

RESEARCH ARTICLE



Conflicts over wildlife conservation: Learning from the reintroduction of beavers in Scotland

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Handling Editor: Leah Gibbs**Abstract**

1. Species reintroductions have become a common conservation tool, but they can be controversial and may generate social conflicts.
2. We examine the social dimension of beaver reintroduction in Scotland to understand the issue, the potential for, and impact of, conflict between groups or individuals with differing views on beavers and reintroductions.
3. Using a literature review and semi-structured interviews, we studied planned and unplanned beaver reintroductions to three contrasting landscapes in Scotland: in Knapdale, the reintroduction was planned and science-led, whereas in Tayside and the Highlands, the reintroductions were accidental and/or illegal.
4. Our results highlight the context dependency and complexity of reintroductions. Nationally, the reintroduction of beavers has not become a conflict. At the local scale, we found the Tayside situation to be a conflict with major consequences on the debate at the national scale. While there were no conflicts in the Highlands and Knapdale, the reintroduction remains controversial.
5. The level of conflict depended on the reintroduction process, relationships between stakeholders and their perspectives on their role in nature, their perceptions of landscapes, and the potential issue of lack of control and uncertainty around reintroductions.
6. Based on these findings, the study outlines lessons learned in terms of management, guidelines and implications for future species reintroductions. We argue that to prevent future conflicts over reintroductions, processes must go beyond addressing the effects of reintroduced species on the environment and people's perceptions and acceptance of these species. Reintroduction processes require engagement in effective discussions which involve all actual and potential stakeholders to agree on broad and long-term conservation plans at the landscape scale.

KEYWORDS

beavers, *Castor fiber*, conservation conflicts, perceptions, rewilding, Scotland, species reintroductions

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1 | INTRODUCTION

Over the last decades, species reintroductions have emerged as a new wildlife conservation tool. One goal of such reintroductions is to restore ecosystems by focusing on key species believed to play an important role in their environment (Seddon, 2010). Many authors perceive reintroduction as a human responsibility, as human action is often the root cause of the original extinction or scarcity of species (Jørgensen, 2011). According to the 2013 IUCN *Guidelines for Reintroductions and other Conservation Translocations* (p. 3), reintroductions are defined as ‘*the intentional movement and release of an organism inside its indigenous range from which it has disappeared [in order to] re-establish a viable population of the focal species within its indigenous range*’. Some reintroduction processes aim to reinforce existing populations, whereas others attempt to bring back a species absent for a greater or lesser period of time. At the international level, such programmes are being encouraged based on the 1979 Bern Convention, as well as the 1992 Convention on Biological Diversity. At the European level, the Member States were encouraged to explore reintroducing wild species following the 1992 Council Directive on the Conservation of Natural Habitat and of Wild Fauna and Flora. However, species reintroductions can be controversial in human societies, and may lead to potential social conflicts between groups or individuals supporting reintroduction and those against it (Lorimer et al., 2015; O’Rourke, 2014). An example of such a controversial reintroduction is the restoration of the Eurasian Beaver *Castor fiber* to parts of its range from where it had been extirpated.

The Eurasian Beaver is an ecosystem engineer that affects its environment profoundly (Jones, Lawton, & Shachak, 1997). By consuming herbaceous and broadleaved woody vegetation (e.g. aspen *Populus tremula*; willow *Salix* spp.), by tree felling and by dam building, it makes its habitat more suitable for foraging and movement and ensures protection from predators. Such changes significantly modify an area’s hydrology and water biochemistry and increase habitat heterogeneity and species richness (Law, Gaywood, Jones, Ramsay, & Willby, 2017; Wright, Jones, & Flecker, 2002). As such, beavers are regarded as a keystone species or restoration agent capable of ecosystem engineering that provides biodiversity benefits and restoration of river corridors (Gurnell, 1998; Reynolds, 2000; Stringer & Gaywood, 2016). Consequently, beavers have been used as part of rewilding projects aiming at restoring ecological functionality and biodiversity, with several reintroductions occurring in Europe since the 1920s (Luglia, 2013; Pettorelli et al., 2018). In 2008, after a long process of consultation and debate, Scotland started its own process of beaver reintroduction (Warren, 2009).

Beavers became extinct from Scotland in the 16th century (Kitchener & Conroy, 1997) with the last record mentioned in the 1526 *Chronikils of Scotland*, referring to beavers in the Loch Ness area (De Planhol, 2004; SNH, 2015). Although there were calls to reintroduce beavers to Britain in 1977 it was not until 1995 that Scottish Natural Heritage (SNH), the public body that advises the Scottish government on environmental matters, started investigating this

option, acknowledging this would represent ‘*the first, formal reintroduction of a mammal species anywhere in Britain*’ (Gaywood, Boon, Thompson, & Strachan, 2016, p. 42).

Reintroducing a species which has been absent for over 400 years is a challenging project from an ecological and social perspective. Over such a time-scale, the ecosystem and its biodiversity have changed considerably due to a host of natural and anthropogenic drivers. Moreover, people have forgotten that beavers were a natural ecosystem component (Manning, Gordon, & Ripple, 2009) and so species that have been absent for hundreds of years may now be considered as invaders or intruders (Jørgensen, 2013) despite being originally native. Mindful of this situation, SNH proceeded by first assessing the feasibility (technical and practical considerations) and desirability (moral and social acceptability) of such a programme (Gaywood, 2018). In 2008, SNH obtained a licence for a scientifically researched and monitored 5-year trial reintroduction to Knapdale, Argyll in the west of Scotland. This Scottish Beaver Trial (SBT) took place between 2009 and 2014. In 2016, the Scottish Government granted beavers the status of native species and Roseanna Cunningham, Cabinet Secretary for Environment, Climate Change and Land Reform, announced that beavers would remain in Scotland (Gaywood, 2018). In the spring of 2019, beavers were officially granted protected status in Scotland.

However, parallel to this official reintroduction, two accidental or illegal ones also occurred. Beavers that either had escaped from private collections or had been illegally released became established in May 2001 in Tayside, Eastern Scotland, on the River Tay and River Earn catchments (TBSG, 2015), and in 2017 on the River Beaully near Inverness in the Highlands. Following their discovery, a process of translocation was initiated to remove the beavers from the R. Beaully.

Both positive and negative views on the reintroduction of this species and beavers in general exist simultaneously (Gamborg & Sandøe, 2004; Jonker, Muth, Organ, Zwick, & Siemer, 2006; Le Lay, Arnould, & Comby, 2017; Luglia, 2013; Organ & Ellingwood, 2000). While many stakeholders insist on the biodiversity, economic and social benefits of beavers (Campbell, Dutton, & Hugues, 2007; Carver, 2016), there are many voices of opposition that indicate the potential for conflict. For example, opposition arises from the fear of the socio-economic impacts that beaver activity may have on agricultural or forested land by destroying vegetation or causing flooding (TBSG, 2015). There is also fear that beavers dams may hinder fish movements (Gaywood, 2018) and that the species may therefore have impacts on inland salmon *Salmo salar* and trout *Salmo trutta* fisheries. The latter concern coincides with a sharp decline in fish catches over the last 50 years due to a wide range of pressures (Warren, 2009).

The reintroduction of beavers to Scotland is an example of a ‘*wicked problem*’, that is a complex issue stemming from interdependent factors that resists resolution (Carver, 2016; Marchini, 2014). More specifically, it would appear to have some characteristics of a conservation conflict. This occurs ‘*whenever an action by humans or wildlife has an adverse effect on the other*’ (White et al., 2009, p. 242) and may manifest in ‘*expressed disagreement among people who see incompatible goals and potential interference in achieving these goals*’ (Peterson et al., 2013 in Madden &

McQuinn, 2014, p. 98). Traditionally, such situations, when studied by ecologists, have emphasised the tensions which may arise from animal activity and effects on both the environment and humans (Thirgood & Redpath, 2008). More recent approaches analyse the problem through a social science lens taking a 'much broader and more holistic approach' (Dickman, 2010, p. 464; Pooley et al., 2017), and which have shown conflicts to be complex and multi-layered (Young et al., 2010; Young, Searle, et al., 2016; Young, Thompson, et al., 2016).

Conservation conflicts depend not only on environmental and economic but also on social, cultural and conceptual factors (Mishra, Young, Fiechter, Rutherford, & Redpath, 2017) and therefore fall into different, often overlapping typologies including conflicts over beliefs and values, process, information, structural conflicts and interpersonal conflicts (Young et al., 2010). While social sciences and humanities research increasingly address the social and human dimensions of conservation conflicts (e.g. Lorimer et al., 2015; Redpath et al., 2013), these aspects are yet to be fully understood both in the case of species reintroductions in general (Butler, Young, & Marzano, 2019), and in the case of beaver reintroduction (Gamborg & Sandøe, 2004; Gaywood, 2018). Much of the literature produced by SNH emphasised the immediate technical, material and economic issues at stake, and tried to weigh these costs against any potential environmental benefits. Therefore, much remains to be learned, more so since the reintroduction of beavers to Scotland is recent and ongoing.

We address these knowledge gaps by focussing on three cases of beaver reintroduction in Scotland to establish whether and how different social, cultural and conceptual aspects affected the beaver reintroduction and its potential shift into a conservation conflict. Our aims were to determine:

- (i) Whether there is a conservation conflict linked to beaver reintroduction in Scotland.
- (ii) If there is a conflict, to determine its different social, cultural and conceptual aspects across the reintroduction locations.
- (iii) Lessons learned for future species reintroduction processes.

It is crucial to understand the current debate since the ongoing situation has implications both in terms of the future of beavers in Scotland and potential future reintroductions of beavers and other potentially controversial species in Europe (e.g. lynx, wolf, bear). This particular reintroduction can therefore serve as a case study for conflicts over species reintroductions, which are likely to occur more often as reintroductions become a commonly used tool.

2 | MATERIALS AND METHODS

2.1 | Epistemological position and framework

In this study, we argue that social issues and representations are important when looking at conservation conflicts. Numerous studies have highlighted the variety of representations and perceptions of nature and wild species (Dickman, 2010; Manfredo & Dayer, 2004;

Marchini, 2014). Others have highlighted the need to consider how stakeholders position themselves and other groups or individuals in the debate (Hodgson, Redpath, Fischer, & Young, 2018; Marshall, White, & Fischer, 2007). These perceptions may, in turn, influence individual or common beliefs and attitudes, and can impact on discussion, debate and action around the conservation issue and develop potentially into a controversial or conflicting situation. Therefore, it is crucial to study stakeholders' roles, their relationships and interactions, as well as the way in which these various representations are produced, negotiated and conveyed. This study is grounded in social constructionism which posits that various understandings and interpretations of the world coexist and are co-constructed, depending on specific social, cultural and historical contexts.

With this in mind, the study aimed at testing whether and how different social, cultural and conceptual aspects impacted on the beaver reintroduction and its potential shift into a conservation conflict. A literature review was carried out to develop a framework underpinning this study (Figure 1). This framework was used to develop the semi-structured interview guide and coding categories for the analysis of the data from the interviews.

2.2 | Literature review

We conducted a search in English and French on Google Scholar and Cairn (a wide-ranging online collection of francophone publications

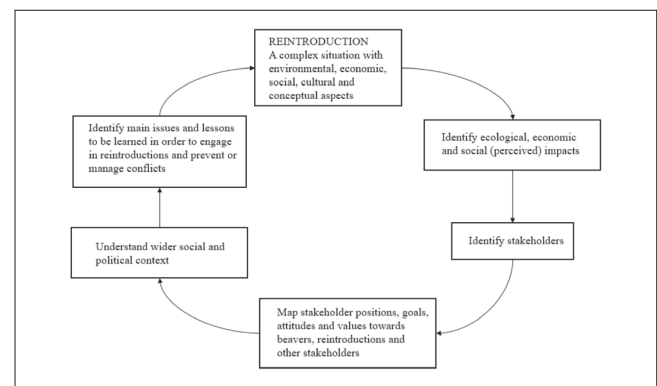


FIGURE 1 Framework underpinning the study and the research process. There are five main steps, involving ecological and social science, for looking at a reintroduction and a potential conservation conflict. The theory underpinning this research is that a reintroduction is a complex situation which has environmental, economic but also social, cultural and conceptual aspects. Therefore, the process then begins with identifying the different (perceived) impacts, to understand what some of the issues may be and begin mapping the different stakeholders. The latter then have to be identified (and interviewed) to understand their views on the reintroduction, the species but also the other stakeholders, and how they position themselves in the debate. Broader social or political debates which may have an impact on the reintroduction can then be identified. This final step links back up to the reintroduction since this process may help manage the conflict at stake but also enable researchers and all the stakeholders involved to better engage in future reintroductions

in social sciences and humanities) using the keywords ‘reintroduction* AND beaver*’ (135 hits), ‘conflict* AND beaver*’ (86 hits), ‘reintroduction* AND conflict*’ (194 hits) and ‘rewilding AND conflict*’ (25 hits) to identify existing academic literature on these different topics. Following initial scoping, removal of duplicates and thorough checking of abstracts, the search yielded 93 academic papers, 23 books or book chapters, 4 newspaper or magazine articles and 8 reports (see Supporting Information). The goal was not to engage in an in-depth quantitative analysis of the existing literature, but rather to understand the potential general issues at stake with beavers and gain a background in the concepts, issues and processes associated with species reintroductions and conflicts involving reintroduced wildlife. As such, it did not include every known paper on beavers, conflicts involving wildlife or species reintroductions. It should be noted that work on the American Beaver *Castor canadensis* formed only a minor part of our literature review since we established early on that this situation was distinct with very different situations and conflicts arising. The searches were terminated once no new theme emerged. Careful reading and identification of themes mentioned in the papers then helped us develop our research aims, framework and interview guide.

These issues were then embedded in the specific context of the Scottish 21st-century conservation movement to understand other potential social, economic and political issues at stake. Thus, both the specificity of the Scottish beaver reintroduction case study and the knowledge gaps in the existing literature were identified. This search was supplemented by colleagues’ recommendations and a snowball technique to follow-up references mentioned in the texts which had already been read. Finally, the review included grey literature on the reintroduction of beavers to Scotland.

2.3 | Mapping

To understand the specifics of each case study (see section below) and landscape, we also mapped the different case studies when possible, using available data provided by OpenStreet Map, OS Open Rivers, National Records of Scotland (NRS), National Biodiversity Network Atlas (NBN Atlas) and the Tayside Beaver Survey 2018. The maps displayed here are therefore intended to give a better understanding of relevant issues, and have been updated to take into account the latest developments which occurred after the study was completed.

2.4 | Case studies

Case study design is used widely across the social sciences as it allows the researcher to explore a phenomenon in its real-life context, to interact with participants and to discover important properties of complex social processes (Bryman, 2016; Cheng & Daniels, 2003). Our three case studies corresponded to the three areas in Scotland where beavers were reintroduced (Figure 2), which differed in the

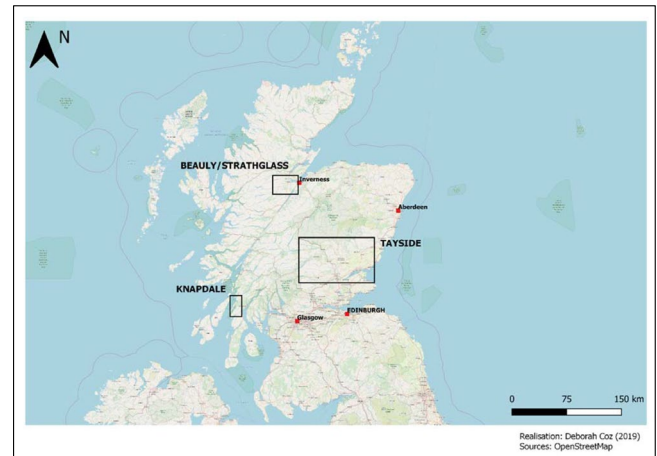


FIGURE 2 Locations of the three case studies in Scotland

manner of reintroduction, the number and range of beavers, and the social and environmental context (Table 1).

2.5 | Semi-structured interviews

Semi-structured interviews were used to gain an in-depth understanding of interviewees’ knowledge, an insight into the nuances and complexity of reintroduction, and to discover new themes and issues that the interviewer may not have considered (Young, Rose, et al., 2018). In all, 25 semi-structured interviews were carried out from March to May 2018. The literature produced by SNH and the TBSG (Tayside Beaver Study Group) in particular was instrumental in selecting the initial interviewees through a process of purposive sampling (Bryman, 2016). Representatives of organisations and interest groups involved or interested in the reintroduction of beavers were selected, as well as knowledgeable informants having a large understanding of the issues at different scales. In particular, six interviewees were members of the Scottish Beaver Forum (SBF). This forum was convened by SNH and represents the different key stakeholders involved in the reintroduction or the management of beavers throughout Scotland, looking at a management framework for the reintroduction and at mechanisms to manage beaver impacts. While many of the interviewees were part of the SBF, this was a necessary step since these informants provided contact details for additional interviewees and helped us broaden the range of interviewees (Bryman, 2016), gain access to stakeholders who had not been captured through the literature search and fill knowledge gaps. Two interviewees (N8 and O2) had a peripheral role in the beaver reintroduction, but were interviewed to understand the potential influence of other conservation issues or reintroductions on our case study. Sampling was terminated once no new stakeholders were suggested by interviewees. The final 25 interviewees belonged to different stakeholder groups: academic, conservation, farming, fishery, forestry, land management, landowning and transport. While we initially tried grouping interviewees according to these roles, we soon realised that many interviewees held multiple roles and

TABLE 1 Main features of the three case studies gathered from the literature review

	Knapdale	Tayside	Highlands
Process	A carefully planned, managed, and scientifically monitored reintroduction	A late monitoring of escaped or illegally released beaver population	An early monitoring of escaped or illegally released beaver population
Context	Mostly single landownership	Multiple landowners Productive forested area and intensive agricultural land A river famous for game fishing (River Tay)	Multiple landowners A variety of land uses An attractive area for visitors and tourists
Beaver population	Small number of families released into a landscape of lochs surrounded by coniferous woodland	A large beaver population dispersed widely throughout the Tay, Earn and Forth catchments, mainly along river courses	A small population dispersed along the River Beaully and the River Glass
Narratives	A prepared narrative before the reintroduction	Narratives after and as a consequence of the unplanned reintroduction of beavers	Hardly any narratives: the situation was kept low-key and translocation of beavers was undertaken almost immediately
Goals	A trial to investigate the possibilities of reintroducing beavers into the wild	Reaction: investigate the interaction between beavers and a wide range of land management interests within a more heavily populated part of Scotland	Reaction: attempts to translocate the beavers to Knapdale

identities. As such, we decided to group interviewees according to their knowledge of beavers and reintroductions. Some interviewees had a local understanding of the issues, based on where they lived or their role in a specific reintroduction area, whereas others had a broader knowledge of reintroduction at the national scale. This provided us with a better understanding of the different issues at the national scale and for each of the three areas. Based on our study aim, these locations therefore formed the basis for analysing the interviews (Table 2).

Before the interview, all aspects of the research were discussed with interviewees, who were given information about the purpose, methods and intended uses of the research prior to any data collection. In addition, each interviewee was asked to complete a confidentiality and consent form and data were analysed and reported accordingly. To ensure consistency and to allow quantitative and qualitative data analyses, all interviews were carried out following an interview guide (see Annex 1 in Supplementary Material) based on our framework and tested following a pilot interview.

In all, 10 interviews were carried out face-to-face. To match the interviewees' availability, and to cover a wide range of Scotland within a limited time, 14 interviews were carried out on the phone, and one on skype. Overall, face-to-face and phone/skype interviews provided us with the same quality of information, as could be expected from the literature (Sturges & Hanrahan, 2004). All interviews were then transcribed verbatim.

2.6 | Analysis

The material from the interviews was analysed using NVivo (v.12) software. The transcripts of the interviews were imported into NVivo and coded, using different 'nodes' which represent

TABLE 2 Distribution and codes of interviewees based on their geographical focus in terms of knowledge and role in the reintroduction. Some interviewees were more knowledgeable and involved in a specific area (the Highlands, Tayside, other), whereas others had a broader understanding of the issues at a national scale (National). The group named 'other' included interviewees who did not fit in the other categories. Two interviewees, for instance, were based in the Lomond and Trossachs National Park, on the upper Tay, and might have been added to the group focused on Tayside. However, the number of beavers being extremely small in that area, and the latter having naturally expanded from the lower Tay rather than having been illegally or accidentally reintroduced, we considered that the situation there was too different from the one on lower parts of Tayside. Finally, because nothing had been done in terms of beaver management, the situation was different from the one in the Highlands, where the beavers are being translocated. Thus, cases which differed from our initial three sub-cases were categorised in another group named 'other'

Interviewee geographical focus	Number of interviewees	Interviewee codes
National	12	N1-N12
Highlands	5	H1-H5
Tayside	2	T1-T2
Other (including Knapdale)	6	O1-O6
Total	25	

the variables relevant to the study aims (Ishak & Bakar, 2012). A total of 39 nodes and 88 sub-nodes were used in the analysis (see Annex 2 in Supplementary Material for full list of the nodes and sub-nodes). While having so many nodes and sub-nodes presented a small risk of lack of consistency in coding, it was best suited to analyse the extensive qualitative material gathered.

3 | RESULTS

3.1 | Mapping the potential conflict around beaver reintroductions based on the literature review

Table 3 maps the three main broad points of debates over reintroductions as collected in the literature, that is, whether species reintroductions are an appropriate conservation tool, how they take

place, and the social context, with the main issues for each (as highlighted by authors), and their implications.

Figure 3 was also developed based on the academic and grey literature to map the different stakeholders identified in the specific case of the beaver reintroduction in Scotland, and their potential views on beavers and their reintroduction. This mapping contributed to the framework—namely in terms of what conflicts might exist, between whom, and over what.

TABLE 3 Mapping the main points of debate on species reintroductions, based on the literature. These points of debate were our basis for creating and testing our research aims and building the framework and interview guide

Dimensions	Issues	Implications
Is reintroduction an appropriate conservation tool?	What past condition do we seek to replicate? (Seddon, 2010)	What are the different stakeholders' baseline perceptions? What are perceptions on the landscape and its management?
	What is the targeted condition in the future? (Seddon, 2010)	How can we adapt to potentially increasing environmental change?
	Is the reintroduction socially acceptable, environmentally feasible and economically desirable? (Hodder & Bullock, 1997; O'Rourke, 2014)	Are the environmental requirements fulfilled? (habitat, appropriate food sources, suitable climate, lack of excessive competition or predation) Have the causes of the extinction been addressed? Can the environmental function be restored?
	Will it be successful? (Nogués-Bravo, Simberloff, Rahbek, & Sanders, 2016; O'Rourke, 2014)	How do we make species reintroductions more successful? Do we have a process to monitor success?
	What do we know about the potential cascading effects? (Hodder & Bullock, 1997)	What would be the potential alterations to habitat? Could reintroduction be harmful to other species? Could the reintroduced species bring along new pathogens or parasites?
	What species should be reintroduced? (Rémy & Beck, 2008; Warren, 2007)	Reintroduction programmes and research projects have taxonomic wide. Should we reintroduce native species? What is nativeness?
	Could reintroduced species come into conflict with other conservation issues? (Lorimer et al., 2015)	Could the reintroduced species have negative effects on other protected species? Could reintroductions come into conflict with the conservation of cultural landscapes?
The process	Quality, intensity and timing of reintroduction processes (Prior & Brady, 2017)	Is it not contradictory to use necessarily human-mediated species reintroduction to reinforce 'wild(er)ness'?
	Quality of information and of the decision-making process (Arts, Fischer, & Wal, 2014)	Were all the necessary stakeholders involved in relation with the influence the issue has on them? Was the process around reintroduction decision-making transparent? Decision-making is an important step, but it should not take too long and delay action
	Costs (SBT, 2007)	Reintroductions may require a substantial amount of money which could be better spent elsewhere
The social context	Relationships and trust (Crowley, Hinchliffe, & McDonald, 2017; Lorimer et al., 2015; O'Rourke, 2014; Young, Searle, et al., 2016)	The acceptability and success of the reintroduction may be influenced by conflicts between the different stakeholder groups or between individuals, by broader socio-political tensions It may also be influenced by (perceived) power asymmetry, group stereotypes
	Politics (Arts, Fischer, & Wal, 2012; Manning et al., 2009)	Species reintroductions may also be political decisions and imply governance issues at different scales
	Values (Gray, Brockington, Hayward, & Walmsley, 2016; Mallon & Stanley Price, 2013; O'Rourke, 2014)	The conflicts or debates about a species reintroduction may stem from different values and different views on nature, the landscapes, the wild

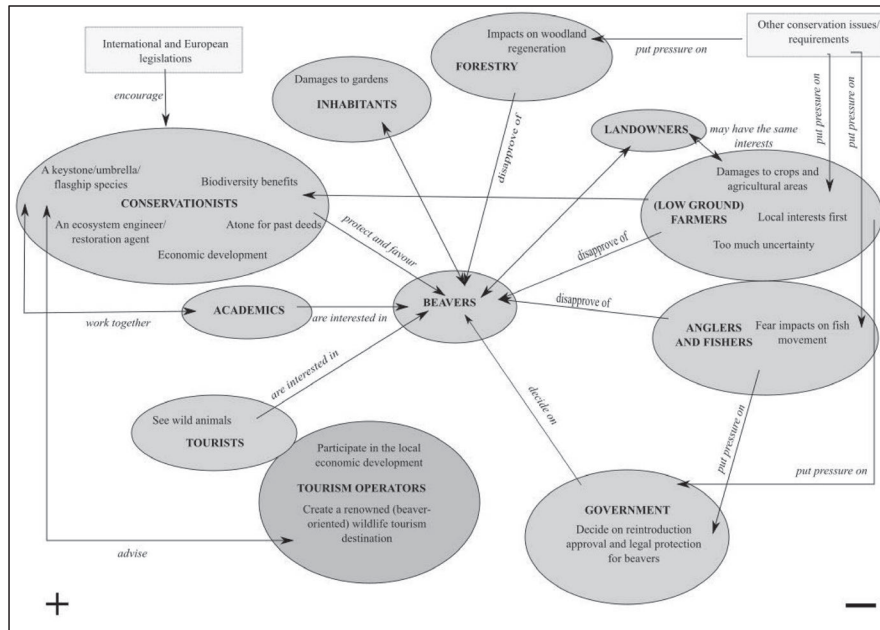


FIGURE 3 Stakeholder groups identified in the literature, as well as their main views and concerns regarding beavers and their reintroduction, and their relationships with the other stakeholders. This figure was developed at the beginning of the study, based on the literature review, and formed a basis for our first and second aims in terms of determining whether there is a conservation conflict around beaver reintroduction—and if there is who is involved and why. The figure provided us with topics and relationships relevant to the potential for conflict, which were then tested in the study. The potential relationships between the different stakeholders are provided through the arrows (e.g. anglers put pressure on the government, which, in turn, decides on beaver reintroduction). The stakeholders are mapped according to potential positive (left-hand side) to negative (right-hand side) perceptions of beavers. Results and details are provided later in this paper

3.2 | Is there a conflict over beaver reintroduction in Scotland?

From our analysis of the interviews, there was a disparity in the perception of conflict between the different case studies. There was a conflict apparent in Tayside: the accidental or illegal releases of beavers were perceived by some interviewees as having an impact on agriculture and the government's response was deemed inappropriate. In Knapdale and the Highlands, no conflict was perceived by interviewees, but tensions and concerns existed regarding the success of the Knapdale trial in the long term and, to some extent, the similarity of the situation in the Highlands with the one in Tayside.

Tayside was seen by the interviewees as the location where the conflict was most acute, although this varied at a more local scale according to the area within the R. Tay catchment. In east Tayside, the accidental or illegal releases occurred in a flat and highly productive agricultural area (Figure 4), which led one interviewee to conclude it was 'more susceptible to impacts' (N1) in terms of beaver activity and management and the financial resources needed to deal with the latter. Moreover, beaver populations have since grown and expanded in Tayside (Figure 5), although the expansion was perceived differently by different actors. According to the SNH Research Report published in 2018, there are now 114 active beaver territorial zones throughout large parts of Tayside and the population has been estimated at about 433 beavers (Campbell-Palmer et al., 2018).

In contrast, interviewees interpreted the Knapdale situation very differently: 'Knapdale was essentially a scientific-led project that was kind of well-researched. It had that stakeholder buy-in. And, you know, it kind of involved the community [...]. Whereas in Tayside, it almost feels that one day landowners woke up and... beavers were back, there'd been no consultation, there'd been no engagement and I guess landowners, land managers were just left to deal with the issue with very little support, guidance, even funding to do that' (N6). The balance of positive and negative impacts was perceived as being very different from Tayside, although this was in part due to the differences linked to land use and beaver population size. The concerns in Knapdale focussed on the success of the trial and its usefulness, since the beaver population in Knapdale was perceived as doing less well than on Tayside: 'it is a reminder though that the Knapdale reintroduction, as laudable as it is, is very small scale, that beavers don't really seem to be thriving, have been growing at a very slow rate' (T1).

The situation in the Highlands was not perceived as conflictual according to the interviewees. This could be explained by three reasons. First, beavers in the Highlands are present in much smaller numbers. Second, the government decided to trap them and relocate them to Knapdale early on. Finally, according to one interviewee (H1), the presence of beavers in the Highlands was kept low-key to avoid creating a wider controversy or conflict. However, concerns were expressed by some interviewees regarding the reintroduction process (see below), whereas others disapproved of the

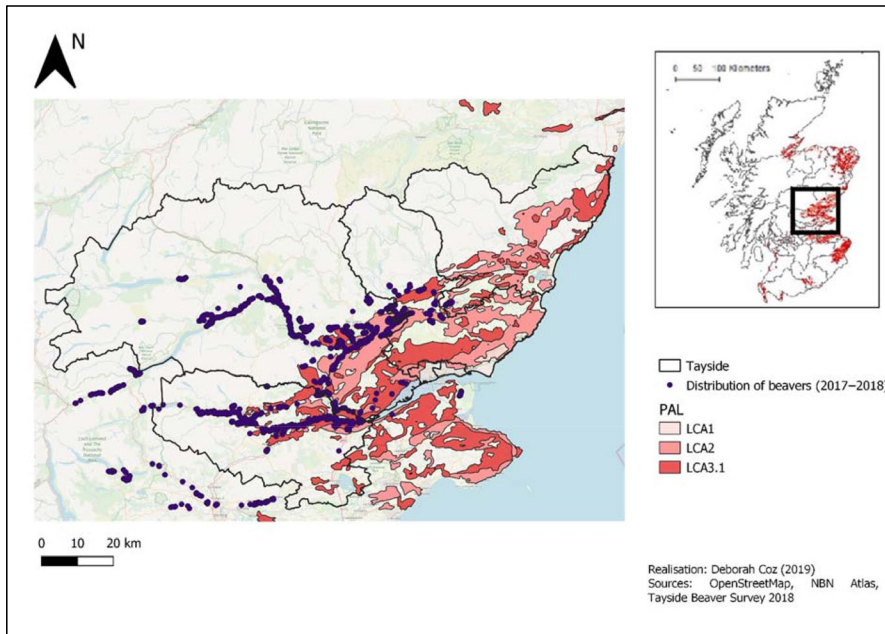


FIGURE 4 Distribution of prime agricultural land (PAL) in Tayside as well as distribution of beavers, potentially highlighting the locations most susceptible to impacts from beavers on agriculture. Agriculture represents a major land use in Tayside, with a majority of PAL, land capable of supporting arable agriculture. PAL divides into three categories under the LCA classification (land capability for agriculture): land capable of producing a very wide range of crops with no or very minor physical limitations (class 1); land capable of producing a wide range of crops with minor physical limitations, and the land is highly productive (class 2); land capable of producing a moderate range of crops with high yields of cereals and grass, other vegetables are also grown (class 3.1)

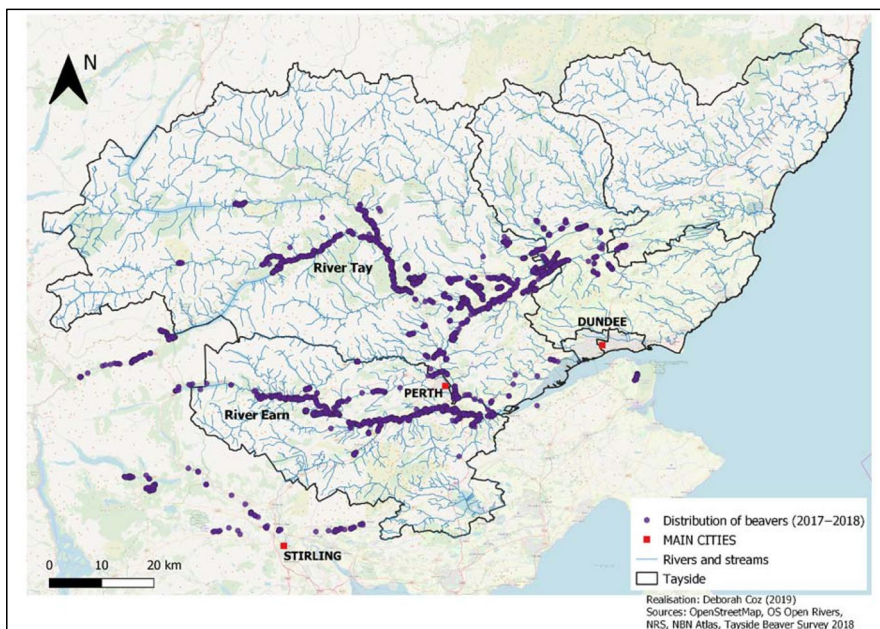


FIGURE 5 Distribution of beaver populations across the Tay and Earn catchments. Beavers are at higher numbers and have dispersed across a wider range on Tayside and its river systems. This map displays some of the localities mentioned by the interviewees

different way in which events in the R. Tay catchment and R. Beaulieu were handled. Indeed, while there was no intervention in Tayside, a capture and translocation from Beaulieu to Knapdale was done with limited success (e.g. three beavers died).

3.3 | Social, cultural and conceptual dimensions of the conflict

3.3.1 | The process of reintroduction

The interviews highlighted that the reintroduction process was the main issue and potential conflict driver. More specifically, the

interviewees stressed the (lack of) management of beavers and their impact, as well as the lack of detailed planning at all stages of the reintroduction. When asked what the actual or potential issues and conflict drivers were, all interviewees mentioned the management of beavers. They insisted on the need to control beaver numbers ($n = 20$), their expansion ($n = 17$), their impacts, and to guarantee appropriate funding for their management ($n = 18$). For some interviewees, the absence of management plans, which may be required in reintroduction or rewilding projects, was not viewed positively, but rather as a loss of identity by those managing the land and/or (other) species (O3). Interviewees instead called for more certainty and were anxious that guarantees could not be provided. In total, 18 interviewees were concerned that there was

too little (legal) guidance for the reintroduction and management of beavers and their impacts. Moreover, there was no detail on the planned outcome for the reintroduction in the long term, despite a 'desired outcome' being requested by the *Scottish Code for Conservation* as well as a 'plan including goals and actions' (p. 8), a 'timeline' for the delivery of these objectives (p. 24), and an 'exit strategy' (p. 8).

The second most important issue mentioned was whether the reintroduction had been planned or not. In all, 21 interviewees explained that this aspect played a key role in the debate and the attitudes, in particular with regard to the illegal releases or escapes on the Tay. According to interviewees, both the reintroduction process and the government's response in Tayside had been responsible for fuelling the conflict there. In 2012, the government eventually decided to accept the presence of beavers on the Tay and Earn catchments and monitor their population, a decision which was criticised by some interviewees: 'if you're gonna reintroduce any species, there's a process that you go through [...]. If you say: "we're gonna bring these species back" and the hang with the regulation, the hang with the law, that creates a dangerous precedent' (N1). This decision has various consequences. First, instead of the official, planned reintroduction in Knapdale, the context and evolution of the Tayside has become the prevailing narrative on the beaver reintroduction. This was clearly guiding some of the stakeholders' positions (H1: 'we certainly see [...] the political effect of the Tayside situation') as well as the government's way of addressing the situation in other areas (H2: 'Roseanna Cunningham said that she wanted to remove all the beavers from Strathglass because she didn't want a repeat of the Tayside situation'). It has become an example with repercussions beyond the boundaries of the area: 'everyone's heard about it' (N12), 'the stories we hear from the Tay' (O3). Second, the lack of due process in the establishment of a beaver population on Tayside has led some stakeholders to consider this as a 'feral' population, an adjective used to discredit the presence of beavers and its legitimacy.

Several interviewees therefore insisted on the need to abide by the guidelines and respect the *Code for Conservation Translocations* established by the National Species Reintroduction Forum. Otherwise, interviewees feared a lack of 'proper planning and budgeting' (N1), or animal welfare issues: 'I think what is highly objectionable is that somebody has been either deliberately careless or just inefficient, in the way that they have released their personal collection of wild animals, boar and beaver, in the area, without any thought about the impact on other people or on the environment or on the animals themselves. Because, in many respects, they are now treated as... as vermin – that's another emotive word – because they are devastating in their impact, no... it's not the fault of the beaver, [...] it's the fault of the individual who's taken it upon themselves to play God' (N8). Two interviewees, however, highlighted that official—but lengthy—processes could create frustration and encourage further illegal releases of species into the wild. Three interviewees explained that the situation would be different if beavers had come back naturally: 'Unfortunately, when things are reintroduced, it tends to be ten times more controversial than when they come back by themselves, simply because it gets more political, because a particular

sector or group of people had to intervene, and you can blame them, for... for whatever problems you face or think you face' (O2).

3.3.2 | Relationships and trust

The reintroduction process not only affected the perception of beavers and their reintroduction but also the relationships within the local community and at a wider scale between the different stakeholders. At the local scale, while there are assumptions regarding who released the beavers, no one has been officially recognised as responsible, fined or prosecuted. This fuelled tensions, expressed by some interviewees: 'Farmers are subject to huge mandatory regulations and they take the view that if they were to break the law, they would be prosecuted, or they would be fined. Others have quite obviously done it and aren't, they're not being prosecuted, they're not being fined, and in fact they're being lauded by some people' (N1).

Similar tensions existed at the broader scale with six interviewees mentioning trust issues between conservationists or environmental organisations being more favourable to beavers and farmers or landowners with different views, shown in Figure 3. Three informants argued that SNH was seen as a bureaucratic body, engaging in lengthy processes that did not meet the need of the farmers and landowners. The latter expressed the need to deal with issues themselves, 'by shooting beavers' for example (T1). Some farmers were also concerned that there was a 'conspiracy' against them (N1). This lack of trust impacted on the perceptions of the reintroduction and fuelled tensions between stakeholders. In particular, it may fuel opposition to conservation bodies and programmes (Warren, 2009; Wilson, 2004). Interviewees did, however, mention that not all tensions fell into these debates and that the specifics of each situation needed to be identified.

3.3.3 | Beliefs and values of different groups

The literature review was instrumental in helping to position the different stakeholders towards the reintroduction and towards other stakeholders (see Figure 3 and also Arts, Fischer, & Wal, 2016). However, the results from the interviews found that a more nuanced approach was required. Views were more balanced than expected and thinking in terms of homogeneous interest groups may not be appropriate. For instance, differences existed within the forestry sector between the public and the private sectors: 'National Forest Estate are always keen on getting involved in these types of projects [species reintroductions]. They're always wanting to be at the front of any of these new projects, so that they can demonstrate and help... push the way forward for everybody else, [...] demonstrate to the rest of the industry that it's possible to do, to show that, if there are any impacts, what they are and how they can be mitigated against [...]. And also, because they have such a large area of land holding it means that some areas can be... set aside' (N7). Similarly,

differences were found within the farming sector: *'we don't have an axe to grind with beavers [...]. Most of them will be ambivalent because beavers don't have an impact and aren't likely to have an impact'* (N1). Differences also existed at the individual scale. In this respect, it is notable that interviewees often showed mixed feelings about beavers, their reintroduction and species reintroductions in general. Those who were concerned about beaver reintroduction did not necessarily dislike beavers. Nor were they always strongly opposed to discussing other reintroductions. Therefore, the discussion was not between pro- and anti-, but rather between idealists and pragmatists, theorists and pragmatists, conservative and progressive individuals, or finally between those who promoted pro-action (anticipating, planning, and making sure everything is ready before a species is reintroduced) and those who reacted once beavers were present (let the species come, and deal with the effects afterwards).

4 | DISCUSSION

Our results show that beaver reintroduction to Scotland has not yet fully developed into a conflict at the national scale. However, it is conflictual in parts of Tayside and is (very) controversial in other areas or at a wider scale—in large part due to the way in which reintroduction took place (i.e. planned or not). Existing tensions between different, often heterogeneous, stakeholder groups and broader debates concerning species reintroductions to Scotland more generally also played a role in the debate. We outline below the main lessons learned from this case study and the broader implications in terms of species reintroductions and wildlife conservation.

4.1 | Implications in terms of the future of beavers in Scotland and future reintroductions

Based on the interviews, the Scottish beaver reintroduction has the potential to develop into a structural conflict where different groups want different things from the same landscape (Young, Marzano, Quine, & Ambrose-Oji, 2018; Young et al., 2010). Indeed, a distinction was made by interviewees between vulnerable places that beavers should be excluded from or where they should be highly controlled, and places which are considered more suitable for them. Interviewees spoke of the *right place* or the *right habitat*, the definition of which remains unclear. For instance, several informants spoke interchangeably of the right, ideal, suitable or natural habitat. Here, the right or natural place did not necessarily refer to places where beavers may thrive, but rather to remote, wild or at least scarcely used places, especially non-agricultural lands, where beavers were not likely to interfere with any existing land use (H2). The right habitat had little to do with biological and ecological requirements, but instead referred to places where beavers would not be problematic in terms of impacting on human activities.

Thus, these interviewees questioned whether Scotland was fit for reintroduced species. The beaver reintroduction has been presented as the first release of a mammal into the wild (Jones & Campbell-Palmer, 2014). But for some interviewees, talking about 'wild Scotland' in the first place made little sense. Disagreements over the concept of wild Scotland contributed to the beaver reintroduction debate: *'the idea of wild Scotland... I'm not sure how wild it is, I don't think it's wild [...]. And I think that again adds problem onto the beaver reintroduction programme. Because, you know, beavers are seen as a wilderness animal. We may not have enough wilderness. So, we return the wilderness, then the beavers can thrive, and then hopefully it benefits the official outcome'* (O3).

In light of our results, and taking the 2013 IUCN *Guidelines for Reintroductions and other Conservation Translocations* in perspective as well as the 2014 *Scottish Code for Conservation Translocations*, Figure 6 brings together lessons learned from the Scottish beaver reintroduction and suggests useful steps when engaging in species reintroductions. It shows that the reintroduction process requires the assessment of the environmental and economic feasibility of the reintroduction, as well as the social desirability of the project, as has been done by SNH. However, a precise mapping of the different stakeholders, their relationships to one another, their views on the species, reintroductions and their plans for the landscape must also be understood and discussed. This must be done locally but also at the national scale, which implies broadening the scope of the stakeholders involved. Finally, Figure 6 highlights the need for continuous and sustained management throughout the reintroduction process.

4.2 | Wider social dimensions of reintroductions

Although beavers now have protected status in Scotland, our findings suggest this controversy will continue until the impacts, management, purpose and process of reintroduction are addressed and agreement reached between the different stakeholders. In addition, through our entry point of conflict mapping, our study emphasises the importance of understanding the social dimensions of reintroductions, and the need for collaboration between social, political and ecological science in achieving this task. With reintroductions becoming more common, we reflect below a number of key issues relating to social dimensions of reintroductions that need to be further considered, including stakeholder perspectives on their role in nature, their perceptions of landscapes, and the potential issue of lack of control and uncertainty.

Much of the expressed opposition to beaver reintroduction mentioned by interviewees remained embedded in an anthropocentric perspective which regards wildlife from a human perspective and views it as an asset or a liability based on the opportunities it provides, or the damages it causes. A biocentrist perspective which recognises an intrinsic value to non-humans and develops moral obligations towards them (Larrère, 2010) is not currently recognised as a means to promote reintroduction or obtain stakeholder buy-in.

This study also highlights that discussion between the different stakeholders is an important part of any reintroduction

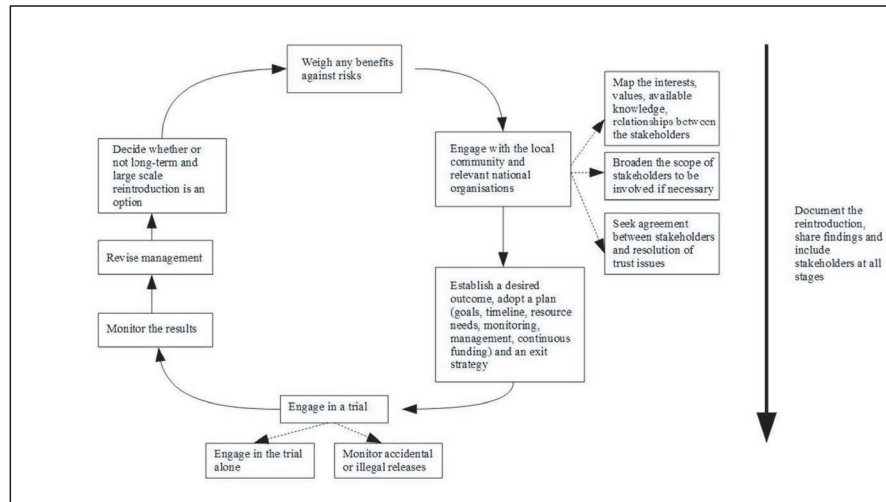


FIGURE 6 Key steps for engaging in species reintroductions. Based on the Scottish Code for Conservation Translocations, the IUCN Guidelines, the literature review and the interviewees' concerns and/or recommendations, the figure outlines key steps needed for species reintroduction processes, taking into account social, cultural and conceptual aspects. The process begins with weighing any benefits against risks and then goes on with engaging with the local community, establishing an outcome, engaging in a trial, leading on to monitor, revising management and deciding on the long-term and large-scale reintroduction process. Throughout the whole process, it is important to document the process and its findings and include all relevant stakeholders, both local and national

programme and should not be overlooked. Although sustainability and multi-purpose conservation (Warren, 2009) have become key concepts for Scottish conservationists, Toogood (2002) argues that these conservationists remain distant elites, acculturated to bureaucratic and inflexible modes of thinking, who pay little attention to local knowledge. Especially in the Highlands, they fuel tensions between scientific knowledge and lay knowledge, nature and culture, by scientifically evaluating and designating conservation areas, disengaging these places from their social context, and contributing to a representation of the Highlands as a depopulated 'wilderness' (Toogood, 2002). As such, institutionalised conservation often has to face hostility (MacDonald, 1998), while agricultural communities in particular may be labelled anti-wild. Debates such as global versus local, on-site versus off-site, jobs versus nature (Warren, 2009) must then be taken into account when engaging in conservation or reintroduction programmes, especially since they now occur at various scales. Indeed, reintroduction programmes are encouraged by the European Union and the 1992 Council Directive on the Conservation of Natural Habitat and of Wild Fauna and Flora. More generally, Scotland has a highly Europeanised environmental policy (Warren, 2009). Therefore, it is crucial that European stakeholders who will also take part in such conservation programmes also pay attention to local and national issues.

At a larger scale, this study has shown that beaver reintroduction is part of a wider debate regarding Scottish landscapes and the possibility of reintroducing wild species in Scotland. Such a debate is fuelled by a long history of conflict over land in Scotland, especially since the country has highly concentrated patterns of private ownership (Warren, 2009). One of Scotland's specificities is its rather well-defined stakeholder groups which reproduce shared or

opposed discourses on the Scottish landscapes, especially in the Highlands which are depicted as a land of (valued) marginality and seen as an authentic landscape (Arts et al., 2016; Lorimer, 2000; Young, Thompson, et al., 2016). Our results therefore confirm those of Vourc'h (1990) and Mauz (2006) who showed that plans for (re) introducing species are also plans about what space or landscapes could or should be. This is especially true for a species (e.g. ecosystem engineer) which may have considerable impacts on the landscape. Therefore, this suggests that a species reintroduction process needs to be part of a wider landscape management plan (see Figure 6).

Because the reintroduction of beavers to Scotland is a recent phenomenon, and the interactions between beavers and the Scottish landscapes remain to be fully understood, reality and future issues are being perceived in various ways—this aspect is often believed to be influenced by the media, which while not an aspect studied in our work could be an interesting future topic of study. While arguing that issues are different depending on scale and context, most of the interviewees expressed concerns and hopes for the future with regard to what might happen based on the Tayside situation, implying that the latter was an example of what would happen wherever beavers occurred. Therefore, the discussions about beaver reintroduction illustrate an issue that is recurrent in discourses over wild species, namely the fear of a lack of order or loss of control (Delfour, 2010). This is a key issue as species reintroduction processes often imply little or no sustained management (Corlett, 2016). As a consequence, we argue that wildlife conservation and management belong to the 'speculative era' which partly defines the 'risk society' according to Beck (2003, p. 132). Although Beck's work was developed with regard to industrial and technological issues, it provides a useful framework to understand the issues which may be at stake in the conflicts involving (reintroduced) wild

species. In the risk society, the past no longer determines the present. Instead, the future does, and something which is a construct that has not yet come into being becomes the cause of present actions (ibid., p. 61). The concepts associated with risk can therefore be applied to interactions with wildlife and wildlife management (Clergeau & Le Lay, 2006). The wild species—in our case, beavers—becomes the uncertain element which cannot be controlled, and may impact negatively on vulnerable landscapes. The vulnerability includes two types: economic (particularly on low-lying, drained prime agricultural lands) and social (preserving traditions, a social identity or relationships within a local community). Putting a management framework in place, such as the one suggested by Figure 6, and setting targets could be a way to limit the uncertainty and to define a threshold before which the risk, that is, the potential negative impacts of beaver activity, is acceptable (Depraz, 2016).

To conclude, this study shows how important the reintroduction process is, not only for the species reintroduction but also for the future of the species and for potential future reintroductions. Moreover, it is a reminder that, by definition, reintroductions involve humans. Individuals or groups carry out these projects which, in turn, have an effect on landscapes and the way they are being inhabited, used or simply perceived. In light of this, any reintroduction project is challenging. It implies looking at a specific species, its effects on the environment and people's perceptions and acceptance of it. It also requires engaging in effective discussions which involve all the actual and potential stakeholders, without labelling them, to agree on a broad and long-term plan for the landscape.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

D.M.C. and J.C.Y. conceived the ideas and designed methodology; D.M.C. collected the data; D.M.C. and J.C.Y. analysed the data and led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

DATA AVAILABILITY STATEMENT

Except where otherwise noted, all data used in this study were collected as part of the interviews described and will be archived as part of the NERC EIDC. However, these data and associated transcripts contain sensitive information that could also compromise participant consent agreements and are therefore available on request only.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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