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Wildlife Tourism in Reintroduction Projects: Exploring Social and Economic Benefits of Beaver in Local Settings

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HIGHLIGHTS

- Economic benefits are observed from wildlife tourism in a reintroduction project.
- Scale of benefit is greatest where there is uptake in business initiatives.
- Reintroduction practitioners should encourage businesses to maximise opportunities.
- Reintroduction wildlife tourism may intensify tourist-community interactions.
- Positive emotions resulted from seeing reintroduced species locally.

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ABSTRACT

Wildlife reintroduction projects are required to account for social and economic factors. Wildlife tourism is often cited as a benefit of reintroduction, so an understanding of whether and how this manifests is required. Through a case study of a village in the catchment of a live reintroduction project (Eurasian beaver (*Castor fiber*) in England) we reveal how reintroduced species tourism has economic benefit for local business, but the scale of benefit is dependent upon business initiatives that take the opportunity (eg merchandise, marketing etc.). We suggest reintroduction practitioners should actively encourage local businesses to maximise opportunities, especially where tourism is cited as a reason to reintroduce. We recommend further research into whether benefits remain in the long-term, but speculate some value will persist. Finally, we recognise reintroduction-related wildlife tourism may interact with other local issues, but seeing a reintroduced species or signs of its activity can produce positive emotional responses.

KEYWORDS

Ecotourism, Eurasian beaver, Human Dimensions, Reintroduction, Socioeconomics, Wildlife Tourism

INTRODUCTION

Wildlife reintroduction is a form of wildlife translocation. Reintroduction is a growing practice in conservation in which individuals of a species that were historically resident in a landscape are returned (Seddon et al., 2007). Reintroductions are motivated by a variety of reasons which can be ecologically driven (such as for ecological restoration) or economically driven (Carter et al., 2017; Corlett, 2016; O'Rourke, 2014). Where reintroductions occur, they should abide by guidelines set by the *International Union for the Conservation of Nature*. These guidelines state that "Any translocation will impact and be impacted by human interests. Social, economic and political factors must be integral to translocation feasibility and design" (IUCN & SSC, 2013). As such, practitioners must account for social variables in wildlife reintroduction projects (Auster et al., 2019; IUCN & SSC, 2013; Perring et al., 2015).

Wildlife tourism is often cited as a potential socio-economic benefit resulting from wildlife reintroductions. For example, the reintroduction of the white-tailed sea eagle (*Haliaeetus albicilla*) in Ireland was viewed favourably by tourism organisations who were broadly supportive of the project (O'Rourke, 2014). However tourism based on a reintroduced species may not be supported by others who may not hold a favourable view of the reintroduction (Hall, 2019). As wildlife tourism and its potential socioeconomic benefit for local communities is often cited as a motivation for reintroduction, an understanding of whether and how this actually occurs is required. Despite this need, there is so far little academic study of the wildlife tourism that results post-reintroduction. This therefore raises the question of whether the potential economic benefits of reintroduction cited pre-reintroduction are realised when the species is present and, if so, how do the opportunities manifest? Further, are there other implications of reintroduction-related wildlife tourism for local communities? As the IUCN Guidelines require an integration of social and economic factors in reintroduction project design (IUCN & SSC, 2013), addressing these research questions would enable practitioners

to appropriately consider wildlife tourism potential when proposing and planning reintroduction projects.

In this paper we seek to address these questions by undertaking a case study of tourism associated with a reintroduced species in a live reintroduction project. We will first introduce the concept of wildlife tourism, and provide context surrounding our study species - the Eurasian beaver (*Castor fiber*). Following the presentation of our case study results, we will close by discussing the findings, and discover what the wider implications are for reintroduction (or translocation) projects.

Wildlife Tourism

Wildlife tourism (a form of ecotourism) is a growing trend globally in which humans interact with wildlife, whether it be flora or fauna (Higginbottom, 2004). The growth in wildlife tourism reflects an increase in people seeking experiences with wildlife both domestically and internationally (Curtin, 2010; Newsome & Rodger, 2013). Where wildlife tourism relates to animals (as will be the case in this study), humans interact with them in the wild or within enclosures (Higginbottom, 2004; Moorhouse et al., 2017; Skibins et al., 2013).

Wildlife tourism facilitates the engagement of people with nature and emotional responses (Curtin & Kragh, 2014), which research has argued leads to increased 'nature connectedness' – an individual's psychological sense of their relationship with nature (Martin et al., 2020). This in turn is claimed to result in a range of potential benefits: local businesses and communities can benefit from increased income resulting from visitors to the area (Higginbottom, 2004; Zimmerhackel et al., 2019); an increase in connectedness with nature can be beneficial for mental health, with numerous studies showing positive effects on an individual's well-being (Curtin, 2009; Lackey et al., 2019; Natural England, 2020); and

encounters with wildlife can stimulate nature conservation behaviours in people (Apps et al., 2018; Natural England, 2020; Newsome et al., 2019).

Wildlife tourism is often centred upon 'charismatic species' (Curtin, 2010; Skibins et al., 2013) defined here as animals which are visually appealing to people, encouraging interest or sympathy (Ducarme et al., 2013). For example, five mammals - the "Big Five" - are promoted as the ones to spot in Africa (Lindsey et al., 2007). A charismatic species focus is sometimes criticised for taxonomic bias (Clucas et al., 2008; Monsarrat & Kerley, 2018) but the focal species may be a 'flagship species' through which other wildlife and ecosystems are supported, either in the distribution of revenue generated (Lindsey et al., 2007; Meer et al., 2016; Williams et al., 2000) or by conserving wider habitat (especially if the species is an 'ecosystem engineer', a species which modifies habitats and supports a wider ecosystem (C. G. Jones et al., 1996; Nummi & Holopainen, 2014)).

Not all wildlife tourism is driven by charisma as some is motivated by the intention to support or see wider biodiversity rather than charismatic species alone (Hausmann et al., 2017). For example, tourist motivations to visit National Parks in Zimbabwe included "abundance of wildlife" and availability of both animal and plant species (Mutanga et al., 2017). Further, wildlife tourism can be motivated by experiencing wild landscapes, with the wildlife in context providing the "activity, drama and the focus" (Cloke & Perkins, 2005; Curtin, 2013).

Eurasian beaver (*Castor fiber*) in Great Britain

In Great Britain, the Eurasian beaver was historically resident until approximately 500 years ago, when they were extirpated by humans for fur, castoreum and meat (Halley & Rosell, 2003; Puttock et al., 2017). There are now reintroductions taking place at a politically devolved level; in Scotland beavers were formally recognised as a European Protected Species in 2019

(Gaywood, 2018; Scottish Government, 2019); in England, a free-living population of Eurasian beavers in Devon (in the south-west) has been monitored for five years and the UK Government announced in August 2020 they may permanently remain, with consultations on a national approach to beaver reintroduction due later in 2020 (UK Government, 2020); in Wales there are no formal reintroductions as yet, but the Wildlife Trusts of Wales have submitted proposals for monitored Trials (Wildlife Trusts Wales, 2012).

The Eurasian beaver (hereon referred to as 'beaver') is a semi-aquatic large mammal of the order *Rodentia*. They are 'ecosystem engineers' for they alter the landscape through tree-felling and dam-building behaviours, creating a mosaic of habitats that support a range of biodiversity. Supported species groups include birds, amphibians, aquatic invertebrates, bats and other terrestrial mammals (Dalbeck et al., 2020; Law et al., 2019; Nummi et al., 2011, 2019; Nummi & Holopainen, 2014; Stringer & Gaywood, 2016). There is ongoing research into the relationship between beavers and fish (see Kemp et al., 2012 for a balanced review of pros and cons). The dam-building behaviours are often seen as beneficial for people as they lead to improved water quality and slow water flows in high rainfall events, reducing the potential for flooding (Brazier et al., 2020; Brown et al., 2018; Graham et al., 2020; Puttock et al., 2017, 2018). There are also challenges associated with beavers which may require management by people including flooded agricultural land upstream of a beaver dam and the felling of trees of social significance (Brazier et al., 2020; Campbell-Palmer et al., 2016; Schwab & Schmidbauer, 2003).

In 2017 (prior to the study presented in this paper) we conducted a nationwide online survey of attitudes towards beaver reintroduction (*n=2759*). This identified groups favourable towards and opposed to the process of beaver reintroduction in Britain, with the reasons given being largely reflective of the benefits and challenges cited above (Auster et al., 2019). When asked specifically about beaver impacts upon 'economics', the potential for beaver tourism was cited

in some form by 47.99% of respondents within their responses (though to varying extents with everything from a "minimal" to a "huge" benefit being referenced).

The beaver fulfils a number of criteria which would make it a prime candidate for a wildlife tourism focus. First, it is a large mammal that is considered a charismatic species with characteristics that appeal to people (Campbell et al., 2007). Second, as 'ecosystem engineers' they actively create (or restore) diverse natural environments, which would appeal to wildlife tourists for whom biodiverse landscapes are of interest (Campbell et al., 2007; Hall, 2019). Third, in the process of beaver-induced landscape change, visible signs of activity are left (such as dam structures or felled trees) which are viewable when the animal itself may not be seen (Brazier et al., 2020). Fourth, they are 'predictable in activity or location' as they are territorial and (although largely nocturnal) they are often seen in daylight hours, especially in the summer months (Gaywood et al., 2008; Reynolds & Braithwaite, 2001). Fifth, where they are introduced they would possess 'elements of rarity' (Reynolds & Braithwaite, 2001) in the early stages or 'super local-abundance' (Reynolds & Braithwaite, 2001) as they become more widespread (Halley & Rosell, 2002; 2003; Halley et al., 2020).

Beaver tourism activities presently exist in Europe. For example, there are initiatives such as 'beaver safaris', guided tours of beaver-modified landscapes and information centres (Campbell et al., 2007; D. J. Halley & Rosell, 2002; Rosell & Pedersen, 1999). Perhaps unsurprisingly therefore, feasibility studies and reintroduction project reports for all three nations in Great Britain have cited wildlife tourism as a potential socio-economic benefit resulting from beaver reintroduction (Brazier et al., 2020; Gaywood, 2018; Gurnell et al., 2009; Jones et al., 2012; Moran & Lewis, 2014).

Some study of 'beaver-tourism' potential in Great Britain has taken place. A report for the Wild Britain Initiative conducted by the University of Oxford in 2007 (prior to any official beaver

reintroductions in Britain) undertook a scoping study of the potential economic benefit that could be garnered from beaver reintroduction. It concluded that "these benefits could be substantial" and a beaver release site may bring an estimated £2million a year into a local economy (Campbell et al., 2007). In Scotland, the Scottish Beaver Trial was a 5 year project which monitored a small reintroduced beaver population in Knapdale, Argyll from 2009 until 2014 (prior to the Scottish Government decision to legally protect Scottish beavers) (Gaywood, 2018). In the Trial's final socioeconomic monitoring report it was concluded that there was some evidence of increased turnover in local businesses, but that this was "modest". It also reported that "Local tourist and retail operators are generally favourable in their assessment of the local and regional added-value of the trial" (Moran & Lewis, 2014). The potential for beaver tourism ventures was also recognised by landowners surveyed by the Tayside Beaver Study Group, who collated evidence on the impacts of an unlicensed population of beavers on the River Tay (Tayside Beaver Study Group, 2015).

In this paper we seek to build upon this knowledge through the case study of a village community situated within the catchment of the River Otter Beaver Trial in South West England (see 'Study Setting'). We seek to understand how the presence of free-living reintroduced beavers on the River Otter near to the village and associated wildlife tourism has impacted upon local businesses and the community. We aim to find out if and how the suggested potential benefit for communities from wildlife tourism manifests. Finally, we will explore what lessons this experience can reveal which are transferable for a variety of wildlife tourism and reintroduction contexts (Tsang, 2014).

STUDY SETTING

Our research occurred within the catchment of the River Otter, Devon (England) during the timeframe of the 'River Otter Beaver Trial' (ROBT). The village of Otterton, situated in the lower catchment, is small with a handful of businesses (see 'Interviews with local businesses' and **Table 2** for business descriptions). The River Otter flows through the village from the North to the South.

In 2015, Devon Wildlife Trust was granted a licence (Natural England, 2015) to monitor a free-living population of beavers of unknown origin on the River Otter (Crowley et al., 2017). Over five years, Devon Wildlife Trust was responsible for monitoring and managing the beaver population with an array of external partners under the auspices of the 'River Otter Beaver Trial' (ROBT). An intensive program of scientific research and evidence gathering on both environmental and social factors (in accordance with the Trial's monitoring framework (Devon Wildlife Trust, 2017)) took place over the course of five years until 2020 when the findings were published in the final 'Science and Evidence Report' (Brazier et al., 2020). This report, alongside a proposed management framework developed by a partnership of organisations (River Otter Beaver Trial, 2019), were presented to UK Government who announced in August 2020 that the River Otter beavers may remain (UK Government, 2020).

In 2017 a beaver pair established a lodge, located a short distance upstream (North) of the village. The beavers were in a location that was easily visible from a well-used riverbank footpath. The beavers did not build a dam construction as they were in the lower reaches of the main channel (beavers tend to only build permanent dam structures in upper and more marginal stretches of river (Graham et al., 2020)). The beavers themselves were often active in daylight hours (usually evening or early morning) in the summer months, and produced feeding signs. The beavers often brought vegetation back to a small beach opposite the footpath to feed. By

the summer of 2018, the beavers had moved away from this location to an area not publicly accessible.

MATERIAL AND METHODS

As the beavers were free to roam throughout the river catchment (and as the population was small meaning there was plenty of available habitat), it was not foreseen that a lodge would be established just outside of the village. With that and the project timescale in mind, the methods selected for this investigation would need to be reactive to the events unfolding in the village. As such, this study undertook a mixed-methods approach. A mail-return questionnaire of village residents allowed for an understanding of how 'beaver-watching' and any association with visitors to the village were viewed amongst the community. Footpath counter data enabled an assessment of footpath use along the river, and face-to-face interviews with local businesses enabled insight into any potential economic impacts of 'beaver-watching'.

Community mail-return questionnaire

In order to understand how the beavers and related wildlife tourism were viewed amongst the local community, a paper questionnaire was delivered to 289 properties, the total which we identified to be within the village (the information for participants and full questionnaire is provided as **Supporting Information**). The questionnaire was supplied with a stamped, addressed envelope in order to submit responses. An optional opt-in prize draw (for a £20 voucher for a choice of stores) was offered as an additional incentive for participation. The survey was delivered on 20th December 2018 and respondents were asked to submit their answers by 10th January 2019, however submissions were accepted for a further two weeks in

order to allow for late responses. 66 household responses were received; a response rate of 22.8%.

This study uses a subset of results from the questionnaire. Within the analysis for each question, respondents who did not answer the question were excluded. The relevant questions in this subset are presented in **Table 1**, alongside their respective focus.

Interviews with local businesses

The researcher identified five businesses within the village. Each was invited to participate in an interview to document their experiences and views of the beavers and beaver tourism; every business was invited at least twice. Three businesses agreed to participate. (Additionally, following the interviews and mail-return questionnaire, one business from outside the boundaries of the community was identified as of interest to interview. However, no response to the invitation was received from this business). The businesses are identified in this study by a code number which relates to the business description as given by themselves. These are outlined in the first two columns of **Table 2**. All businesses were established prior to the appearance of the beaver lodge in 2017.

The interview was of a semi-structured nature to ensure key areas were covered but to enable additional questioning if appropriate. Participating businesses were asked about:

- Their description and views of the beavers and their activity in the local vicinity, and whether there have been any direct impacts of this for the business.
- Whether there have been any changes in customer numbers and/or backgrounds which they related to the presence of beavers on the Otter.
- Whether they have undertaken or planned to undertake any business initiatives in response to the presence of beavers on the Otter.

Interviews took place in March 2019 and ranged between 30 and 60 minutes.

Riverbank footpath counters

The village resides within the designated *East Devon Area of Outstanding Natural Beauty* (AONB). In 2017, the AONB authority installed footpath counters on the riverside footpath near the beaver lodge near to the village. Two counters of particular interest for this study were installed either side of a road bridge over the river; one for the footpath leading north out of the village towards the lodge (North), and the second for the footpath leading south out of the village towards the sea (South). The AONB authority has granted permission for the use and analysis of their records for this research, for which the authors are very grateful.

The counters recorded one count each time an individual passed the counter. The data were available on a monthly basis from June 2017 until February 2019 (with the exception of October and November of 2018 due to a technical issue). The footpath counters recorded a total of 92,170 (North) and 206,593 (South) counts across the available months.

In 2017, the beavers were present on the river with a lodge in a location which was publicly visible from the footpath a short way north of the village. However, in 2018, the beavers moved to a location away from the footpath. Thus, in the data gathered, there were two comparable sets of four summer months when beavers are more likely to be seen (June through to September), including one summer of beaver presence near the footpath (2017) and one of beaver absence (2018). The differences in these months between the two years were statistically compared using a chi-square test of independence.

Ethics

All participants (in the mail-return questionnaire and the business interviews) were informed that participation was voluntary and anonymous, with written consent required for participation. Examples of the ethical information provided for respondents are available as supporting information. This study was approved by the University of Exeter Geography Department's Ethics Committee.

RESULTS

In this section we will present results from the three methodological approaches. First, we present results regarding the contextual use of the River Otter amongst the community and how this may have been influenced by the presence of beavers from the community questionnaire. Second, perceptions of visitors from the community and the footpath counter data will allow for an examination of beaver influence on visitors and footpath use. We then provide results from the business interviews regarding economic influences of 'beaver-tourism'. Subsequently we return to the community questionnaire to understand any other implications of tourism for the community, and to gain an insight into the emotional responses that arise amongst residents when beavers or signs of their activity have been seen.

Community use of the River Otter

The local community use of the River Otter, as reported through the mail-return questionnaire, is shown in **Figure 1.** The predominant activity was for walking (92.3%), followed by viewing wildlife (64.6%) and peace and quiet (40%). The activity for which fewest respondents reported using the river was swimming (1.5%). 6.2% of respondents reported that they did not use the River Otter near to the village.

When asked whether the presence of beavers had influenced the respondents' use of the River Otter near to the village, 32 of the 55 respondents who provided an answer to the question (58.2%) indicated that it had not. Of those who gave reasons, these cited that they used the river anyway, they were resident in the village, and that it had not changed the frequency of their river use. The remaining 23 respondents (41.8%) indicated that the presence of beavers had influenced their use of the river. When reasons were given, these included (in no particular order): increasing time by the river; being more watchful for beavers on walks; aiming to see signs of beaver activity; aiming to see the beavers themselves; being more likely to take visitors; walking more in the evening; walking more in the early morning; and finding walks more enjoyable as there is more wildlife to see. However, there were also some negative reasons given, including (in no particular order): being more careful with dogs on walks; preventing their dogs from being able to swim in the river, walking different river stretches as some areas have now become too busy for them; and walking less frequently.

Visitors to Otterton

Perception within the community

Of the 62 respondents who answered when asked in the mail-return questionnaire about whether they had observed a change in visitors numbers since 2015 (the start of the River Otter Beaver Trial), 7 respondents (11.3%) indicated that they had felt there had been no change and 12 (19.4%) indicated that they did not know.

43 respondents (69.4%) indicated that they had observed a change in visitor numbers. 39 of those respondents (90.7%) indicated this change to have been an increase, whilst none indicated that they felt there had been a decrease. 4 respondents (9.3%) indicated the change had been variable.

Subsequently, respondents who had indicated that there had been a change were asked whether this was attributable to the presence of beavers on the river near to the village. 15 respondents (34.9%) answered 'Yes, completely', 25 respondents (58.1%) answered 'Yes, in part', and 3 respondents (7%) answered 'No'. Those who answered 'Yes, in part' or 'No' were given the opportunity to indicate what other factors may have led to the change in visitor numbers which they described, and reasons included: more people generally visiting the area; attractiveness of the local area and river; people trying to see other wildlife (including otters and birds); increase in holidays remaining in the UK (or 'staycations'); development of a nearby holiday park; development of local businesses as attractions.

Footpath counter data

The footpath counter data for the months of June to September in 2017 (when the beavers were present on the river with a lodge in a location visible from the footpath a short way to the north of the village) and 2018 (when the beavers had moved away from the footpath) is presented in **Table 3.** Between the summers of 2017 and 2018, there was a reduction of 10,925 counts North and 15,506 South. Across all four months, there was a reduction in footpath counts for both the North and South counters. The differences in each of these months were statistically significant for both counters between 2017 and 2018 (North: $X^2_{(3)} = 885.6715$, n = 52859, $p < 0.00001$; South: $X^2_{(3)} = 729.1707$, n = 104166, $p < 0.01$).

Business perspective

A summary of the impacts of the presence of beavers as reported by the local businesses is provided in **Table 2**, with all businesses indicating that the beavers led to an increase in revenue. The table details whether the business has seen a change in visitor numbers and the

impact of this for the business, whether businesses had undertaken any beaver initiatives, other potential initiatives businesses cited that they may consider and any other reported additional impacts.

Overall, B1 reported a large scale benefit of beaver presence for their business predominantly from increased custom (including at beaver-focused events) and sales of beaver-related merchandise and products. This business also reported actively using the beaver presence within their business marketing and promotion.

> "We have stocked various beaver merchandise in the gallery. […] More recently this winter we've brought on three lines of beer made for us, and one of those beers is 'Beaver Bitter'. Now that's sold particularly well."

B2 reported a little benefit from beaver postcard sales but was unsure whether the increase in visitors they had experienced could be attributed towards the presence of beavers.

> "It's very hard to say because we we're gradually building our customer-base up at any rate so I suppose we didn't specifically know if people had come to see the beavers or whether they had just come to see the village. We do sell, we've got these pictures [points to beaver and otter pictures on wall] and we do sell postcards. We've got postcards of those two pictures."

B3 reported some benefit of increased custom from increased visitor numbers.

> "It does bring a bit of tourist trade down […] you do get people coming down and people who say through *booking.com* and stuff that 'we're coming to see the beavers'"

Other impacts of 'beaver-tourism' for the community

Respondents to the mail-return questionnaire were provided with an opportunity to reflect upon any additional impacts of visitors upon the village and its residents. Fifty-nine respondents provided an answer for this question.

Most prevalently, with 28 occurrences, respondents cited additional pressures on parking in the village due to an increase in visitor numbers. There were a further 19 references towards an increase in traffic or cars (including cases where these were linked to safety, congestion, speeding and noise pollution).

Other impacts cited included: damage to riverbanks and footpaths from increased foot traffic *(n=7,* once also citing off-road cyclists); a potential benefit for local business *(n=7)*; an increase in litter (or plastic pollution) *(n=5)*; visitors getting angry at dog-walkers allowing dogs in the river *(n=1);* dog-walkers encouraging dogs into the river *(n=1)*; a new interest for wildlife watchers and photographers *(n=1)*; a lack of toilets for visitors *(n=1)*; being "glad" of visitors coming to see beavers *(n=1)*; a potential for volunteer schemes and funding (*n=1*).

Perceptions of seeing beavers or signs of their activity

Of the 62 respondents who answered the question in the mail-return questionnaire, 56 respondents (90.3%) indicated that they had seen beavers or signs of their activity, with the remaining 6 respondents (9.7%) indicating they had not.

Of those who had, 54 respondents then described how this had made them feel. The emotional and descriptive words were run through a word frequency analysis (with stemmed words). This method of content analysis seeks to quantify the frequency by which words are used (Stemler, 2000), in our case the frequency of emotion words used in responses to the question. This allows us to identify those which occurred most or least commonly amongst the group to give

an indicative overview of the reported emotional responses to seeing beavers or signs of their activity.

The five most frequently used words were ‘excited’ (11 occurrences), ‘interested’ (9 occurrences), ‘happy’ (8 occurrences), ‘pleased’ (8 occurrences), and ‘privileged’ (4 occurrences).

There were however three occurrences of negative words. ‘Concerned’ and ‘worried’ appeared once each, with the respondents describing these as feelings experienced having seen what was perceived as “damage to trees”. The word ‘sad’ occurred once where the respondent described seeing ““so many people 'viewing' the beavers and disturbing them”.

An overview of the word frequency analysis is provided in **Figure 2**, where the more frequently used emotion words appear in larger text.

DISCUSSION

So, is there a wildlife tourism benefit for the community and how has this manifested? From our results, it is clear that the presence of beavers on the river near to this village has certainly had impacts for the local community which have largely been beneficial. Here we provide discussion of how beaver presence related to footfall and the benefits that were derived by local businesses. We will then look at indirect interactions between beaver-tourism and other local issues, and provide some indicative insight into the emotional responses to seeing beavers or signs of their activity.

An increase in footfall

Our data demonstrates that there is an association with increase in footpath usage and visitors to the village resulting from beaver presence. The data from the footpath counters showed a reduction in counts which correlated with when the beavers became absent near to the footpath

(**Table 3**). It is important to recognise the limitation that there may have been other variables contributing towards this reduction in footpath counts which we cannot assess from our data, such as for example if there were unrelated local events or variations in the weather. However, other results presented in this paper lead us to suggest that beaver presence contributed towards riverbank footpath use: 93% of mail-return questionnaire respondents related a perceived increase in visitor number to beaver presence (at least in part, with 34.9% wholly attributing this to beaver presence); two of three business interviews attributed a perceived increase in visitors towards beaver presence (with the third reporting an increase which they were unsure whether it was due to beaver presence or not); residents in the local community - who predominantly use the river for walking or viewing wildlife (**Figure 1**) - indicated that the presence of beavers had influenced their use of the River Otter near the village, with some citing that this was to view beavers or signs of their activity. (As an additional anecdotal note, the lead researcher often witnessed groups of beaver-watchers on the riverbank). Therefore, by triangulating these results we conclude it is likely that the number of people using the footpaths was significantly higher as a result of the presence of beavers near to the village.

Economic benefits exist but are greatest with business initiative

For the local businesses, the increase in footpath users they perceived was reported to have been economically beneficial in respect to an increase in revenue generated by increased customer numbers. All three businesses reported an increase in visitors leading to an increase in custom, although B2 was unsure whether this was attributable to beaver presence. This perceived impact is echoed in the community questionnaire as (although many respondents indicated that they would not spend money in local businesses due to their residency in the area) a proportion of respondents indicated that they would spend money in a range of local business types as part of a ‘beaver-watching’ experience, including the main business types in

the village. We propose therefore that the beaver-watching riverbank users provided some economic benefit for local businesses. This finding is similar to that reported by the Scottish Beaver Trial that local tourist and retail operators were generally favourable of the tourism-related value of the trial (Moran & Lewis, 2014).

Based upon the interview responses (**Table 2**), the business that reported the greatest benefit (B1) stated that they had profited well from sales of beaver-related merchandise and events, as well as the fact that they had incorporated beavers into their business marketing.

> "It's become for us a unique selling point".

The benefits for this business even extended so far as to successfully be awarded funds to develop new toilet facilities on site as a result of an application which included reference towards increased visitor numbers due to 'beaver-watching'. As such, this business had actively sought to maximise the opportunities that were available due to beaver presence. Conversely, B2 had reported a lesser benefit as they had intentionally not undertaken many beaver-related initiatives as: "We try not to compete with [B1]", though they did indicate that they were considering the potential. As such, we suggest that the potential tourism benefit that may be derived from beaver presence will be greatest where businesses actively undertake initiatives to be able to maximise it (with the examples in this case study being beaver-related products, merchandise, events and marketing), and that the benefits from reintroduction will be more limited where this is not the case. Similarly, in the socioeconomic monitoring report from the Scottish Beaver Trial it was stated that the potential economic benefit reported by the Campbell analysis (Campbell et al., 2007) may be flawed as "companies may not actually offer tours" (Moran & Lewis, 2014). Further, a need to actively use initiatives to maximise the opportunity is perhaps reflected by the respondent from B1 who stated: "I think potentially what does need to happen is it needs to be upsold to visitors because people are genuinely

interested", showing how this business has recognised the economic potential and, by using the phrase "upsold to visitors" they identified the benefit would be greater where there is business input to take advantage of it.

Business initiatives may account for temporal variation in animal activity

Bearing in mind the aforementioned assumption about the factors contributing towards the difference in footpath counter data, it is notable that when the beavers were absent there were fewer footpath users. It could therefore be assumed that there may be temporal variation in the impact of beavers for local businesses based upon when beavers (or signs of their activity) are present within a publicly visible vicinity; i.e. if there are no beavers to view then there will be fewer beaver-watchers undertaking expenditure in a local business. However, B1 indicated they had not seen much difference in the benefit for their business between when beavers were present or absent as they had used beavers in the business marketing in such a way as to say they are on the river, rather than based upon activity in the immediate vicinity:

> "I would say that the majority of visitors wouldn't have a clue, without being disrespectful, whether [beaver activity's] increased or decreased. […] that's a marketing element on our part as well, as far as we're concerned beavers are on the River Otter […]. Whether they happen to be gnawing on a tree there or a mile upstream doesn't really affect us".

Again therefore, we suggest that business initiative here has actively unlocked the potential economic benefit arising from beaver tourism by incorporating beaver presence upon the river within their marketing, rather than passively relying upon beaver presence in the immediate vicinity to bring custom.

Are the economic benefits sustainable in the long-term? A focus for future research.

At the time of this study, the free-living beaver population on the River Otter was small and local to the river. They are the first official free-living population within England and an element of the beaver tourism may therefore result from their new or 'novelty' value, particularly amongst visitors to the village. Indeed, the River Otter beavers have attracted national media coverage (Crowley et al., 2017) which B1 referenced had led to some increase in visitors' custom (and custom from the journalists themselves):

> "When there was quite a lot of press at one point […] we did see higher numbers and certainly there was more people talking about it. […] There's been various TV people turn up here to be filmed out there."

Now that the beavers are to be allowed to remain, it would be an interesting point of further research to examine if this scale of benefit is to remain too, or whether the potential benefits will reduce over time and as the species becomes more widespread. This was a factor which was referred to by 29 people in responses to the aforementioned nationwide attitudinal questionnaire (Auster et al., 2019). We speculate that there may, at the time of writing, be some localised benefit attached to the 'newness' of beavers, as demonstrated by B3:

> "Overall, where else can you go in the UK and say 'I've got beavers half a mile up the road'? Not many other places!"

It may be that the scale of benefit reduces over time, but for two reasons we believe there are reasonable grounds to assume that some benefit would still be observed as beavers become more widespread. The first is that, as we have identified, the degree of benefit is related to the initiatives undertaken by the businesses. As such, business initiatives may too be able to address a potential reduction in benefit over time. Indeed, this potential decrease in benefit was

recognised by B1, but they were prepared for this and indicated that the beavers were part of a wider business ethos about engaging with nature.

> ""I suppose the problem would be that if there's beavers in everybody's back garden, the uniqueness of having them here will have less of a pull. […] as far as we're concerned that may be inevitable. […] But that wouldn't be something that we'd still not promote because of the nature of the business that we are […], so the whole sort of ethics of what we're about is quite in sync with nature."

The second reason is that wildlife tourism is a growing and important industry for the United Kingdom (Natural England, 2014). Between March 2018 and February 2019, it is estimated there were nearly 4 billion visits to the natural environment amongst the human population (1.7 visits per person per week), and 4% of these visits were to view wildlife (other reasons include, for example, walking, dog-walking, eating or drinking, playing with children, running – amongst others) (Natural England, 2019). Wildlife tourism in the UK is often focused upon already widespread native species. For example, the grey seal (*Halichoerus grypus*) is common throughout Britain yet attracts large numbers of annual seal-watching tourists (Curtin et al., 2009). Thus, we suggest that a potential for beaver tourism would remain as they become more widespread (even if not quite to the same extent as at first in the localised reintroduction site). This is particularly due to their charisma and natural environment-creating behaviours which make them a prime candidate for wildlife tourism initiatives as discussed in the above (Reynolds & Braithwaite, 2001; Campbell et al., 2007; Curtin, 2010; Newsome et al, 2010; Hall, 2019), as well as the fact that beaver tourism is seen on the European continent where beavers already reside (Macdonald et al., 1995; Rosell & Pedersen, 1999; Campbell et al., 2007).

There can be interactions between wildlife tourism and local community issues

It is important to note however that, in the community questionnaire, there were other factors with which the increase in visitors were related that were less positively viewed. Predominantly these were an increase in traffic and parking issues in the village, which were often associated with other variables rather than the beavers. Hence, we believe it should be recognised that potential benefits in tourism can have indirect interactions with other local issues (Hall, 2019). In this case traffic issues were often related to other factors unrelated to beaver presence. We therefore suggest it is not necessarily the responsibility of reintroduction practitioners to tackle traffic issues directly, however where there are indirect relationships with such matters these may require attention when considering reintroduction-related business initiatives. An example of such consideration was observed in this case study as B1 undertook the development of new toilet facilities to respond to increased visitor numbers.

Similarly, it should be noted that potential tourism benefits may interact with potential conflicts elsewhere with a reintroduced species. In the case of beaver reintroduction, it has been recognised that those who benefit (eg. in tourism) may not necessarily be the same as those who incur the costs (eg. agricultural impact), and that addressing conflicts in a holistic management strategy may enable the maximisation of potential opportunities (Auster et al., 2019; Brazier et al., 2020; Gaywood, 2018). It is a possibility to consider that tourism beneficiaries could have a supporting role to play in conflict alleviation within such a holistic strategy. For one example, revenue generated through tourism could support the costs of coexistence with the wildlife species (Nyhus, 2016). If something on these lines were to occur in instances of reintroductions it will be important to ensure equitable outcomes for those involved, perhaps through localised management of coexistence compensation funds (Jordan et al., 2020).

Positive emotions resulted from seeing the animal or signs of their activity

Finally, many residents indicated that they tried to see beavers and our data indicates that the presence of beavers on the River Otter near to the village was largely seen favourably amongst the community. 93% of residents who answered the question indicated they had seen beavers or signs of their activity, and our word frequency analysis (**Figure 2**) indicates that the majority of the reported feelings experienced as a result of this were positive. It is increasingly recognised that time spent viewing wildlife and engaging with nature evokes positive emotional responses (Curtin, 2010; Natural England, 2019), and emotional responses such as these have been widely demonstrated to be beneficial for the mental health of the observer (Grinde & Patil, 2009; Lackey et al., 2019; Martin et al., 2020; McMahan, 2018). As a result, positive emotions can be an effective way of increasing nature connectedness and enable people to learn about the environment (Martin et al., 2020; Natural England, 2020), which in turn can incentivise pro-environmental behaviours (Apps et al., 2018; Newsome et al., 2019). Our results indicate a positive emotional response to seeing the beavers or signs of their activity amongst the majority of local residents, thus it is likely that experiences of this kind may contribute towards benefits in mental health and nature connectedness for those individuals. Now the beavers are allowed to remain, such opportunities for people to see them or signs of their activity are likely to increase as they become more widespread.

CONCLUSIONS

We conclude there was an observed benefit for the local community resulting from beaver presence on the nearby river, and our findings have a number of implications that are transferable for other reintroduction and wildlife tourism contexts.

Economic benefits resulted from an increase in visitors to see beavers, spending money in local businesses. The economic benefit was greatest where businesses actively sought to maximise the opportunity. Hence - and whilst recognising the need for careful management to protect animal welfare (Moorhouse et al., 2017; Usui, 2019)) - we suggest active encouragement by reintroduction practitioners for businesses to undertake initiatives relating to the reintroduced species (eg. merchandise, events and use in marketing, etc.). This will help realise and maximise reintroduction-related wildlife tourism opportunities, especially where reintroduction practitioners cite tourism potential as a motivator for the reintroduction to occur. Further, we suggest active uptake of this socio-economic opportunity through business initiatives may help to maintain benefits in the longer term as a species becomes more populous and widespread, even if not to the same scale of localised benefit as first seen at the reintroduction site; we recommend this as a field for further research.

However, we note there may need to be consideration of other potential local issues and challenges which may be contributed towards (whether directly or indirectly) in the uptake of the new wildlife tourism opportunity. These will require engagement with appropriate stakeholders if they are to be addressed (Hall, 2019).

Finally (and as is supported in the wider literature (Curtin, 2010; Lackey et al., 2019; Natural England, 2020)), our findings suggest the new wildlife-watching opportunities resulting from the reintroduced species may invoke positive emotions amongst those who see the reintroduced species or signs of their activity. This may lead to benefits for mental health and an increase in connectedness with nature, which in turn can lead to those individuals undertaking pro-environmental behaviours.

CONFLICT OF INTEREST STATEMENT

The authors have no competing interests to declare.

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TABLES

Table 1. The subset of questions from the community mail-return questionnaire in relation to their respective focus.

Focus	Question	Notes
Community use of the river near to their village	"For which of the following reasons do you visit the River Otter near to Otterton?"	Respondents could select multiple answers from a list of tick-boxes.
	"Has the presence of beavers on the River Otter near to Otterton influenced your use of the river?"	Free comment box
Community experience and views of 'beaver-watching'	"Have you seen the beavers or signs of their activity on the river near to Otterton? If yes, please tell us how this made you feel."	Free comment box
	"As part of a 'beaver-watching' experience near to Otterton, would you be likely to spend money in any of the following business types?"	Respondents could tick multiple answers from the options, which were based on business types in the village: pub/restaurant; café; shop; other
Visitors to the village	"Since 2015, have you noticed a change in the number of visitors to Otterton?"	Respondents could tick one of the list of options.
	"Do you believe that the presence of beavers in the river near to Otterton has led to the change which you described?"	Respondents could choose between "Yes, completely", "Yes, in part" or "No".
	"Please use this space to tell us whether you believe there to be any impacts of visitors to Otterton and its residents. These can be positive, negative or neither positive nor negative."	Free comment box

Table 2. Descriptions of participating businesses and interview findings.

Business ID	Description	Impact of beavers on visitor numbers to business	Impact of change in visitor numbers for business	Beaver-related initiatives undertaken	Possible other ideas or initiatives cited	Additional impacts cited
B1	Nature-focused visitor attraction, incorporating a working watermill, bakery, farm shop, restaurant, gallery and live music.	Increase Noted that increase is observed at certain times of year	Beneficial (increased custom)	Beaver Merchandise (eg coasters, cards, bronze figures) Beaver Beer – "Beaver Bitter" Beaver Event days Use of beavers in business marketing and promotion	Beaver interpretation, but hoped this would be provided by a beaver management authority	Successful bid for government funding to improve toilet facilities, with increase in visitors due to interest in beavers cited in the application Increased interest generally in River Otter area
B2	Community-owned shop for local people, run by volunteers with one paid manager.	Unsure (increase observed but not sure whether this is attributable to beavers)		Postcards featuring local photographer's beaver pictures	None, but cited interest in undertaking more	None
B3	Hospitality business incorporating hotel, public house and restaurant	Increase	Beneficial (increased custom)	None	Beaver focused walks	None

Table 3. Summary of footpath count data for both counters in the summers of 2017 and 2018. (Data provided courtesy of *East Devon AONB*).

Month	North counter			South counter		
	2017	**2018**	**Difference**	**2017**	**2018**	**Difference**
June	7090	6673	-417	14011	10599	-3412
July	9396	6020	-3376	15880	12673	-3207
August	10535	6423	-4112	19516	15962	-3554
September	4871	1851	-3020	10429	5096	-5333
Total	**31892**	**20967**	**-10,925**	**59836**	**44330**	**-15,506**

FIGURE LEGENDS

Figure 1. Community use of the River Otter near to the village, as reported by respondents in the mail-return questionnaire.

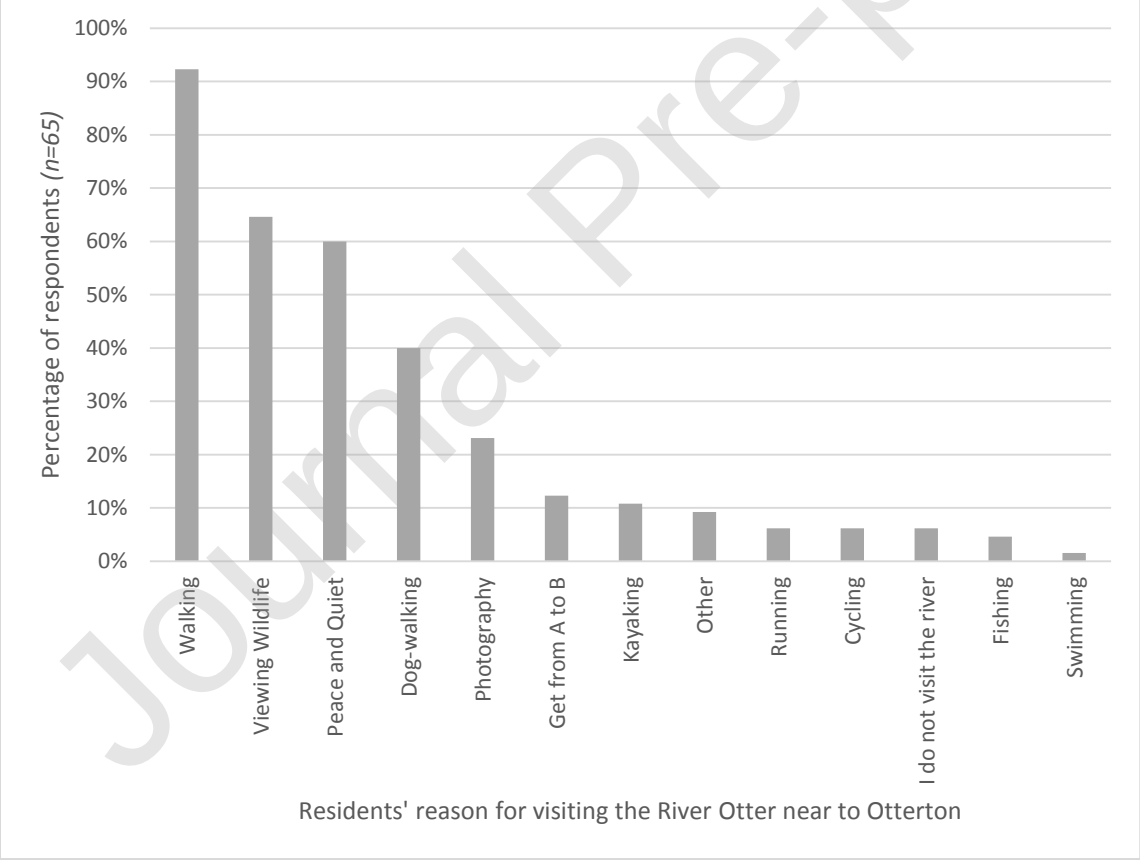

Figure 2. Overview of word frequency analysis of emotion words (including stemmed words) used by respondents to the mail-return questionnaire to indicate how they felt upon seeing beavers or signs of their activity.

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