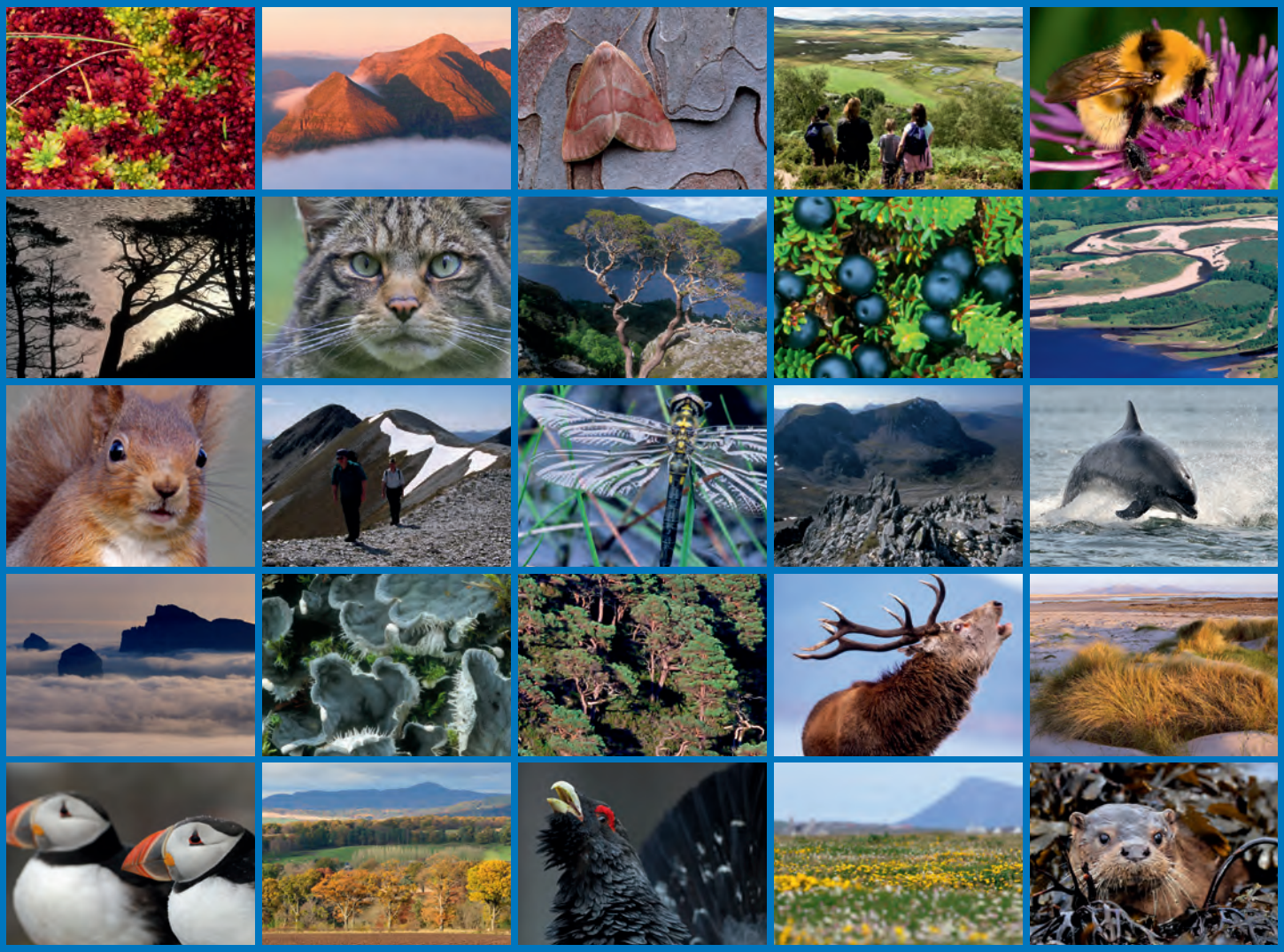
Scottish Natural Heritage
Commissioned Report No. 482

The Scottish Beaver Trial: Socio-economic monitoring - First report 2011



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The Scottish Beaver Trial: Socio-economic monitoring - First report 2011

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COMMISSIONED REPORT

Summary

The Scottish Beaver Trial: Socio-economic monitoring – First report 2011

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Background

In 2008, the Scottish Government approved a licence to the Scottish Wildlife Trust (SWT) and the Royal Zoological Society of Scotland (RZSS), to undertake a five-year trial reintroduction of the European beaver (*Castor fiber*) to Scotland after an absence of more than 400 years. In May 2009, three beaver family groups were introduced to Loch Coille-Bharr, Loch Linne/Loch Fidhle and Creagmhor Loch on land managed by Forest Enterprise at Knapdale, Argyll. Since 2009, additional releases have also taken place, and by the end of 2010, beaver groups were established in these three lochs and Lochan Buic. This is the first report describing the approaches for carrying out socio-economic monitoring of the Scottish Beaver Trial at Knapdale, and summarises the approach used (mainly via a PhD study) up until 2011.

Main findings

The economic benefits of a reintroduction are widely defined to encompass both market and non-market impacts. The former include those reflected in actual behaviour by visitors travelling to the site, and local and regional enterprises changing input, output and employment decisions as a result of the project. Existing literature shows a range of indicators and economic modelling approaches are available to identify the net effect of these impacts, which should be added to any non-market impacts. Non-market impacts are defined as the overall well-being associated with (for example) a conservation project. Such values are often described in terms of optional, existence and bequest value, all of which can be associated with a notional willingness to pay on the part of the general public. Measuring such values is possible though more complex.

This report identifies a range of alternative approaches to quantify relevant market and non-market values, some of which will be applied in the overall socio-economic evaluation of the Scottish Beaver Trial. The general intent is that this information can also be used to inform wider policy decisions on reintroductions beyond the trial.

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This project is part of the independent monitoring programme for the Scottish Beaver Trial coordinated by SNH in collaboration with a number of independent monitoring partners. For further information go to:
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Table of Contents **Page**

1. BACKGROUND

A five-year trial reintroduction of the European beaver (*Castor fiber*) at Knapdale, Argyll, began in spring 2009. An independent monitoring programme has been established to consider, *inter alia*, the social and economic impacts of beavers within the Knapdale area and the wider socio-economic impacts of their presence.

Relative to the ecological impacts, economic and social impacts are not typically considered as central to many conservation programmes. Yet these impacts can often have an important bearing on programme success or failure due to the typically unanticipated nature of subsequent human-wildlife interactions and social acceptance of any implicit change to the environment. For example, releases and reintroductions may not be universally perceived as good. It is therefore important to understand the human dimensions of reintroductions; that is, how changes in attitude and behaviour may occur over the period of any reintroduction or trial scheme.

To understand some of these impacts it is important to determine who is affected by the proposed change, and to collect relevant data that can indicate how they are affected over time. Such evaluation requires adequate baseline data to understand the change relative to what was happening before the reintroduction, or would happen if the trial were not to have taken place.

Relevant data relate to the levels of economic activity and site visitation, as well as broader social attitudes to environmental change and the perceived constraints these may impose on those living in closest proximity to the trial site.

With such baseline information, it is then possible to make a sensible comparison with the situation after the reintroduction to determine the net costs and benefits and their distribution among different segments of society. Some people may be made better-off by a reintroduction and some may be worse off. Attempting to understand and possibly address these potential inequalities is of interest to government agencies monitoring such trials.

This report outlines the importance of socio-economic evaluation to the European beaver reintroduction at Knapdale. It considers the nature of the socio-economic impacts and how these can be measured. Finally, it considers some of the data sources that can be exploited to gain better insights into to overall impact of the reintroduction over the whole period of the trial. The report is the first in a series that will attempt to evaluate the reintroduction.

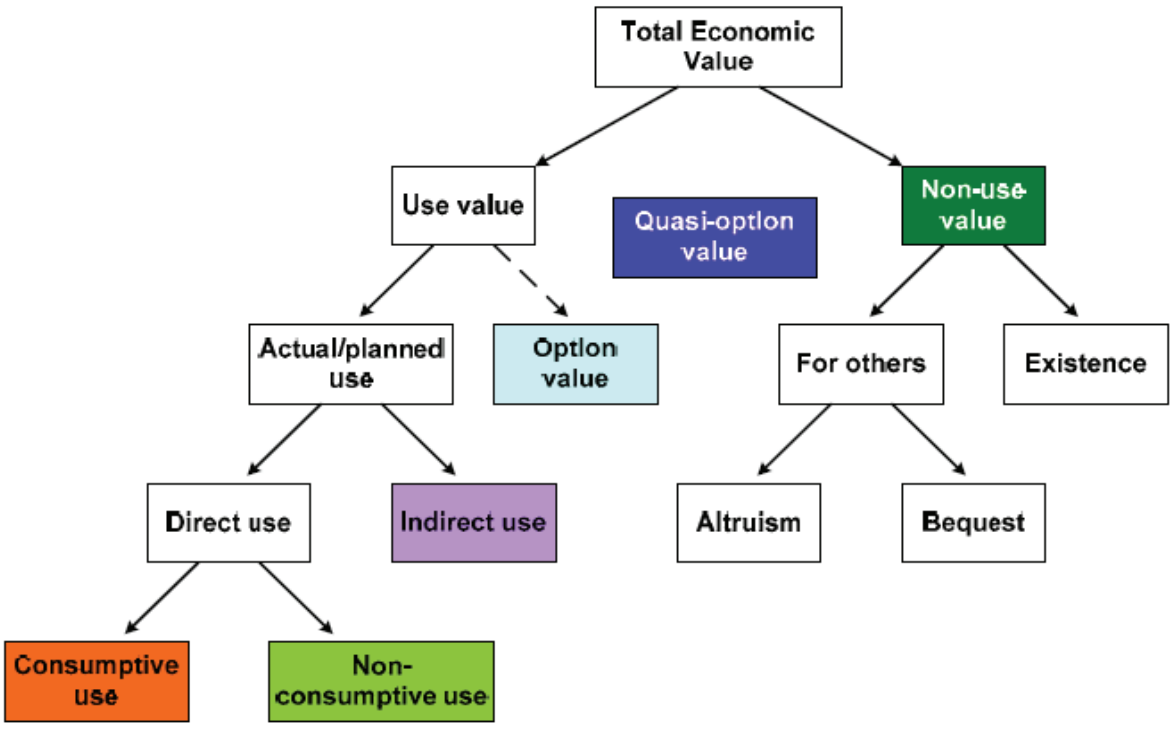
2. SOCIO-ECONOMIC IMPACTS

Species releases and reintroductions affect many parts of society. While the ecological impacts are often prioritised, other direct and indirect economic impacts on local businesses and households should not be ignored. These impacts affect the day-to-day lives of people who are often in closest proximity to such conservation initiatives, and it is important that their well-being is considered as part of any evaluation of the overall success of a project. In this context, direct impacts refer to the employment and income impacts relating to a conservation scheme. These might be economic activities directly implicated in any changes implied by the conservation decision. Other direct impacts may derive from increased economic activity due to greater visitor numbers to a site. In both cases, direct economic expansion or contraction can lead to indirect or second-order impacts, as those directly impacted reduce or increase their spending on goods and services at or away from the project site. These changes in turn induce a changed level of economic activity as a second round multiplier effect. All direct and indirect impacts attributable to the initial conservation choice should ideally be counted, although sometimes data constraints and the absence of a regional economic model can make this challenging.

Beyond these (in principle) measurable market impacts, species conservation also gives rise to categories of non-market impact that are more challenging to measure, yet which are important to the well-being of many people in society. Again, from a government or policy perspective, the success of a scheme can only truly be judged once these additional impacts are accounted for alongside any ecological criteria of success.

People hold different preferences over environmental conservation and these may be expressed in terms of a variety of non-market value categories (see figure 1). These range from the values of direct uses (i.e. visitation and informal hunting) that can have a market value, but which often do not, through to the values people perceive for the option to see a species in the wild one day, or for the mere knowledge that a species exists in its habitat (so-called existence value).

Figure 1. Total Economic Value and Species Conservation



The recent National Ecosystem Assessment (UK National Ecosystem Assessment, 2011) has demonstrated that these preferences can be important for decision making and that a variety of methodological approaches can be deployed to estimate them in the right context. Broadly speaking, valuation methods deploy either revealed or stated preference approaches to identify these values (as seen for example in Hanley and Spash, 1993). Some of the evidence base for the Knapdale evaluation will derive from these methods. Specifically, work deriving from an SNH PhD studentship based at the Scottish Agricultural College (*The Socio-Economics of Species Reintroductions*) will report in 2012.

3. EVIDENCE FROM THE LITERATURE

There has been little research on the social and economic aspects of reintroductions, with the majority of such studies focussed on direct market benefits such as tourism, ignoring almost entirely the non-market costs. A review of 180 reintroductions found published records of expenditure for only six projects (Wolf *et al*, 1996). There is a clear gap in the literature for work on the total economic value (TEV) of a reintroduction and the cost-effectiveness of these projects.

One of the most well documented projects is the reintroduction of grey wolves (*Canis lupus*) to Yellowstone National Park (YNP) and Idaho. Values have been estimated for hunting (US$879,000 per annum in 1994) and livestock losses (just under half a million dollars between 1995 and 2004) (Haney et al., 2007). The programme itself was estimated to have cost the US government US$6.7 million between 1994 and 2002, with compensation for livestock losses being covered by the NGO Defenders of Wildlife estimated at US$100,000 per annum. This is balanced against extra tourism revenues in YNP alone of US$23 million per annum (Bangs and Fritz, 1996).

Other studies estimating reintroduction costs include Hegel *et al*. (2009), which states that between 1996 and 2005, CDN$10,894 was paid in five separate compensation payments due to crop damage from reintroduced elk (*Cervus elaphus canadensis*) in Cypress Hills, Canada. More commonly, studies discuss the broader social costs without attempting to value them; see for example Reading and Kellert (1993), Williams *et al*. (2002) and Wilson (2004).

Typically, benefits have been more commonly covered, as projects are more likely to report successes than downsides (Osterman *et al*., 2002; Pont *et al*., 2007). The benefits of the reintroduction of red kites (*Milvus milvus*) are perhaps the best documented; attributed with £2.9 million in visitor spending in Wales in 1996 (Rayment and Dickie, 2001), and a £116,000 per annum visitor spending increase on the Black Isle (Dickie *et al*., 2006). Similarly, another raptor reintroduction – that of white tailed sea eagles (*Haliaeetus albicilla*) to Mull – is estimated to have helped increase visitor spending in the region of £1.4 million to £1.6 million (Dickie *et al*., 2006).

It should be noted however, that even if on balance a reintroduction is successful in an economic context, the costs and benefits of a reintroduction are seldom distributed evenly across society. Typically individuals living within an area into which a species has been reintroduced can suffer tangible economic losses, whilst the more distant general public benefits from the non-use values of the project. This will inevitably lead to conflict both between the local community and the project, and between these different parts of society applying different values to the reintroductions. Although the *efficiency* of reintroductions (i.e. the comparison of costs and benefits) is important, so too is their actual distribution in society. This *equity* issue is often relegated to a footnote in policy evaluations.

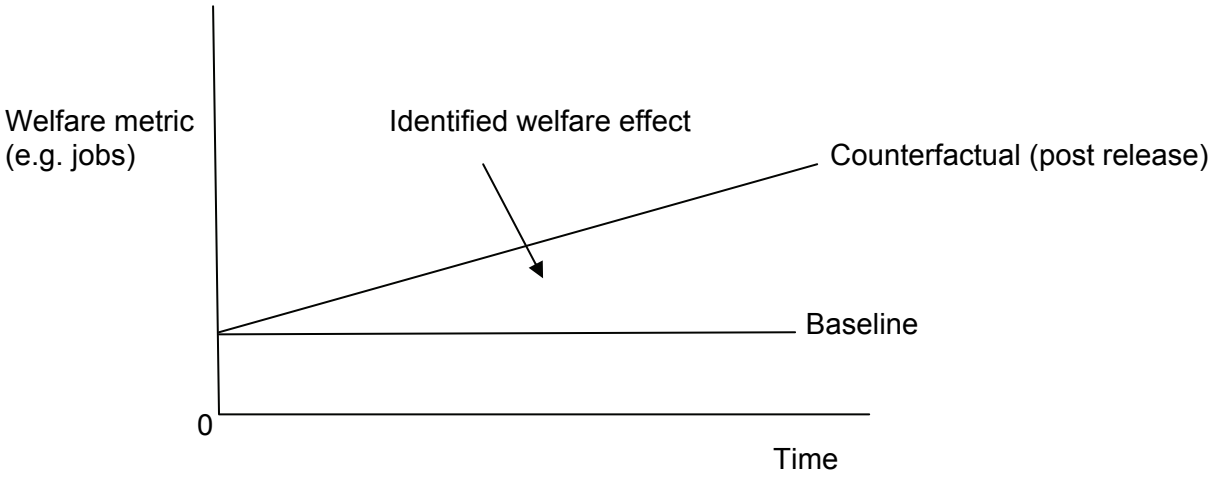
4. EVALUATION

Evaluation is the process of defining the effectiveness of policy against stated objectives. According to the Treasury Green Book, evaluation is the "retrospective analysis of a project, programme, or policy to assess how successful or otherwise it has been, and what lessons can be learnt for the future. The terms 'policy evaluation' and 'post-project evaluation' are often used to describe evaluation in those two areas".

But evaluation methods can be classified as either ex ante (i.e. before an event or policy change) or ex post (after the event). Ex ante evaluations are less common, since, looking to the future and depending on the change in question, they tend to be more uncertain or speculative. Ex post evaluation can tend to draw on actual events and associated empirical evidence.

In both cases, there is a common terminology for evaluation drawn from government guidance (HM Treasury, 2011). This includes the definition of a *baseline* or 'business as usual' scenario, which, over the time horizon of interest, is compared to a *counterfactual* or policy change scenario (Figure 2). Whatever the metric in question (e.g. species numbers or the level of employment around conservation programme), we are interested in evaluating or quantifying the extent of additionality between these scenarios. In short, the purpose of evaluation is to determine whether an intervention has made a (preferably positive) difference to social welfare; whichever method is used in defining and estimating social welfare.

Figure 2. Evaluation baseline versus counterfactual through time



In this project it is worth recalling that we are dealing with a trial rather than a full reintroduction. As such, it should be borne in mind that the effects of the trial will not necessarily predict the impacts that could happen in a wider reintroduction.

With this in mind, a number of metrics are of interest to the Knapdale case study and the socio-economic evaluation needs to draw on a range of approaches with the objective of:

- Assessing the effects of beaver activities on the natural and socio-economic environment.
- Determining whether the impact on the economy of the area as a result of the presence of beavers is positive.

- Determining whether the area suffers significant economic loss as a result of beaver activities.
- Determining the extent and impact of any increased tourism generated through the presence of beaver.
- Exploring the environmental education opportunities that may arise from the trial itself and the scope for a wider programme should the trial be successful.

These objectives relate to outcomes for the immediate vicinity of the trial and to the nation more broadly. As noted, the impacts can be expressed in terms of local and regional economic impact (jobs and or income/value-added multipliers), or wider well-being/welfare effects related to the fact that populations simply have preferences for having the beavers compared to having no beavers. These values or metrics require different valuation approaches providing different evidence that needs to be combined with care.

5. APPROACHES TO (SOCIO-ECONOMIC) EVALUATION

5.1 Local / regional Impacts

There is a requirement for the evaluation to consider local impacts including educational benefits. Accordingly these impacts will be considered and estimated using available data from various sources to consider the impact in terms of spending and employment multipliers. As part of this study, national and international data sources will be reviewed as a basis for deriving comparable income and employment multipliers that can be applied to Knapdale. Part of this review will spell out methodological alternatives which distinguish between what we might call bottom-up versus top down approaches to estimate additionality in terms of employment and visitor numbers.

In this context, a bottom-up approach derives relevant evidence on impact (to employment, incomes and spending) from surveys conducted with key businesses in the project area. These surveys typically try to establish baseline intentions before considering how local business has made hiring and spending decisions in the wake of the trial.

Top-down approaches are more technical and dependent on the existence of regional economic models that estimate the linkages between businesses and therefore the knock-on or multiplier impacts occasioned when one or more businesses change their level of activity in response to an external stimulus like a visitor attraction. Because such models are not always readily available or up-to-date, a common short-cut in evaluation is to borrow employment or income multipliers from other similar case studies. These multipliers can then be used to calculate the increase in activity for every extra pound spent in the area of the trial. In the UK several studies are available as sources of multiplier.

5.2 Data sources and impacts to be considered

At the outset there is some doubt as to whether direct and indirect market impacts of the trial will be as significant as the wider welfare effects associated with the non-market impacts and option and existence values in particular. The latter are likely to have been augmented significantly by the wider national profile of the scheme in the wake of the BBC Springwatch coverage in June 2011. For the purposes of government evaluation, mixed approaches to evaluation are acceptable and this study will adopt combined bottom-up and top-down data from different sources.

To begin this assessment, bottom-up baseline data will be sought from project staff to determine levels of economic activity – e.g. visitor numbers and spending. Because of the different stakeholder interests in the trial, several data sources have been identified as potentially useful for the evaluation. These include:

- Visitor data logger set up by the Scottish Beaver Trial at the Barnluasgan visitor cabin in February 2009.
- Visitor data loggers set up by Forestry Commission Scotland (FCS) in the Loch Coillie-Bharr field and the Loch Collie-Bharr access road in February 2009.
- A new counter to be set up on the track to the dammed area at the Dubh Loch by FCS (Summer 2011).
- Other car and pedestrian counters set up by FCS throughout Argyll to compare trends across the region.

Educational benefits are important to this scheme although the theoretical and empirical basis for estimating these in the longer term is not evident in the conservation literature. In this case study, we are assuming that increased exposure to all elements of the trial will be

beneficial to local educational establishments and that quantification of pupil numbers will be a sufficient albeit limited indicator to express an improvement on the baseline situation, which would have involved alternative teaching content. The actual benefit accruing may be established using interviews or surveys with both teachers and pupils to ascertain the levels of satisfaction deriving from learning about alternative conservation options.

Beyond the local employment, visitor and education impacts, non-market impacts are being investigated as part of the ongoing PhD. A central element of this ongoing study is the investigation of the non-market changes using revealed preference (RP) and stated preference (SP) approaches.

These approaches collect different pieces of useful information including:

A visitor survey, which can be used to estimate a travel cost model (revealed preference approach) of visitor value. A travel cost model uses actual travel behaviour and data to derive a clearer picture of the demand for (in this case) seeing the reintroduced species. The approach is well-established in the environmental economics literature and accepted by the UK Treasury as one approach to quantifying non-market benefits. The method derived information from people who do actually visit the site and this is one of its principal limitations relative to stated preference approaches.

A choice experiment is a variant of a stated preference survey that can be used to derive an estimate of the preferences of a sample of the population who do not visit the Knapdale site. As with the travel cost model, the approach is well established in the environmental economics literature and accepted by the UK Treasury as one approach to non-market valuation.

Results of stakeholder interviews will be used to derive a more qualitative insight into the perceptions and attitudes of stakeholders. These interviews can also provide information on the perceived equity angles in relation to the reintroduction.

The PhD study also draws on specific global evidence on the willingness to pay for reintroductions. While some of the PhD data will be available in 2012, the full PhD evidence should be reviewed in 2013 to allow a better view on the need for any follow-up survey approaches to strengthen the information in our counterfactual.

To date the PhD has accomplished the following:

- On-site survey of visitors to Knapdale at Barnluasgan Car Park combing revealed and stated preference methods. Data were collected both before and after the release of beavers in 2009 and 2010 to estimate:
    - The effect of the beavers on the local use value of Knapdale.
    - An estimation of the total value of the beaver trial to users of Knapdale forest.
- In-depth interviews have been carried out with local stakeholders and representatives of interested organisations to investigate the social impacts of the trial.
- A national survey has been designed and piloted, to be issued by the end of August 2011, using a choice experiment methodology to estimate the following:
    - The relative importance placed on reintroductions in comparison to protecting current native species and controlling invasive non native species.
    - The estimated national value of these three conservation activities.
    - The effects of certain species on these values – the relative interest of the Scottish public in these species.
    - An estimated national value for a reintroduction of beavers to Scotland (NOT the Scottish Beaver Trial).

    - Other methodological questions.
- In-depth interviews have been carried out with representatives of national organisations, and key individuals to explore:
    - The place of reintroductions in land management in Scotland.
    - Factors surrounding reintroductions which lead to social conflict.
    - Potential methods to reduce this conflict.

5.3 Knapdale evaluation timetable

The following table outlines a provisional timetable for data collection and potential content of follow up reports on the socio-economic impacts of the trial

2011-2012	2012-2013	2013-2014
Initial visitor data	Results of stated preference surveys	Overall evaluation of trial impacts
Stakeholder interviews	Results of travel cost surveys	Combination of data from stated preference data collection on employment, visitation, education
Initial or baseline data defined e.g. without trial data on employment, visitation, and overall welfare	Reporting on stated preference studies. Further data collection on employment, visitation, education	

6. CONCLUSIONS

The economic benefits of a reintroduction are widely defined to encompass both market and non-market impacts. The former include those reflected in actual behaviour by visitors travelling to the site, and local and regional enterprises changing input, output and employment decisions as a result of the programme. A range of indicators and economic modelling approaches can be deployed to identify the net effect of these impacts, which are typically observable economic activity and data.

In contrast non-market impacts are defined as the overall well-being associated with (for example) a conservation project. Such values are often described in terms of optional, existence and bequest value, all of which can be associated with a notional willingness to pay on the part of the general public. Measuring such values is possible though more complex.

This report identifies a range of alternative approaches to quantify relevant market and non-market values, some of which will be applied in the overall socio-economic evaluation of the Scottish Beaver Trial at Knapdale. It also notes the distinction between trial outcomes and those associated with a more general reintroduction, which can be expected to generate wider societal benefits and costs. Wherever possible, the analytical approaches suggested here can be suitably modified to allow reasonable extrapolation between the trial and a more general reintroduction program.

Availability of robust data is a factor in deciding which methods to adopt and the evidence base used in the evaluation of the trial draws on a variety of sources. In some cases, (e.g. educational benefits) the use of qualitative rather than quantitative approaches is necessary.

Considerable emphasis is placed on the results of the SNH-funded PhD, which is adopting novel methods to derive robust estimates of the non-market values of reintroductions. These results can be used to guide policy decisions on the costs and benefits of such schemes.

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