*. Along with a lamb, a calf, a sheep, wolves would be eating a part of the farmers’ identity, tradition, and lifestyle.
 - The **disconnect of decision-makers from rural communities needs and realities** discussed in section 4.2.1 was also said to underly opposition to EWR from countryside actors. According to DP6, environmental legislation and interventions commonly ignore the stakeholders affected, so countryside communities perceive them as nothing short of impositions: *“At the moment, everything is top-down, but it really should be bottom-up [...] To achieve [environmental] goals, one has to make sure that the people that engage with the land and enact land management strategies have benefits to gain from them”*. As things stand, EWR would be yet another unwelcome imposition from central government.
 - DP6 and S&DP1 were sceptical about the **availability of landowners willing to devote their estates to EWR realisations**. Because of wolves’ ecology, a substantial amount of land would have to be closed off to accommodate even a small pack. S&DP1 questioned whether there would be enough landowners in Scotland that would willingly give up their land, which is often their whole source of income, to enable EWR - an intervention without any apparent benefit to them.

There was great consensus that the main avenues through which countryside communities opposition could be ameliorated were **stakeholder engagement and participation in decision making** (DP6; SCA representative; DP5; TfL representative; S&DP1-2) and the development of research-based, solid **prophylactic and reactive management plans** (DP5 and DP6; S&DP1-2; H2; DP1).

According to most interviewees, key actors that would need to be involved in EWR evaluation & design in order to better social acceptance would be the farming community, the ADMG, and landowners. H2 rightfully pointed out that *“what happens in isolation is destined to fail”*: one should prioritise dialogue with antagonistic actors. During the interview, S& DP2 added that *“apex predator reintroductions have to be pursued gently and honestly, not as an imposition but by carrying out a consultation process with local actors in the rightful way”*. Consultations, open dialogue, and forums were suggested as effective processes for stakeholder participation. These engagement processes would bring to light the opinions, worries & concerns of local communities and countryside actors, which would then be used as the foundation for a first EWR draft. The draft would then be perfected by reiterating salient stakeholders’ engagement processes, until a final version would be submitted for approval to the general public. S&DP2 highlighted that an intervention as invasive as carnivore reintroduction require ground-up design: the views of local communities

must be taken into account, must be attributed more relevance than the those of non-salient stakeholders who would not be impacted by predator reintroduction (e.g., urban dwellers). S&DP2 statements corroborate the thesis' research approach, whereby selection of participants was restricted to countryside actors. Stakeholder engagement would also vehiculate compromise between antagonistic interests and the various Scottish countryside realities, thus reduce the chances of wolf persecution after reintroduction (TfL spokesperson).

H2, S & DP1, and the TfL representative emphasised that an EWR proposal based on **robust ecological research** could significantly improve social acceptance. By looking at the mistakes committed with past predator reintroductions (e.g., the White Tail Sea eagle), mathematical modelling of ecological dynamics, examination of real-life WR instances and location-specific aspects, the EWR evaluative body would assess potential unintended outcomes. In turn, this would help create **adequate reactive and prophylactic management plans**, including compensation schemes and supporting farmers in the transition towards predator-mindful husbandry practices (DP1). A lot of emphasis was placed on the need of having *“iron-cast guarantees”* (DP6) that the aspects of EWR most threatening to local farmers and communities would be under control. Fences would need to be continuously upkept to prevent escapees, and clear & effective plans to a) deal with problem individuals, b) maintain wolf population at desired levels, and c) eradicate wolves in case the experiment proved too damaging to rural actors, must be developed and communicated to interest groups (DP1, 5-6, S&DP2). S&DP2, DP6, and H2 emphasised the need of anticipating problems, a particularly important point for unintended consequences and the delayed timeframe with which unexpected rewilding complications arise: *“as soon as you start planning EWR, you have to ask yourself and answer questions like: what will happen when wolves start expanding? What is the density we want the wolf population to be, and what happens if they cross it? What mitigation procedures are in place for escapees and potential overpopulation?”* (S & DP2).

A number of interviewees (SCA & TfL representatives, DP5, S&DP1) discussed an additional social barrier: **Scottish citizens alienation from nature impedes coexistence with large predators**. It was argued that such disconnect is rooted in the nearly absolute control human populations have been exerting over British wilderness since the industrial revolution (*“we have forgotten how to work with nature and instead started working against nature”*, TfL representative). The UK was compared to a fully anthropogenic habitat, where mankind is the sole, true engineer of natural ecosystems. As a result, rewilding projects struggle against the status quo, with politicians, the general public and salient stakeholders unwilling to introduce variables that could disrupt their dominion over landscapes. Large predators would constitute such a variable. In the words of DP5: *“[the public in Scotland is] so removed from the idea of having something that they cannot control and or remove at their own whim that bringing wolves back is just not doable”*. The detachment of Scottish citizens from nature, wildlife and ecosystems needs has a practical manifestation in what are considered traditional shepherding practices. To leave flocks unsupervised, free to roam even at night would be a deleterious choice in any country were large carnivores still exist. It is the author opinion that this barrier may be tied to a traditional anthropocentric worldview, whereby nature is subordinated to mankind, predominating among the British public. From the words of the interviewees, was the dominant value system to shift towards a more eco-centric perspective, EWR and similar rewilding projects would gain better approval.

Institutional Barriers

As for institutional barriers, the TfL spokesperson alone mentioned a **lack of political support**. Since the UK is insular, any species reintroduction would result from deliberate efforts. It follows that the political entity who spearheaded a reintroduction would be held accountable by

the public for eventual adverse consequences. Because of the complexity of ecological systems and prey-predators dynamics, it is nearly impossible to ascertain *a priori* whether a LPR project would backfire. Thus, finding a politician willing to gamble, and risk losing their voters' favour, to see EWR become a reality is no easy task. However, it would be a crucial step.

A second institutional barrier was forwarded by ecologists, deer professionals and hunters, and deals with legislative issues. There are **two pieces of legislation in direct conflict with EWR: the Zoo Act and the Land Reform Act, enabling 'Freedom to Roam' in Scotland**. The former makes it illegal to feed live prey to an enclosed predator. Once the fence necessary to contain wolves would be complete, local deer herds would be effectively locked inside with the predator, meaning that an artificially fenced EWR would be in breach of the Zoo Act (S&DP1). Either the text of the Zoo Act is revised, and exceptions are made for EWR, or one would have to consult with legal experts to understand whether this barrier could ever be overcome. Land access rights in Scotland are very permissive per the Land Reform Act. As long as a person complies with the Scottish Outdoor Access Code (prescribing norms for respectful behaviour: no littering, no open fires...), they can cross or access any piece of land and inland waterbody on Scottish territory. Establishing a fenced EWR would inevitably infringe the Freedom to Roam that Scottish citizens have been enjoying for the last decades. According to DP5, the public backlash would be substantial: *"people are unwilling to compromise, to accept that a large chunk of area would become restricted, removed from their own activities, children, sheep, hobbies, and instead devoted to wildlife. People could never put aside their own interests"* (DP5). This legislative barrier to EWR realisation is therefore interlinked with the social sphere, specifically the reported difficulty the British public has in conceding space to wildlife, control over landscapes.

4.2.4 Additional themes of interest

The true nature of the Scottish deer problem: absentee landowners

DP1, DP3 and S&DP1 stated that Scottish deer populations are not spiralling out of the control of existing management measures. Quoting S&DP1: *"all the objective evidence show that deer has been increasing until the end of the 1990s, but ever since populations plateaued and actually started to decline. [...] Existing methods for deer management work [...], it is dishonest to suggest that we need wolves to help us manage deer populations because we cannot cope with this herbivore"*. The testimonial of CR2 suggests that the deer problem occurs at regional, localised level: *"I do not subscribe to the view that deer are a problem. I believe there are too many deer in some areas and too few in others, and that is due to local good management or poor management. [...] Around me deer are fewer in number than they have been for over 40 years"*. S&DP1 further elaborated that the perceived "deer problem" is rooted in human mismanagement and greed. In areas where land managers actively seek to control deer numbers, culling and other traditional approaches are effective. However, certain private landowners refuse to take proper control measures, and allow deer to reproduce undisturbed so to improve stalking rights sales during hunting season. Multiple other participants agreed (F2; TfL spokesperson, S&DP2). Because of the profitability of the stalking business, many landowners wish for deer to abound on their estates – but the herds that are allowed to prosper are far from sedentary. Once they move and start roaming throughout Scotland, the unmanaged deer causes the ecological and socioeconomic damages presented in the Introduction Chapter. F2 believed the 'absentee landowner' phenomenon originates from a value shift among Scottish people. The numbers of gamekeepers, farmers, and other professional figures dedicated to managing the countryside are dwindling because *"[the general Scottish population] no longer care about keeping Scotland's land healthy"*; as a consequence, *"people started treating deer as a commodity for hunting and food; numbers are too high because gamekeepers, whose whole life is taking care of the natural environment, are now much less than before – a lot of estates do not even have one"* (F2). These comments add to the previously discussed public alienation from nature.

Absentee landowners and the causal link with deer overabundance was brought up by several other interviewees (F1, F3; NFUS Staff; DP5, DP6; H2), who however had a distinct angle and criticised the disruptive role played by carbon offsetting programs. The following narrative emerged through their testimonials. Multinational companies have been buying large parcels of land in rural Scotland at premium market prices, outcompeting and driving away local buyers (DP5). These companies' main objective is to gain carbon credits by offsetting their emissions through investment in reforestation projects. They are uninterested in conducting holistic land management and therefore neglect the deer herds populating the estates (F3). Ungulates are allowed to grow in numbers, and once they migrate the "deer problem" arises. H2 commented on the greenwashing quality of this phenomenon: since deer graze and uproot tree saplings, by not investing in deer control these companies somewhat nullify the reforestation efforts they engage in. DP5 looked at the future environmental consequences – a worsening of Scottish landscapes quality: *“those who would own the land philanthropically, and are passionate about taking care of it, are pushed away by these people and multinationals that only want carbon assets – what impact will their indifference have in 20 years from now?”*. Altogether, it appears that carbon credit schemes in Scotland might have unintended ecological & socioeconomic impacts: (a) the promotion of excessive deer densities, and (b) distancing Scottish rural communities from landscape management.

Were-lynx to are-lynx?

A variety of research participants (TfL spokesperson; H2; S&DP1, S&DP2) brought up, unprompted, that the Eurasian lynx is a much more suitable candidate for reintroduction than wolves because of their respective ecological traits. The TfL representative stated that LPRs conversations should focus on lynx, not be distracted by debates on unfeasible projects like EWR or WR. Most barriers EWR faces do not apply to lynx, a solitary predator intolerant of human presence with negligible records of livestock predation. By contrast, wolves are quick to adapt, are known to approach human settlements and infrastructures, and have much larger home ranges than lynx – causing habitat suitability issues. While lynx would not be able to indent deer numbers, they could still contribute to ecosystem restoration, and help farmers by reducing badger and fox populations via competition. H2 and S&DP2 were quite optimistic about lynx reintroduction: *“we [Scotland] don't have sufficient habitat to see wolves soon in Scotland, but we have enough habitat for lynx, a species that is also less problematic and very unlikely to cause major wildlife-human conflicts. In the next future, I expect lynx to be legally brought back in Scotland.”* (S&DP2). Even though lynx reintroduction was not within the scope of the thesis, this by-product is extremely interesting, as it suggests a clear direction for future research (covered in Chapter 5).

4.3 Comparison of survey and interview analyses

Although the questionnaire items and interview questions tackled differently the topic of EWR, their results share commonalities, do not appear to be at odds and instead support each other.

First and foremost, survey respondents reported a widespread, starkly negative view of EWR, confirming the presence of a widespread opposition towards EWR among countryside actors – which many interviewees identified as a significant hurdle in the path of EWR realisation. Livestock predation, distress to rural communities, and a generalised mistrust in Scottish environmental management authorities were mentioned by diverse stakeholders as key reasons to oppose EWR. The questionnaire corroborated such insights. Many respondents reported a worry/concern score of 5, livestock predation and distress to nearby communities received high dreadfulness and likelihood ratings, and the trust index was quite low across all stakeholders - indicating that countryside communities perceive Scottish institutions as untrustworthy. Low trust scores also support the central decisionmakers–rural communities divide reported by

numerous interviewees, whereby the former fail to include the needs & insights of the latter in landscape management policies.

Interviewees also commented on a second disconnect, one between the Scottish public and the natural world. DP5 and the TfL representative in particular discussed how citizens are no longer used nor open to idea of sacrificing habits and self-interests to accommodate wildlife. Their views resonate with the very low acceptance of compromise from survey respondents, as well as with the overall negligible symbolic beliefs scores. However, symbolic beliefs did not capture the biospheric values and worldviews of respondents. Moreover, in the ranking of outcome importance, “to help the environment thrive” was voted in third-place by most participants, suggesting that natural landscapes well-being is a topic close to the heart of many countryside stakeholders involved in the research.

A last, important point raised by both interviewees and questionnaire respondents touches the ecological relevance of wolf reintroduction. Most participants did not believe wolves could ever control deer numbers, which survey respondents judged as an extremely unlikely EWR benefit. The fact that ecotourism was poorly judged echoes the TfL representative’s reasoning that proponents of EWR must focus on the socioeconomic benefits the intervention might yield to muster social acceptance.

5 Discussion

Overall, the qualitative and quantitative findings indicate that the acceptance of EWR is extremely low among Scottish farmers, hunters, countryside residents, deer professionals, landowners & workers, and ecologists. Rural opposition to EWR is founded on socioeconomic, ecological, and institutional grounds, and appears to be linked with negative emotions, a perceived lack of benefits and considerable negative outcomes impacting rural communities, personal value & beliefs, and a deep mistrust in the wildlife management capabilities of Scottish authorities. In this chapter, the author will contextualise and compare with existing literature the insights on EWR attitude formation and social acceptance presented in the “Findings” chapter. Before engaging in detailed discussion, the author would like to re-address a crucial limitation of the thesis, as well as comment on the WR – EWR gap.

As aforementioned, survey respondents were not numerous ($n = 17$) and unevenly distributed across age and interest groups. Arguably, deer management is not the main occupation of Scottish countryside residents, yet deer professionals outnumbered every other stakeholder type. Thus, the sample did not accurately represent the general, underlying population (i.e., Scottish countryside communities). It follows that the results of survey analysis cannot be considered reliable nor final. The author is well aware that the trends discussed in section 5.1 could be ascribed to ineffective sampling, hence encourages the reader to judge these quantitative findings as simply exploratory, to interpret their discussion with caution.

The preamble of section 4.2 mentioned that interviewees often discussed problems, solutions and matters linked to a nation-wide reintroduction, not a fenced one. While this could be caused by the author’s inability to ensure participants would conceptualise EWR and WR as two separate topics, the tight correlation reported between attitudes towards the former and the latter offers an alternative interpretation. Simply put, Scottish stakeholders conceive unrestricted and fenced wolf reintroduction as twin-topics; if EWR’s aim is to verify the ecosystem restoration (ER) potential of WR, then the issues related to the planning and realisation of one intervention are synonymous to the challenges linked to the other. A corollary of the intertwined nature of EWR and WR is that respective attitudes should form similarly. That is to say, the author expects that EWR attitudes’ antecedents would present nearly identical relationships with WR. Be that as it may, perhaps EWR is too new of a topic, too poorly addressed in public debates for Scottish stakeholders to differentiate it from WR. Had the author supplied participants with a first draft of EWR covering its logistics, the two interventions might have been conceptualised and addressed more distinctly.

5.1 Socio-psychological antecedents to EWR attitude

Older citizens have been frequently reported to hold more negative views of LPRs programmes than younger individuals (Bath, 1989; Williams et al., 2002; Meadow et al., 2005; Bath et al., 2008; Sakurai et al., 2021). In their meta-analysis, Williams (et al., 2002) proposed that this is due to a cohort effect, underlined by evolving worldviews on humans’ position within the ecosphere. The historical perspective of nature as subordinate to mankind is progressively fading, leaving space to more eco-centric philosophies appreciative of coexistence with wildlife (Blossey & Hare, 2022). Against expectations, statistical analysis revealed a null effect of age on attitudes among Scottish countryside stakeholders. On the one hand, this might hint that cohort effects are less influential on attitude formation in Scotland compared to other locations. Much more likely, this unexpected finding is simply fictitious. Age distribution was greatly skewed: most of the respondents were between 55 and 64 years old, and only two were under 35. Because

of the severe underrepresentation of younger cohorts, the null effect of age ought to be considered a sampling artifact.

According to the literature, occupation should be another determinant of citizens' LPR and WR views. Ranchers & farmers are usually the strongest opponents to predator reintroductions (Bath, 1989; Williams et al., 2002; Wilson, 2004; Meadow et al., 2005; Nilsen et al., 2007; Bath et al., 2008). The findings of the present research, whereby farmers unanimously displayed the worst possible EWR attitude scores, corroborate this trend. Environmentalists and ecology professionals typically hold the most positive LPR attitudes (Bath, 1989; Williams et al., 2002; Nilsen et al., 2007), and hunters are known to perceive carnivore recovery more favourably than farmers (Williams et al., 2002; Bath et al., 2008) - although their opinion on WR specifically tends to be either very negative or very positive (Williams et al., 2002). The thesis displayed both consistencies and inconsistencies with such prior studies. The participants who were open towards EWR, albeit to different degrees, were an environmentalist (IfL representative), a hunter (H2), and a gamekeeper (i.e., a professional in the ecological field, DP5). Additionally, hunters were the stakeholder group with the highest average attitude scores, and some Deer Professionals (DPs) had fewer negative views than farmers (Figure 4-1). Yet, the two ecologists and the remaining DPs here interviewed were far from supportive of EWR. Given the uncertain ER value of wolf presence in Scotland, the complex socioeconomic impacts of EWR, it is not surprising that scientists and wildlife managers would not unanimously welcome it.

Regardless, the thesis showed that stakeholder group of belonging was uninfluential on a participant's EWR stance. Even though data limitations undermine the veracity of this result, at odds with prior studies, there is an alternative explanation. The author deliberately selected stakeholder groups who would be at the 'receiving end' of EWR, and in doing so, they might have inadvertently prevented stakeholder-specific differences from manifesting. Indeed, Wilson (2004) found that Scottish urban residents are more welcoming of WR than rural counterparts mainly because they would be less affected by it. If EWR was to be pursued, all social groups who were administered the survey could be exposed to undesirable consequences – either because of their occupation or location of residency. In other words, it appears that regardless of a countryside resident specific profession, and related capabilities & context, if they believe EWR jeopardises their lifestyle, habits, livelihood and community, their attitude would be less favourable than otherwise. Altogether, the thesis corroborates that self-interests and social context influence opposition or support to fenced wolf reintroduction.

Self-interest and social identification with those who would be most impacted by the attitude-object (in this case, EWR) are also thought to promote personal significance of the attitude itself (Boninger et al., 1995). Unsurprisingly, the levels of Importance attached to the EWR issue were predominantly on the upper end (Table 4-1): Scottish countryside actors deeply care whether wolves would or would not return to Scotland. In turn, personal importance can affect not only how and if attitudes evolve over time (Olson & Zanna, 1993; Boninger et al., 1995; Meadow et al., 2005), a topic with clear Practical Implications (section 6.1), but also the relative weight of attitudinal affective & cognitive components (Bright & Manfredi, 1996). In individuals for whom WR truly mattered, symbolic beliefs about wolves return and emotions were the strongest attitude-shaping factors, whereas appraisal of potential outcomes and knowledge (i.e., cognitive variables) were better determinants among people displaying lower personal significance (Bright & Manfredi, 1996). Even though sample limitations impeded the verification of the causal links between attitude, importance levels, emotions, outcome appraisal and symbolic beliefs, differences in correlation strength and significance show consistency with Bright & Manfredi (1996). In line with their findings, a statistically insignificant relationship between EWR attitudes and outcome perception, along with a stronger correlation with symbolic beliefs, was found among participants attributing great significance to the EWR issue. By contrast, sample-wide

tests of correlation between attitude and evaluation of potential negative & positive consequences were statistically relevant. However, the substantial size gap between High and Low Importance Groups, counting 14 and 3 people respectively, undermine the validity of observations on the modulatory effect of issue importance on attitude formation.

Spearman tests revealed, consistently with Bright & Manfredi (1996), that outcome perception correlates with EWR attitude. The lower a person's opinion of EWR, the more likely and dreadful they evaluated EWR's negative consequence to be – and vice versa with hypothetical benefits. Cognitive consistency might underlie this phenomenon: people strive to provide rational grounds to justify their views (Siegrist & Cvetkovich, 2000). The existence of reinforcing feedback loops between attitude and its antecedents is furtherly supported by the specular relationships PNO and PPO had with symbolic beliefs, and their significant correlation with attitudes. People who attributed high symbolic value to wolves' return to Scotland were prone to rate potential benefits (i.e., ecotourism, deer control, thriving landscapes) more favourably than those with low belief indexes, who instead evaluated more intensely hypothetical undesirable outcomes. Symbolic beliefs and perceived outcomes also covaried with emotional reactions. Feelings of worry/concern and fear promoted PNO scores, while awe and interest increased PPO. At the same time, negative emotions were inversely proportional to symbolic beliefs, while positive emotion were directly proportional to the latter variable. Even though the emotions–outcome perception relationship may be biased to question wording (see section 4.1.2), the present research provides empirical evidence to the theorised interconnections between affective and cognitive attitudinal factors – covered in Chapter 2. However, correlation is not causation. Using the available data, it was not possible to infer whether attitude & beliefs shape outcome appraisals or vice versa, nor which antecedent plays the biggest role in EWR attitude formation. Be that as it may, the links between emotions and outcome perception here revealed echo the work of Alhakami & Slovic (1994) and suggest paths to influence public opinion (more in section 6.1).

Speaking of emotions, affective reactions are widely believed to sway public support for predators' recovery and/or reintroduction (Bright & Manfredi, 1996; Bath et al., 2008; Slagle et al. 2012; Ghasemi et al., 2021). Broadly speaking, emotional reactions and attitudes covary both in direction and strength (Bath & Manfredi, 1996; Slagle et al., 2012; Ghasemi et al., 2021). In agreement with the literature, feelings and EWR attitudes of Scottish stakeholders are linked; positive emotions covaried with EWR views, whereas the higher the concern & fear reported, the stronger the opposition to the intervention. Emotional reactions are thought to influence perceived risk to self, fellow humans, livestock and wildlife (Kahan, 2008). In their study, Ghasemi and co-authors (2021) observed that WR risk assessments covaried in intensity and direction with emotional responses, so that individuals reporting positive feelings would be lenient in their judgments of hazardousness, and those reporting negative emotions would be harsher. However, perceived risk itself had no influence over WR attitudes (Ghasemi et al., 2021). Encouragingly, statistics revealed a null correlation between Risk and EWR attitudes scores, and a specular relationship between Risk-PE and Risk-NE, hence matching the work of Ghasemi (et al., 2021). Once again, the thesis corroborates tight links between rational (i.e., risk assessment) and non-rational (i.e., affective reaction to EWR) psychological antecedents of EWR attitude.

Generally speaking, most of the findings aligned with prior studies. It was therefore unexpected to find an insignificant relationship between attitudes and trust in institutions, since numerous papers endorse a positive association between social trust and large carnivore recovery acceptance (Sponarski et al., 2014; Engel et al., 2016; Arbieu et al., 2019; Sakurai et al., 2020).

Nonetheless, it is likely that such nil relationship is fictitious. No survey respondent was confident in the capabilities of Scottish institutions to safely manage & design EWR (Table 4-1), meaning that there was no actual term of comparison for the participants reporting low trust. Thus, it was not possible to determine whether trust in management agencies exerts a beneficial influence on EWR acceptance among Scottish rural communities.

Even though analysis of trust's direct influence over EWR attitudes was inconclusive, this variable was interlinked with emotions and assessments of risk & outcomes. In agreement with Ghasemi (et al., 2021), trust had an inverse relationship with worry & fear, perceived risk, and undesirable outcomes assessments. By contrast, social trust covaried with positive emotions and evaluation of potential benefits. Therefore, the thesis supports the existence of a trust–emotions–outcome/risk perception triangle. As aforementioned, it was not possible to examine the causality of antecedents' connections. The present research cannot answer questions such as “are people less trusting because they perceive EWR to be hazardous, or do they think the intervention would yield significant negative outcomes because environmental authorities are not to be trusted with its design?”, “is EWR worrisome and frightening because people think it would yield undesirable consequences, or do they perceive negative outcomes more intensely because they are frightened and worried by EWR?”, and similar variations. Nevertheless, considering that EWR constitutes an unknown, unfamiliar ‘danger’ to Scottish countryside communities, the relationships between trust, emotions and outcome assessments are consistent with the affect heuristic (Slovic et al., 2007) and trust heuristic (Siegrist & Cvetkovich, 2000). It is arguable that due to low familiarity with EWR, Scottish countryside actors' judgements of risk and benefits might be biased by emotional reactions to the intervention and poor faith in governmental institutions' capabilities to handle EWR. Such psychological dynamics entail that EWR acceptance can be fostered by improving trust in governmental agencies and the nature of the feelings EWR evokes among the public.

All in all, the quantitative findings agree with previous studies on the determinants of LPR & WR attitudes. The thesis supply empirical evidence to socio-psychological theories, albeit non-conclusive, that support of environmental policies originates from the interplay of heuristics, values, beliefs, self-interests, and rational thinking. The author would like to highlight how Scottish stakeholders' opinions were polarised, either very favourable or starkly against EWR. Meadow (et al., 2005) and Blossey & Hare (2022) also commented on how attitudes towards large predators' recovery are rarely mild, with public debates being characterised by lack of middle ground. It was also noticeable how pro- and anti-EWR respondents displayed an almost specular pattern of scores across the various attitude antecedents. In the authors opinion, the mirroring response trends corroborate the relevance of the independent variables considered.

5.2 Social acceptance of EWR and environmental policies among Scottish countryside stakeholders

The opposition of salient stakeholders to EWR was based on socioeconomic, institutional and technical grounds, highlighting the multifaceted nature of rewilding interventions. All participants provided a mixture of arguments against the realisation of fenced reintroduction, although farmers and deer professionals were the sole civil society stakeholders who criticised EWR for (a) the livestock predation it would lead to, and (b) its uselessness for deer management purposes. Both arguments were presented by 12 participants, making them the most frequently cited reasons to oppose EWR. However, the third (i.e., EWR would not stay experimental in the long-term) and fourth (i.e., Scottish environmental authorities could not trustworthily design & manage EWR) most popular anti-EWR arguments counted 11 and 10 proponents respectively, and were mentioned by hunters, countryside residents and landowners / workers too. Therefore, no Scottish countryside stakeholder group has monothematic reservations

towards EWR, but instead holds concerns of varied nature, which often intertwine and blend into each other. Even the few who were open to EWR acknowledged the issues it would bring about, especially in terms of impacts on farmers and nearby communities. In alignment with Nilsen (et al., 2007), the TFL representative here interviewed had a positive outlook on bringing wolves back in Scotland. However, the only interviewee who explicitly said he would support EWR was a hunter (H2). Also considering the overwhelmingly negative EWR attitudes among survey respondents, the thesis provides evidence that EWR acceptance among Scottish rural stakeholders is unequivocally minimal.

The three interviewees who benignly saw EWR possibly did so because of their pro-environmental personal experiences, values, and worldviews, which allowed them to appreciate the intervention potential benefits and attribute high symbolic value to wolves return to Scotland. That is not to say that those who rejected EWR do not care about nature; when asked to rank hypothetical EWR outcomes, stakeholders typically attributed quite a high importance to “help the surrounding environment thrive and improve”, showing widespread concern for Scottish landscapes well-being. Simply, most participants believed either that EWR pros would not outweigh the cons, or that there would be no noteworthy benefit. A gamekeeper (DP5) thought bringing wolves back would push Scottish citizens to change their ways so to accommodate these wild animals, hence stimulate their interest towards wildlife, and altogether help reconnect the Scottish public with nature. While multiple interviewees agreed that their compatriots are increasingly alienated from the needs of local ecosystems, they did not recognise EWR as a solution to such disconnection. The TFL representative and H2 justified their favourable EWR stance by highlighting wolves’ ER and deer control potential, and the insights on prey-predator dynamics EWR could generate. However, according to the stakeholders here interviewed, the ecological and scientific value of EWR is dubious. An ecology professor (S&DP1) mentioned that prey-predator dynamics within a fenced reserve would not mimic what happens in an unbound environment. Thus, data from EWR could not be used to model post-WR changes in deer distribution, density and abundance, and consequently inform decision-makers regarding the ER value of WR.

Numerous participants thought that wolves could never become deer management tools, and since traditional methods work effectively, why fix what is not broken? Indeed, Albon (et al., 2019) meta-analysis of density trends among the red deer populating Scottish open hills proved that culling associates with deer counts; in the Deer Management Areas (DMAs) where >22% of the total hinds were removed, instead of the traditional 17% cull rate, deer densities stabilised if not decreased over time. Plus, authors found that local culling levels explained a high proportion of geographical differences in deer demographics, negatively impacting ungulate densities of a given DMA (Albon et al., 2019). Many interviewees and survey respondents altogether rejected the idea of a national “deer problem”, intended as a situation in which deer species numbers keep growing uncontrollably. Instead, their testimonials and reports commissioned by NatureScot (SNH at the time) lead the author to conclude that the “deer problem” (i.e., undesirably high deer counts & densities) might exist solely at a finer scale.

In the National Forest Estate, comprising of ~650,000 ha of woodlands interspersed throughout Scotland, overall deer counts declined between 2001 (average density: 16.5 deer per km²) and 2016 (average density: 12.5 deer per km²), but locally increased in certain forest parcels (Campbell et al., 2017). Similarly, while average open range deer densities were found to be stable, mildly decreasing for the past 20 years, there was significant regional variation (Albon et al., 2019). The 30 DMAs Albon and colleagues (2019) examined displayed extremely heterogeneous changes: in some areas, deer densities went up by more than 60% over the last

couple of decades, in others there was a >60% drop. Opposite changes often occurred in adjacent DMAs, but broadly, deer herds grew the most in North-Eastern Scotland and dwindled in the northern and central Grampian Mountains (Albon et al., 2019). However, looking at absolute numbers, densities were usually on the lower end among islands and North-West Highlands (e.g., Skye DMA: <2/km²), and on the upper end in the Ross-shire, Inverness-shire and Eastern Scotland (e.g., Glenartney DMA: >30/km²). Such heterogeneity can be ascribed to the Scottish decentralised approach to deer management. Per the Wildlife and Natural Environment Act (2012), governmental authorities can step in only if ungulates are jeopardising public safety and/or agricultural, environmental, forestry quality. In all other circumstances, deer management objectives, practices and intensity are entirely up to landholdings' private landowners, who can join the Association of Deer Management Groups (ADMG) to coordinate their efforts (Putman et al., 2019). While the ADMG receives advisory input from governmental authorities, its members can act independently (Putman et al., 2019). Considering that landowners exert complete control over the herds populating their estates, and that managing deer is costly, it is not surprising to observe stark spatial differences in culling efforts and trends of deer abundance. The unevenness of management approach across Scottish DMAs is further underlined by seemingly contradictory changes in recruitment (i.e., natality) and density of open range herds: the former continuously decreased over the past 60 years, the latter markedly grew between the 1960s and the year 2000 (Albon et al., 2019). Likely, open hill populations acted as a 'sink' for woodland populations. Mature deer, presumably driven by high resource competition and local densities, may kept emigrating from forested habitats to establish in open range ones.

Altogether, while man-led deer management can effectively drive down ungulates' densities to ecologically preferable ones (<8/km², Andrews et al., 2000; Sandom et al., 2012), culling efforts differ landholding to landholding, and along with additional abiotic variables (e.g., weather patterns, sheep grazing competition...), when insufficient they can lead to localised deer overabundance. Indeed, a variety of research participants attributed the cause of the deer problem to the negligence of 'Absentee Landowners' who, according to their insights, either wish to inflate stalking rights sales or are corporations interested in consolidating carbon credits. The indirect role of the hunting industry and carbon credit schemes in fostering deer overabundances across Scotland ought to be thoroughly understood, and the author advances suggestions for future investigations in the next Chapter. More broadly, the findings indicate that while the ecological value of wolf return is uncertain, and the realisation of EWR would lead to severe public backlash, the effectiveness of existing deer management methods is not. The core issues seem to be that individual landowners' investment in deer control practices differ substantially throughout Scotland. Being deer a highly mobile species, the effects of localised underculling spill over, ripple across nearby areas. It follows that unless inter-DMAs management efforts homogenise, so that all herds are subjected to comparable culling levels, the Scottish deer problem would persist. This point is further developed in section 6.1.

A second, popular technical anti-EWR argument was the belief that the intervention would inadvertently cause nation-wide reintroduction, either because of wolf escapees or because 'overzealous environmentalists' would see to it. S&DP1 offered a solution: introduce a male-only experimental pack, so to avoid breeding and ensure a definite time limit to the experiment, corresponding to wolves' lifespan. Picking an island as the EWR location would minimise the chances of escapees establishing a nation-wide, unrestricted viable wolf population thanks to the intrinsic difficulties in reaching mainland. The author also wonders whether, in case EWR was to occur in an island where wolves would be allowed to freely roam, insular wolf and deer populations would be considered captives under the Zoo Act. If that was not the case, then EWR would no longer infringe this piece of legislation. Regular upkeep of fence and tracking with GPS collar would also contribute to EWR remaining experimental in the long-term and are examples of proactive and prophylactic management measures. According to research

participants, if wolf management plans were properly developed following thorough research & models, and communicated with countryside actors, the firm opposition of rural communities to EWR should be lessened. Broadly speaking, action plans should focus on the topics of utmost concern for salient Scottish stakeholders, which were found to be sheep & cattle predation, related emotional distress to farmer, and disruption of countryside communities. Nevertheless, the author cannot help but question whether ‘iron-cast’ wolf management plans could truly improve social acceptance or if instead, given the widespread low faith in Scottish agencies’ capabilities to oversee a safe EWR project, rural actors would dismiss them as unreliable. The poor trust Scottish countryside communities placed in central environmental authorities partially has its origins in failure to control Sea eagle, geese, deer, and beaver populations - wildlife species damaging to rural actors and economic activities. A second source of such mistrust is the perceived alienation of central decision-makers from countryside realities, possibly underlined by skewed population distribution. Since Scottish citizens concentrate in urban settlements, and the countryside is scarcely populated, politicians would be incentivised to seek the support of urban dwellers – i.e., the majority of voters.

Regardless, according to the testimonial here collected, the situation is such that central policymakers seldom consider rural actors’ needs and involve local communities in the design of environmental interventions. The consequences are two-fold. First, countryside stakeholders do not trust landscape management decisions are taken with their interest at heart. Second, the insights and knowledge of local actors, which Santana & Raimunda (2008) identify as pivotal for the long-term success of ecosystem restoration (ER) projects, are not integrated in policy design. Thus, such rural-urban divide undermines not only the social acceptance of EWR and other ER policies, but potentially their effectiveness as well. Countryside stakeholders’ engagement & participation in the evaluation, design and planning of EWR were regarded by most research participants as an essential point that could bridge the divide. Paraphrasing DP6, the Scottish government ought to transform its current top-down approach to environmental and landscape management into a bottom-up one. By doing so, countryside communities and salient stakeholders would become more trusting and open to novel environmental policies.

The literature offers ample evidence that by bringing together the generation of ecological and socioeconomic benefits, participatory processes (PPs) in ER interventions design foster social acceptance and effectiveness (Derak et al., 2017; Swart et al., 2018; Garzon et al., 2020). Collaboration, engagement, and straightforward communication between practitioners, salient stakeholders (i.e., local actors depending on the ecosystem being restored), and scientific experts are key to that end (Jellinek et al., 2021). ER case studies from Basque Country (Palacios-Agundez et al., 2014) and Mexico (Gomez-Ruiz et al., 2022) highlighted the importance of involving salient stakeholders from the very beginning, so that scientific expertise, local knowledge and socioecological needs would be fully integrated in the final project design. By doing so, not only ER interventions were better accepted by local actors, but also their socioeconomic usefulness and relevance improved. Therefore, the papers by Palacios-Agundez (et al., 2014) and Gomez-Ruiz (et al., 2022) constitute valuable resources for Scottish environmental agencies, providing guidelines for inclusive development of sustainable landscape management and nature recovery strategies. However, as long as the socioeconomic benefits of EWR remain understudied and poorly understood, it is dubious whether achieving PPs would matter. The author agrees with the TfL representative in that there have been insufficient attempts to quantify and understand the practical, tangible benefits WR would bring to Scottish communities. In the case of EWR, where any environmental benefit would be restricted within the reserve boundaries, drawing causal links between restoration of ecosystem goods & services and benefits to the human sphere is particularly complicated. The low

compromise and EWR attitude scores among survey respondents lead the author to believe that, unless EWR proponents build a strong socioeconomic case, no degree of social dialogue and PPs could scratch the opposition of Scottish countryside communities.

Similarly, while diverse participants suggested that information campaigns (e.g., on the value of ER, behaviours to best coexist with wolves...) would ameliorate social acceptance of EWR, their effectiveness in the Scottish context is questionable. On paper, education of salient stakeholders would reduce feelings of concerns and fear, and consequently promote support of LPRs. Following Slovic (et al., 1980; et al., 2007) and Siegrist & Cvetkovich (2000), the more knowledgeable people are about a hazard source, the less affective reactions and social trust would influence related attitudes and risk assessments. Given that wolf predation on livestock is much more infrequent than what non-experts typically believe (SCOTLAND: The Big Picture, 2022-b), and that levels of concern towards EWR and mistrust in institutions were high, if Scottish countryside actors increased their factual knowledge on the implications of coexisting with wolves and the value of rewilding, attitudes towards EWR should improve. Yet, responses to unfamiliar hazards, such as wolf presence would be for Scottish residents, are driven by the possibility, not the probability of undesirable consequences; hence, concerns about radiation exposure among the public often fail to recede despite clear evidence on the safety of nuclear energy plants (Loewenstein et al., 2001; Slovic et al., 2007). Additionally, Scottish countryside stakeholders were found to attach considerable levels of personal importance to the issue of EWR. Attitude importance vehiculates selective exposure to and elaboration of factual information, as well as resistance to change (Krosnick et al., 1993; Boninger et al., 1995). In other words, the opinions of Scottish actors on EWR may be too firmly crystallised to be influenced by new knowledge regarding the true risks and implications of bringing wolves back in a reserve boundary. That is not to say that education of the Scottish public on the value of ER projects would be worthless. In Gomez-Ruiz (et al., 2022), the rural communities who participated in a workshop covering the connections between mangrove forests' health and their personal livelihoods & well-being became more aware of the need for nature conservation, and more supportive of other nature recovery interventions. Therefore, while educational campaigns on the ecological pros of rewilding may not sway public acceptance of EWR, they could stimulate the interest of the Scottish public towards sustainable landscape management and nature conservation. Perhaps, the detachment reported between Scottish citizens and the needs of local ecosystems could then be partially amended.

All in all, social acceptance of EWR among salient Scottish stakeholders was minimal. Uncertain ecological & scientific value, likely dire consequences for rural actors, and a deep-rooted mistrust in governmental institutions' ability to cater for countryside communities' needs were popular anti-EWR arguments. If EWR was to be pursued, practitioners should: have a bottom-up approach, involve countryside actors throughout the whole project; consolidate prophylactic & preventative wolf management measures; and lead educational campaigns. However, given the stark opposition shown by countryside stakeholders, lack of clear socioeconomic benefits, it is questionable whether EWR is a path worth exploring for Scottish environmental authorities.

6 Conclusions

The thesis provides clear evidence that Scottish countryside stakeholders would not welcome EWR. Proponents of EWR advocate that a properly designed fenced reintroduction could ascertain whether an unrestricted reintroduction would vehiculate ecosystem restoration, yield such ecological benefits to balance socioeconomic drawbacks. However, albeit to a lesser degree, fenced reintroduction can bring about the same disruptive consequences of WR, a price that is not worth paying according to the Scottish salient stakeholders here involved. The opposition of ecologists, who also do not have self-interest reasons to be against EWR, speaks loudly against the scientific value the intervention. Overall, research participants attributed great importance to the EWR issue, and their attitudes were polarised – either very negative or very positive, suggesting that Scottish countryside communities’ opinion of EWR is deep-rooted.

EWR attitudes appear to be underlined by affective (emotional reactions, social trust) and cognitive (outcome perception, symbolic beliefs about wolf return to Scotland) factors, which were tightly intercorrelated. Positive emotions to EWR correlated with favourable assessments of EWR benefits and lower risk perceptions. By contrast, concern, worry, and fear were greater in participants who evaluated EWR unwanted consequences as more likely and dreadful. Interestingly, outcomes assessments did not correlate with the attitudes of those who attached high personal importance to the EWR issue. Trust in institutions, which was generally minimal, was linked to better appreciation of hypothetical benefits, while it negatively correlated with perceived risk levels and negative outcomes assessments. Inter-stakeholder differences in socio-psychological antecedents to EWR attitudes were negligible, both in terms of absolute levels (e.g., of fear, trust, perceived risk...) and type of intercorrelations. Nevertheless, these conclusions were drawn from an unrepresentative, limited sample of Scottish countryside stakeholders. Sampling fallacies undermine the reliability of these findings and impeded the examination of causal links between EWR attitudes and potential determining factors.

Ecological, technical, institutional and socioeconomic arguments were provided by research participants to justify their anti- and pro-EWR views, highlighting the multi-faceted nature of rewilding and ecosystem restoration projects. The most popular arguments were wolves’ inability to control deer populations, concerns of EWR not remaining experimental, livestock predation, and mistrust in the Scottish environmental agencies. Favourable opinions of EWR were offered by only three individuals, likely because of the high value they attributed to rewilding and large carnivores’ existence, but only one person (i.e., H2) explicitly supported the realisation of EWR in Scotland. Social acceptance of EWR among Scottish salient stakeholders could be improved by: (a) ensuring local communities engagement and participation in the design, planning, and implementation of the intervention; (b) develop research-based prophylactic & reactive wolf management plans that would minimise the occurrence of negative social impacts, such as livestock predation; (c) investigating and communicating the socioeconomic benefits of EWR; and (d) lead educational campaigns. However, the considerable polarisation of attitudes, high importance attached to the EWR issue, and widespread lack of faith in Scottish institutions abilities to handle EWR are such to question whether these four elements could truly improve acceptance among countryside actors. Also considering the uncertain ecological & scientific value of this rewilding project, and the reported anthropogenic origin of the Scottish “deer problem”, the author concludes that EWR may not be a path worth exploring for Scottish environmental authorities. However, the thesis revealed valuable insights for the pursue of other rewilding projects, sustainable landscape management and deer management in Scotland, as well as points of interest for future research.

6.1 Practical Implications

The thesis suggests the existence of links between affective reactions to EWR, social trust and perception of risks and outcomes. There were very strong and significant correlations between positive & negative emotions and assessments of hypothetical undesirable consequences of fenced reintroduction. Psychological theory suggests that cognitive evaluations of risks, benefits and unwanted outcomes are influenced by social trust and emotions, which would hence have a greater role in attitude formation, among non-experts, or when the attitude-object is unfamiliar. Arguably, EWR constitutes a relatively novel and unknown topic for Scottish countryside actors. Moreover, countryside actors generally attached very high importance levels to the EWR issue, suggesting that their opinion would be difficult to affect, especially via information sharing and provision of factual knowledge. Altogether, these considerations are valuable to Scottish practitioners and environmental decision-makers, who should take in account the substantial influence heuristics have on public opinion towards EWR. Rather than attempting to change stakeholders' opinion through educational campaigns or other measures that address cognitive, rational aspects of attitude formation, it might be more effective to frame the issue at hand in such a way to elicit positive emotional reactions, or by linking it to salient values of the public.

The widespread mistrust countryside stakeholders reported towards governmental institutions should be cause of concern for Scottish practitioners, as it did not apply to EWR management alone, but instead encompassed the current approach central decision-makers have to environmental & landscape policy making. Low faith in Scottish environmental agencies capabilities could undermine countryside salient stakeholders' support to ER projects as a whole. Siegrist and colleagues (2000) discuss how social trust could be improved by increasing perception of salient value similarity between central agencies and rural actors. However, Scottish practitioners should reconsider their approach to landscape management decision-making, and favour ground-up processes to engage countryside communities & salient stakeholders throughout the evaluation, planning, implementation and monitoring of environmental or ER interventions. The literature offers an array of guidelines for participatory processes and inclusive policy design. Among others, Gomez-Ruiz (et al., 2022) and Palacios-Agundez (et al., 2014). The latter developed a plan for managing the Basque countryside based on the needs and insights of the forestry industry private actors, ecologists' expertise, and ER ambitions. Gomez-Ruiz (et al., 2022) provides examples of community-based development of an ER program, of how local communities can be involved in the planning, implementation and monitoring phases of nature recovery projects. The difficulty of explaining mathematical and ecological models to non-academic audiences is a commonly reported barrier to social participation in environmental policies: Herman (et al., 2019) offer a template for interactive workshops to help non-scientific actors understand the most technical aspects of ER.

The fact that different participants brought up the topic of lynx reintroduction, and were rather optimistic regarding its realisation, is quite telling and clearly indicate a more feasible direction for LPR projects in Scotland than wolf reintroduction. The TfL representative and DP6 shared with the author that lynx return to the Highlands has been receiving an increasing amount of attention from media, practitioners and researcher alike. A cross-organisational project called 'Lynx to Scotland' examined the social feasibility and barriers of lynx reintroduction (Bavin & MacPherson, 2022). Their encouraging results, along with the willingness and optimism with which certain research participants discussed the lynx topic, support that Scottish countryside communities may be more open towards this felid than grey wolves. Therefore, Scottish organisations and rewilding practitioners interested in returning locally extinct apex predators, may want to focus on lynx instead of wolves.

A last point of interest for practitioners touches the root of deer overabundance in Scotland. Uneven control efforts, insufficient in certain DMAs, was indicated by participants and review of SNH reports as the core cause of localised deer overabundance. Moreover, the ADMG network mostly covers open hill habitats (ADMG – Association of Deer Management Groups, n.d.), yet deer densities typically peak in woodlands (Putman et al., 2019). At the same time, Albon (et al., 2019) review of deer populations trends across 30 DMAs substantiated that deer overabundance occurs regionally, and that increasing cull rate to 22% of the total herd size (rather than the traditional 17% or 1/6th) can curb growth. As such, the thesis provides clear insights for central decision-makers, who are encouraged to stimulate homogenous culling throughout Scotland's regions especially in forested areas, and private landowners, who would prevent local deer herds from overgrowing if they were to ensure a 22% culling year after year.

6.2 Future research

Despite the minute, unrepresentative sample, the socio-psychological antecedents to EWR attitudes here considered appeared to be of relevance. Thus, it would be of interest to reproduce the investigation of socio-psychological attitudinal factors here undertaken with a larger, representative sample, and perhaps using lynx as the focal predator species. As commented in the previous section, lynx appear to be a more palatable candidate from a social acceptance perspective than wolves are. If the socio-psychological dynamics of attitude formation to lynx reintroduction acceptance were assessed, the significance and interactions of affective and cognitive elements for determining salient stakeholders' opinion would be revealed. Consequently, practitioners would gain valuable insights on core issues for countryside communities and barriers to lynx acceptance.

In order to ascertain the role played by absentee landowners, the hunting industry, and carbon credit schemes in the Scottish deer problem, one could compare the ungulate densities across open range and woodlands DMAs with spatial distribution of culling efforts, stalking rights sale and private reforestation projects pursued for the purpose of emission offsetting. If deer densities were to overlap with hunting rights sales and carbon offsetting forestry projects, then the suggestion that absentee landowners are the root cause of localised deer overabundances would find confirmation. Such an investigation would be of particular interest for the management of carbon credits schemes in Scotland, since it might reveal that they can lead to a negative, wide-impacting ecological consequence (i.e., deer overabundance) unless holistic estate management is pursued concomitantly. Moreover, it would be important to verify a second proposed negative outcome of carbon credit schemes: the alienation of local communities from Scottish landscapes, and loss of job opportunities. The author observes that these hypothetical negative impacts of carbon offsetting programmes, if proven true, could be resolved synergistically. Additional personnel could be hired among local communities by the companies to pursue holistic management of the estates bought for carbon offsetting purposes. Gamekeepers, land and wildlife managers would ensure that reforestation efforts are not undone by deer grazing, and that the herds populating the estates are controlled in such a way to not hinder recovery of Scottish landscapes.

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Appendix

Stakeholder mapping

The table below thoroughly explains the stakeholder mapping process, the relevance of each group involved, and interviewees identity. It is important to note that not every interviewee affiliated with an organisation accepted to participate as a spokesperson, rather as a private individual. This is disclaimed throughout the table, along with interviewee-specific considerations. For the stakeholder groups the author is certain were administered the survey, the corresponding column shows a Yes (Y), otherwise a U (uncertain).

Stakeholder type	Stakeholder group	Reason for inclusion	Survey	Interviewee identity & considerations
Civil society	Countryside residents	<ul style="list-style-type: none"> - Psychological and physical wellbeing may be affected by EWR. - Establishing a fenced EWR would change land access, thus affecting recreational and land use activities. - EWR may change tourism patterns. - Escapees may reach human settlements surrounding the fence. - Knowledgeable of Scottish countryside culture and identity 	Y	<ul style="list-style-type: none"> • F2 – also responded to the survey. • NFUS Staff Member • DP6 – also responded to the survey. • H2 – also responded to the survey. • DP5 – also responded to the survey.
	Farmers	<ul style="list-style-type: none"> - Psychological and economic wellbeing may be significantly affected by EWR due to re-established wolf presence and potential predation of livestock. - Establishing a fenced EWR would change land access, thus influence livestock grazing patterns. - Knowledgeable about Scottish landscapes and wildlife. - Important part of the Scottish rural identity, traditions and culture 	Y	<ul style="list-style-type: none"> • F2 – the interviewee comes from a farming tradition and runs a cattle & sheep farm with their family) • NFUS Staff member • DP6 – crofter on top of deer manager.
	Hunters	<ul style="list-style-type: none"> - EWR may change deer populations dynamics and affect land access, with repercussions on the hunting and venison industry. - Knowledgeable about Scottish landscapes, wildlife and deer populations 	Y	<ul style="list-style-type: none"> • H2 - hunter, ADMG attendee and wildlife enthusiast.
	Land estate workers,	<ul style="list-style-type: none"> - EWR will require large parcels of land, with disturbance for neighbouring estates. - Escapees from the fence may roam in neighbouring estates, leading to unwanted and undesirable wolf interactions. 	Y	<ul style="list-style-type: none"> • DP5 - head gamekeeper, oversees land use & management in a

	managers, and owners	<ul style="list-style-type: none"> - EWR may change tourism patterns in the country. - Knowledgeable about inter-stakeholder conflicts resolution and collaboration - Knowledgeable about landscapes, wildlife and deer populations management, and the balancing of conflicting land uses. 		>8,000 hectares large Land Estate
	Deer professionals and wildlife managers	<ul style="list-style-type: none"> - Fenced EWR would necessitate the input of expert deer managers, both in the design and implementation phase. - Knowledgeable on deer populations behaviour, herd health and spatial use patterns. - Knowledgeable about inter-stakeholder conflict resolution and collaboration, as well as respective land use needs and concerns - Knowledgeable about balancing conflicting land-use needs. 	Y	<ul style="list-style-type: none"> • DP5 – their role as head gamekeeper includes deer and wildlife population mgmt. • DP6 – regional manager of deer populations within a Scottish county. • S & DP1 • S & DP2
Public sector	NFUS	<ul style="list-style-type: none"> - Central lobbying role played in the Scottish policy-making sphere, meaning that the NFUS would most certainly be involved in the evaluation and design of a hypothetical EWR. - Knowledgeable about farmers land use needs and concerns. - Knowledgeable about Scotland’s rural landscapes key mgmt. issues 	Y	<ul style="list-style-type: none"> • NFUS Staff Member (not a spokesperson)
	Association of Deer Management Groups (ADMG)	<ul style="list-style-type: none"> - Coordinates deer professionals, population managers, stalkers, and landowners across Scotland. - Knowledgeable about deer populations management issues, health, spatial usage. - Fenced EWR would require the input of deer experts in its evaluation, design and implementation 	Y	<ul style="list-style-type: none"> • DP6 – active, working member in deer management of the ADMG network. (not a spokesperson) • H2 - (attende, not a spokesperson).
	Scottish Countryside Alliance (SCA)	<ul style="list-style-type: none"> - EWR potential landscape-wide effects might affect any category of countryside actor. - Knowledgeable about the needs and concerns of a variety of countryside stakeholders, as well as key issues for Scottish landscapes management. - Politically campaigning organisation that actively advocates for the interests of rural communities. - Wide outreach, wide audience means its inclusion would improve the breadth of Scottish countryside realities reached. 	Y	<ul style="list-style-type: none"> • SCA representative – High ranking staff member of the SCA

Scientific	Scottish or British ENGOs involved in biodiversity conservation	<ul style="list-style-type: none"> - Likely to be interested in EWR and asked to be involved in evaluation and design by central decision-makers. - Knowledge of Scottish countryside actors' needs and attitudes towards environmental interventions. - Knowledgeable on Scottish landscapes issues and priorities for ecosystems restoration and conservation 	U	<ul style="list-style-type: none"> • Tree for Life (TfL) representative – TfL is an ENGO advocating for rewilding and restoration of the Caledonian rainforest.
	Ecologists with expertise in wildlife management	<ul style="list-style-type: none"> - Likely to be involved in the evaluation and design of a hypothetical EWR by central decision makers. - Knowledgeable on EWR feasibility, necessary design elements - Knowledgeable on Scottish countryside actors' attitudes towards environmental and rewilding interventions, as well as their land use needs 	U	<ul style="list-style-type: none"> • S & DP 1 – ecology professor with ample expertise in resolution of wildlife conflicts, and advising public and private entities with landscape and deer populations management • S & DP 2 - Agricultural ecologist and professor in Land Management at a Scottish University with expertise in farmer-wildlife conflicts and interactions

Survey cover letter & closing instructions

After reading the foreword, respondents were required to state they understood its content and implications, and could not access the main body of the survey without doing so.

“Thank you for your interest in this questionnaire! It should take 15-20 minutes to complete, your identity will stay anonymous (so please, be as honest as you can) and your answers will be used to complete a master thesis in environmental management & policy at Lund University. At the end of the survey, you will have the opportunity to opt-in for a follow-up interview and the chance of winning a £50 Amazon gift card as a token of gratitude for your time. The objective of the research is to analyse Scottish countryside actors' opinions on a hypothetical experimental wolf reintroduction. This study is being carried out in complete independence from the Scottish government, and it does not reflect by any means an interest from the latter in bringing wolves back to Scotland.”

After answering the question items category 1 through 13, respondents were thanked for their time and asked to specify whether they would be interested in participating to a follow-up interview, contact details, and their email to enter the £50 Amazon gift card raffle.

Survey items

Categories in red required reading a paragraph of text before answering the questions, reported after the table. Open-ended questions had a word limit of 300, which was however not made explicit to avoid putting unnecessary pressure on respondents.

Category	Questionnaire Item	Response type	Main reference (if applicable)
1) Demographics	My country of residency is...	Open-ended	N/A
	I would define myself as...	Multiple-choice question: a. City resident b. Countryside resident	Bath 1989; Bath et al., 2008
	I am a...	Multiple-choice question: a. Farmer b. Hunter c. Forester d. Deer professional (venison industry, population management...) e. Owner / manager / employee in a land estate f. Professional in the environmental field g. None of the above	Bath 1989; Bath et al., 2008
	My age is...	Multiple-choice question: a. 18-24 b. 25-34 c. 35-44 d. 45-54 e. 55-64 f. 65+	Bath et al., 2008
	Are you knowledgeable about environmental and ecological issues?	5-point bipolar scale: Not at all (1) to I'm an expert (5)	Bath, 1989; Bath et al., 2008; Sakurai et al., 2021
2) Attitudes towards Wolf Reintroduction	Would you support the Scottish government if it wanted to pursue wolf reintroduction in Scotland?	5-point Likert scale: Absolutely no (1) No (2) Neither yes or no (3)	Bright & Manfredi, 1996; Ghasemi et al., 2021

	<p>Given the opportunity, are you likely to vote in favour of wolf reintroduction in Scotland?</p>	<p>Yes (4) Absolutely yes (5)</p>	
	<p>Do you think reintroducing wolves back to Scotland is a good idea?</p>		
	<p>Do you approve the prospect of wolf reintroduction in Scotland?</p>		
<p>3) Attitudes towards Experimental Wolf Reintroduction</p>	<p>Is “experimental wolf reintroduction” a different concept from “wolf reintroduction” in your opinion?</p>	<p>5-point Likert scale: Absolutely no (1) No (2) Neither yes or no (3) Yes (4) Absolutely yes (5)</p>	<p>N/A This question was deemed necessary to verify how EWR was conceptualised and interpreted by respondents.</p>
	<p>Would you support the Scottish government if it wanted to pursue experimental wolf reintroduction?</p>		<p>Bright & Manfredro, 1996; Ghasemi et al., 2021</p>
	<p>Given the opportunity, are you likely to vote in favour of experimental wolf reintroduction?</p>		
	<p>Do you think experimental wolf reintroduction is a good idea?</p>		
	<p>Do you approve of the prospect of reintroducing wolves in a controlled setting in Scotland?</p>		
<p>4) Compromise acceptability for EWR support</p>	<p>If experimental wolf reintroduction was to happen in a county other than my own, I would be more supportive of the idea</p>	<p>5-point Likert scale: Strongly disagree (1) Somewhat disagree (2) Neither agree or disagree (3) Somewhat agree (4) Strongly agree (5)</p>	<p>Bath, 1989</p>
	<p>If wolves were to be continuously tracked with GPS collars, I would be more supportive of experimental wolf reintroduction</p>		

	If the government compensated farmers and shepherds for livestock losses caused by wolves, I would be more supportive of experimental wolf reintroduction		
5) Reasoning behind attitude	<p>Could you please explain the reasoning behind your view on experimental wolf reintroduction?</p> <p>Focus on those factors and considerations that have the most influence on your attitude. For example, economic considerations like "it would cause monetary losses to shepherds", cultural beliefs like "wolves are an integral part to the Scottish natural heritage" or personal reasons such as "I love wolves" or "wolves would threaten my safety"</p>	Open-ended	Sakurai et al., 2021
6) Trust in government and environmental agencies	<p>The Scottish government would pursue experimental wolf reintroduction only after careful examination of costs, benefits, and strategies to minimise risk to people and animals.</p> <p>I trust the Scottish government to take the best decision regarding experimental wolf reintroduction</p> <p>NatureScot and SEPA, key environmental agencies, can understand the risks and benefits associated with experimental wolf reintroduction</p> <p>NatureScot and SEPA have the expertise to devise a safe and trustworthy experimental wolf reintroduction plan.</p>	<p>5-point Likert scale:</p> <p>Strongly disagree (1) Somewhat disagree (2) Neither agree nor disagree (3) Somewhat agree (4) Strongly agree (5)</p>	Ghasemi et al., 2021; Sakurai et al., 2021

7) Symbolic beliefs about wolves	It matters to me that wolves are brought back and made to thrive in Scotland	5-point Likert scale: Strongly disagree (1) Somewhat disagree (2) Neither agree nor disagree (3) Somewhat agree (4) Strongly agree (5)	Bright & Manfredro, 1996; Bath et al., 2008
	It is our duty towards future generations to ensure there will be wolf populations in Scotland for them to enjoy		
	Regardless of whether I will ever see one, it is important to me that there are wolves living in Scotland		
	It is our duty towards Scottish nature to bring wolves back and ensure that they can thrive in our country		
8) Attitude towards wolves	How would you describe your attitude towards wolves?	5-point bipolar scale: Very negative (1) to very positive (5)	Bright & Manfredro, 1996; Sakurai et al., 2021
	Do you like or dislike wolves?	5-point bipolar scale: Strongly dislike (1) to strongly like (5)	
	Do you think wolves are harmful or valuable members of the environment?	5-point bipolar scale: Very harmful (1) to very valuable (5)	
	Do you think wolves are worth conservation efforts?	5-point bipolar scale: Absolutely no (1) to absolutely yes (5)	
9) Personal importance of Experimental Wolf Reintroduction issue	How much do you care about the final decision on experimental wolf reintroduction being the same one you would take?	5-point scale: Not at all (1) Mildly (2) Moderately (3) Quite a lot (4) Extremely so (5)	Bright & Manfredro, 1996; Bath et al., 2008
	How much do you care about actively keeping updated with the issue of experimental wolf reintroduction in Scotland?		

	How much do you care about the issue of experimental wolf reintroduction?		
	How much do you care about the issue of Scotland-wide wolf reintroduction?		
10) Emotion	If wolves were brought back in Scotland in a controlled, fenced setting (i.e., experimental wolf reintroduction), how much would you feel each of the following emotions?	Rate from 1 to 5 how intensely they would have felt: <ul style="list-style-type: none"> ○ Concern / worry ○ Awe ○ Fear ○ Interest 	Ghasemi et al., 2021
	I would be afraid to go on hikes if I knew wolves were present	5-point Likert scale: Strongly disagree (1) Somewhat disagree (2) Neither agree nor disagree (3) Somewhat agree (4) Strongly agree (5)	Bath et al., 2008; Sakurai et al., 2021
	In countries where wolves live, attacks on humans are very common		
	I would be excited to go on hikes if I knew wolves were present		
	Seeing a wolf in the wild would be a treasured memory		
11) Risk perception	If experimental wolf reintroduction happened, what would be the level of risk posed by wolves to the following? Assuming they all lived in the same area/county of fenced wolves.	Rate from 1 to 5 the level of risk experimentally reintroduced wolves would pose to: <ul style="list-style-type: none"> ○ Livestock & Sheep ○ Deer ○ Other wildlife ○ People working in contact with nature ○ Human communities ○ Pets 	Ghasemi et al., 2021
12) Outcome perception	<u>Likelihood:</u> Rate the following statements, describing hypothetical positive and negative outcomes, according to how	5-point Likert scale: Extremely unlikely (1) Somewhat unlikely (2) Neither likely or unlikely (3)	Bright & Manfredro, 1996

	<p>likely you think they are to happen. "Experimental wolf reintroduction would...</p> <ul style="list-style-type: none"> ○ Cause lots of sheep predation ○ Make farmers lose money ○ Keep deer numbers under control ○ Increase tourism in Scotland ○ Negatively impact the mental well-being of nearby rural communities ○ Help the surrounding environment to thrive and improve 	<p>Somewhat likely (4) Extremely likely (5)</p>	
	<p><u>Intensity</u></p> <p>Please report how intensely negative these hypothetical outcomes would be in your opinion:</p> <ul style="list-style-type: none"> ○ Sheep and livestock predation ○ Economic losses to farmers ○ Distress to nearby human communities 	<p>5-point scale: Neither positive nor negative (1) Slightly negative (2) Somewhat negative (3) Very negative (4) Extremely negative (5)</p>	<p>Bright & Manfredro, 1996</p>
	<p><u>Intensity</u></p> <p>Please report how intensely positive these hypothetical outcomes would be in your opinion:</p> <ul style="list-style-type: none"> ○ Help the environment thrive and improve ○ Keep deer populations under control ○ Increased tourism in Scotland 	<p>5-point scale: Neither positive nor negative (1) Slightly positive (2) Somewhat positive (3) Very positive (4) Extremely positive (5)</p>	

	<p><u>Importance</u></p> <p>Please rank by dragging these hypothetical outcomes from most to least important. In other words, start with the one that matters the most to you personally.</p> <ul style="list-style-type: none"> ○ Sheep and livestock predation ○ Help the environment to thrive and improve ○ Economic losses to farmers ○ Keep deer populations under control ○ Cause distress to nearby human communities ○ Increase tourism in Scotland 	<p>Respondents were allowed to reposition the sentences describing negative and positive potential outcomes of EWR in a ranking order.</p>	<p>N/A</p>
<p>13) Design elements</p>	<p>What do you think are essential points to consider in the design and planning of experimental wolf reintroduction in Scotland?</p>	<p>Open-ended</p>	<p>N/A</p>

Text before Category 2 items:

“Please read the text before answering the questions.

Wolves disappeared from Scotland over 200 years ago. Without predators, deer have reached extremely high densities (40 per km²), far above environmentally ideal ones (7 per km²). Too much deer means too much grazing, and the resulting stress on Scottish vegetation is such that deer have been reported to hamper nature restoration projects, like reforestation. Plus, deer cause damage to private property, crops, and favour Lyme disease spread. The Scottish government is aware of the deer problem. The traditional management methods in place have however not yet fully succeeded in controlling deer numbers. An unconventional path forward would be wolf reintroduction. Scientific studies and real-life success stories (e.g., the Yellowstone National Park case) suggest that if wolves were brought back in Scotland, they could affect deer in such a way that overall biodiversity and environmental quality may improve. In essence, less deer means more and more diverse plant species for other animals to use, and less stress on the surrounding environment. While wolves could help Scottish nature, their reintroduction would have consequences for various social groups. For example, it could cause sheep predation and psychological distress to nearby communities. Careful risk-benefit evaluations, examinations and planning are paramount to the realisation of Scotland-wide wolf reintroduction.”

Text before Category 3 items:

“Please read the paragraph before answering the questions:

Instead of pursuing a Scotland-wide reintroduction, some researchers suggest that the Scottish government should focus on an experimental wolf reintroduction. Wolves would be brought back in a fenced area, either naturally (an island) or artificially so (using physical barriers), and equipped with tracking collars. Their effects on deer and the surrounding environment would be monitored and analysed over a long timeframe, so to collect accurate scientific data to guide further decisions on Scotland-wide reintroductions.”

Consent form for interview participation

Interviewees were provided with a digital copy (both in PDF and Word format) of the following consent form prior to meeting. The author collected the signed consent forms throughout the data collection period, accepting both e-signatures and manual ones (e.g., a scanned copy of the signed form) as valid. At the beginning of every interview, the author took care to reiterate that the study was for purely academic purposes, and the interviewee had the responsibility to clarify whether certain pieces of information were to be considered confidential.

Consent form for interview participation

I, _____ [name and surname], born in _____ [birthplace] the _____ [birthday], confirm to have read and understood the following points:

- By signing the present consent form, I am agreeing to be interviewed and therefore participate in the data collection process for a Master thesis in environmental management & policy lead by Marta Lamorgese (Lund University).
- Participation in this study is completely voluntary.
- If I so choose, my identity will stay anonymous. The only piece of personal information that will be disclosed in the final research would then be my occupation and/or affiliations (e.g., with SCA, NatureScot...).
- The sole purpose of the interview is data collection for the writing of a Master thesis. The research focus is on Scottish stakeholders' attitudes and views towards experimental wolf reintroduction.
- I will not be required to reveal commercially sensitive information, and participation to the study shall not cause me distress or damage my personal livelihood nor my well-being.
- During the interview I will be able to indicate, using extremely clear and specific language/wording, if I consider certain information to be confidential. The information so identified will not be used in the final research.
- I am entitled to stop or end the interview at any time, and if I so wish, reschedule the interview.
- I am entitled to withdraw my participation to the study at any time during the interview. By doing so, all the information I may have provided until that point will not be included in the final research.
- I understand that the interview will be recorded and/or transcribed. Data will be stored digitally in a secure manner, and processed in such a way that my identity could not be traced back from the dataset in the unlikely event of a security breach.

Truthfully,

Date and location:

Name in print:

Signature:

Interview protocol

As aforementioned, the exact wording and content of each interview was adapted to the identity of the interviewee, so to ensure that the most relevant information would be disclosed, and increase the likelihood of understanding the exact stance, needs, concerns and landscape visions of each interest group. If the interviewee had previously completed the questionnaire, the content of the interview was also based and tailored on their survey responses. Nevertheless, the protocol depicted in the following table served as a template for each interview.

Basic information
<ul style="list-style-type: none"> ○ Interviewee identity ○ Stakeholder group represented ○ Date, location, duration: ○ Recorded (Y/N) ○ Transcribed (Y/N) ○ Anonymity request (Y/N) ○ Mentioning of confidential information (Y/N)
Introduction
<ul style="list-style-type: none"> ○ Thanking for participating ○ Reminder of the consent form key points (i.e., right to anonymity, confidentiality, independence from Scottish government, academic purpose) ○ Summary of the research and interview purpose ○ Emphasise that the focus is on their personal view or, if the interviewee represented an organisation, the organisation's stance on the matter ○ Repeat distinction between wolf reintroduction and experimental wolf reintroduction ○ Ask if there is any question from their end before commencing
Opening questions
<ul style="list-style-type: none"> ○ Can you describe your occupation / the aim of your organisation? ○ Could you describe the vision you / your organisation hold in terms of Scottish landscapes management?
Content questions
<ul style="list-style-type: none"> ○ If the government was to decide to pursue experimental wolf reintroduction, how much would that coincide with your organisation mission / how much would that affect your lifestyle, livelihood and mental well-being? ○ Would you / your organisation support the decision to pursue experimental wolf reintroduction in Scotland? Why so? <i>[follow-up questions on the exact reasons for the attitude expressed]</i> ○ What do you identify as the main sociocultural and economic barriers to experimental wolf reintroduction? ○ How could the barriers to experimental wolf reintroduction realisation in Scotland be overcome? ○ Taking in consideration your / your organisation needs and desires, what would be design elements that should be implemented in experimental wolf reintroduction to ensure that the intervention would minimally affect you / your organisation?

- In what ways do you think acceptance of experimental wolf reintroduction could be improved across Scottish countryside stakeholders?

Probes

- How do you mean?
- Could you elaborate on the meaning of...
- For example?
- Please continue

Closing instructions

- Thanking them again for their time and availability
- Ask if they have any last questions
- Double check whether they would like certain pieces of information disclosed in the interview to be removed from the final research.
- Ask if they would like to receive a copy of the research or its executive summary once the thesis is finished