

*EVALUATING IMPACT ASSESSMENT IN
NON-PROFIT CONSERVATION PROJECTS*

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Abstract

Conservation organisations strive for positive impacts from their projects, often working in difficult conditions, with limited resources. In many cases conservation projects have successfully protected species and landscapes. However, sometimes things go wrong. Nowhere is this more obvious than in cases of pro-environmental actions which have subsequently been shown to have negative impacts and effects. Conservation projects, arguably even more so than general environmental actions or legislation, should be designed to have positive effects and to avoid negative impacts. Yet, even with the best of intentions, during the protection of species or fragile ecosystems there can be opportunities for unforeseen and unexpected knock-on effects.

I review 208 projects from conservation non-profit organisations across five countries (Australia, Canada, Ireland, New Zealand and the United Kingdom) and within five scale-classifications to establish current practice regarding prediction and assessment of conservation and non-conservation impacts. Assessments include evaluation of the “significance” (severity and duration) of impacts that are both included in, and omitted from reports. The use of parameters for assessment derived from the field of Environmental Impact Assessment (EIA) commonly used in planning and construction provides a method applicable to project management in non-profit conservation. The study also provides an analytical assessment of the links between organisational characteristics and the approaches to impact assessment and its level of use.

This study revealed differences in the frequency and comprehensiveness of impact assessment between organisations, with certain impacts both more likely to occur and more likely to be included in project reports. However comparison of organisational characteristics including location, size and approaches to management showed minimal significant differences, suggesting that the causes of differences are universal.

The key findings from the comparison are combined and used as the basis for a working demonstration of a predictive tool to assess impact significance. This has the potential to add value to conservation actions and to be applied to future projects to enhance outcomes.

"Most people, if you describe a train of events to them, will tell you what the result would be. They can put those events together in their minds, and argue from them that something will come to pass. There are few people, however, who, if you told them a result, would be able to evolve from their own inner consciousness what the steps were which led up to that result. This power is what I mean when I talk of reasoning backwards, or analytically."

Sherlock Holmes in A. Conan Doyle, *A Study in Scarlet* (1887)

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Acronyms and abbreviations

ACEVO	Association of Chief Executives of Voluntary Organisations
ACT	Australian Capital Territory
AEE	Assessment of Environmental Effects
APM	Association of Project Management
AUD	Australian Dollar
CAD	Canadian Dollar
CAP	Conservation Action Planning
CBD	Convention on Biological Diversity
CBSG	Conservation Breeding Specialist Group
CEE	Collaboration for Environmental Evidence
CITES	Convention on International Trade in Endangered Species
CMP	Conservation Measures Partnership
CSR	Corporate Social Responsibility
DRC	Democratic Republic of Congo
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMAS	Eco-Management and Audit Scheme
EMS	Environmental Management System
EUR	Euro
FFI	Flora and Fauna International
GBP	Pound Sterling
GDP	Gross Domestic Product
GDP PPP	Gross Domestic Product Purchasing Power Parity
GMA	Game Management Area
ICJ	International Court of Justice
IUCN	International Union for the Conservation of Nature
IWC	International Whaling Commission
JNCC	Joint Nature Conservation Committee
NGO	Non-governmental Organisation
NHM	Natural History Museum
NOI	Notice of Intent
NZD	New Zealand Dollar
PMWC	Project Management for Wildlife Conservation
NSW	New South Wales
NT	Northern Territory
PRISM	Practical Impact Assessment Methods for Small and Medium-Sized Conservation Projects
QLD	Queensland
REDD(+)	Reducing Emissions Due to Deforestation
SA	South Australia
SCP	Systematic Conservation Planning
SROI	Social Return on Investment
SSC	Species Survival Commission
TAS	Tasmania
TESSA	Toolkit for Ecosystem Service Site-based Assessment
TSO	Third Sector Organisation

UK	United Kingdom
UN	United Nations
USD	United States Dollars
VIC	Victoria
WA	Western Australia
WAZA	World Association of Zoos and Aquariums
WWF	World Wide Fund for Nature

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1. Introduction

The conservation of wildlife and habitats is a hugely complex and difficult task. Conservationists face the problem of defending their targets from a range of anthropogenic threats and must justify the importance of maintaining spaces for nature in a world where resources are limited and the needs of a growing population must be met.

In many cases conservation efforts are successful but on occasion this success is elusive. This thesis explores whether drivers of failure are within the control of conservation organisations, and whether, through altered project management approaches, failure can be predicted and mitigation put in place. To do this, financial constraints, varied approaches to conservation, conservation project management and public perceptions are first reviewed. A methodology for identifying potential unintended consequences is proposed, followed by a review of conservation project management approaches and guidance to propose a novel approach to conservation project management to enhance the likelihood of success and to identify mitigation of negative impacts, including failure.

1.1. What is conservation? Types of and approaches to conservation

Conservation actions strive for positive impacts, often in difficult working conditions with limited resources. In many cases conservation actions have succeeded, but sometimes things go wrong. Nowhere is this more obvious than in cases of pro-environmental actions which have subsequently been shown to have negative impacts and effects. Well-publicised examples of this include the promotion of biofuels as low-carbon fuel sources but in reality driving tropical forest destruction and release of sequestered greenhouse gases (Ramdani and Hino, 2013). Conservation projects, arguably even more so than general environmental actions or legislation, should be designed to have positive effects. However, even with the best of intentions, during the protection of species or fragile ecosystems there can be unforeseen and unexpected consequences. For example, removing grazing competitors by banning livestock grazing within a national park to protect the huemul deer in Patagonia increased levels of predation on the deer (the target organism), as predators switched to the conservation target following prey depletion (Wittmer, Elbroch and Marshall, 2013).

Conservation is a diverse and internationally important topic. In the UK alone it was assessed that 24.4% of grants made to environmental issues in 2011/12 were focused on

biodiversity and species preservation (Murray et al., 2014). However in spite of the scale of the time and resources devoted to the issue, finding a single clear answer to the question “what is conservation?” is difficult.

At its simplest, conservation can be defined as:

“The preservation, protection, or restoration of the natural environment and of wildlife; the practice of seeking to prevent the wasteful use of a resource in order to ensure its continuing availability”.

OED Online (2019)

However, this is unsatisfactory. Conservation means different things to different people but the definition draws on some common elements in conservation; aims centring on protection, preservation and restoration. In order to establish a more comprehensive definition it is much better to look at the way individuals and organisations that consider themselves practitioners of conservation define their activities under specific themes and approaches.

The initial question simply leads to a further set of questions. In particular, “why is conservation important?”

1.2. Why is conservation important?

1.2.1. Moral and philosophical importance

Echoing the views of Theodore Roosevelt who was instrumental in the evolution of modern conservation, it can be argued that there is a moral imperative to protect the non-human world: humans have an obligation not to damage or destroy the elements of the non-human world (Jepson and Ladle, 2010). There is also a philosophical argument that landscapes and species offer beauty and wonder beyond the scope of evaluation and there is therefore an imperative to preserve these elements, but the power of these arguments varies between societies. Alternative arguments include valuing the economic services that biodiversity provides via ecosystem services provisioning.

1.2.2. The value of the natural world to humans

The natural world represents a measurable value to humans. Whether humans are considered part of the natural world, or shapers of it, there are clear elements of the

natural world that humans rely on for their continued survival, including the most basic elements of existence; the oxygen that humans need to breathe, the water that humans need to drink and the food that humans need to eat. This extends to more complex requirements such as the minerals used in farming or building, or the chemicals used in pharmaceuticals. The Millennium Ecosystem Assessment defined this concept of 'ecosystems' services, providing four areas of ecosystem service; provisioning services; regulating services; cultural services and supporting services as shown in Table 1.1.

Table 1.1: Millennium Ecosystem Assessment Ecosystem Categories

Provisioning services	Regulating services	Cultural services
Products obtained from ecosystems	Benefits obtained from regulation of ecosystem processes	Nonmaterial benefits obtained from ecosystems
• <i>Food</i> • <i>Fresh water</i> • <i>Fuelwood</i> • <i>Fiber</i> • <i>Biochemicals</i> <i>Genetic resources</i>	• <i>Climate regulation</i> • <i>Disease regulation</i> • <i>Water regulation</i> • <i>Water purification</i> <i>Pollination</i>	• <i>Spiritual and religious</i> • <i>Recreation and ecotourism</i> • <i>Aesthetic</i> • <i>Inspirational</i> • <i>Educational</i> • <i>Sense of place</i> <i>Cultural Heritage</i>
Supporting services		
Services necessary for the production of all other ecosystem services		
• <i>Soil formation</i> • <i>Nutrient cycling</i> • <i>Primary production</i>		

Table reproduced from Alcamo and Bennett (2003).

These direct resources are also countered by a secondary element which is the indirect value of natural spaces on human health and wellbeing. There are also intangibles which are much more difficult to quantify. The natural world represents opportunity for humans, for example, the potential value of things that we do not yet know about such as chemical discoveries, or bases for new technologies.

Discussions about conservation can cross these boundaries and part of the value of the natural world, and the argument for its protection, is that it should be kept for future generations so they can benefit from its aesthetic qualities as well as what it can offer in

terms of resources. In addition nature and wildlife conservation represent central sources of income and the livelihoods of humans are inextricably linked to preservation of the natural world (Gamborg, Palmer and Sandoe, 2012).

1.3. What is being conserved?

Conservation can exist in different forms. It can mean protection of species, ecosystems or landscapes and may use different approaches to these.

- Conservation may focus on individual species, considering the least abundant or most threatened species.
- It may focus on protecting the landscape, considering space on a large scale, seeking to protect large areas and by extension protecting all the habitat types and their constituent communities contained within that space.
- It may combine the two above approaches.
- It may seek to provide protection at an ecosystem level, including all levels of species and the habitat type(s) that supports those species.

1.3.1. Species conservation

Species may be directly protected and when this occurs the measures put in place to protect species (with the possible exception of captive breeding activities) are likely to have impacts on other species. For example protecting and manipulating an area of habitat focussing on a single species which is threatened by habitat loss or degradation, may affect other species in that habitat, these effects may be positive or negative.

1.3.2. Landscapes / habitats

Almost all landscapes, habitats and ecosystems have had anthropogenic impacts; whether through land use change for agriculture or settlement, hunting, pollution or even leisure. If this is the case then what are attempts to conserve working towards? Human impacts mean that there is no single concept of 'natural' as all areas of Earth have been affected by human activity (Boivin et al., 2016). However, the aim of landscape and habitat conservation is to maintain space in the state that it is (or was, within recorded memory) in order to protect its functions and the ecosystem(s) that it currently contains.

1.4. Methods for conservation

While the definition of conservation can be stretched and altered depending on the audience and whether current practice meets the requirements of conservation, it needs to be recognised that conservation does not exist within a theoretical bubble. Conservation is essentially a large industry and it is important to understand current practice.

In the broadest terms conservation actions can be broken down into six overarching themes:

- Physical habitat protection and enhancement
- Species rearing and release / captive breeding programmes
- Direct *in situ* species protection
- Education
- Legislation and status protection
- Livelihoods and alternatives to wildlife exploitation

Adapted from Hambler (2013).

To this list four more potential approaches can be added.

- Research / monitoring
- Campaigning
- Representation
- Funding

These can be considered “cross-cutting” conservation themes which can be applied across conservation topics, either in support of another approach or independently.

Most projects include elements from two or more of the central themes and have secondary activities associated with each theme, although some methods can stand alone. These links are shown in Table 1.2.

Table 1.2: Linkages between conservation approaches

Primary aim	Likely secondary activities required / not required to support primary aim
Species rearing and release / captive breeding programmes	Direct <i>in situ</i> species protection Physical habitat protection Livelihoods and alternatives to wildlife exploitation Legislation and status protection Education
Direct <i>in situ</i> species protection	Physical habitat protection Livelihoods and alternatives to wildlife exploitation Legislation and status protection Education Species rearing and release / captive breeding programmes
Physical habitat protection	Livelihoods and alternatives to wildlife exploitation Legislation and status protection Education Species rearing and release / captive breeding programmes Direct <i>in situ</i> species protection
Legislation and status protection	Livelihoods and alternatives to wildlife exploitation Education Species rearing and release / captive breeding programmes Direct <i>in situ</i> species protection Physical habitat protection
Livelihoods and alternatives to wildlife exploitation	Education Species rearing and release / captive breeding programmes Direct <i>in situ</i> species protection Physical habitat protection Legislation and status protection
Education	Species rearing and release / captive breeding programmes Direct <i>in situ</i> species protection Physical habitat protection Legislation and status protection Livelihoods and alternatives to wildlife exploitation

The following section explores the approaches to conservation in detail to identify key themes, successes and failures within them.

1.5. Who delivers conservation actions?

Conservation can be delivered by a range of actors. These include National and local level governmental organisations with responsibility for managing landscapes (either directly or through locally devolved governance) responding to obligations within national and international legislation and agreements.

A significant level of conservation is delivered through not-for-profit organisations (NFP) and charities (Jepson and Ladle, 2010). These organisations can vary in size from multinational organisations delivering conservation on a landscape scale with multiple agencies and partners, to local organisations carrying out hands-on conservation activities in local parks and reserves. Conservation can also be carried out by the private sector through consultancy or advice from private companies, or through individual organisations' management of private conservation areas (PCAs) (Gallo et al., 2009; González-Roglich, Southworth and Branch, 2012) as privately owned lands either explicitly for conservation benefits or operating as businesses (Clements, Baum and Cumming, 2016).

1.6. How much does conservation cost?

As part of the development of the Aichi Targets, the Convention on Biodiversity estimated global annual spending on biodiversity in 2010 at US\$36-38 billion per annum with around US\$24 billion as direct government spending, with the remainder spent via non-profit organisations and private contributions (CBD Secretariat, 2010a). This spending is insufficient. McCarthy et al. (2012) extrapolated the amount required to reduce extinction risk for bird species (moving all IUCN Red Listed species one level closer to "safety") to all IUCN listed species, estimating a global conservation funding requirement in excess of \$76 billion in 2012. By extension this figure is estimated to have risen to circa \$90 billion in 2018 (Table 1.3).

Table 1.3: Estimated shortfall of biodiversity conservation spending 2012-2018

	Estimated expenditure (based on 1992 - 2010 with 38% increase in real terms) (US\$ Billions)	Estimated requirement (US\$ Billions)	Shortfall (US\$ Billions)
2012	41.29	76.10	34.81
2013	42.43	78.19	35.77
2014	43.59	80.34	36.75
2015	44.79	82.55	37.76
2016	46.02	84.82	38.80
2017	47.29	87.16	39.87
2018	48.59	89.55	40.96

Adapted from McCarthy et al. (2012) (Estimated requirement) and CBD Secretariat (2010a) (Estimated expenditure)

Waldron et al. (2017) argue that as development pressure increases additional spending will be required to achieve required outcomes. However, evidence of current governmental spending suggests that the opposite is currently happening. In the UK for example, annual figures for governmental spend show a reduction in total spend and a static spend as a percentage of GDP since 2010/11 (JNCC, 2017a), with a concomitant shift to the non-government sector to deliver biodiversity conservation and a requirement to deliver more effectively and efficiently (Kapos et al., 2008). Figures for NGO spending on biodiversity in the UK show an increase of 11% since 2010/11 (which is acknowledged as an underestimate) (JNCC, 2017b). Black, Meredith and Groombridge (2011) argue “Wherever projects demonstrate deficiency, bureaucracy or inefficiency, they inevitably consume resources at the expense of other conservation initiatives” It is therefore these ‘third sector’ organisations and these contributions to ineffectiveness that are the focus of this study.

1.7. Research aims

There has been significant development of the literature on unintended consequences and how indirect feedbacks can undermine conservation actions (Larrosa, Carrasco and Milner-Gulland, 2016). While this theoretical framework is in place, there has been no exploration of how delivering organisations take account of the possible “side-effects” of

their activities and the elements that have potential to undermine or alter conservation outcomes. The research here aims to evaluate how comprehensively organisations, across a range of geographic locations, organisational foci, organisational sizes and make-up, are predicting and assessing their impacts and to identify whether alternative methods of impact assessment could enhance conservation impacts, or could better record beneficial impacts outside conservation targets.

In recent years there has been a surge in best practice guidance from academia and in large organisations to deliver “evidence based conservation”, seeking outcomes for conservation targets that are based on systematic planning and previously successful approaches to similar problems. In the UK the potential approaches have been identified in the Lawton Report (Lawton et al., 2010) and all signatories to the Aichi Convention are required to produce assessments of the state of nature in their territories and thus identify biodiversity conservation priorities. In spite of this new guidance and increased requirement for reporting, there is little evidence that such work is going on within delivery organisations. Ferraro and Pattanayak (2006) claimed that few projects were designed in ways that allowed assessment of effectiveness. They argued that with increased evaluation, “non-governmental organizations and governments can use the results of evaluations to focus their limited budgets on those programs that are most effective” (Ferraro and Pattanayak, 2006) With ever more stretched financial resources, if non-profit organisations are to achieve the complex and diverse outcomes required of them, then it is increasingly important that they work efficiently and effectively.

Impact assessment is a widely used approach in many fields to understand and evaluate the effects and outcomes of proposed activities (be they projects, programmes or policies) on a range of external receptors. It could be expected that the use of such techniques would be common practice in conservation organisations to establish baselines and effects of their activities on the wider world. Environmental Impact Assessment (alongside its offshoots of cumulative assessment and strategic assessment) offers a well-developed and comparatively well understood method of assessing development projects (usually exceeding a certain size or covering specific types of activity). The processes have been accepted into law in most developed countries as well as many developing countries (Glasson, Chadwick and Therivel, 2012). The method allows the impacts of a project to be assessed on a case by case basis, identifying the true impacts of the project. The process of EIA breaks down the impacts of a project into ‘constituent’ parts, allowing them to be assessed by experts. These impacts cover both impacts to the environment as well as

impacts on human society. The receptors of potential impacts covered in the process commonly include:

- Socio-economic impacts (economic and social)
- Noise
- Transport
- Landscape and visual impacts
- Heritage
- Air quality and climate
- Soils, geology and geomorphology
- Water
- Ecology
- Coastal geology and geomorphology.

Glasson, Chadwick and Therivel (2012)

The methodologies for the assessment of impacts depend on the impacts being assessed. This is determined by an initial scoping exercise undertaken to decide which potential impacts are important and need to be quantified. Each potential area of impact is assessed against common standards (based on national or local legislation or guidance) to inform parameters for acceptable levels of impact, weighing the value of the project against the cost of the various impacts. Although approaches to, and methodologies within EIA vary from country to country the overarching principle is to assess the impacts quantitatively, using both data collected *in situ* and modelled data from 'scenarios'. This is then used to make a value judgement of the overall cost/benefit of projects, weighing positive against negative impacts to determine the acceptability of projects, or identify areas for refinement.

EIA commonly includes an ecological element, using various biological assessment techniques to evaluate the impacts of a proposed development on ecology at scales of local and national significance. However, the process does not currently appear to be in common usage in any formal sense to achieve the opposite (to assess the impacts of conservation projects on other receptors). In this study some of the key elements of EIA (in particular the identification and classification of impacts, and the assessment of impact "significance") are utilised to assess the impacts of conservation projects undertaken by non-profit organisations.

The central objective of this research is to understand current practice with regard to impact assessment within conservation projects undertaken by non-profit organisations. Secondly this project will assess the potential value of an impact assessment based approach to conservation by examining the potential severity of impacts associated with conservation projects. This will establish whether such projects make an overall positive contribution in areas not restricted to their conservation outcomes.

This will be achieved through:

1. A literature review of conservation approaches to identify successes and failures and examples of best practice guidance
2. A practice review of project management methodologies and approaches in the non-profit sector and in conservation specifically
3. A regulatory and legislative review of regulations and legal instruments relating to impact assessment within five Anglophone countries (Australia, Canada, Ireland, New Zealand, UK)
4. A comparative case-study review of project reports from conservation organisations drawn from the same five countries, across a range of scales and conservation approaches.
5. The development of a tool to support assessment of individual and cumulative impacts arising from projects undertaken by non-profit conservation organisations.

The conclusion of this study is the consideration of a simplified assessment methodology which can be delivered by non-experts in the field of assessment, whilst avoiding prohibitively expensive costs of implementation and mitigation.

2. Literature Review: Conservation Approaches

2.1. Habitat protection

2.1.1. Overview

A key element of modern conservation is the protection of physical areas at a range of scales, ensuring that these areas remain free from anthropogenic threat, with the aim of maintaining or enhancing the habitat(s) present in that area. Spatial protection, including reserves and parks, represents the foundation of modern conservation and is a key element of conservation. Translated into landscape scale conservation projects, this provides spatially distributed resource patches for whole communities (Lawton et al., 2010).

2.1.2. Why is habitat protection used?

The protection of habitats at a landscape scale differs from single species protection. It acknowledges that the existence of a species is dependent on a range of ecological and environmental factors and that any target species is part of an ecological community. While many species-specific conservation efforts consider habitat suitability the focus on single species can mean that these wider interactions are sometimes not considered. Habitat level conservation aims to support the preservation of all the species within these biological communities.

2.1.3. How common is habitat protection?

National Level

The majority of large level habitat protection projects, through the forms of national parks and landscape scale conservation processes, are government led. The ongoing protection of landscapes involves the combination of legislative protection, land ownership and management guidance which can only usually be achieved through government level leadership, though this may also be combined with private ownership as in for example the Cairngorms Connect project in Scotland (Cairngorms Connect, 2019).

Private ownership

In some cases large landscape level conservation can be privately owned. Large scale privately owned projects exist in many countries. For example “45% of Costa Rica’s Biological Reserves lie in private hands; and a minimum of 14 million hectares of private

land in Southern Africa is involved in some form of wildlife management” (Chacon (2005), Krug (2001), quoted in Kamal, Grodzińska-Jurczak and Brown (2015)) Habitat protection can also happen at a smaller level, which is more frequently achieved by smaller private organisation and non-profit organisation initiatives.

2.1.4. Guidance and best practice considerations for habitat protection

IUCN provides a suite of best practice guidance for development and management of protected areas, covering topics such as governance (Borrini-Feyerabend et al., 2013) ecological restoration (Cairns et al., 2012), management planning (Middleton and Thomas, 2003) and assessing the effectiveness of management approaches (Courrau et al., 2006). Much of this guidance relates to national or government run, large scale reserves. However, guidance also exists for privately owned reserves (Pasquini et al., 2011). Best practice for habitat protection involves consistent features. These include the need for baseline surveys of species and habitats. However, they must also acknowledge the difficulty of exhaustive recording across taxonomic groups and may require the use of indicator species as proxies for assessment. Similarly habitat protection, by definition, requires acknowledgement of the physical space constraints of the protected area in relation to species requirements. For example, if a species needs a certain range, then if the extent of the protected area is not large enough to allow that species to multiply then the project will not be able to meet its proposed aims.

2.1.5. Successes and failures in habitat protection

In many cases large scale landscape habitat protection frequently represents a compromise. There is a requirement to meet the needs of conservation combined with, for example, public access, leisure and tourism and in some cases additional commercial exploitation. Rewilding has been proposed as a mechanism for large scale habitat protection and promotion of native flora and fauna but is usually only applicable in areas of low human footprint (low population density) in areas where there is space to adopt this approach (Wolf and Ripple, 2018).

There is an argument that the existence of ‘wild places’ designated as parks and wildlife refuges, and the spatial restrictions on coverage of protection means that conservation exists in isolation and only biodiversity within the boundary can be protected (Bowman, 2011). There is also the suggestion that the existence of such places may provide a false sense that the job of conservation is completed, through protection of low conflict and low

conservation value areas, as argued by Pinheiro et al. (2019) in the case of marine protected areas.

Habitat protection makes the assessment of progress to biodiversity targets difficult. A clear example of this is the hunting concessions that surround and directly border national parks and protected reserves in many nations of Africa. A well-publicised example of this is the case of “Cecil the lion”, a much studied individual of a vulnerable species (*Panthera leo*) of conservation value (IUCN, 2015). It is clear that the geographic status of “Cecil” provided the key to his safety (or ultimately lack thereof). Inside the park the lion was safe while once outside the park he became “fair game” for recreational hunting activities.

Even the creation of protected habitats can be considered controversial. The creation of an extensive protected area in Patagonia, funded by Douglas and Kristine Tompkins has been considered to be an imperialistic action and even a potential threat to national security and development in Chile (Jones, 2012; Escobar, 1996). While there is no suggestion that the action was anything other than philanthropic based on a desire to preserve a landscape, this illustrates the potential conflict associated with private habitat protection efforts.

2.2. Species rearing and release / captive breeding programmes

2.2.1. Overview

This approach to conservation exists in three forms, all with the aim of ultimately maintaining populations in the wild. The three approaches consist of:

- Temporary captive rearing and release
- Reintroductions of individuals of a species from an area where they persist into an area where the population has either been lost, or has become unviable
- Long-term captive breeding programmes.
- Long-term *in situ* species / population management.

Species can be temporarily reared in captivity purely for the purpose of releasing them into their natural habitats when their likelihood of survival is high(er). Species can also be reintroduced to an area from which they have been lost or populations reduced either due to extrinsic or intrinsic factors, providing the area can support the species and the threat(s) have been removed / reduced. Alternatively species can be relocated; moving individuals to an alternative area offering the potential for persistence in the wild.

Extended approaches include breeding for longer term species survival. In effect this might be breeding / building up sufficient numbers of a species to allow the reintroduction of a population above the minimal viable population size. Alternatively, there can be breeding programmes with no specific planned or possible release but simply to ensure the survival of the species, even if that species only persists within captivity.

The role of zoos can be effective in both approaches. Zoos can be a repository of “future stock” for species but they can also rear for immediate release if appropriate sites are available and be part of collaborative breeding programmes that usually incorporate maintenance of genetic diversity. Seed banks can play a similar role for plants. While the requirements to preserve botanical species as seeds may not be as complex as for wildlife, banks such as those at Kew (Royal Botanic Gardens Kew, 2019a) or Svalbard (Crop Trust, 2019) are able to preserve plants against the risk of extinction even where natural habitats are degraded, arguably in a much more efficient way. Kew's Millennium Seed Bank now holds seeds from (almost) all UK plants and aims to conserve 25% of the world's plants (Royal Botanic Gardens Kew, 2019a). Achieving similar levels of conservation for animal species would involve unrealistic resource requirements.

2.2.2. Why use captive breeding?

Any form of captive breeding allows the protection of a species in a closed environment, reducing the risks presented to the species in the wild by loss of habitat, lack of resources, poaching or disease. Rearing species in captivity is essentially playing for time, whether that is long term or short term.

In the short term this may involve “supplementation programmes” captive breeding or captive rearing a species to adulthood (or to a life stage at which survival likelihood is increased) before releasing captives to the wild, adding to existing populations (Conservation Evidence, 2019).

2.2.3. How common are species rearing and release / captive breeding activities?

Ascertaining the frequency of captive breeding and release programmes is difficult, partly due to their prevalence and the lack of regulated approaches. Magin et al. (1994) (quoted in Frankham (2008)) estimated 245 species were in captive breeding programmes in 1989/1990. Seddon et al. (2005) identified 699 “recent” reintroduction projects involving animal and plant species in a 2005 review. A more recent review in 2008 of captive breeding programmes focussing on amphibian species suggests there are around 110 captive breeding programmes for amphibians alone with 58 having release programmes in place or planned (Griffiths and Pavajeau, 2008) so the total number of captive breeding programmes is now likely to be far in excess of the original assessment. The IUCN category “Extinct in the Wild” also lists 75 species that are considered extinct in the wild but persist in captive populations (IUCN, 2016) but it is unclear whether all of these species are included in the total of Magin et al. (1994).

Complete captive breeding programmes however, are long term strategies. In some cases the future release date is completely unknown. This Noah’s ark approach can be considered a species repository which can be drawn from at a theoretical suitable future date. However the high resource requirement needed for captive breeding means that such projects are limited to a comparatively small number of high-priority species (Rahbek, 1993).

2.2.4. Guidance and best practice considerations for species rearing and release / captive breeding

As captive breeding is such a common approach to conservation, there is extensive guidance available from various organisations, offering a top-down format for potential reintroductions. Guidance can relate to the captive breeding process such as information provided by organisations including the Conservation Breeding Specialist Group (CBSG, 2016) or specific approaches to ex-situ conservation or managing reintroductions from, for example, IUCN (IUCN, 2013; IUCN/SSC, 2014).

There are a number of central considerations that need to be made as part of planning for captive breeding and reintroduction projects. These key elements are:

- Can the species be bred and reared successfully in captivity? Are natural and artificial breeding techniques sufficiently developed for use with the specific species in order to be successful?
- Are the spaces / facilities / closed habitats appropriate for the target species?
- Is human contact damaging?
- Is there sufficient genetic variability for viable populations and are there opportunities to maintain this?
- Is there a suitable site for release / will there be a suitable site for release? By extension can the captive population be sustained until such a time as there is a suitable space and sufficient funds to maintain the species until then?
- Do released animals pose a threat to wild populations through disease, competition or genetic factors?

Genetic viability

A key aspect of developing viable populations for reintroduction using a relatively small number of individuals is to ensure existing levels of genetic diversity are maintained. Most obviously captive programmes need to avoid direct inbreeding where possible and not lose those alleles that may be associated with original populations in particular reintroduction locations (Montgomery et al. (1997) in Wedekind (2002)). However there are subtle elements that should be considered as part of such programmes. Genetic adaptation can occur in captivity, creating characteristics that are advantageous to captive populations but this may be detrimental when individuals are returned to the wild (Frankham, 2008).

Captive breeding can also have a negative effect on survival in released populations due to a genetic effect rather than an environmental effect. Captive bred steelhead [rainbow] trout (*Oncorhynchus mykiss*) showed that “unintentional domestication selection and relaxation of natural selection, due to artificially modified and well-protected rearing environments for hatchery fish, are probably occurring” (Araki, Cooper and Blouin, 2007). These evolutionary impacts can occur due to a number of causes combining high survival rates and high fecundity due to lack of predation and higher availability of food, meaning that factors that impact on natural selection are not the same as those in the wild, and individuals which would not breed under “natural” conditions but do so in captivity are able to pass on characteristics which may be unfavourable. During a 50 generation study of *Drosophila melanogaster* it was shown that when populations were moved from captivity to “wild” conditions reproductive fitness declined by 64–86% (Woodworth et al., 2002).

Behaviour

Captive breeding (and capture-release) programmes may affect behavioural characteristics of individuals, altering their fitness (and the fitness of subsequent generations). Individual behaviour can be directly affected as an impact of captive breeding and “Human induced changes are often an unexpected, unplanned and detrimental side effect of human activities like captive breeding and hand-feeding wild animals” (McDougall et al., 2006). Many organisations are aware of this issue and have built behavioural management aspects into projects to maintain ‘wild’ behaviours, for example by including appropriate stimuli and enrichment for individuals during captive rearing, or by including methods of rearing and training which are appropriate to the release plans for the species (Murn and Hunt, 2008). This is particularly important for mammals (Reading, Miller and Shepherdson, 2013) and species where cultural behaviours are passed on within and between generations. Individuals with different levels of ‘fear’ may differ in survival probabilities when released to the wild (Bremner-Harrison, Prodohl and Elwood, 2004) as may the level of ‘instinctive behaviours’ exhibited in captivity (Mathews et al., 2005). A review of carnivore reintroductions found that captive bred individuals were less likely to survive than wild caught individuals (translocations) and that they are “particularly susceptible to starvation, unsuccessful predator/competitor avoidance and disease” (Jule, Leaver and Lea, 2008). Whilst these factors are recognised, assessments of individual fates following release are rare (Coelho, Schetini de Azevedo and Young, 2012), and generally species with short generation times that are small and exhibit little complex behaviour such as lizards and amphibians (Santos et al., 2009) are more easily reintroduced than those with complex behaviours.

Habitat

The availability of suitable habitats for release is a key element of captive breeding with the objective of reintroduction (Hirzel et al., 2004). Available habitats with appropriate resource levels to support persistent populations are required and equally important is the understanding of threats within reintroduction areas. While sites may meet the species' immediate requirements, anthropogenic inputs should also be compatible with long-term persistence. Re-introduction of species extinct in the wild poses additional problems if the precise requirements of the species are poorly documented.

Cost benefit assessment

Ex situ conservation efforts need to be assessed in comparison to the *in situ* potential for conservation (Dolman et al., 2015) to demonstrate there is a net gain for the species. This is especially true if the source population is being drawn from the wild as the translocation of individuals needs to provide more benefit to the species' persistence as a whole than would have occurred or would have been achieved by leaving individuals in their original habitat or location. Costs for breeding programmes are high (Snyder et al., 1996), often requiring dedicated staff (or volunteers) or specialist facilities. The assessment of the value of the species and the level of impact that can be achieved on a species level are central to the assessment of the cost of such projects.

Much of the guidance however, focuses on the practicalities of delivering conservation outcomes and minimising or removing the threats to the species in question. IUCN guidance for *ex situ* conservation for example states:

“A threat analysis should be undertaken to identify the specific historical, current and likely future primary direct and indirect threats as well as stochastic threats facing the species in the wild and the constraints limiting its viability and conservation. This analysis should, wherever possible, utilise the rapidly growing data knowledge on anticipated climate change scenarios to predict likely changes in status. This provides the framework for evaluating specifically how *ex situ* management of the species may contribute to its conservation.”

IUCN/SSC (2014)

However, detailed guidance on species reintroduction from IUCN, in addition to guidance on meeting local legal and regulatory requirements for reintroduction advises consideration of “Social Feasibility”. This includes assessment of the impacts on local communities which may be affected, with wherever possible the inclusion of measures to mitigate negative impacts on people and their livelihoods (IUCN, 2013). Arguably there has not been any study that evaluates the potential success of captive breeding programmes compared to *in situ* conservation methods such as habitat protection (Dolman et al., 2015).

2.2.5. Successes and failures in species rearing and release / captive breeding activities

For release projects the only legitimate measure of success is the establishment of viable long-term wild populations created or increased in size by captive breeding programmes. Success may be measured by the first reintroduction or release, by the first successful breeding or by the success of subsequent breeding generations depending on the organisational objectives of those carrying out the reintroduction. For many species, particularly those likely to attract the interest and accompanying financial support required for reintroduction (mainly large vertebrates (Balmford, Mace and Leader-Williams, 1996)), lifecycles are long and measuring of successful interventions requires both a comprehensive monitoring plan and adequate resources to establish measures of long term successes. A reintroduced population may be successful temporarily before failing, and without monitoring in place this may not be clearly recorded. These difficulties support the suggestion that reintroduction should be the conservation method of last resort (Snyder et al., 1996) but there is concern that due to the visibility and comparative ease with which a species can be captive bred (when compared for example to changing landscape use or amending or introducing legislation), combined with a focus on the charismatic (Primack, 2014) it is being done too often.

In general success rates for reintroductions are low (Griffith et al., 1989; Beck et al., 1994) and successful projects are notable. One of the most widely recognised successes is the restoration of the Arabian oryx (*Oryx leucoryx*) restoring a species from only ten individuals to a wild adult population in excess of 850 (IUCN, 2019). Other notable successes include the reintroduction of the red kite (*Milvus milvus*) to the UK. Following reintroduction in 1989 the species has thrived in certain areas, so much so that it is now the source of conflict between humans (Orros and Fellowes, 2015).

There is some suggestion that the evaluation of success (or failure) of captive breeding by even simple measures post-release is not carried out or not assessed in detail (Ostermann, Deforge and Edge, 2001). Seddon et al. (2007) suggest that reintroduction efforts are popular as they attract media attention for releases, but very little in the way of follow up on the “subsequent fates of reintroduced populations”. However, there are numerous studies assessing the success of such projects across a range of species and taxonomic groups such as scarlet macaws (Brightsmith et al., 2005), yellow-shouldered Amazon parrots (Sanz and Grajal, 1998) African wild dogs (Gusset et al., 2008) and tuatara (Nelson et al., 2002).

In a study of a reintroduction of lacertid lizards (*Psammodromus algirus*) it was shown that captive-bred released lizards were approximately 25% larger than native individuals because of feeding and early hatching. The captive bred individuals were found to be better colonisers of alternate habitats (woodlands), were better able to traverse fragmented habitats and had higher activity rates and had a higher inter-seasonal survival rate (Santos et al., 2009). The risk to the wild population was not assessed in the study and the assessment focuses on the positive impact on increasing the overall population of the species by adding ‘stronger’ individuals in areas with no native population. However, the apparent success of a reintroduction project also highlights the potential risk to wild populations through competition for both resources and reproduction, particularly if introduced populations are not genetically fit.

2.3. Direct *in situ* species protection

2.3.1. Overview

While captive rearing and reintroduction programmes work within a closed system, physical species protection *in situ* provides defence to species (or often individuals of a species) within their natural habitat, frequently within wider protected areas such as national parks or private conservation areas. In most cases the process of physical species protection is labour intensive and focuses on very visible and highly endangered species which have a high value to poachers such as rhinos or primates. Methodologies are very diverse. There are common tools but the deployment of them needs to match both the species in question and its habitat and the external threats that it faces.

2.3.2. Why use direct *in situ* species protection?

In situ protection often relates to species which are too large or difficult to breed in captivity, and which may need large home-ranges. Usually such species are sufficiently low in abundance that intervention can, in theory, afford protection to a relatively high proportion of the local or globally threatened population. The use of *in situ* protection provides the opportunity to maintain the species within its natural habitat and also to avoid some of the issues surrounding captive breeding/reintroduction approaches. *In situ* protection activities can also be part of pragmatic approaches to conservation. For example maintaining “charismatic megafauna” in their natural habitats represents a joint value to maintain the space simply because of the species’ presence. This is a circular argument in support of protecting the species. As the species is protected within the area, the area itself becomes valuable through for example attracting tourists (and income) so the species is afforded further protection for its measurable value. The wider area becomes valuable for both the species **and** for what the species provides to the economy. In the case of mountain gorillas (*Gorilla beringei beringei*) in Rwanda and Uganda their presence helps, in part, to maintain the existence of the national parks located in the Virunga region. They provide value in more than one way. In terms of the moral question of maintaining the park space, their existence justifies the existence of the parks and counters arguments for alternative uses of the space (such as agriculture or mineral exploitation). They also provide a potential source of income through wildlife tourism (Plumptre et al., 2007) (which in turn justifies the existence of the park and also pays for the costs associated with their *in-situ* protection). However, political and financial instability in the same region in connecting protected areas within the Democratic

Republic of Congo, mean that the same species and their habitats are increasingly threatened through demand for bush-meat and charcoal, to such an extent that 170 conservation staff have been killed in the park in the last 20 years, six in April 2018 alone (Burke, 2018). Political instability and therefore deterrence of tourism activities, including closure of the park over security concerns (News24, 2018), means that plans for oil exploration within the park have been proposed (BBC News, 2018).

2.3.3. How common is direct *in situ* species protection?

It is very difficult to assess how frequently *in situ* conservation happens. The scale of projects can vary from very small local projects to transnational projects. However the breadth of different methodologies can be used as a proxy indication of the frequency with which *in situ* conservation is practiced. *In situ* protection is often strongly linked to other aspects (education, protected areas, livelihoods, education, post-captive breeding release, legislation) so can be difficult to distinguish.

There are some repeatable approaches to *in situ* protection (list created from Hambler (2013)):

- Guarding (for example active human patrols to protect species such as rhinoceros, tigers, gorillas)
- Removing the aspect that makes the species threatened or desirable (for example dehorning)
- Technological approaches (for example radio collars for tracking individuals)
- Protection from non-human threats (for example vaccination projects)
- Removal of competition (especially domesticated or introduced).

Protection activities can be undertaken by a range of actors including both non-profit and private organisations, particularly focusing on species protection within closed protected areas.

2.3.4. Guidance and best practice considerations for *in situ* species protection

As approaches and methods for *in situ* conservation are both diverse and ill-defined (Rotach, 2005) so too are the sources of guidance available for best practice and many relate to landscape-scale habitat protection. Rotach provides a simple methodology, focussed on plant conservation but applicable to any organism involving seven activities:

- Collection of relevant information
- Selection of target species and setting of priorities
- Establishment of basic conservation method (active, passive, dynamic, static)
- Identification and selection of populations to be conserved
- Definition of conservation objectives and specific targets
- Definition of management guidelines (if any)
- Establishment of a monitoring system.

Rotach (2005)

What is notable regarding *in situ* conservation is that although it is a key element of the Convention on Biological Diversity (CBD Secretariat, 2010b) there is a lack of specific guidance from, for example the IUCN or large NGOs, perhaps reflecting the complexity of *in situ* conservation approaches.

2.3.5. Successes and failures in direct *in situ* species protection

Arguably the measure of a successful *in situ* conservation project is either the demonstration of an increase, or at minimum a demonstration of no further loss of the species in question. However, projects can also be deemed successful if they have reduced a decline in the species (essentially buying more time for species increase).

For example, the process of conserving sea turtle species by relocation and subsequent protection of nests (Garcia, Ceballos and Adaya, 2003; Revuelta et al., 2015) is essentially a short term conservation strategy. It allows the eggs to hatch and become viable individuals increasing the population size of hatched individuals (avoiding the predation of eggs before hatching, or the potential loss of egg clutches due to inundation or destruction by other means) with the aim of increasing the released population of turtles. This increases the probability that some of these individuals will survive to adulthood and reproduce. In this case there is still available habitat in which the species can exist. The risk posed to the individuals within this habitat is the spur to increasing recruitment to natural populations.

A nine-year project to assess the impact of intensive beach management on the nesting success of olive ridley sea turtles (*Lepidochelys olivacea*) in Mexico demonstrated the effectiveness of *in situ* conservation (Garcia, Ceballos and Adaya, 2003). This project assessed how three risks to nest success could be addressed. Through limiting access to

the site, poaching of eggs from nests was virtually eliminated. Relocating nests to safe locations at risk of damage by inundation or natural predation improved the overall number of successful nests. Finally by using careful management of relocated nests the impact on both hatching numbers and sex ratios were minimised. The success of these latter two methods have also been shown to be successful in other areas including Greece (Kornaraki et al., 2006). While the relocation of nests is arguably not *in situ* conservation, species are not removed from their habitat, eggs hatch naturally and hatchlings are released on the beach where they were laid.

However this approach cannot be considered an unqualified success. Bevan et al. (2014) reviewed Kemp's ridley sea turtle (*Lepidochelys kempii*) protection work in Rancho Nuevo, Mexico and considered the natural levels of predation of nests *in situ* by estimating predator abundance. As a result of the decision to relocate *in situ* nests to safe hatcheries the authors propose two hypotheses for the lower than predicted levels of nest predation, either that the historic decline and subsequent protection of remaining nests means that there is minimal available food for nest predators, resulting in a general decline in predator numbers, or an alteration in behaviour of those same predators.

Martin and Vigne (2012) demonstrated the effectiveness of an integrated approach to *in situ* conservation on Indian rhinoceros (*Rhinoceros unicornis*) populations in the Gorumara National Park and Jaldapara Wildlife Sanctuary in West Bengal, India. The combination of significant local and national government funding and employment for patrols, addition of livelihoods activities directly related to the species (land management) and indirectly (through tourism activities), education and significant enforcement of penalties through courts for poaching and related activities resulted in increases in Indian rhinoceros populations in both parks, and minimal incidents of poaching.

Where such projects are not successful there are a range of causes. For large organisms the extent of species' ranges can make them difficult to track, monitor and protect, particularly for organisations (either state run or otherwise) with limited financial resources for staff and equipment. For example a study of anti-poaching activity in Tanzania demonstrated that with sufficient resources such efforts can be "effective for the protection of the species of interest" (Hilborn et al., 2006) while an assessment of the effectiveness of rangers showed that the success of patrols in reducing poaching is directly related to the frequency of those patrols (Moore et al., 2017). Where resources are not available then sufficient levels of protection cannot be achieved.

The most high profile examples of failure of *in situ* conservation are related to large scale conservation of species. For example Robson et al. (2017) showed that even within protected areas, African elephant (*Loxodonta africana*) population densities are only 25% of what modelling predicted, as a result of poaching, demonstrating that even protective measures can be ineffective.

Other factors, such as unsatisfactory habitat protection (see Section 2.1), lack of economic alternatives for local people (see Section 2.6) and insufficient or inappropriate legislative measures (see Section 2.5) also contribute to *in situ* conservation failures.

2.4. Education

2.4.1. Overview

Conservation education may be indirect or direct. Indirect conservation education can consist of a number of approaches, all of which are targeted on individuals who do not directly impact upon the area of conservation concern. Indirect conservation education may be the educational elements included in zoos, museums, aquaria, national parks and wildlife encounter activities. Campaigning charities can also include indirect conservation education in materials distributed to supporters and potential supporters. Most indirect education focuses on 'awareness raising' with the aim of informing the public to make decisions or take actions that can have a direct effect on a conservation issue, for example through campaigns to reject products containing palm oil (Say No to Palm Oil, 2016).

Direct conservation education targets those who directly affect the issue of conservation concern. The approach seeks to alter their decision making and resource management (for example agricultural grazing, hunting or fishing) by increasing awareness and understanding, and often demonstrating the value (financial, aesthetic or cultural) of the threatened species or habitat. This could be considered genuine conservation education and is more closely aligned with the definition of project based conservation that is used here. For this category, education projects may be very closely related to, or even be part of conservation projects attempting more holistic approaches, such as protecting landscapes and species and/or developing alternative livelihoods. Such projects seek to demonstrate the alternative values of species and landscapes aside from a direct resource for consumption. These projects are particularly of interest to those who are the direct 'harvesters' of the natural resources. Equally they may be related to projects to amend or introduce legislative protection, underlining to those directly affected by this legislation what their rights and responsibilities with regard to the new legislation are.

Capacity building in conservation can also be considered part of this direct approach to conservation education. While traditional conservation education seeks to inform those living alongside species or habitats of their value, capacity building equips those same groups with the knowledge and skills needed to actively contribute to their conservation. This serves a dual purpose, providing both employment opportunities that are directly linked to conservation as well as reinforcing the links between the value of species both directly to those involved and to their wider families and communities.

2.4.2. Why use conservation education?

Conservation education is unique amongst approaches in that it can stand alone with no distinct conservation target. For indirect conservation education the aim is simply to provide more information to interested individuals and groups. While this might be accompanied with a call to action, this is by no means certain.

In the case of direct education projects, the aim can be considered to be more distinct and definite. Essentially the focus is on instilling behaviour change; encouraging those living directly with the conservation target to modify or in some cases cease the damaging activity, or to contribute to its protection and preservation. For all other approaches to conservation it is likely that an educational element will need to be included. The educational element of a project can be the difference between success and failure; for individuals the justification of *why* it is important can be enough to encourage behavioural change.

2.4.3. How common is conservation education?

Quantifying indirect conservation education is incredibly difficult. Even activities which are not overtly conservation related, such as recreational visits to zoos or aquaria contain elements of conservation education. The World Association of Zoos and Aquariums (WAZA) claims over 700 million people visit zoo and aquaria each year (WAZA, 2017). While this figure is debated (Smith, 2013) based on the potential for double counting of repeat visitors as well as visits to unaffiliated institutions, this still represents a significant level of engagement and potential for conservation education amongst the wider public. Likewise, the nature documentary Planet Earth II received the third highest viewing figures in the UK in 2016 with 13.1 million viewers (for its highest rated episode) (Kanter, 2017). However this level of engagement with nature based entertainment was not replicated within other countries included in this study (for Australia see Hickman (2017); for Canada see Bell Media (2017); for Ireland see Entertainment.ie, (2017); and for New Zealand see StopPressNZ (2017).

Direct conservation education is frequently a sub-element of wider conservation projects within one of the other hands-on conservation categories such as captive breeding, reintroduction, direct species protection, or livelihood creation. For many direct conservation education projects the focus is on external organisations coming in and

providing knowledge to those directly affected by or impacting on the conservation target. In many cases this may also involve a skills or capacity building element to allow the educational approach to continue after the initial project has concluded. Bettinger, Shabani and Cox (2012) describe an education programme in the Democratic Republic of Congo which reached 1,559 [adult] community members through 60 meetings, 16,207 primary school children and promotional billboards were estimated to have reached around 120,000 individuals. While measuring the reach of these activities is possible, measuring the effectiveness is more difficult. The same study showed an increased willingness of the community to report illegal wildlife activities (for example through the reporting of a gorilla infant in captivity) demonstrating some direct impact of the education campaign.

Quantifying capacity building is more difficult. While the lack of a global understanding of capacity building in conservation is acknowledged (Elliot, Ryan and Wyborn, 2018), efforts to establish a wider overview have focussed on the extension of high level (in many cases postgraduate) schemes to enhance scientific knowledge skills amongst practitioners, and there is little assessment on the provision of “soft” or practical skills for conservation.

Conservation education can often exist as a secondary element of a wider conservation effort used in support of other conservation goals. An example is in education used in support of reintroduction of great apes following seizure of infants. “Projects were successful in that they were able to generate enough community support to maintain their operation” (Cartwright, Wall and Placide Kaya, 2012). However the same project encountered difficulties as “the chimpanzee release at HELP [Habitat Ecologique et Liberté des Primates Congo] was delayed when the local community protested and it took several days of negotiation to ensure that all local concerns were met”, suggesting that even attempts to provide education can be insufficient, at least initially.

2.4.4. Guidance and best practice considerations for conservation education projects?

Key to successful conservation education is the ability to demonstrate a wider value of the conservation issue being considered. This can be linked to livelihoods conservation approaches (as for example a sustainable resource for consumption), but can also be related to developing an appreciation for the intrinsic ‘value’ of a species or space. For example WAZA includes education as a key duty for its members who must “Lead,

support and collaborate with education programmes that target changes in community behaviour towards better outcomes for conservation” (WAZA, 2015).

There are a number of central elements to conservation education which can be summarised as:

- Longevity of projects (Breuer and Mavinga, 2010)
- Cultural interpretation and language nuance (Bettinger et al., 2010)
- Value of trust / relationship in convincing / educating (Bettinger et al., 2010)
- Importance of appropriate training for education delivery people (Bettinger et al., 2010)
- Relevance of information (related to human wellbeing) as an ecosystems services approach (Wallis and Lonsdorf, 2010)
- Used in combination with active conservation (Wallis and Lonsdorf, 2010) particularly poverty alleviation, livelihoods work (Breuer and Mavinga, 2010)
- Appropriately skilled delivery people (Wallis and Lonsdorf, 2010; Jacobson, 2010; Jacobson, McDuff and Monroe, 2015)
- Include evaluation (Wallis and Lonsdorf, 2010)
- Share information (Wallis and Lonsdorf, 2010)
- Target adults as well as children (as adults will be currently involved in illegal / damaging activities and can ‘break the cycle’ more quickly) (Jacobson, McDuff and Monroe, 2015)
- Include informal education (outside schools) as children outside formal education are likely to be involved in subsistence, illegal, damaging, survival mechanism activities (Breuer and Mavinga, 2010)
- Manage stakeholder expectations
- Show the increased value of improved stewardship
- Develop interest in species or space often through the use of charismatic or locally unique species
- Empower people by showing them that their role in the protection is important.

2.4.5. Successes and failures in conservation education

Effectiveness of conservation education is difficult to measure because it rarely exists in isolation. There is an issue of demonstrating direct impact for education activities, and there is a time limit during which impacts of education are possible and beyond which it is

difficult to ascribe a direct effect. There are also issues with reaching sufficient participants for follow up to understand whether their behaviour has altered (Fien, Scott and Tilbury, 2001). Content analysis showed that from 56 reports on tropical conservation education projects from 1975 to 1990 fewer than half were successful in achieving their objectives (Norris and Jacobson, 1998).

Indirect projects:

Some conservation education actions focus on the wider public rather than those directly involved in causing or contributing to the threats to wildlife or habitat. These projects may focus on educating individuals about the indirect impacts of their lifestyle choices, or simply drawing attention to the threats and fears surrounding species or areas. Such projects may also focus on educating individuals about the ethical and moral issues surrounding species protection with the aim of creating new advocates for conservation.

Photography exhibitions can also play a significant role in conservation education (Farnsworth, 2011). Documentary photography can bring issues to a far wider audience than direct education activities allied to specific projects. The UK Wildlife Photographer of the Year is an annual photography competition with an accompanying exhibition of the commended images. In 2015 the exhibition was viewed by 150,000 people in the Natural History Museum itself, and over 1,000,000 people visited the touring exhibitions (NHM, 2015). The importance of such approaches clearly frames the conservation debate in the aesthetic arena which is easily accessible, but many such approaches also include more detailed information about the wider conservation activity. For example the work on ivory poaching by Stirton (2015a; 2015b) frames the issues in very human terms, focussing on the impact of elephant conservation on the lives of those directly working within the field and their families.

In many cases the mass appeal approaches do not seek to evaluate their success in a formal way. However, zoos may assess the success of their projects in increasing awareness. Such assessments of effectiveness include studies considering how zoo education projects have increased volunteer participation in zoo work, and have altered the behaviours of those volunteers (Bixler, Joseph and Searles, 2014), or assessing the impacts of zoo projects on school age visitors (Livermore, 2013; Randall, 2012; de White and Jacobson, 1994) through simple questionnaires and post-visit assessments.

The effectiveness of these indirect conservation education efforts is necessarily difficult to quantify; for many of those engaged there is no opportunity to directly apply the knowledge that they have obtained and impacts may only be seen through attitudinal change or through the decisions that visitors or viewers make on aspects within their control (see for example Chester Zoo's Palm Oil Challenge which encourages visitors to consider their own consumption of products that are indirectly affecting species (Chester Zoo, 2017)).

The potential prevalence of conservation education can also be observed in reflections on missed opportunities. This missed opportunity for education and conservation engagement is discussed with reference to walkers/climbers in Kota Kinabalu National Park, Malaysia (Goh and Rosilawati, 2014). This is due to guides' lack of communication skills (both generally and specifically in terms of language skills) which in part is due to the lack of permanence of employment, meaning that conservation messages are not shared with potentially receptive audiences.

Direct projects:

In many cases the success of direct education projects is related to the direct availability of alternative sources of income either for those who are part of the education project, or for their families and associates. Direct education's aim is to link understanding of human activity to the availability and variability of natural resources (Nkosi, 2002).

Even in education projects which will have direct implications for conservation it is difficult to measure effectiveness. For example Johnson-Pynn and Johnson's (2005) assessment of the success of the Roots and Shoots and Wildlife Clubs of Uganda demonstrates a positive impact of educational programmes on participants' knowledge and awareness of local conservation issues, but does not link this to applied learning within the local conservation context. Similarly assessment of projects in Madagascar show numbers of people engaged at different levels of education and within the community (Kling and Hopkins, 2015), but does not assess the application of this learning, although the authors suggest that for the majority of Malagasy socio-economic factors preclude any application. They also suggest that the inclusion of native biodiversity and conservation education in formal school curricular would be most beneficial as this would reach a wider audience as school attendance increases.

Some projects have shown direct links between education and pro-environmental actions. For example, “Clubs de Conservation” in Madagascar, have resulted in an increase in demand for young native trees as well as fruit trees, and requested assessments of the area that could be managed by club members as a direct result of this conservation education programme (Dolins et al., 2010). Similarly and unexpectedly following an education programme on preventing wildlife damage to agriculture in Japan the result was the creation of a community based wildlife group in one of the study areas (Sakurai et al., 2015).

Education efforts have power to change participant perceptions, both positively and negatively. Bettinger et al. (2010) assessed the effectiveness of an education programme at a chimpanzee (*Pan troglodytes*) sanctuary in Uganda. Images showing negative images of chimpanzees (for example showing animals dancing or smoking) reflected in the answers given by children on why they like chimpanzees (because they dance, because they smoke). Images of natural behaviours resulted in a significant reduction in the number answering with human activities (from 20% to 6%), indicating that education projects can both succeed and fail according to the values ascribed to species.

Although legal restrictions and enforcement to conserve both species and habitat are a conservation approach on their own, education on the (il)legality of activities is frequently a core component of environmental education both in direct and indirect application. Even for species where there is large potential for severe conflict, educational approaches to conservation can have a positive impact. In the municipality of San Mariano in the Philippines, deliberate killing of the endemic Philippine crocodile (*Crocodylus mindorensis*) was stopped, and support for protection of the species increased amongst the local community after an education and awareness raising campaign made people aware of both the legal status of the species and its conservation status (van der Ploeg et al., 2011).

Measuring the success of capacity building is difficult. While there is significant evidence of conservation capacity building across continents and projects (Elliot, Ryan and Wyborn, 2018), much academic literature focusses on the limitations and gaps of this approach (O’Connell et al., 2019) with particular issues including the limited provision of support to enhance leadership skills, and the limited specific support given to capacity building amongst indigenous participants. Until the point when approaches can be led by those most directly tied to the conservation issues (rather than by external influences of

governments, international bodies and NGOs) then any successes are qualified. While there are clear examples of capacity building success, with this comes the recognition that capacity building for conservation is still in its infancy and that there are notable gaps that must be resolved before capacity is truly built.

2.5. Legislation and status protection

2.5.1. Overview

Legislation on wildlife conservation exists at both national and international levels. In many cases legislation is inextricably linked to livelihoods issues with the aim of managing (or stopping) the exploitation of wildlife for direct financial gain. Legislation also provides a mechanism by which natural resources can be consumed sustainably, providing consideration of the long-term viability of target resources (such as fish or timber) with the explicit aim of providing an ongoing resource which can be equitably exploited. This defines the difference between biodiversity that can be exploited legally and biodiversity that cannot. In some cases it can be agreed that there is no form of sustainable consumption of some key resources due either to the target's importance within the wider ecosystem, or because of the moral imperative to protect the target from complete loss. However there is also legislation relating to accidental loss of biodiversity, for example implementation of speed limits in areas of conservation interest. Legislative protection frequently overlaps with other approaches to conservation and a key element of successful legislation is associated education (van der Ploeg et al., 2011).

2.5.2. Why use conservation legislation?

By penalising the potential of causing harm to a habitat or species it provides an alternative “value” to nature. In most local conservation legislation, this method either seeks voluntary compliance, whereby the public comply “because it is the law” or alternatively because the risk of punishment outweighs the reward of the illegal activity. International conservation law works by consensus. Agreements need to be adopted into local legislation by governments who accept them and apply them into local laws.

For conservation non-profit organisations their role in legislation is restricted to lobbying for new laws or the enforcement of existing laws, either through pressure campaigns or through legal processes holding legislators to account (Hambler, 2013).

2.5.3. How common is conservation legislation?

As conservation legislation can cover both species and habitats it exists globally. Each of the 196 national signatories to the Convention on Biological Diversity (CBD Secretariat, 2018) “is now legally committed ‘as far as possible and as appropriate’ to rehabilitate and restore degraded ecosystems and promote the recovery of threatened species” (Hambler,

2013). Many key pieces of legislation are international such as the Convention on the International Trade in Endangered Species (CITES) but local laws relating to conservation exist in most nations. What is more inconsistent is the application and enforcement of legislation (see below) and the levels of severity with which offences are dealt.

2.5.4. Guidance and best practice considerations for conservation legislation

For non-profit organisations, pressuring enforcement authorities for the creation or application of legislation itself is often a key project goal, but the actual delivery of enforcement and punitive measures is by its nature only deliverable by the state. Therefore guidance for delivery is limited. Organisational and geographical priorities as well as local legislative arrangements all affect how a non-profit may attempt to lobby for legislative change, but a standardised approach is unlikely to be successful.

Guidance does however exist for some levels of conservation legislation, particularly in supporting enforcement organisations in the ways that relevant laws are enforced. For example the IUCN provides comprehensive guidance documents on Wildlife Law Enforcement Best Practice in sub-Saharan African protected areas (Henson, Malpas and D'Udine, 2016).

2.5.5. Successes and failures in conservation legislation

The assessment of success in conservation legislation can be made in two ways. In terms of providing a legislative base, conservation of species and habitats are well represented both nationally and internationally. CITES has 182 Contracting Parties (mostly countries) (CITES, undated) and covers more than 35,000 species. What is much harder to assess is whether or not all that legislation is effective. The illegal trade in wildlife is very significant in spite of international conservation legislation but quantifying the extent is difficult (Schneider, 2012).

“By its very nature, it is almost impossible to obtain reliable figures for the value of illegal wildlife trade, but the figure must run into hundreds of millions (US billions) of dollars. The value of illegal, unreported and unregulated (IUU) fisheries alone has been estimated as [sic] between USD10-23 billion per year (MRAG & FERR, 2008), while the value of the illegal international timber trade has been estimated as USD7 billion per

year, and the illegal wildlife trade, excluding timber and fisheries as USD7.8-10 billion per year (GFI, 2011)."

TRAFFIC (undated)

The use of legislative means to protect wildlife is not limited to direct species protection, outlawing hunting or trade in endangered species. There is also legislation around 'resource management'. This acknowledges that some use of species is either inevitable, is the basis of economic sustainability, or is part of cultural heritage.

For much international conservation legislation a key consideration in assessing success is the importance of international consensus on that legislation. An important illustration of the central importance of consensus in international conservation comes around discussions on whaling. Since the agreement of the moratorium on commercial whaling in 1982 (International Whaling Commission, 2018a) all but three countries (Iceland, Norway, Russia) are signatories to the moratorium on commercial whaling, while Japan continues whaling under "Special Permit" (scientific whaling).

Since protection was provided there is evidence that most large whale species populations have increased (International Whaling Commission, 2018b), (WWF Global, 2018) but there are other implications of the IWC moratorium. Of particular note is the impact on international relations between Australia and Japan, in part due to Japanese whaling boats operating within the Southern Ocean Whale Sanctuary. In 2015 Australia brought the case to the International Court of Justice (Payne, 2015; Plant, 2015) who found that Japan had breached the terms of the moratorium, carrying out commercial whaling under the auspices of science. While Japan ceased whaling during 2016, it resumed again in 2017 creating further division with Australia (Smyth, 2017).

In developing areas with substantial social / economic problems detection of infringements (and therefore enforcement of legislation) is often very limited. Frequently legislation exists, but the success of that legislation is reliant on voluntary compliance as there are no resources available for enforcement. Rowcliffe, de Merode and Cowlishaw (2004) showed that in spite of legal protection for certain species in the Democratic Republic of Congo, commercial bush meat hunters were undeterred from targeting these species, with decisions made on species profitability rather than legal status, meaning protected species were in fact more likely to be pursued. The unintended consequence of the

legislation was that species protected by designations are considered as more profitable due to their larger size and reduced effort for increased financial return.

During 2008 an agreement was made to allow the temporary legal sale of ivory in Japan and China. This ivory was generated from elephants dying from natural causes or euthanised through official management. This approach was designed to provide for what was considered a limited demand in those countries for ivory, providing 'sustainable' resource without impacting on wild elephant populations. However, later research showed this coincided with an increase in interest and demand in general for ivory and contributed to around 70% increase in poaching (Hsiang and Sekar, 2016). While it is debatable that there is a direct link it seems likely that the combination of relaxing the legislation, combined with the national governments' promotion of the sale increased demand to the point where this could not be met by the legal sale and was provided by illegally poached ivory.

The limited effectiveness of legislation is not restricted to developing countries. Wildlife and Countryside Link and Wales Environment Link (2018) compared reports of wildlife crime in five thematic areas (badgers, bats, marine mammals, raptors and illegal wildlife trade) with conviction rates in the UK in 2016. This found that only 22 convictions resulted from over 1,278 reports (numbers of reports for illegal wildlife trade were not available). The authors highlighted issues such as a lack of comprehensive data, initial responders not treating wildlife related incidents as crime, the lack of expert witnesses for testimonies and a lack of sentencing guidelines for wildlife crime.

It has been suggested that even legislative methods to allow sustainable resource use may have negative impacts. For example it has been suggested that fishing quotas in Europe have been a driver of piracy in Somalia (Fairlie, 2009), in combination with other factors such as political instability and lack of governance locally (Sumaila and Bawumia, 2014) and the technological discrepancy between fishing fleets (The Ecologist, 2011).

2.6. Alternative livelihood approaches and alternatives to wildlife exploitation

2.6.1. Overview

The aim of alternative livelihoods approaches to conservation is *“to link the livelihoods of people living near natural resources to the conservation of those resources”* (Salafsky and Wollenberg, 2000). This is in contrast to previous over-exploitative uses of resources which contribute to species or habitat loss. However, Roe et al. (2014) note there is no common definition for “alternative livelihood”. Often this means ensuring that the resources that were previously available to local people either continue to be available to them, often in a managed way, or alternatively offering those who have previously directly exploited a natural resource another source of income (either from that resource or another previously unexploited or unutilised resource), either as subsistence livelihoods or as an income stream. Salafsky and Wollenberg (2000) highlight the two distinct approaches that can be taken to align livelihoods and conservation, either indirectly or directly. The first provides an economic benefit that is separate from the conservation goal (such as secondary tourist services); the second provides an economic benefit that is reliant upon the conservation goal (such as employment in wildlife protection).

Approaches to conservation projects addressing livelihood and wildlife exploitation largely involve finding alternative employment options for those who live side-by-side with the natural resources that are the focus of protection efforts. This might be related to immediate employment but also includes the development of training and/or capacity building to provide the skills that communities will need in order to maximise the benefits of the conserved resource.

Compensation schemes can also be considered to be an element of livelihoods approaches to conservation. A key concern for those directly affected by wildlife conservation schemes is that additional wildlife can damage crops, buildings or even cause loss of human life (Richardson et al., 2012). A central element to alleviating this conflict is the creation of compensation schemes whereby those affected by loss (financial or otherwise) receive an alternative income.

2.6.2. Why use livelihood approaches and alternatives to wildlife exploitation?

The involvement of local groups is central to conservation (Alexander, 2013). While large, international organisations can effect change for positive conservation, in reality it is those people who live alongside the target species or habitats that are most able to protect them; either through change in their own behaviour or by preventing the damage caused by external actors. The demonstration that they can actually be 'better off' using new resources is key to ensuring that the threatened area or species stops being useful, or ideally, becomes important as a protected, rather than exploited, resource.

Areas of critical conservation concern frequently coincide with areas of limited development, economic and social deprivation (Fisher and Christopher, 2007). Where traditional ways of life continue, so too does traditional consumption. Situations exacerbated by habitat loss or historical over-exploitation mean that the reduction in the target habitat or species requires local consumption to be managed, reduced or cease, even when those people who live with the resource are not responsible for its decline.

2.6.3. How common are livelihood approaches and alternatives to wildlife exploitation?

Roe et al. (2014) identified 22,146 projects relating to livelihoods approaches to conservation (although the majority had minimal details available). However it is likely that livelihoods considerations make up at least part of many conservation projects. Livelihoods approaches to conservation occur in a range of settings, but are often closely related to *in situ*, *ex situ* and habitat protection conservation actions. Many organisations and providers explicitly acknowledge the importance of improving livelihoods of local people (Conservation International, 2018; FFI, 2018; The Nature Conservancy, 2018; WWF, 2018). For many large conservation organisations, livelihoods approaches are central to their activities. Similarly for development organisations, there is a growing understanding of the role of biodiversity conservation as a tool for poverty alleviation (Care International UK, 2018; Oxfam International, 2018). Sources of support for conservation reflect this change. The Darwin Initiative still has a central focus on biodiversity protection, but the origin of funds it distributes has diversified and is now drawn from non-environmental sources via the UK Department for International Development (DFID) and the Foreign and Commonwealth Office (FCO) with the explicit aim of reducing poverty (Darwin Initiative, 2015). The result is that recipients of many such funding streams projects must also demonstrate a livelihoods impact on beneficiaries (see

for example the ‘Madagascar yam conservation for livelihoods’ project at the Royal Botanic Gardens Kew (2019b)).

2.6.4. Guidance and best practice considerations for livelihoods approaches and alternatives to wildlife exploitation

Guidance on best practice for livelihoods approaches to conservation is limited. In 2012 a motion at the IUCN World Conservation Congress called for the development of “best practice guidelines for alternative livelihood projects to ensure sustainable benefits to species, ecosystems and people” (IUCN (2012) in Roe et al. (2014)) but a single agreed point of reference has yet to be established.

However, researchers considering alternative livelihoods approaches in specific instances have begun to develop an understanding of best practice in this area. For example Holmes and Potvin (2014) considered people-centred approaches to REDD+ (Reducing Emissions from Deforestation and Forest Degradation) projects to synthesise a series of best practice recommendations which could be applied to other conservation areas. Projects should:

- Ensure local participation in all phases of projects
- Address community development needs and expectations
- Enhance stakeholder collaboration and consensus building
- Apply an adaptive management approach
- Develop national and local capacities
- Include objectives that match community livelihood priorities.

Adapted from Holmes and Potvin (2014)

These themes overlap with best practice suggestions in other areas of conservation. For example Barnett et al. (2016) considered best practice for sport-fishing in conservation and livelihoods. This also suggests projects should consider:

- Providing a culturally appropriate livelihoods approach
- Respecting local governance
- Engaging with local scientists and experts
- Communicating social and economic benefits that communities are likely to derive
- Employing local people or provide secondary sources of employment, and where necessary provide support for capacity building in this area

- Providing negotiated 'offsets' (compensation) if negative side effects are unavoidable
- Providing a bespoke solution for each community based on consultation with local people.

Adapted from Barnett et al. (2016)

Combining these considerations provides a starting point for best practice in livelihoods consideration.

2.6.5. Successes and failures in livelihood approaches and alternatives to wildlife exploitation

A systematic review of livelihoods approaches to conservation revealed of 21 projects with sufficient detail on outcomes for review (from a screened total of 889) "nine were reported as having been effective (positive conservation outcome), nine were reported as being neutral (no change) and three had a negative conservation outcome" (Roe et al., 2015). The lack of information on outcomes was a central limitation of the study but this suggests that about 43% of alternative livelihoods approaches are successful in terms of conservation outcomes.

Consumption of wild resources can be related to subsistence or negative coping strategies, such as charcoal production (Coulibaly et al., 2015). Therefore livelihoods approaches to conservation are often difficult to define in terms of success and failure particularly as the perception of what is and what is not sustainable consumption is related to the observer. As Marks (2001) argues "the current notion of "conservation" remains so attached to its western cultural idioms and methods that for it to become effectively implanted elsewhere it must be allowed to evolve thereby incorporating more situationally relevant concepts and actors." Success and failure for livelihoods efforts can be concerned with perception of the action by stakeholders regardless of tangible conservation benefits. For example Bennett and Dearden (2014) reviewed community responses to marine protected areas. Responses were contradictory with relation to conservation; some respondents felt that protection of terrestrial areas could be achieved through the approach, while a lower proportion felt that the marine environment could be protected. When respondents were asked about how the projects treated individuals reliant on the space for their livelihoods the responses were exclusively negative; conservation actions were perceived as having a negative impact on humans.

There is also the more modern phenomenon of commercial, industrialised exploitation and organised criminal exploitation of natural resources whether for commodities such as hardwoods, illegal wildlife trade, or wildlife parts, which has been shown to have links and commonalities with other types of crime such as drugs, people trafficking and arms sales (INTERPOL, 2015). This type of exploitation of resources, in contrast to, for example, subsistence hunting or even local sale of bush-meat, bears little relevance to the socio-economic conditions of those local to the area, and the value of these commodities means that alternative livelihoods opportunities may not be able to match the income levels provided by illicit activities.

In a study of wildlife related tourism in Zambia the authors examined the interaction between game management areas (GMA), buffer zones in which consumptive tourism (hunting) is permitted, which sit adjacent to national parks, and local poverty (Richardson et al., 2012). The authors found that there are “meaningful economic benefits” attributable to the GMAs but these are directed towards wealthier households, rather than delivering a more general financial uplift to communities. Additionally the increase in wildlife brings with it increased crop damage for agriculturalists. While the benefits of the GMA at the time of the study outweighed the negative cost of crop loss, the authors suggest there is a tipping point at which, without a compensation scheme for loss, crop damage would exceed the ‘value’ of the GMAs to local people, likely bringing increased conflict and threats to conservation aims.

A study of protected areas in Ethiopia interviewed local communities living in areas adjacent to national parks again showed unequal distribution of benefits of conservation and found that the most supportive individuals of conservation measures were those who had seen a direct financial benefit from the protected area (Tessema et al., 2010). This need for equitable division of benefits is echoed by (Scanlon and Kull, 2009) considering the Torra Conservancy in Namibia.

One example of the provision of livelihoods as part of a conservation programme is the legal harvesting of olive ridley turtle (*Lepidochelys olivacea*) eggs in Ostional, Costa Rica. Although the species is granted legal protection, and the collection of eggs is technically illegal, local people are allowed to collect eggs laid during the first 36 hours of the *arribada* (the mass nesting phenomenon) to sell, before the nesting site is then protected for the remainder of the season. This provides both an incentive to protect the beaches and the

species. While this permission seems to allow removal of potentially viable offspring, due to the density of arrivals, earlier nests are destroyed by turtles arriving later, which causes bacterial levels to be high in the area as earlier eggs rot (Le Guern, 2011). While the agreement has provided income for local people and has provided an incentive to conservation in an area with limited opportunity (Vince, 2017), there is a counter argument that legal consumption drives illegal demand which in turn indirectly contributed to the death of a ranger in another part of Costa Rica in 2013. Similarly when considering the ecological success of the approach (Valverde et al., 2012) demonstrated that there is insufficient data to establish whether this is a successful approach to increasing turtle populations, as populations have declined over the short term.

2.7. Summary

Conservation can cover a wide range of approaches to achieving benefits for core species, landscapes, habitats or the people that interact with them. While all projects and organisations aim for positive outcomes for their targets, in practice the success of such projects varies, and this success can be undermined by external factors.

There is guidance available to assist organisations to manage their projects to a successful outcome, and this guidance encourages organisations to consider their impact, particularly in terms of assessing and mitigating risk factors that could prevent the completion of the proposed packages of work. However there is minimal guidance relating to evaluation of the impacts of projects on the wider world. Thus there is a need for a review of the state of impact prediction and whether organisational structures and locations have an influence on whether impacts are predicted and outcomes are positive.

While this list of approaches covers the majority of activities that conservation organisations are likely to undertake within their own remits, some activities that could be considered conservation are additional to this list. Activities where input and guidance from conservation non-profits are provided to commercial organisations, such as for remediation of industrial spaces (for example conversion of sand and gravel extraction to amenity spaces with associated biodiversity benefits) do not fall clearly under the definitions here, and the delivery of conservation “work” may be undertaken by commercial ecological and landscape consultants. This type of activity might involve significant time commitments for some non-profit organisations, and where they are engaged on a consultancy basis to advise on such activities might deliver significant revenue streams to them. However, it is unlikely that organisations will report on these activities as “projects” as they do not “own” these projects, and in most cases can only direct the conservation approaches that are used, set against the commercial and financial requirements of lead partners.

3. Practice review: Project management methods for conservation impact assessment

This section examines the current project management guidance and systems available to non-profit conservation organisations, including bespoke systems for conservation and general guidance for the non-profit community to establish whether guidance or advice exists on the assessment of wider impacts from projects.

3.1. Impact assessment in non-profit organisations

Reviewing current practice on impact assessment in non-profit organisations reveals a difference in interpretation of the term “impact”. Whilst EIA practice considers impact to be either positive or negative effects of a proposed activity, from a non-profit context, “impact” is used interchangeably with terms such as “returns”, “benefits” or “value”. Impact evaluation for non-profit organisations can be “broadly referred to as the wider external benefits to society, the economy, and/or environment that TSOs [third sector organisations] can create via their activities” (Harlock, 2013).

From the context of this review, the focus of impact assessment is on assessing the effectiveness of organisational approaches to achieving the desired change that the organisation aims for (Breckell, Harrison and Robert, 2010). As part of developing a financial value for charitable activities, the Social Return on Investment (SROI) methodology, repeats this concept as a means by which organisations can evaluate and subsequently highlight the beneficial activities they undertake (Nicholls et al., 2012). Funders, (particularly governmental) require measurable achievements and assessment of positive impacts (Ógáin, Lumley and Pritchard, 2012) so this is the focus for many conservation organisations, rather than any attempt at understanding the secondary, or indirect impacts of activities.

Although not directly linked, this interpretation of impact measurement is increasing, but its application is inconsistent across organisation types. Larger, more established organisations do more measurements of impacts while smaller organisations do less (Harlock, 2013; Ógáin, Lumley and Pritchard, 2012; Breckell, Harrison and Robert, 2010). Although there is a movement towards increased support for impact measurement (see for example Inspiring Impact (2018)), barriers to implementation exist including “staff skills

and training, resourcing, and learning and review processes” (Harlock, 2013). While these findings relate to the UK, similar experiences are shown in the other countries included in this study. For example Polonsky, Landreth Grau and McDonald (2016) highlighted the case in Australia (and the USA) with 19 practitioner interviews, which demonstrated the perceived importance of impact measurement and highlighted similar ongoing barriers. Similarly the Canadian charity support organisation Charity Village demonstrates the value of improving measures of success to its network (Smith, 2014).

While there is limited evidence of impact assessment in current monitoring and evaluation practice amongst non-profit organisations, impact assessment is not the only approach that can be used by organisations to understand their effects. Again this area of research is limited, with the majority of academic investigation coming via the Third Sector Research Centre at the University of Birmingham, with a focus on UK practice.

Edwards, Smith and Büchs (2013) reviewed levels of implementation of Environmental Management Systems (EMS) (ISO 14001 and EMAS) in non-profit organisations. The study found that although there was interest and support for the concept from influential bodies such as the Association of Chief Executives of Voluntary Organisations (ACEVO) (Church and Evison, 2009) implementation was limited, partially due to a lack of external drivers in the form of regulation (see 4.1 below) and the minimal funder requirement for such systems. In a separate study the same authors discussed the complexity around identifying and measuring environmental impacts as an additional barrier to EMS implementation (Edwards, Smith and Büchs, 2010). In recent years it has been suggested that environmental sustainability has become less important to non-profit organisations, as highlighted by former UK Energy Minister Ed Davey, who claimed in 2016 *“For too many third sector organisations, the environment has slipped off their radar”* (Kay, 2016).

Although these issues do not directly concern impact assessment in the sense used in this study, there are limitations of implementation and organisations are poorly equipped to provide evaluation and measurement of their own positive effects. This is the case even when funding sources might be reliant on showing such outcomes. Combined, these factors suggest that the assessment of negative impacts is likely an even lower priority for most non-profit organisations both inside and outside the field of conservation.

3.2. Impact assessment in conservation specific project management approaches

This section includes a review of the current approaches to conservation project planning and management that are in common usage to understand the level of significance these methods attach to prediction of impacts from projects.

There is a wealth of support for systematic conservation project planning and delivery through things like the Conservation Measures Partnership's Open Standards on Conservation (2018) and software systems such as Miradi (2018a). The Evidence Based Conservation movement (Conservation Evidence, 2018) takes this further by capturing and communicating the approaches that have been applied to similar problems in other contexts to identify the most effective approaches to deliver conservation outcomes.

There is a considerable movement towards enhancing the outcomes of conservation through systematic and evidence based approaches to conservation planning and the monitoring and assessment of what projects achieve rather than what they entail (in terms of cost or resource) (Kapos et al., 2008).

The following review of common sources of guidance and management methodologies outlines the standardised approaches available to organisations to manage their projects and where this includes assessment of the impacts of their conservation projects.

3.2.1. The Conservation Measures Partnership (CMP) Open Standards for the Practice of Conservation

The Open Standards for the Practice of Conservation provide a systematic approach to conservation planning (The Conservation Measures Partnership, 2018). Dr Kate Fitzherbert describes the system in detail (Victorian Biodiversity Management Network, 2017) through the stages summarised in Table 3.1.

Table 3.1: Conservation Measures Partnership Project Stages

Stage	Actions
Conceptualise	Define team Define Scope Define Vision Identify critical threats to project success Situation analysis.
Plan actions and monitoring	Develop “results chain” (Logical process of action and effect). Create Operational Plan, including: • Funding • Resources • People and skills • Risk management • Duration • Gantt chart • Costing.
Implement Actions and Monitoring	Implementation
Analyse, Use, Adapt	Capture results Analysis of results and assumptions Analysis of operation and data Document discussions and decisions Update plan.
Capture and Share Learning	Document lessons and results Communicate and share Report to key audiences (especially funders) Evaluate and audit activities.

The methodology encourages consideration of stakeholders and how the project might affect people. The identification of threats and risks to the project facilitates strategies to address such issues.

“What risk factors exist for your project and how they can be addressed. A risk factor is an uncertain event or condition which, if it occurs, has a negative effect on at least one project element, such as time, cost, scope or quality. A risk assessment should rate both the probability of the risk factor occurring and the impact or severity of the risk factor if it does occur. The purpose of a risk assessment is to identify issues that potentially could negatively impact the project’s ability to implement key strategies effectively and/or achieve conservation goals, and to identify additional strategies necessary to mitigate or avoid those risks.”

The Conservation Measures Partnership (2013).

While the Operational plan stage of the approach includes a risk assessment element, the aim is to identify threats which potentially undermine the success of the project. However guidance on these risks appears minimal. There is a clear focus on traditional project management risk assessments, considering elements such as retention of key staff or financial resource (and contingencies to overcome these issues), but does not consider indirect risks.

3.2.2. Conservation Gateway – Conservation Action Planning (CAP)

This is the Nature Conservancy’s interpretation of the Open Standards and toolkit for other conservationists to use to develop their own plans (The Nature Conservancy, 2017). This is centred on a ten point plan to deliver effective conservation:

- Identify People Involved In Your Project
- Define Project Scope and Focal Conservation Targets
- Assess Viability of Focal Conservation Targets
- Identify Critical Threats
- Conduct Situation Analysis
- Develop Strategies: Objectives and Actions
- Establish Measures
- Develop Work Plans
- Implement
- Analyse, Learn, Adapt, and Share.

The Nature Conservancy (2017)

Crucially the two phases where there is some consideration of the conservation action's impacts on the wider environment "Identify Critical Threats" and "Conduct Situation Analysis" both focus on the threats to the conservation target and the external factors which might affect the success of the project and not the factors which conservation actions might create, contribute to or exacerbate.

The process of understanding threats should consider not just the issues that currently threaten the conservation target (the species or habitat) as in CAP, but should also address the potential impacts of the action which in turn threaten the project (and therefore the conservation target).

3.2.3. Miradi software

While not specifically a methodology, Miradi is a bespoke conservation project management software package (Miradi, 2018a), developed as a management tool by the Conservation Measures Partnership, Sitka and Benetech (Miradi, 2018b). It is a recommended tool in the Open Standards guidance (Conservation Measures Partnership, 2013). The software is provided as a non-profit product, but is chargeable for users at a rate of approximately \$300/user (with reduced rates for student / low-income users) or on a sliding scale for organisations depending on number of users. It provides a very detailed tool for project management and includes some risk assessment criteria, based on the CMP standards.

3.2.4. PRISM

PRISM (Practical Impact Assessment Methods for Small and Medium-sized Conservation Projects) (Dickson et al., 2017) is an impact assessment methodology developed through the Cambridge Conservation Initiative (Cambridge Conservation Initiative, 2015). This toolkit provides a detailed approach to evaluation of areas that may not be as obvious to practitioners as measures of biodiversity or landscape change, under the following thematic areas:

- Attitudes and Awareness
- Capacity Development
- Livelihoods and Governance
- Policy
- Species and Habitat Management

This is an extensive impact assessment process, with a focus largely on delivering positive conservation impacts, although secondary positive and negative impacts are considered. The process centres on post-project evaluation, understanding what the project has done, rather than pre-project prediction for mitigation. The process only relates to the effectiveness (intentional impacts) of the project and not to indirect impacts.

3.2.5. Project Management for Wildlife Conservation (PMWC)

Project Management for Wildlife Conservation (PMWC) is a guidance document produced by the UK conservation training charity WildTeam (WildTeam, 2017). This guide uses a phased approach to project delivery within a conservation context. The guide does include some information on assessing negative impacts. One of the approaches principles is a “Do No Harm” concept which is described thus:

“In the process of achieving results that benefit wildlife, projects may inadvertently risk contributing to the suffering of other wildlife or humans. While avoiding all negative impacts of a project may not be possible, the Do no harm principle is in place to make sure a project team considers and incorporates means to minimise such adverse effects.”

WildTeam (2017)

The methodology encourages users to document potential negative effects, but only to humans or wildlife (meaning other environmental receptors are not considered) and to mitigate negative impacts within the project. It also includes a recommendation to cease a project if negative impacts outweigh positives. However this evaluation is left to the project team and there is no advice provided on how to make this assessment.

3.2.6. Conservation Evidence

The Conservation Evidence project (Conservation Evidence, 2018) offers free access to systematically reviewed scientific literature on effective conservation efforts based on potential variables or contexts such as species or habitat. The aim is to provide conservation practitioners with the knowledge base needed to make appropriate decisions on conservation actions. The database includes actions focussing on ten topics with more than 4,500 studies reviewed against more than 1,000 possible conservation actions.

The current process systematically lists potential actions for conservation and highlights studies which support or oppose the proposed course of action, with an overall summary

of whether the action is likely to be beneficial or not (based on the reviewed evidence). Such a system offers a very clear benefit to conservation planners who can decide where to best focus activities. However, the approach is focused on the conservation outcomes and the potential threats to this, rather than the impacts that may arise from the action on external elements which may further undermine the action.

3.2.7. Collaboration for Environmental Evidence

In a similar approach the Collaboration for Environmental Evidence (CEE) (Collaboration for Environmental Evidence, 2018) provides a library of “Evidence Reviews” (systematic reviews or maps) of particular questions relating to conservation activities. The approach specifies “You might commission a systematic review if you ... want to know the impact of any policy action on other environmental variables (i.e. important side effects).” However the published EE Libraries of both completed and current studies at the time of review do not list any attempts to evaluate impacts of, rather than impacts on conservation actions. Completed reviews with application to the wider field of impact assessment have been undertaken. For example a systematic review into the use of development as a conservation tool (Brooks et al., 2006) considered the evaluation of success in such projects, looking at outcomes from ecological, economic, attitudinal and behavioural point of view. However the review found that for the majority of projects reviewed there was insufficient evidence to draw any conclusions about the success across the themes. The administrative centre for the CEE is the Centre for Evidence Based Conservation at Bangor University which also carries out its own systematic reviews.

3.2.8. Systematic Conservation Planning

Systematic Conservation Planning (SCP) is a landscape level conservation approach, designed to compare potential locations for biodiversity interventions in order to identify the maximum levels of benefits to conservation targets and the wider society and allow organisations to allocate resources accordingly (Margules and Pressey, 2000).

The process of Systematic Conservation Planning can be separated into six stages:

- Compile data on the biodiversity of the planning region
- Identify conservation goals for the planning region
- Review existing conservation areas
- Select additional conservation areas
- Implement conservation actions

- Maintain the required values of conservation areas

Margules and Pressey (2000)

The methods used are designed to maximise positive impacts and avoid negative impacts. However “there is currently no standardized protocol for undertaking impact evaluations of SCP projects” (McIntosh et al., 2017). The approach considers avoidance of impact (in much the same way as the field of planning does) at the decision making stage, but there is minimal reference to assessment of impacts post project. McIntosh et al. (2017) have begun the process of reviewing the outcomes and effectiveness of SCP interventions, but impact assessment is not an integral part of the SCP process.

3.2.9. Capacity for Conservation

Capacity for Conservation is a web-based toolkit from the Cambridge Conservation Initiative (Capacity for Conservation, 2018) that provides information and planning advice for conservation organisations. Information is provided in the form of ‘Organisational Assessment’ which allows an organisation to compare its activities and processes to a series of ‘best practice’ approaches under the following themes:

- Organisational Planning and Management
- Governance
- Human Resources and Staff Management
- Leadership
- Internal Communications
- Fundraising
- Finance Management
- Monitoring, Evaluation and Learning
- Project Planning and Management
- Constituency
- External Communications
- Partnerships and Networks.

Capacity for Conservation (2018)

This checklist includes approaches to project management and assessment, and institutional learning outcomes. However, it only covers direct risks to the organisation and the inclusion of outcome based learning in future project development, rather than any risks or threats posed by the organisation or its activities. The site also includes links to

external tools for conservation planning (including the Open Standards for Conservation, PRISM and other tools largely relating to the description and recording of positive impacts and indicators).

3.2.10. Conservation Excellence Model

The Conservation Excellence Model (Black and Groombridge, 2010; Black, Meredith and Groombridge, 2011) is an approach based on methods used in commercial settings (the European Foundation for Quality Management) to improve the achievements of conservation programmes. It includes detailed assessment of leadership, resources and baseline conditions. The approach is deliberately designed not to be prescriptive, but involves a number of areas of assessment of project outcomes. These include three areas of impact; the effects on “Biodiversity”, “People and Local Community” and “Wider Society”, reflecting the growing importance of incorporating stakeholder requirements (of people living directly with the conservation target and of wider society) into conservation planning. However, although the approach includes consideration of interactions concerning landscape and geophysical variables, it does not include assessing the effects of conservation activities on the wider environment.

3.2.11. Toolkit for Ecosystem Service Site-based Assessment (TESSA)

TESSA is a system of review for on site assessment of current ecosystem service provision, developed by BirdLife International (Peh et al., 2017). The system is designed to help conservation practitioners understand the ‘value’ of ecosystem services within managed or protected areas. In the same way as other ecosystem service assessments this builds on the argument of enhancing values in order to conserve biodiversity, repeating the focus on highlighting positive outcomes shown in other tools. While there is no direct impact assessment included in the system, outputs from the tool could be used as a baseline assessment for understanding what a conservation activity alters, in a form of impact assessment.

3.3. Non-conservation specific tools

3.3.1. BOND Impact Builder

The BOND Impact Builder (BOND, 2018) provides a hub of resources for a range of NGOs (with a focus on international development) with further resources to manage their impacts, across a range of subjects, including environmental impacts. The environmental section of the tool refers to (and in some cases links to) 86 individual tools and concepts which can be utilised to provide support to non-profit organisations in assessing and improving their environmental outcomes. These tools have been reviewed and relate to a range of issues related to development and biodiversity, including advocacy, rights, transparency and climate change adaptation. However, as with other tools these focus on identifying and enhancing the positive impacts of activities, rather than avoiding the negative effects.

3.3.2. Natural Capital Coalition Protocol

The Natural Capital Coalition Protocol is a systematic approach designed for businesses to understand both their impacts and their dependency on Natural Capital (i.e. natural resources) (Natural Capital Coalition, 2017). The protocol aims to enable behaviour change amongst its adherents by making them understand the risks both to the wider environment and to their own operations, as well as highlighting the benefits that improved environmental management could bring. The Protocol identifies risks and benefits to organisations as part of five key themes (Operational, Legal and Regulatory, Financing, Reputational and Marketing, and Societal), with guidance on how organisations can alter their activities to minimise risk and enhance outcomes. While this is a new tool aimed at business, the process could equally be applied to conservation organisations as a way of evaluating their consumption and the changes they make to the wider environment on an organisational rather than project centric basis.

3.4. Summary

Conservation can cover a wide range of approaches to achieving benefits for core species, landscapes, habitats or the people that interact with them. There is some guidance available to assist organisations to manage their projects to a successful outcome, and this guidance encourages organisations to consider their impact, particularly in terms of assessing and mitigating risk factors that could prevent the completion of the proposed packages of work and in enhancing and recording successful outcomes. However there is minimal guidance relating to evaluation of the impacts of projects on the wider world. Alternative methods from other industries such as the Natural Capital Protocol could be adapted for use by non-profit organisations, but to date there is no evidence that this is happening.

Of the conservation specific project management tools PRISM and PMWC are the most useful documents in terms of practical use in a project based context. Both provide a logical process for practitioners to follow (although at 396 pages the PRISM approach is perhaps too comprehensive for many small organisations) in order to provide effective project evaluation which can be used to develop institutional learning and to share with stakeholders and funders. While the guidance currently contains limited information on impact assessment the inclusion of the “Do no harm” principle within PMWC (WildTeam, 2017) demonstrates that organisations are beginning to identify negative direct and indirect impacts as a potential issue within conservation.

In a simplified process the current guidance to project assessment focuses on threats to the core aim. For example a simplified model of the risk assessment for a proposed river water quality improvement project may resemble the example shown in Figure 3.1:

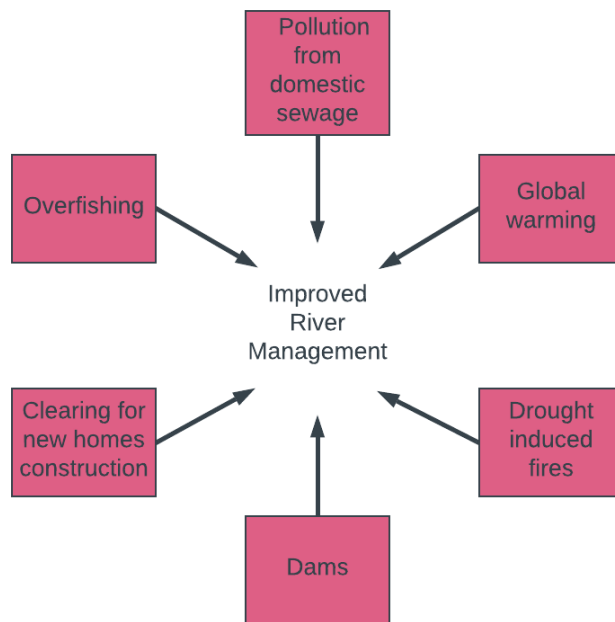


Figure 3.1: Current approaches to conservation risk assessment

However, a more complete model would include the risk and threats to the central aim (both those that currently exist and may exist) but should also consider the impacts that alteration to the current situation could cause to external aspects as shown in Figure 3.2:

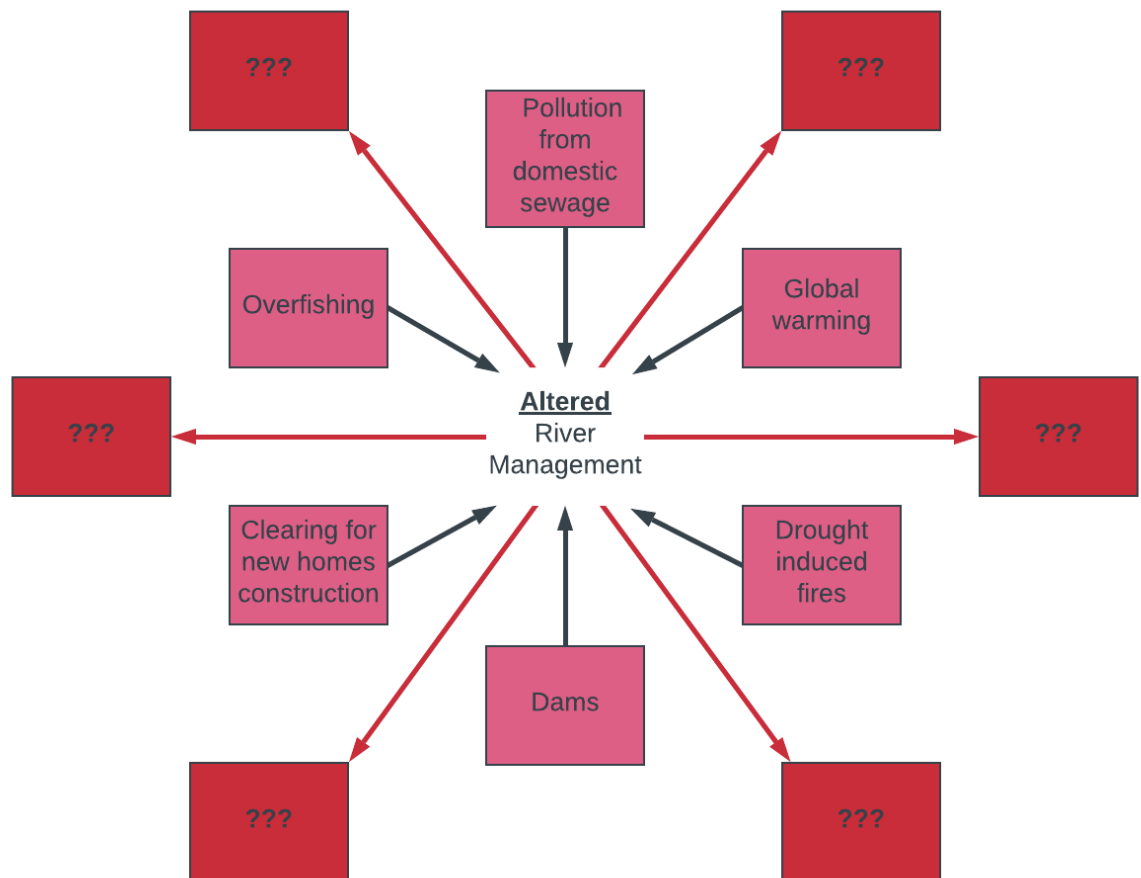


Figure 3.2: A potential model for conservation risk assessment

While current project management guidance does not reflect such an approach the following section will examine whether regulatory and legislative requirements within the target countries for this study create any additional requirements on non-profit conservation organisations to consider the impacts of their projects.

4. Regulatory and legislative review: Impact assessment regulation for conservation non-profit organisations

This section examines the current legislation and regulation relating to impact assessment within the five Anglophone countries that are included in the comparative case study assessment in the subsequent sections. This will establish whether there are any mandated systems in place which oblige non-profit conservation organisations to assess the wider impacts from their projects.

4.1. Legal regulation for non-profit organisations

Local regulators of charitable organisations in each of the target countries provide minimal advice on practical impact assessment for organisations. Searches of the regulator websites reveal that only the UK provides any guidance on pro-environmental behaviour for the non-profit sector in general.

In the UK the Charity Commission carried out a small scale review of environmental behaviours in a range of charities by telephone interview published in the report *Going Green: Charities and Environmental Responsibility* (UK Charity Commission, 2008). This guidance document provides an assessment of the steps taken by some UK organisations to address their wider impacts, whilst at the same time highlighting potential benefits of action including cost saving through resource management and enhancing reputational advantage. The report shows only six of 21 organisations included were “monitoring their environmental activity and/or impact in some way” while only one of 21 had quantitative records of energy and water consumption or waste generated. Charities concerned with specific environmental issues included within the survey were found to be “applying the good environmental practice that they promoted to their own internal procedures and back office activities” but only very limited examples of this are provided (for example Friends of the Earth specifying recycled materials for furniture). The document is generally supportive of organisations minimising some of their environmental impacts but tellingly the “Frequently Asked Questions” section includes the question:

“Q - Do charities have to take environmental action?

A - No. It is for the trustees to decide if becoming involved in environmental activities is in the best interests of the charity and the most effective way of furthering their charitable purpose.”

UK Charity Commission (2008)

The document also highlights where organisations might have any legal responsibility for environmental management, highlighting:

- Charity law (“the requirement to use charity property in a way which furthers their charitable purpose”)
- Companies Act 2006 (incorporated charities (charitable companies) must have regard to “the impact of the company’s operations on the community and the environment”)
- The Energy Performance of Buildings (Certificates and Inspections) (England and Wales Regulations 2007 SI 2007/91 (the requirement that when built, sold or rented buildings require an Energy Performance Certificate to demonstrate the efficiency).

There is minimal evidence of compulsion for impact assessment in the non-profit sector, and minimal guidance in most countries within this study.

4.2. EIA legislation in target countries

The process of EIA is well established in each of the countries included within this study (Australia, Canada, Ireland, New Zealand, United Kingdom) (Wood, 2003). This section examines the legislative background to EIA and explores whether conservation related activities are already subject to the requirement for any form of impact assessment associated with planning within the territories. Where activities are outside the home nation of the organisation any impact assessment will be dependent on the local legislation for the country where the conservation activity is taking place and this will be assessed based on that local context as required.

4.2.1. Australia

EIA in Australia is governed at both a national (Commonwealth) and at a State and Territory Level.

National level legislation and requirement for environmental assessment

EIA at a national (Commonwealth) level in Australia is governed by the *Environment Protection and Biodiversity Conservation Act (Australia) 1999* (EPBC Act). Under this system environmental assessment is required before permission will be granted for projects that have a significant impact on a matter of national environmental significance.

These matters include:

- World Heritage properties
- National Heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development.

The guidance provides an extensive definition of what a 'significant' impact is.

"A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts."

Australian Government Department of the Environment and Energy (2019)

Status of conservation actions in Australian National EIA Legislation

The legislation largely provides to limit negative impacts. The guidance associated with the legislation refers to damaging and detrimental impacts (Australian Government Department of Environment, 2013). Projects that will have positive impacts can be subject to "Conservation Agreements" which exempt them from the requirement for approval under the EPBC Act, (and accompanying impact assessment that might be required) (Australian Government Department of Environment, Undated). A conservation agreement covers activities that promote the protection and conservation of the following:

- Biodiversity
- The World Heritage values of declared World Heritage properties

- The National Heritage values of National Heritage places
- The Commonwealth Heritage values of Commonwealth Heritage places
- The ecological character of a declared Ramsar wetland
- The environment, in respect of the impact of a nuclear action
- The environment in a Commonwealth marine area
- The environment on Commonwealth land.

The guidance lists 22 conservation agreements for existing projects (Australian Government Department of Environment, Undated).

State and Territory level legislation and requirement for environmental assessment

4.2.2. Australian Capital Territory (ACT)

EIA in the Australian Capital Territory is governed by the EPBC Act (*Environment Protection and Biodiversity Conservation Act (Australia), 1999*). The requirement for EIA is dependent on either the type of proposed development, or the likely impact of processes required as part of a development. Development types that relate to the following require an EIS (Environmental Impact Statement) (dependent variously on size of development and types of impact):

- Transport
- Energy generation
- Water storage dam
- Airport / airfield
- Wastewater treatment plant
- Petroleum storage facility
- Waste management facility.

Processes that are likely to have significant adverse impacts relating to the following also require an EIS:

- A critically endangered species; an endangered species; a vulnerable species; a conservation dependent species; a regionally threatened species; a regionally conservation dependent species; a provisionally listed threatened species; a listed migratory species; a threatened ecological community; a protected native species; a Ramsar wetland; any other protected matter
- The clearing of more than 0.5 hectares of native vegetation both inside and outside designated development areas

- Proposals for development on land reserved as wilderness area, national park, nature reserve or special purpose reserve
- Impact on a domestic water supply catchment; a water use purpose mentioned in the territory plan; a prescribed environmental value mentioned in the territory plan of a natural waterway or aquifer
- Environmentally significant water extraction or consumption, except for urban lake, pond or retardation basin or a wastewater reuse scheme
- Registered heritage places or objects
- Registered contaminated land
- Sites where significant environmental or ecological scientific research is being conducted by a government entity, a university or another entity prescribed by regulation.

Status of conservation actions in ACT EIA Legislation

The ACT approach only includes adverse impacts so positive impact conservation projects are unlikely to be subject to the legislation, unless for example a large area of native vegetation clearance was planned (which is unlikely in the context of conservation work). Proposals having impacts can also be ruled out from requiring EIA if the conservator of flora and fauna produces an environmental significance opinion that the proposal is not likely to have a significant adverse environmental impact, making any requirement for EIA for conservation activities even more unlikely.

4.2.3. New South Wales (NSW)

In New South Wales EIA is governed by the EPBC (*Environment Protection and Biodiversity Conservation Act (Australia) 1999*) and the *Environmental Planning and Assessment Regulation (New South Wales) 2000*. The Regulation lists 34, mainly industrial and agricultural development activities, which exceeding certain sizes or based on location factors require EIA to be carried out for permission to be granted. A large focus of the requirement is to minimise impacts on threatened species, populations or ecological communities, or their habitats.

Status of conservation actions in NSW EIA Legislation

Again the focus is on solely negative impacts. Schedule 4A of the *Environmental Planning and Assessment Regulation* excludes some project types from the requirement for assessment. This includes “Eco-tourist facilities over \$5 million: Development for the

purpose of eco-tourist facilities that has a capital investment value of more than \$5 million” meaning that pro-environmental project types could potentially be excluded solely because of their scale regardless of the impacts on other areas of the environment.

4.2.4. Northern Territory (NT)

In Northern Territory EIA is governed by the *Environmental Assessment Act (Northern Territory) 2013* and the *Northern Territory Environmental Assessment Administrative Procedures (EAAP) 2013*. The Northern Territory Environment Protection Authority can require a developer to provide a Notice of Intent (NOI), based on a simple checkbox assessment process (Northern Territory Environment Protection Authority, 2014) which assesses where any potential impacts are likely. For projects that require an NOI this is an initial scoping assessment of the impacts of a project and a statement as to whether the environmental impacts will be significant. Based on this the Environment Protection Authority will decide if the environmental impacts are significant based on factors such as location, size and activities, and if so the level of detail needed for this assessment, either as a full Environmental Impact Statement or a less comprehensive Public Environmental Report (Northern Territory Environment Protection Authority, Undated).

Status of conservation actions in NT EIA Legislation

Within the NT process the initial requirement for assessment before the submission of a Notice of Intent means that any proposed development should identify the potential for negative environmental impacts and require some further assessment if any likely impacts are highlighted. However, as the process is focussed on physical development (largely building works) only conservation projects that meet this broad definition would be covered. Conservation actions which do not include this type of physical development are unlikely to be included.

4.2.5. Queensland (QLD)

EIA in Queensland is largely governed by the *Environmental Protection Act (Queensland) 1994*. This requires that mining and petroleum related projects produce EIS in relation to their activities (Queensland Government, Undated) highlighting the environmental, social and economic impacts of the activity. The *Environmental Protection Act* does not provide detailed criteria for when an EIS is required, but secondary guidance from the Queensland Government provides direction on the triggers for when such projects need EIS

(Queensland Government Department of Environment and Heritage Protection, Undated). In addition the *State Development and Public Works Organisation Act 1971* requires EIS for major public works under certain criteria or those which are designated “coordinated projects”.

“The Coordinator-General may decide a project should be declared a coordinated project if it has one or more of the following characteristics:

- Complex local, state or federal government approval requirements
- Strategic significance to the locality, region or the state, including for the infrastructure, economic and social benefits, capital investment or employment opportunities it may provide
- Significant environmental effects
- Significant infrastructure requirements.”

Queensland Government (2017).

The *Environmental Protection Act* also allows for voluntary preparation of EIS for projects where there is no obligation under this legislation or the national level Commonwealth Environment Act.

Status of conservation actions in Queensland EIA legislation

For Queensland the focus is on mining and resource extraction projects, either as new projects on green-field sites, or amendments to active projects on brownfield sites. The option for voluntary EIA could be applied to a conservation project, but the lack of defined criteria and the assessment of requirement and triggers on a case by case basis suggest that this is unlikely to either compel or encourage any assessment of a conservation related activity.

4.2.6. South Australia (SA)

EIA in South Australia is governed by the *Development Act (South Australia) 1993*. The Act allows for the South Australia Minister for Planning to make a declaration as to whether a project is a 'Major Development', if there is likely to be a major economic, social or environmental impact of the action. Development is defined in broad terms as:

- Construction, demolition or removal of a building
- Any excavation or filling associated with construction, demolition or removal of a building

- Change of land use
- Division of land
- Construction or alteration a road, street or thoroughfare (including associated works)
- Demolition, removal, conversion, alteration, addition to, or painting of a 'State Heritage Place' or a 'local heritage place'
- Tree damaging activity
- Prescribed mining operations.

Planning South Australia (2002).

Major Developments are then required to provide an EIA at one of three varying levels of complexity (Environmental Impact Statement, Public Environmental Report or Development Report) which is set by the Development Assessment Committee following an initial scoping assessment of likely impacts by this committee and appointed independent advisers (South Australia Development Assessment Commission, 2016).

Status of conservation actions in South Australia EIA Legislation

The focus in NSW is on physical development (largely building works) all of which requires approval, hence conservation projects involving for example ecotourism or site development could be included. It is unclear how such a project would be reviewed however, as the decision is made by the Development Assessment Committee. Alternate conservation approaches which do not require any physical alteration are unlikely to be included.

4.2.7. Tasmania (TAS)

EIA in Tasmania is largely governed by the *Environmental Management and Pollution Control Act (Tasmania) 1994*. Under the system the proponent lodges a Notice of Intent (NOI) or referral for consideration of the project. This is then assessed by the Environmental Protection Authority Board. The guidance for this stage only requires proponents to provide details of "the key environmental, health, economic and social issues identified for the project to date" and "The surveys and studies proposed or underway in relation to the key issues for the project".

After referral, projects may require further assessment based on their size or type of impacts. Class 2A assessments are for small scale projects with minor, local

environmental impacts that management can easily avoid or mitigate. Class 2B assessments are for proposals not covered by Class 2A or Class 2C assessment. Class 2C assessments are for projects that are likely to have a very high level of public interest, have environmental impacts across a wide area, increase pressure on a threatened species or are unusual or complex and require additional time resources to provide an environmental impact assessment process (Tasmanian Environmental Protection Authority, 2013).

Status of conservation actions in Tasmanian EIA Legislation

The very general nature of the initial referral requirement combined with the characteristics of projects requiring further assessment suggests that conservation projects are unlikely to meet the criteria for EIA.

4.2.8. Victoria (VIC)

In Victoria, EIA is governed under the *Environment Effects Act (Victoria) 1978*. Projects are referred for review if they meet individual referral requirements based on a simplified set of impact criteria including:

- Vegetation clearance
- Species loss
- Degradation of Ramsar Wetland
- Impacts on aquatic, estuarine or marine biodiversity or ecosystem health
- Impacts on human health
- Direct carbon dioxide emissions.

or include a combination of more than one impact considered major or extensive relating to:

- Vegetation clearance
- Species loss
- Landscape values
- Land stability and soil quality
- Water quality
- Social or economic impacts
- Displacement of residences
- Visual, noise and traffic conditions affecting local communities

- Human health affected by emissions to air, water exposure of a human community to severe or chronic health or safety hazards air or water or noise or chemical hazards or associated transport
- Aboriginal cultural heritage
- Places registered as culturally important.

Victorian Government Department of Sustainability and Environment (2006).

The Victoria Minister for Planning reviews the referred application to decide on the requirement for an Environment Effects Statement (EES) or application of a set of limiting criteria on the project (Victoria State Government Department of Environment, Land & Water Planning, 2016).

Status of conservation actions in Victoria EIA Legislation

Although conservation projects could be considered, the focus of the initial assessment referral criteria on habitat- and species-related negative impacts suggests that this type of project is unlikely to be subject to further assessment.

4.2.9. Western Australia (WA)

EIA in Western Australia (WA) is governed by Part 4 of the *Environmental Protection Act (Western Australia) 1986*. Under this system projects are referred to the Western Australia Environmental Protection Authority. Referral is based on a simple checklist to identify the likely impacts (Western Australia Environmental Protection Authority, Undated) of projects that will have a significant effect on the environment. This checklist requires the proponent to identify impacts on specific receptors:

- At a landscape level (including native vegetation, wetlands, estuaries or inlets, coastal areas or near-shore marine areas, public water supply areas, landform of special interest)
- Soil or land degradation
- Pollutant discharges to air, surface water, soil or groundwater
- Use of areas of contaminated land or groundwater
- Use of land with a high water-table
- Development that may cause emissions (noise, gases, odour, dust, light, vibration) to impact on sensitive land use
- Sensitive land use which will be affected by emissions (noise, gases, odour, dust, light, vibration)

- Historical and/or cultural impacts
- Any environmental issues of concern to the public.

The EPA then decides if further assessment is required. Where this is the case there are two levels of assessment possible, Assessment on Proponent Information or Public Environmental Review (Western Australia Environmental Protection Authority, 2012).

Status of conservation actions in WA EIA Legislation

The assessment criteria in WA are very general and related to a range of options. The caveat of 'any environmental issues of concern to the public' puts the onus on the project proponent to consider all impacts. The decision for further assessment is based on the decision of the EPA so conservation projects could be determined to require further assessment.

4.2.10. Canada

EIA in Canada is governed by the *Environmental Assessment Act (Canada) 2012*. This legislation requires EIA for predominantly large scale industrial activities as well as activities in designated sensitive environments such as wildlife areas or migratory bird sanctuaries as included in the Regulations Designating Physical Activities (Canada Gazette, 2012). Additionally the Minister of the Environment may also require other projects to carry out an EIA "if the project may cause adverse environmental effects or there are public concerns about such effects" (Canadian Environmental Assessment Agency, 2016). Following an initial scoping review the Canadian Environmental Assessment Agency will provide a decision on whether a full EIA is required. Where this is the case the EIA can be undertaken by the authority itself or by an appointed (or in specific cases by the Canadian Nuclear Safety Commission or by the National Energy Board).

Requirements for conservation related EIA in Canada

The EIA process in Canada is focused on industrial type activities and as such it is unlikely that conservation activities would be covered. While specific guidance on EIA has been issued by Parks Canada to cover EIA within Canada's wilderness areas this focusses on the process for development within these protected areas (Parks Canada, 2015) rather than assessing the impacts of conservation activities.

4.2.11. Ireland

EIA in Ireland is governed by the *Planning and Development Regulations (Ireland) 2001* and amendments. This is the implementation of the EU *EIA Directive (85/337/EEC)* (as amended by *97/11/EC* and *2003/35/EC*) (Department of the Environment Community and Local Government, 2013). Section 171A added to the Act in 2010 states that an impact assessment must include direct and indirect effects of a proposed development on the following: human beings, flora and fauna; soil, water, air, climate and the landscape; material assets and the cultural heritage, and the interaction between these factors (Department of the Environment Community and Local Government, 2013). Under the system a brief EIS must be included with applications for projects that fall under the development types as a scoping exercise to identify potential impact receptors before a full EIA is carried out by the planning authority (Department of the Environment Community and Local Government, 2013) when required. EIA and subsequent EIS is required for similar industrial projects as in the UK which are either deemed to be of a type and associated risk to require assessment or exceed a set criteria in terms of size or activity for the particular proposal to be included (Envirocentre.ie, 2016).

Requirements for conservation related EIA in Ireland

EIA regulation in Ireland does not provide a legislative driver to implement EIA processes within conservation activities. While the requirement is to assess the direct and indirect effects of a proposed development on human beings, flora and fauna, soil, water, air, climate and the landscape, material assets and the cultural heritage, and the interaction between these factors, the focus falls on impact assessment of largely industrial or resource intensive impacts. The only area where some requirement could conceivably be possible is under the category of transport which requires assessment for “All private roads which would exceed 2,000 metres in length” *Planning and Development Regulations (Ireland) 2001* and tourism projects where some assessment would be required for eco-tourism related accommodation exceeding the thresholds set out in the legislation.

4.2.12. New Zealand

EIA in New Zealand is governed by the *Resource Management Act (New Zealand) 1991* and subsequent amendments. In New Zealand projects that are likely to cause impacts are required to undertake an Assessment of Environmental Effects (AEE) before consent can be provided for the development (New Zealand Ministry for the Environment, 2006).

In practice this means that almost all development projects require a resource consent and therefore an AEE to a greater or lesser level of detail (Wood, 2003). The decision on the requirement for AEE is made on the basis of the categorisation of the activity to be carried out. Activities can be categorised as permitted, controlled, restricted discretionary, discretionary, non-complying and prohibited (Environment Guide, 2015). Local and regional authorities categorise the activity based on local and regional plans, and on the basis of the simplified initial AEE which is included with all resource consent applications (Wood, 2003).

Requirements for conservation related EIA in New Zealand

The specific details of what the AEE should include are provided in Schedule 4, clauses 6 and 7 of the *Resource Management Act (New Zealand) 1991* and includes a comprehensive list of impacts and the requirement to address “any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity” and also specifies that “effects” include “any positive or adverse effect”. Therefore even projects seeking biodiversity enhancement are nominally covered by the legislation. However in practice the legislation relates only to physical construction and development projects so while construction related to conservation aims certainly would be required to submit to the process other conservation actions likely would not.

4.2.13. United Kingdom

Devolved government in the UK means that EIA in England, Scotland and Wales is governed by the *Town and Country Planning (Environmental Impact Assessment) (United Kingdom) Regulations 2011*, the *Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011*, and the *Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2016*. In Northern Ireland EIA is governed by the *Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2015*. For all four countries this is the implementation of the EU *EIA Directive (85/337/EEC)* (as amended by *97/11/EC* and *2003/35/EC*). In each nation, the legislation covers developments in two areas listed as schedules within the regulations. Schedule 1 developments consist of heavy industry and infrastructure activities all of which require EIA. Schedule 2 developments consist of other industrial and infrastructure activities, agriculture, tourism activities. These activities require EIA if they are likely to have a significant effect on the environment due to the size, type or location of the activity.

Requirements for conservation related EIA in the UK

None of the EIA regulation in the UK provides a legislative driver to implement EIA processes within conservation activities, as the focus for all is on mitigation of impacts from largely industrial or resource intensive impacts. The only area where some requirement could conceivably be possible is under the category of tourism where some assessment could be required for eco-tourism related accommodation if such a project exceeded the thresholds set out.

4.3. EIA legislation for projects in other countries

The legal status of EIA varies from country to country. While the process is well established in Western Europe, North America, and Australasian countries, practice in other countries varies (Glasson, Chadwick and Therivel, 2012) (see Figure 4.1).

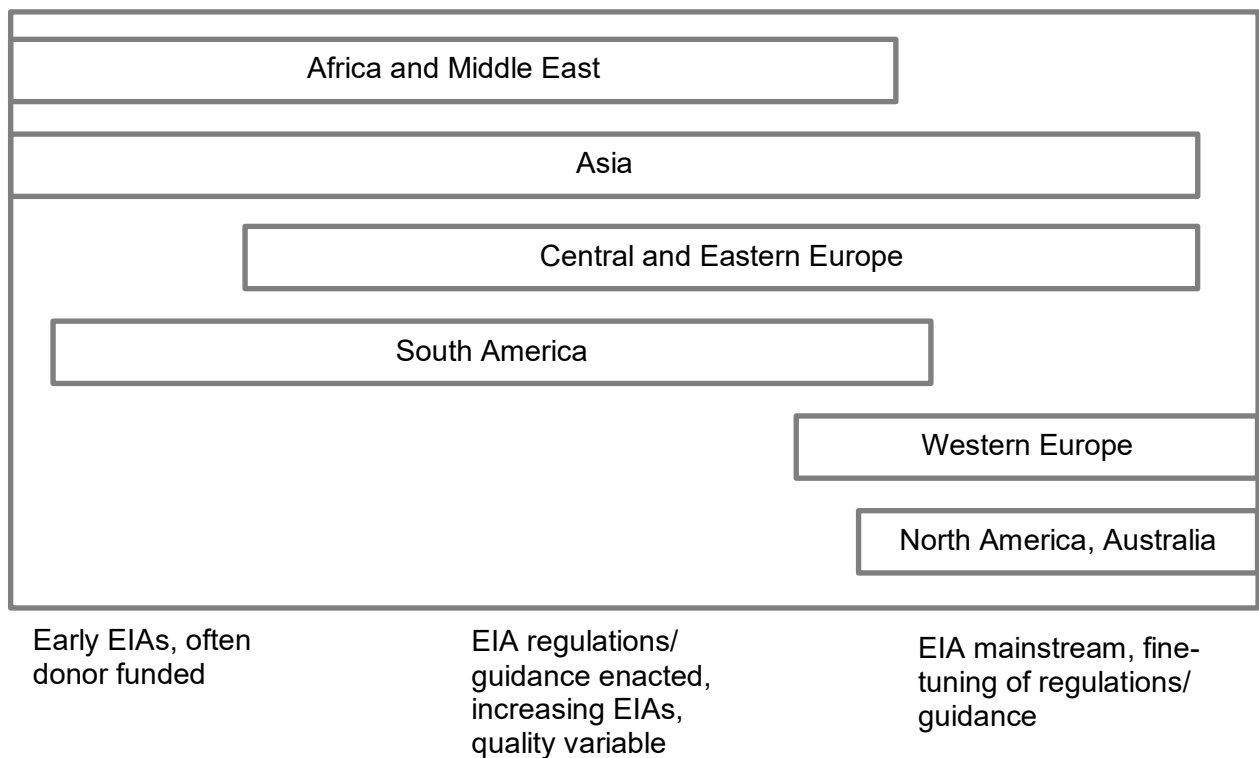


Figure 4.1: Global EIA status (Glasson, Chadwick and Therivel, 2012)

Conceivably, projects undertaken by organisations headquartered in the target countries used in this study but carried out in other countries could be subject to EIA legislation in the country of the activity. However, given the commentary on EIA status provided by Glasson, Chadwick and Therivel (2012) it is likely that legislation in any country outside

the target countries would only be subject to less sophisticated EIA regulations. In countries where EIA practice is more developed the level of scrutiny given to conservation activities is low (as shown in this review) therefore it follows that it is unlikely that in countries where the practice is less developed that conservation projects will be subject to any EIA legislation.

4.4. Summary

For all countries included in this review and for countries where case study organisations may undertake activities it appears unlikely that there are any legal or regulatory requirements for the inclusion of impact assessment approaches for most conservation projects. While there are some occasions, notably in New Zealand, where an EIA type approach could be considered applicable to a conservation project, this is only likely in situations where large scale construction activities are taking place. Therefore the following review of impact assessment in conservation is an assessment of current practice, rather than regulatory compliance.

This lack of legal context does represent an opportunity for developing new legal frameworks that could support the wider assessment of projects outside the 'usual' EIA context of infrastructure development. While such changes may represent an additional barrier for conservation, an enhanced requirement to undertake assessment of impacts could provide much needed direction for practitioners in the conception, design and delivery of projects, and allow them to avoid potentially damaging activities that may not be considered under current approaches.

5. Case study review: General methodology and data collection

The following sections examine case study reports selected from a range of non-profit conservation organisations across five Anglophone countries (Australia, Canada, Ireland, New Zealand, and the United Kingdom). These examinations will establish the current levels of impact assessment included in project reports, the accuracy of this reporting compared to the actual impacts arising from activities, and the “significance” (severity) of the impacts that are both included and omitted from reports, whilst identifying consistent factors within the organisations that may contribute to any differences in impact assessment between organisations. This will develop an overview of current practice and highlight areas for alteration or improvement to the approaches used by non-profit conservation organisations to report the wider impacts from their projects.

5.1. Case Study Selection

A number of specific criteria were initially established in order to ensure that a representative sample of organisations (and their potential approaches to impact assessment) was included. Organisations for inclusion were required to meet the following criteria:

- Use English as the language for both management processes and project reporting. English is the *lingua franca* for most conservation activity and time constraints of this project meant that translating and subsequently assessing outputs from non-English language organisations was not feasible.
- Were identified during searches through records obtained from regulatory bodies to ensure their legitimacy.
- Were identified as having legitimate conservation activities (falling within the definitions and approaches to conservation defined in the Literature Review) as part of review process.
- Have annual expenditure higher than 100 of local currency units (e.g. exceeding \$100 AUD, \$100 CAD, €100 EUR, \$100 NZD, £100 GBP).
- Have a publicly accessible website at the time of review.

This study only includes organisations from Australia, Canada, Ireland, New Zealand and the UK. In addition to being Anglophone, these countries were selected due to their

similarity in terms of EIA experience and process (see Figure 4.1: Global EIA status (Glasson, Chadwick and Therivel, 2012), the prevalence of conservation as a charitable activity within those countries, the existence of national regulatory bodies for non-profit activities (see Table 5.1: Available Non-profit records from national regulatory bodies) and finally their similarity economically (see 5.3.1). 81The USA was not included even though the USA represent a large share of the global spend on conservation and some of the largest conservation organisations are both registered and operate within the USA. However, the data collection process identified that the USA no longer provides a complete list of charitable organisations and only large already known organisations can be found as the Internal Revenue Service's search facility has been withdrawn. It was not therefore possible to randomly select organisations by size or turnover.

5.2. Data processing and cleaning

Data obtained from the national charity regulators varied in terms of format, contents, detail, and number of records included. Datasets were collected for the most recent available year of operation (see section 5.3.2 for details of date ranges). This included some variation depending on the location of the organisation as financial years and requirements for reporting vary according to location.

The available data for the different countries is shown in Table 5.1. Automated and manual approaches were used to ensure only relevant results were included within final lists for case study selection and comparison.

Table 5.1: Available Non-profit records from national regulatory bodies

	Records	Pre-filtered?	Data source(s)	Further data processing actions
Australia	44,544	No	Data download from Australia Charities and Not for Profits Commission (Australian Government, 2016)	Cleaning according to criteria Manual data cleaning to remove non-conservation organisations / non-appropriate activities
Canada	2,694	Yes Categories 52 (Preservation of sites, beauty and historical) and 54 (Protection of animals)	Data provided directly from the Canada Revenue Agency – Charities Directorate (Canada Revenue Agency, 2016) after online request	Cleaning according to criteria Manual data cleaning to remove non-conservation organisations / non-appropriate activities
Ireland	4,217	No	Full download of charity register from Ireland Charities Regulator (Ireland Charities Regulator, 2016)	Cleaning according to criteria Manual data cleaning to remove non-conservation organisations / non-appropriate activities
New Zealand	838	Yes Advanced search for Category Environment / Conservation	Data download from New Zealand Charity Register using Advanced Search function to search for all “Environment / Conservation” and “Care / Protection of animals” as main organisational activities (Charities Services New Zealand, 2016a)	Cleaning according to criteria Manual data cleaning to remove non-conservation organisations / non-appropriate activities

Table 5.1 Continued:

UK	England and Wales 27,464	Yes Charitable Purposes including 111 Animals and 112 Environment / Conservation / Heritage	England and Wales Data download from UK Charity Commission (UK Charity Commission, 2016)	Cleaning according to criteria Manual data cleaning to remove non-conservation organisations / non-appropriate activities Comparison between England and
	Northern Ireland 4,527	No	Northern Ireland Data download from Northern Ireland Charity Commission (Charity Commission Northern Ireland, 2016) Export of all data to CSV then selection by categories "The advancement of environmental protection or improvement" and "The advancement of animal welfare"	Wales, Scotland and Northern Ireland data to remove duplicates before combining to create UK data set
	Scotland 24,159	No	Scotland Data download from Scottish Charity Regulator (OSCR Scottish Charity Register, 2016) then selection by categories: "The advancement of environmental protection or improvement" and "The advancement of animal welfare"	
Total	108,443			

5.2.1. Removal of duplicates

Where duplicates within a national list occurred these were automatically removed if the duplication was clear (for example organisations listed multiple times with an identical name or registration number). However, when organisations were registered with the relevant regulatory body under multiple names and granted multiple registration numbers duplicates were manually removed through identification of website duplication. The format of data obtained from the regulatory bodies was for the most part comprehensive but in some cases was not. In order to provide a basis for comparison and further assessment the following minimum information was required:

- Organisation Name
- Website
- Type of Organisation (based on regulatory body classification)
- Brief Details of Organisational Purpose
- Date of Financial Return
- Income
- Expenditure.

Where these elements were not included in the data collected from regulatory bodies this information was added manually when it was available from other sources.

For example where websites were not listed the process was facilitated using a simple Excel function

`=HYPERLINK("https://www.google.co.uk/#q=" & CELL).`

This was used to create a clickable Google search which could be run to identify the existence of a website for each omitted record. Where websites were identified these were manually checked to add the omitted website information. When financial details were omitted this information was added from published annual reports where available.

Where this information was not available or an organisation was found to no longer exist or have no online presence the organisation was removed.

5.2.2. Manual data cleaning to remove non-relevant results

The limitations of the in-built filtering within each country's data access portals meant that obtained data contained information relating to organisations not directly involved in conservation activities. For example the UK (England and Wales) data set included organisation where the "Charitable Purposes" includes Categories 111 "Animals" and 112

“Environment / Conservation / Heritage”. This meant that obtained information could include records for example related to organisations involved in pet rescue and rehoming (Category 111 “Animals”) or listed building conservation ((Category 112 “Heritage”). These were removed by manual review. Where an organisation’s name or the description included with its listing clearly identified its purpose this was accomplished by simple “Find and Remove” searches within the database. Where this information was not clear a simple website review allowed for inclusion or removal of the organisation from the list.

5.3. Creating national stratified lists

Following data cleaning, organisational lists for each country were stratified according to their level of expenditure in local currency. Although exchange rates are not equivalent for the five national currencies, for all countries the same strata were used:

- Micro: 100 – 10,000
- Small: 10,001 – 100,000
- Medium: 100,001 – 1,000,000
- Large: 1,000,001 – 5,000,000
- Very large: 5,000,001 +.

This stratification is broadly based on the classifications used for income in the UK Charity Commission (UK Government, 2016). However, income is not directly reflective of impact; organisations may have received substantial donations which have been used to, for example, supplement reserves or for income generating investment, so expenditure was a preferable measure. Where values of less than 100 were identified these were also removed as the impact of such low levels of expenditure (either directly on stated aims, or indirectly) are insufficient for consideration. Strata based on guidance from the other countries concerned were also considered where provided (only Australia (Australia Charities and Not for Profits Commission, 2016) and New Zealand (Charities Services New Zealand, 2016b)) but these did not provide sufficient granularity to classify the organisations for this purpose. A total of 208 case studies were finally selected. Details of location and size category of the final selection are shown in Table 5.2.

Table 5.2: Countries and organisations for inclusion in study

Country	Number of results	Number of case studies
Australia	Micro – 103	10
	Small – 181	10
	Medium – 184	10
	Large – 54	10
	Very large – 30	10
Canada	Micro – 105	10
	Small – 207	10
	Medium – 204	10
	Large – 56	10
	Very large – 25	10
Ireland	Micro – 1	1
	Small – 4	4
	Medium – 7	7
	Large – 2	2
	Very large - 2	2
New Zealand	Micro – 91	10
	Small – 91	10
	Medium – 70	10
	Large – 11	10
	Very large - 2	2
UK	Micro – 250	10
	Small – 225	10
	Medium – 188	10
	Large – 84	10
	Very large - 26	10

5.3.1. Comparison of stratification for similarity

The stratification of organisations based on expenditure provided a convenient method to group organisations to allow random selection of case studies. However as the study draws from multiple countries, local economic factors could make comparison unequal. A

simple assessment of the similarity of economic factors ensured that size categories for all countries were broadly similar to allow reliable comparisons by expenditure.

At first review, all the countries included within the study are broadly similar in terms of economic and development indicators; all are ranked within the 30 highest global economies based on both GDP Per Capita and for GDP Purchasing Power Parity for both 2014 and 2015 (the years for which expenditure data is used as the basis for organisational inclusion in this study).

Table 5.3: Included countries GDP Per Capita and GDP PPP Ranking 2014 and 2015

	GDP Per Capita		GDP Purchasing Power Parity	
	2014 Ranking	2015 Ranking	2014 Ranking	2015 Ranking
Australia	9	= 9	19	↓ 22
Canada	19	↓ 20	22	↓ 24
Ireland	14	↑ 8	14	↑ 8
New Zealand	23	↓ 28	30	= 30
UK	25	↑ 18	27	= 27

Adapted from World Bank GDP PC and PPP Data (World Bank, 2017)

This initial assessment suggested a comparative assessment based on economic factors is valid. Using Gross Domestic Product Purchasing Power Parity (GDP-PPP International \$) allows an alternative means of comparison of organisation size, grouping organisations by their expenditure in the context of their national economies which includes factors such as relative cost of living and inflation. Each stratum was recalculated as a percentage of the average GDP PPP for the two core years of data (2014 and 2015) for the appropriate country (Table 5.4).

Table 5.4: Classification strata as percentage of average GDP PPP (International \$) for 2014 and 2015

	Average GDP PPP 2014 and 2015 (International \$)	Classification Strata				
		100	10,000	100,000	1,000,000	5,000,000
Ireland	59,619.91	0.17	16.77	167.73	1,677.29	8,386.46
Australia	46,460.98	0.22	21.52	215.23	2,152.34	10,761.72
Canada	44,643.48	0.22	22.40	224.00	2,239.97	11,199.84
UK	41,238.24	0.24	24.25	242.49	2,424.93	12,124.67
New Zealand	37,565.59	0.27	26.62	266.20	2,662.01	13,310.05

Adapted from World Bank GDP PC and PPP Data (World Bank, 2017)

Each strata was then recalculated as an equivalent percentage of GDP PPP for each country using the lowest GDP PPP figure (New Zealand) as a base, essentially providing classification strata specific to each country based on that country's GDP PPP (Table 5.5).

Table 5.5 Classification strata re-categorised as weighted percentage of 2014/2015 year average GDP PPP GDP PPP (International \$)

	Micro	Small	Medium	Large	Very Large
New Zealand	100	10,000	100,000	1,000,000	5,000,000
Ireland	159	15,871	158,709	1,587,088	7,935,442
Australia	124	12,368	123,680	1,236,796	6,183,982
Canada	119	11,884	118,841	1,188,414	5,942,071
UK	110	10,978	109,777	1,097,767	5,488,833

These categories were then applied to the cleaned databases of organisations to assess the change on classifications. The resulting classifications showed that only 7% (157 of 2,189) organisations would need to be reclassified to a lower stratum. In order to allow the assessment exercise to be repeated the decision was made to maintain the existing unit based classification strata as the basis for random selection and assessment.

5.3.2. Years of financial return

For all countries the most recent available financial (expenditure) information at the point of review was requested from the data sources. This date varied depending on the location of the organisation as financial years and requirements for reporting vary according to location. For the majority of records, the most recent year of financial returns was 2014 and 2015. Where information for these years was unavailable, the most recent alternative was used allowing the organisation to be included in the study. Years of financial return for the eventual case study organisations are shown in Table 5.6.

Table 5.6: Year of data for case study organisations

	Administrative Year Selected	2013	2014	2015	2016	Undated
Australia	1 July 2014 – 1 June 2015	0	21	17	2	10
Canada	1 January 2014 – 31 December 2015	0	50	0	0	0
Ireland	1 January 2014 – 31 December 2015	0	15	1	0	0
New Zealand	1 April 2014 – 31 March 2015	6	6	29	0	1
UK	6 April 2014 – 5 April 2015	0	18	32	0	0
Total		6	110	79	2	11

5.4. Selecting case study organisations from national lists

After compiling complete lists for each country, these lists were subsequently broken down into separate lists for each stratum. Lists in Excel spreadsheet format were then sorted by Expenditure (from High to Low) and numbered within the table and 10 organisations from each stratum within each country were randomly selected (where 10 organisations were present), providing 208 organisations for review.

5.5. Selection of projects from websites

For each organisation a case study 'project' was selected for review. As websites are essentially 'live' documents the majority of websites do not provide 'index lists'. Attempts to index websites of organisations software do not provide sufficient results for most websites to allow a secondary round of random sampling.

Where possible a "Projects" home page was located. For many organisations this provided a chronological list of projects (new to old). For other organisations project details were provided within "News" pages, "About us" pages, within annual reports to donors or regulatory bodies, or were included within details of thematic areas of interest or topic (for example an organisation carrying out species level terrestrial conservation and campaigning activities relating to landscape conservation).

This lack of consistent publication of project information due to the differing structures within website design and the different processes used by organisations to publish and publicise their project activities meant there was no consistent way to randomly select projects for review from the websites of organisations returned by the initial random selection. Therefore the decision was made to select the most prominent project highlighted in the website. This method was selected as each represents a project highlighted as being important by the organisation concerned.

The potential approaches to conservation may be used in different ways and it is important to define what a conservation project is and ultimately how this project-focussed approach is supported by standardised methodologies and approaches to identify the areas of impact assessment that are included.

There are many definitions of projects, but all rely on the same distinct elements as shown in this definition from the Association of Project Management.

"A project is a unique, transient endeavour, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits. A project is usually deemed to be a success if it achieves the objectives according to their acceptance criteria, within an agreed timescale and budget."

Association of Project Management (2015)

Therefore a conservation project can be considered to be a conservation action that falls within the parameters of uniqueness, is time finite, with planned conservation outcomes. The definition of a project by necessity varies according to the size and type of organisation. For large organisations with complex activities, selecting projects for review is simple as these closely meet the project definition (and in most cases are self-defined by the organisation). However, for smaller organisations the following criteria were used to define a “project”:

- A project is unique and is not part of other elements of an organisation’s activities. It could exist independently of other activities.
- It is finite with a planned point where it will be finished.
- There are planned objectives.
- Success is measurable, by the achievement of the objectives.
- Secondary measures of success can be considered within acceptable timescales or within agreed cost parameters.

This allows for short activities carried out by organisations to be considered from a project point of view. For example an organisation arranging a volunteer clearance of an invasive plant from a local reserve site could be considered as a project as shown in Table 5.7.

Table 5.7: Exemplar small project criteria

Criteria	Exemplar project
Unique	The organisation does not spend all its time on this specific vegetation clearance (this is an occasional or periodic activity at the site)
Finite	Volunteer work party to last one day
Planned objectives	Aim to clear 200m stretch of river bank
Success measurable	Was 200m cleared?
Secondary measures of success	Was less than 200m cleared, but alternative work also completed? Were conditions unfavourable? Was more than 200mm cleared? Etc.

5.6. Case study assessment framework

An assessment framework was designed to capture relevant data regarding both the management of the organisation and specific details relating to the measurement and evaluation of specific projects. The framework includes recording of background details of management processes and approaches (as described in Section 2) as well as specific information relating to assessment of impacts from projects. This approach is based on EIA thematic methodologies relating to the specific areas of assessment:

- Socio-economic impacts (economic and social)
- Noise
- Transport
- Landscape and visual impacts
- Heritage
- Air quality and climate
- Soils, geology and geomorphology (including coastal geology and geomorphology)
- Water
- Ecology.

Glasson, Chadwick and Therivel (2012)

This structure also forms the basis of the theoretical 'impact scoping' exercise undertaken for each organisation. Based on the descriptions of the projects published by each organisation the likely impacts that could/should have been evaluated were 'scoped'. The framework is summarised in Table 5.8. Each measure included for assessment is designed to provide an alternative measure of an organisation's activities and approach to delivery of conservation aims.

Table 5.8: Assessment Framework

Area	Detail	Justification
Background details	Country	Are there differences in impact reporting between the countries included in the study?
	Size	Are there differences in impact reporting between the organisation size categories?
	What are the main aims of the organisation?	Are there differences in impact reporting between projects with different approaches?
Project Management Approaches	How are activities delivered (by paid staff and/or volunteers)?	Are there differences in impact reporting between organisations that employ paid staff and those that do not? Are there differences in impact reporting between organisations that use volunteers and those that do not?
	Are organisational project management approaches included?	Are there differences in impact reporting between organisations with and without project management methods?
Project Reporting	Project report format	Are there differences in impact reporting between report formats?
	Date(s) of most high-profile project listed	Are there differences in impact reporting between project dates (start, end)?
	Location of most high-profile project listed	Are there differences in impact reporting between projects in different locations?
	What conservation approaches are used in the most high-profile project listed?	Are there differences in impact reporting between projects with different approaches?
	Project budget	Are there differences in impact reporting between projects of different costs?
	Project duration	Are there differences in impact reporting between projects of different durations?
	Project staff details	Are there differences in impact reporting between organisations that give details of project staff and those that do not?
Impacts	Which impacts are considered in report(s) Ecology Socio-economic Noise Transport Landscape and visual Heritage Air quality and climate Soils, geology, geomorphology (inc. coastal) Water	Comparison with organisation / project characteristics

5.7. Method of case study review

In order to provide an efficient method of data collection during reviews the case study assessment template was translated into a “Google Form”. This provided a simple interface for data collection and allowed for outputs as a “Google Sheet” allowing for export to other software for later analysis. For most categories, response options were standardised. In addition free text fields allowed collection of additional information and contextual information where required.

Where categorical responses could be multiple and provide useable information, for example in the conservation approaches used within a project, all categorical variables were recorded. In other situations, for example in reporting methods, this information was recorded as the most complex method employed.

NVivo software was trialled as a method to automatically carry out text searches to extract relevant information. However the complexity of the documentation being reviewed meant that searches for text-strings and critical key words returned both relevant and irrelevant information. This then required complete document reading to extract relevant critical information and the process was therefore slower than manual extraction of the data.

5.8. Manual data collection

Selection bias for information was a central consideration in the decision to review published documents rather than undertake a survey based assessment of organisations. Interview/questionnaire approaches can lead to inconsistency in results between organisations because it might be perceived that the overall process could be considered to be a criticism of organisational function. Furthermore there is potential for only those organisations considering that they are already engaging in ‘positive’ behaviours to respond and organisations could provide only positive information. Additionally the levels of information requested would favour organisations with sufficient staffing available to respond to the questions, while smaller organisations may be less likely to respond.

6. Results: Current practice of impact reporting in non-profit conservation organisation project reports

6.1. Aims and Objectives

This section aims to assess the current status of comprehensive impact inclusion within non-profit conservation organisation project reports. Further, this section will test the hypotheses that both organisational characteristics and project characteristics are linked to the inclusion of 'impacts' within conservation project case studies.

This section of the study therefore has two aims:

1. To compare the frequency of included impacts within the case studies.
2. To identify whether organisational and project characteristics are linked to the inclusion of impacts.

Each section therefore provides summary data regarding the impacts included within reports and tests the null hypothesis that Characteristic "X" has no link to the inclusion of impacts.

6.2. Hypotheses

Three hypotheses were tested (where appropriate) for each area of organisational and project characteristic to assess the comprehensiveness of impact consideration in current approaches:

Hypothesis 1: Organisational / project characteristic "X" is not linked to the inclusion of any impact in project reports.

Hypothesis 2: Organisational / project characteristic "X" is not linked to the number of impacts included in project reports.

Hypothesis 3: Organisational / project characteristic "X" is not linked to the inclusion of impact "Y" in project reports.

6.3. Statistical tests

To compare the inclusion of impacts (Hypothesis 1) and the inclusion of specific impacts between different organisational categories (Hypothesis 3) extensions of Fisher's exact test were used (Rose and Sullivan, 1996). Where significant differences were identified, Fisher's exact tests were repeated between the individual pairs to identify the specific source of the difference, using the Bonferroni correction to set appropriate significance levels based on the number of comparisons (McDonald, 2014). Kruskal-Wallis tests with Dunn's *post hoc* tests were used to compare the number of impacts included against organisational characteristics (Hypothesis 2). All tests were carried out using IBM SPSS Statistics 25.

6.4. Summary of Study

6.4.1. Case Study Reviews Undertaken

A total of 208 case study organisations were reviewed from a proposed 250 (Table 6.1) from five case study countries (Australia, Canada, Ireland, New Zealand, UK) and five size categories (established based on annual organisational expenditure). Where fewer than the proposed 250 case studies were undertaken this was due to the limited number of organisations in existence within the size/country in question.

Table 6.1: Case Study Reviews Undertaken

	Size Category					Total
	Micro	Small	Medium	Large	Very large	
Australia	10	10	10	10	10	50
Canada	10	10	10	10	10	50
Ireland	1	4	7	2	2	16
New Zealand	10	10	10	10	2	42
UK	10	10	10	10	10	50
Total	41	44	47	42	34	208

6.4.2. Publication of Project Information

The majority of reviewed organisations (72.7%) publish details of their projects (Table 6.2). However, there were multiple occasions of organisations where no details of projects

were published. The approach to publication is largely consistent between organisations' locations.

Table 6.2: Publication of Project Information by Organisation's Country of Registration

	Project Listed		No project listed	
Australia (<i>n</i> =50)	37	(74.0%)	13	(26.0%)
Canada (<i>n</i> =50)	37	(74.0%)	13	(26.0%)
Ireland (<i>n</i> =16)	11	(68.8%)	5	(31.3%)
New Zealand (<i>n</i> =42)	33	(78.6%)	9	(21.4%)
UK (<i>n</i> =50)	34	(68.0%)	16	(32.0%)
Average	30.4	(72.7%)	11.2	(27.3%)

There is however greater variation by size, with the largest category of organisation most likely to publish details of projects (Table 6.3).

Table 6.3: Publication of Project Information by Organisation's Size Category

	Project listed		No project listed	
Micro (<i>n</i> =41)	25	(61.0%)	16	(39.0%)
Small (<i>n</i> =44)	22	(50.0%)	22	(50.0%)
Medium (<i>n</i> =47)	35	(74.5%)	12	(25.5%)
Large (<i>n</i> =42)	38	(90.5%)	4	(9.5%)
Very large (<i>n</i> =34)	32	(94.1%)	2	(5.9%)
Average	30.4	74.0%	11.2	26.0%

6.4.3. Inclusion of impacts

Comparison of organisational information to impact assessment inclusion showed that 146 of 152 (96.1%) projects reviewed included at least one element of impact assessment (consideration of one impact).

Inclusion of “Ecological” category impacts is found in the majority of project reports. However, for certain impact categories the frequency of inclusion is much higher than others (Table 6.4). For example 92.8% of projects included an assessment of “Ecological” category impacts, while only 4.6% included any assessment of “Noise” category impacts.

Table 6.4: Proportion of projects including impact by type

	Projects Including Impact (<i>n</i> =152)	
Ecological	141	(92.8%)
Socio-economic	88	(57.9%)
Noise	7	(4.6%)
Transport	13	(8.6%)
Landscape and visual	49	(32.2%)
Heritage	38	(25%)
Air quality and climate	16	(10.5%)
Soils, geology, geomorphology	31	(20.4%)
Water	38	(25%)

6.4.4. Comprehensiveness of impact assessment

As a proxy for comprehensiveness, the number of impacts included in each report was assessed. The majority of reports included a single impact (largely “Ecological” category impact) while only two reports in the study made reference to all nine categories of impact (Figure 6.1).

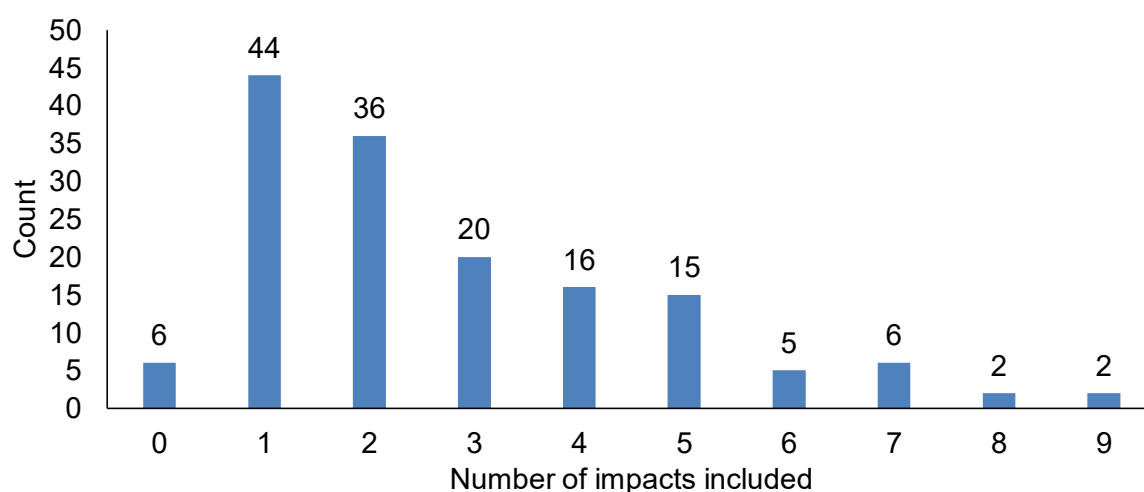


Figure 6.1: The number of studies including between zero and nine impact categories

6.5. Organisational characteristics and links to impacts

6.5.1. Country of organisation

It is possible that the consideration of any impacts, the number of impacts considered, and the frequency with which each impact is considered may vary between the countries of the organisations.

Inclusion of any impact and number of impacts reported

There was no relationship between the country of organisation and the general approach to inclusion of impacts (Fisher's Exact Test (2-sided) $P=0.745$), nor between the number of impacts included and the country of organisation (Table 6.5).

Table 6.5: Country and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis test
		0	1	2	3	4	5	6	7	8	9	
Australia	2	1	10	9	4	4	4	1	2	1	1	H=2.461 P=0.652
Canada	3	1	11	6	9	4	4	0	1	1	0	
Ireland	2	1	3	3	0	2	0	1	1	0	0	
New Zealand	2	1	9	8	3	3	5	2	1	0	1	
UK	2	2	11	10	4	3	2	1	1	0	0	

H=Kruskal-Wallis Test. P=Significance. Degrees of Freedom = 4

Inclusion of specific impacts

Further comparison was undertaken to compare whether the individual impacts assessed differ between the countries of origin of the organisation (Figure 6.2). Universally, "Ecological" and "Socio-economic" category impacts were included the most frequently in all countries and followed in general by "Landscape and visual" category impacts. Other impacts were more variably reported by organisations from different countries. The reporting of "Heritage" category impacts was the only impact that differed significantly between countries (Table 6.6), with the UK and Canada including them the least and Australia and New Zealand including them the most.

Post hoc repetition of Fisher's exact test comparing each pair showed no specific significant differences between countries for this impact category when results were adjusted using the Bonferroni correction.

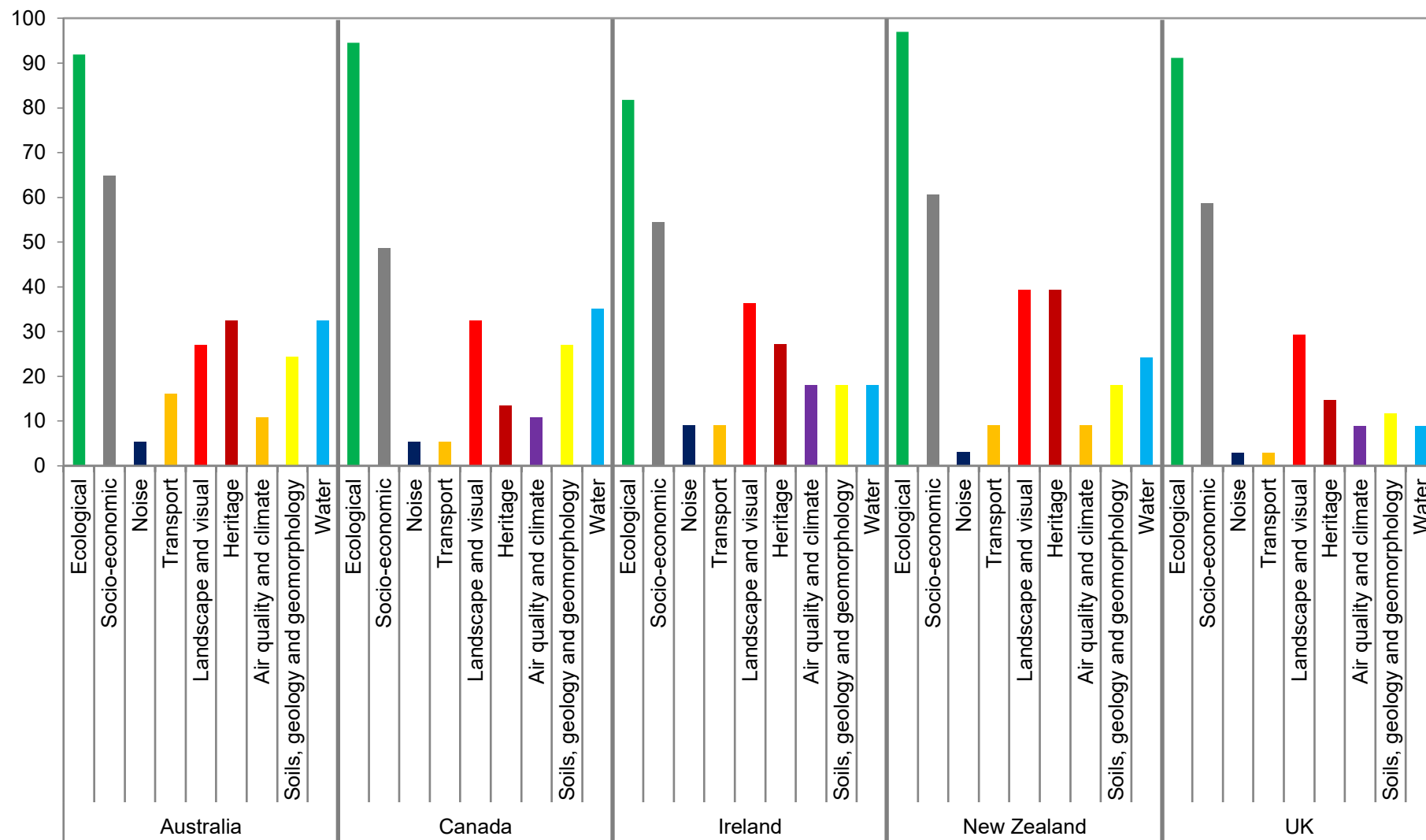


Figure 6.2: Percentage of country category including impact

Table 6.6: Country and specific impacts included significance summary

	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	0.467
Socio-economic	0.705
Noise	0.869
Transport	0.316
Landscape and visual	0.835
Heritage	0.050
Air quality and climate	0.916
Soils, geology, geomorphology	0.551
Water	0.068

6.5.2. Organisation size

Potentially the consideration of any impacts, the number of impacts considered, and the frequency with which each impact is considered may vary by the size of the organisation.

Inclusion of any impact and number of impacts reported

There was no relationship between the overall inclusion of impacts and the size of organisation (Fisher's Exact Test (2-sided) $P=0.500$). There was strong evidence of a difference between the number of impacts included and organisational size with a tendency for larger organisations to include more impacts (Table 6.7). However there was only a significant difference between "Micro" and "Large" organisations (Dunn's *post hoc* test $P=0.027$, applying Bonferroni correction) and between "Micro" and "Very large" organisations (Dunn's *post hoc* test $P=0.001$, applying Bonferroni correction).

Table 6.7: Size and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis test
		0	1	2	3	4	5	6	7	8	9	
Micro	1	1	17	2	1	1	3	0	0	0	0	H=18.235 P=0.001
Small	2	2	6	7	1	5	1	0	0	0	0	
Medium	2	1	8	11	7	3	1	1	2	0	1	
Large	3	2	4	10	5	3	7	3	2	1	1	
Very large	3	0	9	6	6	4	3	1	2	1	0	

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 4

Inclusion of specific impacts

Further comparison was undertaken to compare the individual impacts assessed to the size of the organisation (Figure 6.3, Table 6.8). "Ecological" and "Socio-economic" category impacts were the most frequently included across all size categories. The likelihood of most impact categories being included varied between different sized organisations, but only "Socio-economic", "Soil, geology and geomorphology", and "Water" category impacts differed significantly. *Post hoc* repetition of Fisher's exact test comparing each pair showed "Large" organisations included "Socio-economic" category

impacts significantly more frequently than “Micro” category organisations (Fisher’s Exact Test (2-sided) $P=0.001$, applying Bonferroni correction).

For both “Soils, geology, geomorphology” and “Water” the same *post hoc* tests showed no significant differences between the size categories.

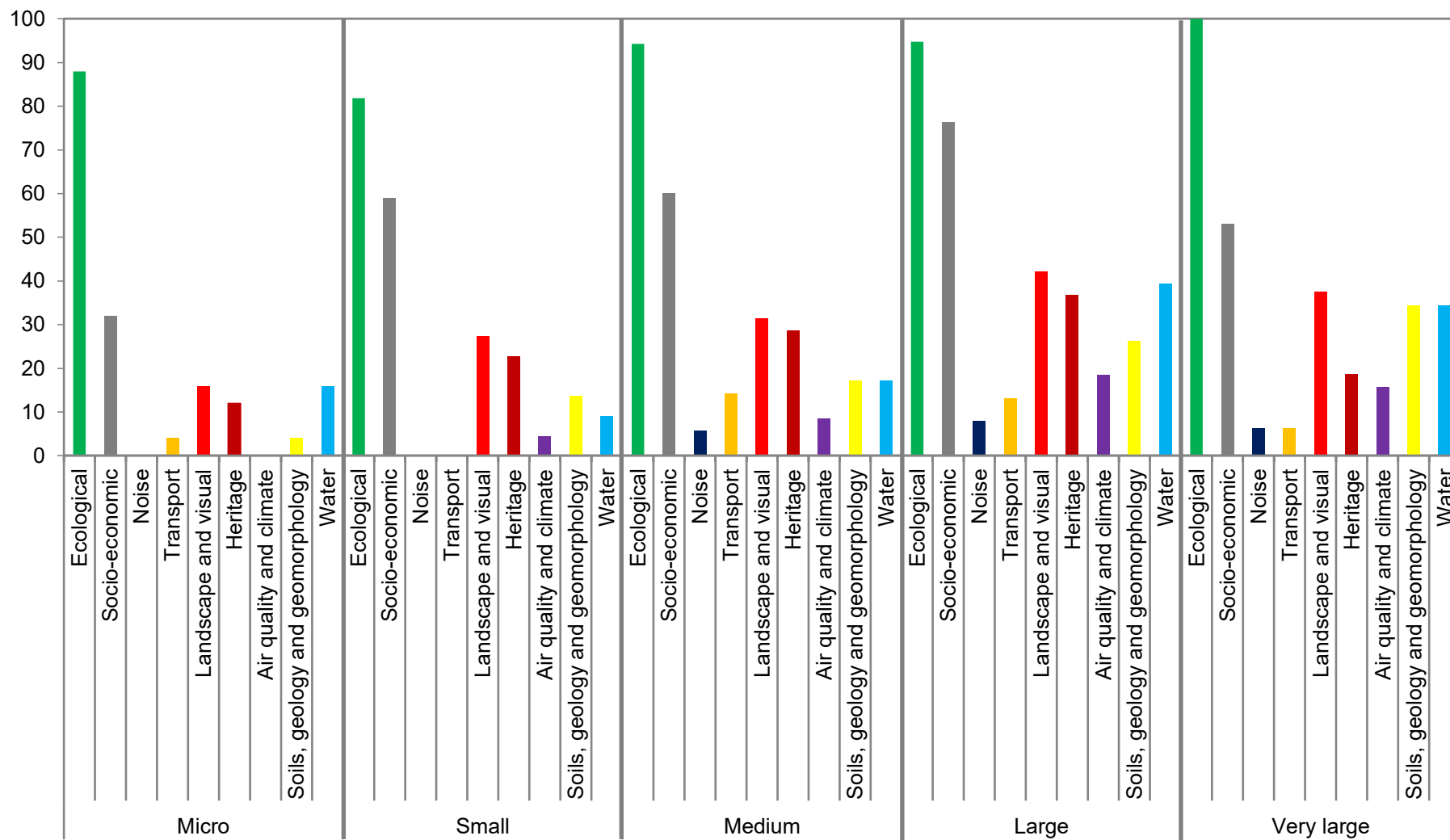


Figure 6.3: Percentage of size category including impact

Table 6.8: Size and specific impacts included significance summary

	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	0.082
Socio-economic	0.013
Noise	0.570
Transport	0.267
Landscape and visual	0.251
Heritage	0.207
Air quality and climate	0.110
Soils, geology, geomorphology	0.042
Water	0.030

6.5.3. Organisational aim

Organisations may have more than one conservation aim. This section compares the conservation aims held by organisations with the impacts included in their reports. Where an organisation included multiple conservation aims the comparison was repeated for each aim, thus allowing the identification of links between the aims included and the likelihood of any impact being included, the number of impacts included and the frequency with which specific impacts are included.

Inclusion of any impact

The inclusion of any impacts in relation to the stated aims of the included organisations (across all projects and activities) is summarised in Table 6.9. There were no differences between organisational aims and the inclusion of any impacts.

Table 6.9: Organisational aim

Organisational aim		Organisations Including Any Impact		Fisher's Exact Test (2-sided) <i>P</i>
Habitat protection	(<i>n</i> =95)	89	(93.7%)	0.084
Breeding	(<i>n</i> =22)	22	(100.0%)	0.594
Species protection	(<i>n</i> =65)	62	(95.4%)	1.000
Education	(<i>n</i> =112)	109	(97.3%)	0.187
Legislation	(<i>n</i> =47)	46	(97.9%)	0.667
Alternative livelihoods	(<i>n</i> =15)	15	(100.0%)	1.000
Research / Monitoring	(<i>n</i> =57)	55	(96.5%)	1.000
Campaigns	(<i>n</i> =28)	27	(96.4%)	1.000
Funder	(<i>n</i> =6)	6	(100.0%)	1.000
Representation	(<i>n</i> =4)	4	(100.0%)	1.000

Number of impacts included

The inclusion of different aims equated to differing numbers of impacts being reported (Table 6.10). Organisations that included "Habitat protection" as an aim differed from organisations that did not. Although the tests showed that for organisations including

“Representation” as an aim the number of impacts included differed from organisations not including that aim, the sample size of such organisations was low ($n=4$). For all other comparisons inclusion of an aim did not result in differing distributions of the number of impacts reported compared to organisations without that aim (Kruskal-Wallis tests, $P>0.15$ in all cases).

Table 6.10: Organisational aims and number of impacts included (frequency)

Organisational aim	Included?	Median Number of Impacts Included	Number of impacts included (frequency)											Kruskal-Wallis Test
			0	1	2	3	4	5	6	7	8	9		
Habitat protection	Yes	3	6	19	19	16	12	12	4	4	1	2	H=6.767 P=0.009	
	No	2	0	25	17	4	4	3	1	2	1	0		
Breeding	Yes	3	0	3	7	7	2	0	1	1	0	1	H=1.430 P=0.232	
	No	2	6	41	29	13	14	15	4	5	2	1		
Species protection	Yes	2	3	21	14	9	9	3	2	3	0	1	H=0.887 P=0.346	
	No	2	3	23	22	11	7	12	3	3	2	1		
Education	Yes	2	3	31	27	18	11	8	4	6	2	2	H=1.115 P=0.291	
	No	2	3	13	9	2	5	7	1	0	0	0		
Legislation	Yes	3	1	12	10	7	5	7	2	3	0	0	H=1.589 P=0.207	
	No	2	5	32	26	13	11	8	3	3	2	2		
Alternative livelihoods	Yes	2	0	2	7	3	2	1	0	0	0	0	H=0.056 P=0.813	
	No	2	6	42	29	17	14	14	5	6	2	2		
Research / Monitoring	Yes	3	2	18	18	6	4	5	1	2	1	0	H=1.748 P=0.186	
	No	2	4	26	18	14	12	10	4	4	1	2		
Campaigns	Yes	2	1	11	5	1	2	5	1	1	1	0	H=0.122 P=0.727	
	No	2	5	33	31	19	14	10	4	5	1	2		
Funder	Yes	2	0	2	2	1	0	0	0	1	0	0	H=0.049 P=0.824	
	No	2	6	42	34	19	16	15	5	5	2	2		
Representation	Yes	5.5	0	0	1	0	1	0	0	1	0	1	H=4.187 P=0.041	
	No	2	6	44	35	20	15	15	5	5	2	1		

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

Inclusion of specific impacts

The inclusion of specific impact types by organisational aim are summarised in Table 6.11. Using Fisher's exact tests showed organisations that included the aim of "Habitat protection" included "Soils, geology, geomorphology" category impacts more frequently than organisations without that aim, while organisations with the aim of "Representation" included both "Noise", "Transport" and "Heritage" category impacts more frequently than organisations without that aim.

Organisations with the aim of "Species protection" included "Water" category impacts less frequently than organisations without that aim. Organisations with the aim of "Campaigns" included "Socio-Economic" category impacts less frequently than organisations without that aim.

However for the majority of comparisons (84 from 90) there was no significant association between organisational aims and the inclusion of impacts.

Table 6.11: Organisational aim and specific impacts included significance summary

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research / Monitoring		Campaigns		Funder		Representation	
	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %
Ecological	91.6	94.7	100.0	91.5	93.8	92.0	94.6	87.5	97.9	90.5	100.0	92.0	91.2	93.7	96.4	91.9	83.3	93.2	75.0	93.2
<i>P</i>	0.538		0.368		0.759		0.159		0.174		0.603		0.748		0.690		0.368		0.262	
Socio-economic	63.2	49.1	68.2	56.2	53.8	60.9	58.0	57.5	57.4	58.1	66.7	56.9	52.6	61.1	39.3	62.6	83.3	56.8	75.0	57.4
<i>P</i>	0.094		0.355		0.410		1.000		1.000		0.586		0.315		0.033		0.402		0.639	
Noise	6.3	1.8	9.1	3.8	4.6	4.6	6.3	0.0	4.3	4.8	0.0	5.1	5.3	4.2	0.0	5.7	16.7	4.1	50.0	3.4
<i>P</i>	0.257		0.267		1.000		0.191		1.000		1.000		1.000		0.349		0.250		0.010	
Transport	8.4	8.8	4.5	9.2	7.7	9.2	9.8	5.0	2.1	11.4	0.0	9.5	5.3	10.5	10.7	8.1	0.0	8.9	50.0	7.4
<i>P</i>	1.000		0.693		1.000		0.515		0.066		0.365		0.373		0.709		1.000		0.037	
Landscape	37.9	22.8	45.5	30.0	30.8	33.3	33.0	30.0	34.0	31.4	20.0	33.6	26.3	35.8	32.1	32.5	16.7	32.9	75.0	31.1
<i>P</i>	0.073		0.216		0.861		0.844		0.851		0.388		0.283		1.000		0.665		0.099	
Heritage	28.4	19.3	36.4	23.1	29.2	21.8	25.0	25.0	25.5	24.8	26.7	24.8	19.3	28.4	35.7	22.8	0.0	26.0	75.0	23.6
<i>P</i>	0.248		0.191		0.346		1.000		1.000		1.000		0.248		0.157		0.337		0.048	
Air quality and climate	12.6	7.0	9.1	10.8	6.2	13.8	11.6	7.5	17.0	7.6	0.0	11.7	7.0	12.6	17.9	8.9	16.7	10.3	50.0	9.5
<i>P</i>	0.414		1.000		0.182		0.563		0.092		0.370		0.414		0.179		0.493		0.055	
Soils, geology, geomorphology	27.4	8.8	18.2	20.8	18.5	21.8	22.3	15.0	27.7	17.1	26.7	19.7	19.3	21.1	17.9	21.1	33.3	19.9	50.0	19.6
<i>P</i>	0.006		1.000		0.687		0.370		0.190		0.509		0.838		0.800		0.602		0.185	
Water	30.5	15.8	18.2	26.2	15.4	32.2	27.7	17.5	34.0	21.0	13.3	26.3	21.1	27.4	28.6	24.4	16.7	25.3	50.0	24.3
<i>P</i>	0.053		0.596		0.023		0.287		0.105		0.359		0.442		0.636		1.000		0.260	

P=Fisher's exact test (2-sided) Significance

6.5.4. Organisational employment of paid staff

It may be expected that organisations that use paid staff more likely to have (time) resources to dedicate to reporting and therefore are more likely to consider any impacts, may consider more impacts and may consider each impact more frequently.

Inclusion of any impact and number of impacts reported

Some organisations employ staff while others rely on volunteer effort. Despite this there was no association between the specification of use of paid staff and the general inclusion of impacts (Fisher's Exact Test (2-sided) $P=0.381$). However, organisations specifying using paid staff included significantly more impacts than those that did not specify paid staff (Table 6.12).

Table 6.12: Paid staff specified and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Paid staff specified	2.5	3	22	27	16	11	11	5	5	2	2	H=10.340
Paid staff NOT specified	1	3	22	9	4	5	4	0	1	0	0	$P=0.001$

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 1

Inclusion of specific impacts

Organisations specifying paid staff tended to report “Ecological”, “Landscape and visual”, “Air quality and climate”, “Soils, geology, geomorphology”, and “Water” category impacts more frequently than those that did not (Table 6.13).

Table 6.13: Employment of paid staff and specific impacts included significance summary

	Organisations using Paid Staff including impact (n=104)		Organisations NOT using Paid Staff including impact (n=48)		Fisher’s Exact Test (2-sided) P
Ecological	100	(96.2%)	41	(85.4%)	0.037
Socio-economic	65	(62.5%)	23	(47.9%)	0.112
Noise	7	(6.7%)	0	(0.0%)	0.098
Transport	10	(9.6%)	3	(6.3%)	0.756
Landscape and visual	40	(38.5%)	9	(18.8%)	0.016
Heritage	28	(26.9%)	10	(20.8%)	0.546
Air quality and climate	15	(14.4%)	1	(2.1%)	0.022
Soils, geology, geomorphology	26	(25.0%)	5	(10.4%)	0.050
Water	31	(29.8%)	7	(14.6%)	0.047

6.5.5. Organisational use of volunteers

Organisations that rely on volunteers have less skill / experience in reporting and therefore may be less likely to consider any impacts, consider fewer impacts and consider each impact less frequently.

Inclusion of any impact and number of impacts reported

In addition to the use of paid staff some organisations specified the use of volunteers, while others did not. Organisations that specified use of volunteers were compared to organisations that did not specify use of volunteers but showed no significant difference between the general inclusion of impacts (Fisher's Exact Test (2-sided) $P=0.182$). There was also no difference between organisations specifying volunteers and organisations not specifying volunteers and the number of impacts included (Table 6.14).

Table 6.14: Volunteers specified and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Volunteers specified	2	6	33	25	13	12	8	2	5	2	2	H=1.656
Volunteers NOT specified	2.5	0	11	11	7	4	7	3	1	0	0	P=0.198

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 1

Inclusion of specific impacts

Organisations specifying use of volunteers tended to report “Socio-Economic” category impacts more frequently than organisations that did not use volunteers (Table 6.15).

Table 6.15: Employment of volunteers and specific impacts included significance summary

	Organisations using Volunteers including impact (n=108)		Organisations NOT using Volunteers including impact (n=44)		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	98	(90.7%)	43	(97.7%)	0.178
Socio-economic	55	(50.9%)	33	(75%)	0.007
Noise	6	(5.6%)	1	(2.3%)	0.674
Transport	11	(10.2%)	2	(4.5%)	0.349
Landscape and visual	37	(34.3%)	12	(27.3%)	0.449
Heritage	29	(26.9%)	9	(20.5%)	0.536
Air quality and climate	13	(12%)	3	(6.8%)	0.401
Soils, geology, geomorphology	19	(17.6%)	12	(27.3%)	0.189
Water	23	(21.3%)	15	(34.1%)	0.104

6.5.6. Project management approach

Organisations that detail their approach to project management may be more likely to consider any impacts, may consider more impacts and may consider each impact more frequently.

Inclusion of any impact and number of impacts reported

Few ($n=25$ versus $n=127$) organisations specified that project management approaches were adopted, but whether this was included or not did not change the likelihood that impacts were included in reporting or not (Fisher's Exact Test (2-sided) $P=0.590$). However, the number of impacts included (Table 6.16) was significantly greater where a project management approach was reportedly adopted.

Table 6.16: Project management approach provided and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Project management approach specified	3	0	4	5	7	2	2	2	0	1	2	H=5.015
Project management approach NOT specified	2	6	40	31	13	14	13	3	6	1	0	P=0.025

H=Kruskal-Wallis Test. P=Significance. Degrees of Freedom = 1

Inclusion of specific impacts

When project management methods were included “Socio-economic” and “Soils, geology, geomorphology” category impacts were more frequently included than when methods were not included (Table 6.17). There were no differences in the proportions of other impact categories.

Table 6.17: Project management approach provided and specific impacts included significance summary

	Project Management Approach provided including impact (n=25)		Project Management Approach NOT provided including impact (n=127)		Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	25	(100.0%)	116	(91.3%)	0.213
Socio-economic	19	(76.0%)	69	(54.3%)	0.049
Noise	2	(8.0%)	5	(3.9%)	0.324
Transport	4	(16.0%)	9	(7.1%)	0.230
Landscape and visual	11	(44.0%)	38	(29.9%)	0.241
Heritage	9	(36.0%)	29	(22.8%)	0.206
Air quality and climate	3	(12.0%)	13	(10.2%)	0.729
Soils, geology, geomorphology	10	(40.0%)	21	(16.5%)	0.013
Water	8	(32.0%)	30	(23.6%)	0.449

6.5.7. Staff list provided

The inclusion of a staff list suggests that an organisation includes more details in general so may be more likely to consider any impacts, may consider more impacts and may consider each impact more frequently.

Inclusion of any impact and number of impacts reported

There was no association between the inclusion of details of staff engaged on projects and the likelihood of reporting impacts (Fisher's Exact Test (2-sided) $P=0.210$). However, where details were provided more impacts were included (Table 6.18).

Table 6.18: Staff list provided and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Staff list provided	3	1	11	24	11	10	7	4	4	2	1	H=12.328
Staff list NOT provided	2	5	33	12	9	6	8	1	2	0	1	$P<0.001$

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 1

Inclusion of specific impacts

A greater proportion of projects including a staff list reported “Socio-economic”, “Landscape and visual” and “Air quality and climate” category impacts (Table 6.19) than projects that did not.

Table 6.19: Staff list provided and specific impacts included significance summary

	Organisations providing staff lists including impact <i>n</i> =75		Organisations NOT providing staff lists including impact <i>n</i> =77		Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	68	(88.3%)	73	(97.3%)	0.056
Socio-economic	51	(68%)	37	(48.1%)	0.014
Noise	5	(6.7%)	2	(2.6%)	0.273
Transport	7	(9.3%)	6	(7.8%)	0.779
Landscape and visual	31	(41.3%)	18	(23.4%)	0.024
Heritage	24	(32%)	14	(18.2%)	0.061
Air quality and climate	12	(16%)	4	(5.2%)	0.036
Soils, geology, geomorphology	19	(25.3%)	12	(15.6%)	0.161
Water	22	(29.3%)	16	(20.8%)	0.263

6.5.8. Trustees / advisory board list provided

It may be expected that organisations that have a list of trustees have a higher level of oversight so are more likely to consider any impacts, may consider more impacts and may consider each impact more frequently.

Inclusion of any impact and number of impacts reported

There was no association between whether details of trustees / advisory boards were given or not and whether impacts were reported or not (Fisher's Exact Test (2-sided) $P=0.198$), but organisations which provided this comprehensive information did detail more impacts within reports than those that did not (Table 6.20).

Table 6.20: Trustees / advisory board information provided and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Trustees / advisory board provided	3	2	20	24	15	12	10	4	5	2	1	H=9.994
Trustees / advisory board NOT provided	2	4	24	12	5	4	5	1	1	0	1	$P=0.002$

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 1

Inclusion of specific impacts

Whether details of trustees and/or advisory boards were reported or not, there were no differences in the impacts reported apart from “Socio-economic” category impacts. Organisations providing this detail tended to report a greater proportion of “Socio-economic” category impacts in their statements (Table 6.21).

Table 6.21: Trustees / advisory board information provided and specific impacts included significance summary

	Organisations providing details of trustees / advisory boards including impact		Organisations NOT providing details of trustees / advisory boards including impact		Fisher's Exact Test (2-sided) <i>P</i>
	<i>(n=95)</i>		<i>(n=57)</i>		
Ecological	91	(95.8%)	50	(87.7%)	0.102
Socio-economic	62	(65.3%)	26	(45.6%)	0.027
Noise	6	(6.3%)	1	(1.8%)	0.257
Transport	9	(9.5%)	4	(7%)	0.768
Landscape and visual	36	(37.9%)	13	(22.8%)	0.073
Heritage	29	(30.5%)	9	(15.8%)	0.053
Air quality and climate	12	(12.6%)	4	(7%)	0.414
Soils, geology, geomorphology	22	(23.2%)	9	(15.8%)	0.306
Water	28	(29.5%)	10	(17.5%)	0.123

6.6. Project specific characteristics and links to impact assessment

In addition to the assessment of organisational characteristics, specific project related information was collected.

6.6.1. Project location

Projects may take place within the country of the organisation, or in another country. It is possible that the consideration of any impacts, the number of impacts considered, and the frequency with which each impact is considered may vary by project location.

Inclusion of any impact and number of impacts reported

Comparison of the location of projects (activities within the country of organisation / activities outside the country of organisation) showed no difference between the inclusion of any impact (Fisher's Exact Test (2-sided) $P=0.590$), and no difference between the number of impacts reported (Table 6.22).

Table 6.22: Project location and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Within Country of Organisation	2	6	37	25	16	14	13	5	6	2	2	H=0.648
Outside Country of Organisation	2	0	7	11	4	2	2	0	0	0	0	P=0.421

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 1

Inclusion of specific impacts

There were no differences in the reporting of specific impacts between projects within the country of organisation and projects outside the country of organisation except in “Water” category impacts (Table 6.23).

Table 6.23: Project location (within country of organisation or outside country of organisation) and specific impacts included significance summary

	Project within country of organisation including impact (n=126)		Project outside country of organisation including impact (n=26)		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	115	(91.3%)	26	(100.0%)	0.213
Socio-economic	71	(56.3%)	17	(65.4%)	0.514
Noise	6	(4.8%)	1	(3.8%)	1.000
Transport	12	(9.5%)	1	(3.8%)	0.699
Landscape and visual	43	(34.1%)	6	(23.1%)	0.359
Heritage	34	(27%)	4	(15.4%)	0.319
Air quality and climate	15	(11.9%)	1	(3.8%)	0.309
Soils, geology, geomorphology	29	(23%)	2	(7.7%)	0.108
Water	37	(29.4%)	1	(3.8%)	0.005

6.6.2. Conservation approach

Projects may focus on more than one of the conservation approaches listed. This section compares the conservation approaches used with the impacts included. Where a project employs more than one conservation approach the comparison was repeated for each approach used, thus establishing links between the approaches utilised and the likelihood of any impact being included, the number of impacts included and the frequency with which specific impacts are included.

Inclusion of any impact and number of impacts reported

Comparing the conservation approaches with the inclusion of any impact provides no significant results (Table 6.24) therefore there are no associations between the variables.

Table 6.24: Conservation approach and any impact included

		Impact included		Fisher's Exact Test (2-sided) <i>P</i>
Habitat protection	(<i>n</i> =78)	75	(96.2%)	1.000
Breeding	(<i>n</i> =12)	12	(100.0%)	1.000
Species protection	(<i>n</i> =59)	59	(100.0%)	0.082
Education	(<i>n</i> =62)	61	(98.4%)	0.402
Legislation	(<i>n</i> =7)	7	(100.0%)	1.000
Alternative Livelihoods	(<i>n</i> =17)	17	(100.0%)	1.000
Research / Monitoring	(<i>n</i> =63)	59	(93.7%)	0.233
Campaigns	(<i>n</i> =20)	20	(100.0%)	1.000

Projects including “Habitat Protection” approaches included significantly more impacts than those that did not. Projects including “Education” approaches included significantly more impacts than those that did not. Projects including “Legislation” approaches included significantly more impacts than those that do not (Table 6.25).

Table 6.25: Conservation approach and number of impacts included (frequency)

Approach	Used?	Median Number of Impacts Included	Number of impacts included (frequency)											Kruskal- Wallis Test <i>P</i>
			0	1	2	3	4	5	6	7	8	9		
Habitat protection	Yes	3	3	14	10	13	15	13	3	5	1	1	H=21.741 <i>P</i> <0.001	
	No	2	3	30	26	7	1	2	2	1	1	1		
Breeding	Yes	2	0	3	5	1	1	0	1	0	0	1	H=0.008 <i>P</i> =0.930	
	No	2	6	41	31	19	15	15	4	6	2	1		
Species protection	Yes	2	0	20	16	5	10	3	3	1	0	1	H=0.191 <i>P</i> =0.662	
	No	2	6	24	20	15	6	12	2	5	2	1		
Education	Yes	3	1	11	18	10	7	6	4	3	0	2	H=6.257 <i>P</i> =0.012	
	No	2	5	33	18	10	9	9	1	3	2	0		
Legislation	Yes	5	0	1	1	0	0	3	1	0	1	0	H=4.685 <i>P</i> =0.030	
	No	2	6	43	35	20	16	12	4	6	1	2		
Alternative Livelihoods	Yes	3	0	0	6	5	5	0	0	1	0	0	H=3.451 <i>P</i> =0.063	
	No	2	6	44	30	15	11	15	5	5	2	2		
Research / Monitoring	Yes	2	4	19	16	9	6	4	1	4	0	0	H=2.004 <i>P</i> =0.157	
	No	2	2	25	20	11	10	11	4	2	2	2		
Campaigns	Yes	2	0	7	5	0	1	4	1	1	1	0	H=0.206 <i>P</i> =0.650	
	No	2	0	37	62	60	60	55	24	35	8	18		

H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 1

Inclusion of specific impacts

The inclusion of specific impact types by organisational approach are summarised in Table 6.26. Using Fisher's exact tests a number of associations were identified.

Projects that use a "Habitat protection" approach included more "Socio-economic", more "Landscape and visual", more "Soils, geology, geomorphology" and more "Water" category impacts than projects not using that approach.

In addition, projects using a "Species protection" approach included more "Ecological" category impacts than projects not using that approach.

Projects using an "Alternative livelihoods" approach included more "Socio-economic" category impacts than projects not using that approach.

Projects using a "Legislation" approach included more "Heritage" category impacts than projects not using that approach.

Projects using an "Education" approach included more "Socio-Economic" category impacts than projects not using that approach.

The only exception to this pattern was for projects using a "Research / Monitoring" approach which included fewer "Landscape and visual" category impacts than projects not using that approach.

However for the majority of comparisons (63 from 72) there was no significant association between organisational activities and inclusion of impacts.

Table 6.26: Conservation approaches and specific impacts included

		Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research / Monitoring		Campaigns	
		Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %	Yes %	No %
Ecological		94.9	90.5	100.0	92.1	100.0	88.2	95.2	91.1	100.0	92.4	100.0	91.9	90.5	94.4	100.0	91.7
	<i>P</i>	0.359		0.602		0.007		0.526		1.000		0.613		0.527		0.361	
Socio-economic		69.2	45.9	41.7	59.3	61.0	55.9	79.0	43.3	71.4	57.2	100.0	52.6	57.1	58.4	50.0	59.1
	<i>P</i>	0.005		0.361		0.614		<0.001		0.699		<0.001		1.000		0.474	
Noise		6.4	2.7	8.3	4.3	3.4	5.4	6.5	3.3	0.0	4.8	0.0	5.2	4.8	4.5	0.0	5.3
	<i>P</i>	0.443		0.444		0.706		0.444		1.000		1.000		1.000		0.595	
Transport		10.3	6.8	8.3	8.6	5.1	10.8	12.9	5.6	28.6	7.6	11.8	8.1	4.8	11.2	15.0	7.6
	<i>P</i>	0.565		1.000		0.372		0.143		0.111		0.641		0.240		0.381	
Landscape and visual		50.0	13.5	41.7	31.4	25.4	36.6	37.1	28.9	57.1	31.0	29.4	32.6	20.6	40.4	35.0	31.8
	<i>P</i>	<0.001		0.525		0.160		0.296		0.213		1.000		0.013		0.800	
Heritage		30.8	18.9	50.0	22.9	22.0	26.9	27.4	23.3	71.4	22.8	17.6	25.9	17.5	30.3	40.0	22.7
	<i>P</i>	0.133		0.074		0.567		0.574		0.011		0.564		0.088		0.104	
Air quality and climate		14.1	6.8	8.3	10.7	5.1	14.0	9.7	11.1	28.6	9.7	5.9	11.1	11.1	10.1	20.0	9.1
	<i>P</i>	0.188		1.000		0.106		1.000		0.160		1.000		1.000		0.230	
Soils, geology, geomorphology		30.8	9.5	16.7	20.7	22.0	19.4	24.2	17.8	42.9	19.3	19.3	29.4	19.0	21.3	20.0	20.5
	<i>P</i>	0.001		1.000		0.686		0.413		0.150		0.343		0.839		1.000	
Water		37.2	12.2	16.7	25.7	20.3	28.0	27.4	23.3	57.1	23.4	23.5	25.2	22.2	27.0	30.0	24.2
	<i>P</i>	<0.001		0.731		0.340		0.574		0.066		1.000		0.571		0.585	

P=Fisher's exact test (2-sided) Significance.

6.6.3. Project start year

Projects with an earlier start date may be less subject to trends in impact assessment so less likely to consider any impacts, consider fewer impacts and consider each impact less frequently.

Inclusion of any impact and number of impacts reported

There was no difference in the inclusion of any impact between the categorised project start years (Fisher's Exact Test (2-sided) $P=0.223$) and no difference in the number of impacts reported between the categorised start years (Kruskal-Wallis test $H=3.965$, d.f.=4, $P=0.411$).

Inclusion of specific impacts

There were no differences in the reporting of specific impacts between project start year categories (Table 6.27).

Table 6.27: Project start year and specific impacts included

	Pre-1990 % included ($n=2$)	1990- 1999 % included ($n=6$)	2000- 2009 % included ($n=29$)	2010 and later % included ($n=90$)	Undated % included ($n=25$)	Fisher's Exact Test (2-sided) P
Ecological	100.0	100.0	93.1	88.0	92.8	0.784
Socio-economic	50.0	50.0	69.0	56.7	52.0	0.702
Noise	0.0	0.0	13.8	3.3	0.0	0.170
Transport	0.0	16.7	17.2	7.8	0.0	0.131
Landscape and visual	50.0	50.0	27.6	34.4	24.0	0.593
Heritage	50.0	16.7	31.0	23.3	24.0	0.756
Air quality and climate	0.0	33.3	10.3	12.2	0.0	0.117
Soils, geology, geomorphology	0.0	16.7	27.6	23.3	4.0	0.146
Water	50.0	50.0	24.1	26.7	12.0	0.215

6.6.4. Project end year

It may be expected that projects with an earlier finish date are also less subject to trends in impact assessment so are less likely to consider any impacts, consider fewer impacts and consider each impact less frequently.

Inclusion of any impact and number of impacts reported

There was no difference in the inclusion of any impact (Fisher's Exact Test (2-sided) $P=0.190$) or in the number of impacts reported (Kruskal-Wallis test $H=2.832$, d.f.=3, $P=0.418$) between the categorised project end years.

Inclusion of specific impacts

A difference was shown between the projects' end years for "Heritage" category impacts (Table 6.28). *Post hoc* repetitions of Fisher's exact test comparing each pair showed "Ongoing" projects included "Heritage" impacts significantly more frequently than projects ending "2010 and later" ($P=0.007$, applying Bonferroni correction).

Table 6.28: Project end year and specific impacts included

	2000-2009 % included (n=9)	2010 and later % included (n=68)	Undated % included (n=24)	Ongoing % included (n=51)	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	100.0	92.6	87.5	94.1	0.670
Socio-economic	55.6	58.8	54.2	58.8	0.986
Noise	0.0	2.9	4.2	7.8	0.696
Transport	11.1	7.4	4.2	11.8	0.589
Landscape and visual	22.	29.4	29.2	39.2	0.639
Heritage	0.0	17.6	20.8	41.2	0.008
Air quality and climate	11.1	11.8	4.2	11.8	0.749
Soils, geology, geomorphology	22.2	22.1	16.7	19.6	0.953
Water	11.1	26.5	25.0	25.5	0.886

6.6.5. Project duration

Shorter duration projects have less time available for planning / assessment so may be less likely to consider any impacts, consider fewer impacts and consider each impact less frequently.

Inclusion of any impact and number of impacts reported

There was no difference between project duration categories and the inclusion of any impact (Fisher's Exact Test (2-sided) $P=0.201$). However there was a difference in the number of impacts reported (Kruskal-Wallis test $H=16.884$, d.f.=5, $P=0.005$) between project duration categories. There was a significant difference between projects in the "Less than one year" duration category and projects in the "1-5 year" duration category (Dunn's *post hoc* test $P=0.012$, applying Bonferroni correction). There was no evidence of a difference between the other pairs.

Inclusion of specific impacts

A difference was shown between the projects' durations for "Socio-economic" category impacts and "Heritage" impacts (Table 6.29). *Post hoc* repetition of Fisher's exact test comparing each pair showed "1-5 year" duration projects included "Socio-economic" impacts more frequently than projects of "Less than 1 year" ($P=0.001$, applying Bonferroni correction) and more frequently than projects of "Unspecified" duration ($P=0.004$, applying Bonferroni correction). The same test showed "Ongoing" duration projects included "Heritage" category impacts more frequently than projects of "Less than 1 year" ($P=0.004$, applying Bonferroni correction).

Table 6.29: Project duration and specific impacts included

	Less than 1 year % included (n=36)	1-5 years% included (n=23)	5-10 years % included (n=8)	10 years or more % included (n=2)	Ongoing % included (n=52)	Not specified % included (n=31)	Fisher's Exact Test (2- sided) <i>P</i>
Ecological	88.9	100.0	100.0	100.0	94.2	87.1	0.452
Socio- economic	41.7	87.0	75.0	50.0	59.6	48.4	0.007
Noise	0.0	4.3	12.5	0.0	7.7	3.2	0.331
Transport	8.3	4.3	25.0	0.0	11.5	3.2	0.381
Landscape and visual	16.7	47.8	50.0	50.0	36.5	25.8	0.070
Heritage	11.1	17.4	37.5	50.0	40.4	16.1	0.012
Air quality and climate	5.6	17.4	25.0	0.0	9.6	9.7	0.452
Soils, geology, geomorphology	13.9	34.8	25.0	50.0	19.2	16.1	0.298
Water	13.9	30.4	50.0	50.0	25.0	25.8	0.227

6.6.6. Project duration “to date”

The number of projects which were “ongoing” at the date of review (with no project end year specified) was high at 34.2% (52). In order to account for this, significance tests were repeated using estimated project durations, based on the latest date of project review (2017) to provide project duration “to date”.

Inclusion of any impact and number of impacts reported

There was a difference between project duration to date categories and the inclusion of any impact (Fisher’s Exact Test (2-sided) $P=0.047$). *Post hoc* repetition of Fisher’s exact test with duration “to date” category pairs showed no significant differences.

There was a difference in the number of impacts reported between project duration “to date” categories (Kruskal-Wallis test $H=15.030$, $d.f.=4$, $P=0.005$) with a significant difference between projects in the “Less than one year” category and projects in the “1-5 year” categories (Dunn’s *post hoc* test $P=0.014$, applying Bonferroni correction). There was no evidence of a difference between the other pairs.

Inclusion of specific impacts

A difference was shown between the projects' duration "to date" for "Socio-economic" and for "Heritage" category impacts (Table 6.30). However, *post hoc* repetition of Fisher's exact test with each pair showed no significant differences between the duration "to date" categories for either "Socio-economic" impacts or "Heritage" impacts.

Table 6.30: Project duration "to date" and specific impacts included

	Less than 1 year % included (n=36)	1-5 years% included (n=38)	5-10 years % included (n=22)	10 years or longer % included (n=25)	Not specified % included (n=31)	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	88.9	97.4	95.5	96.0	87.1	0.431
Socio-economic	41.7	73.7	68.2	60.0	48.4	0.042
Noise	0.0	5.3	9.1	8.0	3.2	0.367
Transport	8.3	5.3	18.2	12.0	3.2	0.337
Landscape and visual	16.7	42.1	45.5	36.0	25.8	0.077
Heritage	11.1	26.3	36.4	44.0	16.1	0.022
Air quality and climate	5.6	15.8	13.6	8.0	9.7	0.655
Soils, geology, geomorphology	13.9	31.6	13.6	24.0	16.1	0.322
Water	13.9	28.9	27.3	32.0	25.8	0.456

6.6.7. Project staff details

Details of (some) staff involved in project delivery were provided in 27.6% (42) of the projects (either as specific details of individuals, or by including the job title of those working on the project).

Projects with evidence of dedicated staff appear to have more staff resource to undertake planning and assessment so may be more likely to consider any impacts, may consider more impacts and may consider each impact more frequently.

Inclusion of any impact and number of impacts reported

There was no difference between the inclusion or omission of project staff details and the general inclusion of impacts (Fisher's Exact Test (2-sided) $P=1.000$). There was also no difference between the inclusion or omission of project staff details for the number of impacts reported (Table 6.31).

Table 6.31: Project staff details and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Project staff detailed	2	1	10	13	4	8	1	1	3	1	0	H=0.272
Project staff NOT detailed	2	5	34	23	16	8	14	4	3	1	2	P=0.602

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 1

Inclusion of specific impacts

There were no differences in the impacts reported between organisations detailing project staff and organisations that did not (Table 6.32).

Table 6.32: Project staff details and specific impacts included

	Project Staff Details Provided (<i>n</i> =42)		No Project Staff Details Provided (<i>n</i> =110)		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	40	(95.2%)	101	(91.8%)	0.728
Socio-economic	28	(66.7%)	60	(54.5%)	0.202
Noise	2	(4.8%)	5	(4.5%)	1.000
Transport	2	(4.8%)	11	(10.0%)	0.517
Landscape and visual	15	(35.7%)	34	(30.9%)	0.567
Heritage	15	(35.7%)	23	(20.9%)	0.092
Air quality and climate	3	(7.1%)	13	(11.8%)	0.558
Soils, geology, geomorphology	6	(14.3%)	25	(22.7%)	0.272
Water	9	(21.4%)	29	(26.4%)	0.676

6.6.8. Project expenditure

Only 12.5% (19) of the reports provided details of project specific expenditure. The majority of these, 68% (13), provided information related to the costs of the total project. However 32% (6) provided only annual expenditure details. In these cases this amount was multiplied by the project duration “to date” figure for that project to obtain an estimated project budget. Where project budgets were provided in currencies other than that of the country of the organisation these were converted to that national currency and the same metric used to convert used in the stratification process described in Section 5.3 was applied to convert the amount to a GDP PPP equivalent. To allow comparison between project expenditure and the impacts assessed, spending was also categorised as a percentage of GDP PPP (<10%, 11-100%, 101-1,000%, 1,001-10,000%, 10,000%+).

Projects with higher expenditure have more financial resources available in general so can allocate more to planning and assessment so may be more likely to consider any impacts, may consider more impacts and may consider each impact more frequently.

Inclusion of any impact and number of impacts reported

There was no difference between project expenditure categories and the inclusion of any impact (Fisher’s Exact Test (2-sided) $P=1.000$). There was also no difference between project expenditure categories and the number of impacts included (Table 6.33).

Table 6.33: Project expenditure as % of GDP PPP and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal- Wallis Test
		0	1	2	3	4	5	6	7	8	9	
<10	1	0	2	1	0	0	0	0	0	0	0	H=10.934 P=0.053
11-100	1	0	1	0	0	0	0	0	0	0	0	
101-1,000	4	0	1	1	1	5	0	1	0	1	0	
1,001-10,000	3	0	0	1	1	1	0	0	0	0	0	
10,001+	6	0	0	0	1	0	0	0	0	0	1	
Not specified	2	6	40	33	17	10	15	4	6	1	1	

H=Kruskal-Wallis Test. P =Significance. Degrees of Freedom = 5

Inclusion of specific impacts

A difference was only shown between the project expenditure and “Transport” category impacts (Table 6.34). However *post hoc* repetition of Fisher’s exact tests with each pair showed no specific significant differences between the expenditure categories.

Table 6.34: Project expenditure as % of GDP PPP and specific impacts included

	<10 (n=3)	11-100 (n=1)	101- 1,000 (n=10)	1,001- 10,000 (n=3)	10,001+ (n=2)	Not specified (n=3)	Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	66.7%	100.0%	100.0%	100.0%	100.0%	66.7%	0.516
Socio-economic	33.3%	0.0%	80.0%	100.0%	100.0%	33.3%	0.132
Noise	0.0%	0.0%	10.0%	0.0%	50.0%	0.0%	0.108
Transport	0.0%	0.0%	40.0%	0.0%	50.0%	0.0%	0.012
Landscape and visual	33.3%	0.0%	60.0%	33.3%	50.0%	33.3%	0.322
Heritage	0.0%	0.0%	30.0%	33.3%	100.0%	0.0%	0.193
Air quality and climate	0.0%	0.0%	10.0%	0.0%	50.0%	0.0%	0.481
Soils, geology and geomorphology	0.0%	0.0%	10.0%	33.3%	20.0%	0.0%	0.653
Water	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	0.254

6.6.9. Report format

Assessment revealed that reports on projects were provided by the case study organisations in a range of formats. These are shown in Table 6.35 (where appropriate in order of complexity from simplest to most complex).

Table 6.35: Format of case study reports

Report format	Count	
Paragraph	6	(3.9%)
Short	55	(36.2%)
Video	3	(2.0%)
Website	8	(5.3%)
Comprehensive	41	(27.0%)
Multiple	36	(23.7%)
Academic paper	3	(2.0%)
Total	152	(100%)

Longer reports are likely to include greater detail of projects in general, so may be more likely to consider any impacts, may consider more impacts and may consider each impact more frequently.

Number of impacts reported

There was a difference between report formats and the number of impacts reported (Table 6.36). However there was only a significant difference between “Short” report and “Multiple” report formats (Dunn’s *post hoc* test $P=0.015$ applying Bonferroni correction) and between “Short” report and “Comprehensive” report formats (Dunn’s *post hoc* test $P=0.003$, applying Bonferroni correction). There was no evidence of a difference between the other pairs.

Table 6.36: Report format and number of impacts included

	Median Number of Impacts Included	Number of impacts included (frequency)										Kruskal-Wallis Test
		0	1	2	3	4	5	6	7	8	9	
Paragraph	1	1	4	0	1	0	0	0	0	0	0	H=29.866 P<0.001
Short	2	5	20	16	6	5	3	0	0	0	0	
Comprehensive	3	0	7	11	5	6	4	3	2	2	1	
Website	4	0	1	1	1	2	1	1	1	0	0	
Multiple	3	0	8	7	7	3	6	1	3	0	1	
Video	1	0	2	0	0	0	1	0	0	0	0	
Academic paper	1	0	2	1	0	0	0	0	0	0	0	

H=Kruskal-Wallis Test. P=Significance. Degrees of Freedom = 6

Inclusion of specific impacts

Differences were shown between report formats (Figure 6.4) and the inclusion of “Ecological”, “Socio-economic”, “Soils, geology and geomorphology” and “Water” category impacts (Table 6.37).

Post hoc repetition of Fisher’s exact tests with each pair of report formats showed “Comprehensive” reports were more likely to include “Ecological” impacts than “Paragraph reports” or “Short” reports (respectively Fisher’s Exact Test (2-sided) $P<0.001$ and $P=0.002$, applying Bonferroni correction). “Comprehensive” reports were also more likely to include “Water” impacts than “Short” reports (Fisher’s Exact Test (2-sided) $P<0.001$, applying Bonferroni correction). “Multiple” format reports included “Soils, geology and geomorphology” impacts more frequently than “Short” reports (Fisher’s Exact Test (2-sided) $P<0.001$, applying Bonferroni correction).

Table 6.37: Report format and specific impacts included significance summary

	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	0.044
Socio-economic	<0.001
Noise	0.082
Transport	0.172
Landscape and visual	0.506
Heritage	0.064
Air quality and climate	0.146
Soils, geology and geomorphology	0.004
Water	0.001

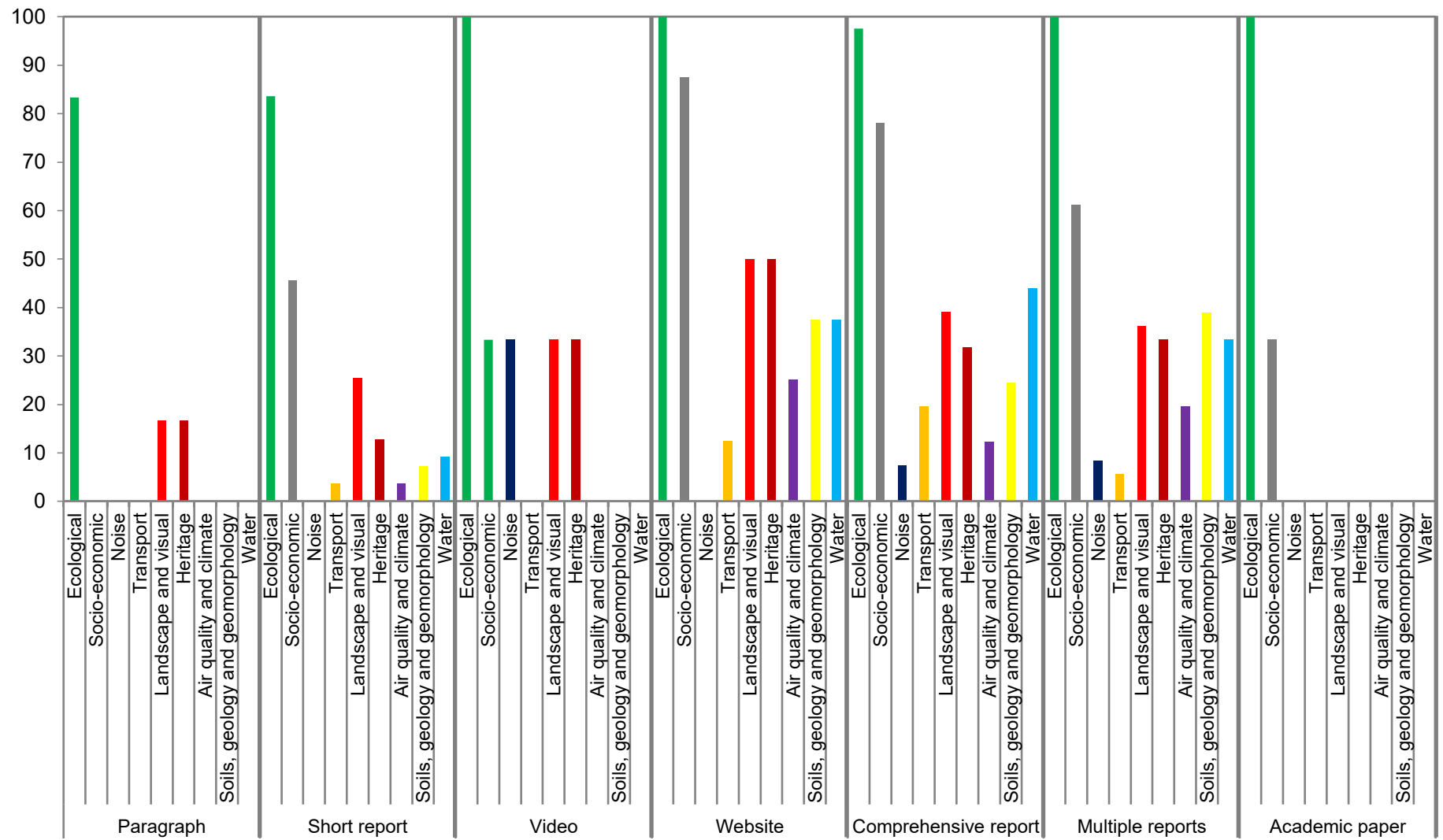


Figure 6.4: Percentage of report format including impact

6.7. Discussion

Some form of impact assessment was included in 96.1% of reports, so there is clearly an understanding amongst most organisations that reporting on the outcomes of activities is important and by extension valuable. However, the focus is on “Ecological” category impacts (92.8%), and secondarily “Socio-economic” category impacts (57.9%). All the remaining impact categories were considered in fewer than 40% of cases (the highest being “Landscape and visual” category impacts in 32.2% of reports) while “Noise” category impacts were only included in 4.6% of reports. This suggests a discrepancy between the impact categories themselves, with some being considered almost essential (“Ecological”), some important (“Socio-economic”) and some almost irrelevant (“Noise”, “Transport”).

However, the presence of even these “neglected” areas of impacts within some reports suggests that for some organisations at least there is an appreciation of their relevance to conservation activity, and the importance of reporting on such areas. That 30 organisations (19.7%) include more than five impacts goes further and suggests that a sizeable minority appreciate the value of considering multiple impacts.

6.7.1. Consideration of any impact

Only one characteristic comparison (Project duration “to date”) provided a significant result when considering the inclusion of any impact assessment, specifically demonstrating that projects with no defined duration were more likely to consider any impact than projects of other durations. However as this is a ‘catch-all’ category for projects where information was simply not provided then drawing any conclusions is largely redundant. It can therefore be concluded that organisational and project characteristics have no relation to the inclusion of any impact assessment within reports.

6.7.2. Number of impacts included

Table 6.38 summarises the significant findings when comparing the number of impacts included within reports to the various organisational and project related characteristics.

From 33 statistical comparisons (excluding *post hoc* tests) 16 significant results were identified, suggesting that in most cases organisational and project characteristics have

limited links to the number of impacts included in reports. These significant results and the possible links are considered here.

Comparing organisation size and number of impacts included provides some evidence of difference. The sample shows some differences between larger category (“Large” and “Very large”) and the smallest category (“Micro”) organisations. In both cases the larger organisations’ reports include more impacts than the smallest organisation. This conclusion is unsurprising as it is likely larger organisations are capable of delivering larger projects with an increased capacity for more impacts.

Significant differences were only shown between the presence / absence of specific organisational aims and the number of impacts in two comparisons. In most cases however (eight from ten comparisons), there was no significant difference between the presence / absence of an aim and the number of impacts included in a report. It can therefore be concluded that this characteristic has minimal effect on the number of impacts included.

Significant results were found when comparing the presence / absence of characteristics with the number of impacts included in reports. These significant results included:

- Organisations that employ paid staff include a significantly higher number of impacts than those that do not.
- Organisations that employ volunteers include a significantly higher number of impacts than those that do not.
- Organisations that provide details of project management methods include a significantly higher number of impacts than those that do not.
- Organisations that provide staff lists include a significantly higher number of impacts than those that do not.
- Organisations that provide details of trustees / advisory boards include a significantly higher number of impacts than those that do not.

While this comparison does not provide conclusive evidence that organisations that possess each characteristic include more impacts, this suggests a link between the provision of more information, and the number of impacts included in reports.

Comparing the presence / absence of project approaches and the number of impacts included in reports shows significant differences in only three cases. In these cases it appears that such approaches may be linked to a higher number of impacts included in reports. In most cases however (five from eight comparisons), there was no significant difference between the presence / absence of an approach and the number of impacts included in a report. It can therefore be concluded that this characteristic has only a small effect on the number of impacts included.

Consideration of project timescales provides few significant results. Comparison of start and end years for projects and the number of impacts included provide no significant results. Duration and duration "to date" comparisons both provide evidence of a significant difference between projects of "1-5 years" and projects of "less than 1 year" in duration. In both comparisons the longer duration projects include significantly more impacts than those of shorter duration. This suggests the possible conclusion that longer projects include more impacts than shorter projects. However, drawing this conclusion is not founded as no significant differences were found between the other, longer, categories of duration ("5-10 years" and "10 years or more") and the shortest duration so no useful link can be established between project duration and the number of impacts included in reports.

The comparison of expenditure provided no significant results, so no conclusions on the number of impacts included in reports can be drawn.

Comparing the report categories suggests that the longer more detailed report categories include more impacts than the shorter reports. Projects with a "Comprehensive report" include more impacts than projects with a "Short report" and projects with "Multiple reports" include more impacts than projects with a "Short report". However there was no significant difference between the longer report categories and the shortest ("Paragraph") format so this conclusion is not completely supported.

While some significant differences were identified across the characteristics, in most cases drawing useful conclusions from these is difficult. Where significant results were shown in differences between the binary characteristics (presence/ absence of employed staff; volunteers; project management approaches; staff lists; trustee details) this allows the conclusion that the inclusion of such information relates to the number of impacts included. However, it cannot be established whether this is attributable to a difference in

approaches to impact assessment or is related to an overall lack of published information on all aspects of the organisation.

Table 6.38: Number of impacts included summary of significant results

Characteristic	Significant differences	Specific difference
Country	No significant results	No significant results
Size	“Large” vs. “Micro”	“Large” organisations include more impacts than “Micro” organisations
	“Very large” vs. “Micro”	“Very large” organisations include more impacts than “Micro” organisations
Aim	“Habitat protection” vs. “No habitat protection”	Organisations with the “Habitat protection” aim include more impacts than those that do not
	“Representation” vs. “No Representation”	Organisations with the “Representation” aim include more impacts than those that do not
Paid staff	Paid staff vs. No paid staff	Organisations employing paid staff include more impacts than those that do not
Volunteers	Volunteers vs. No volunteers	Organisations employing volunteers include more impacts than those that do not
Project Management	PM method vs. No PM method	Organisations providing details of project management methods include more impacts than those that do not
Staff list	Staff list vs. No staff list	Organisations providing staff lists include more impacts than those that do not
Trustees	Trustee details vs. No Trustee details	Organisations providing details of trustees / advisory boards include more impacts than those that do not
Location	No significant results	No significant results
Approach	“Habitat protection” vs. “No habitat protection”	Projects using a “Habitat protection” approach include more impacts than those that do not
	“Education” vs. “No education”	Projects using an “Education” approach include more impacts than those that do not
	“Legislation” vs. “No legislation”	Projects using a “Legislation” approach include more impacts than those that do not
Start year	No significant results	No significant results
End year	No significant results	No significant results

Table 6.38 Continued:

Duration	"<1 year" vs. "1- 5 years"	Projects of duration "1-5 years" include more impacts than projects of "<1 year"
Duration "to date"	"<1 year" vs. "1- 5 years"	Projects of duration "to date" "1-5 years" include more impacts than projects of "<1 year"
Project Staff	No significant results	No significant results
Expenditure	No significant results	No significant results
Report format	"Short report" vs. "Multiple reports"	Projects with "Multiple reports" " include more impacts than projects with a "Short report"
	"Short report" vs. "Comprehensive report"	Projects with a "Comprehensive report" " include more impacts than projects with a "Short report"

6.7.3. Inclusion of specific impacts

Table 6.39 summarises the significant findings in comparisons between organisational and project characteristics and the inclusion of specific impacts in reports. In almost all cases where a significant difference (41 cases from 549 comparisons excluding post hoc tests) was identified, the possession of a characteristic meant that an organisation was more likely to include the impact under consideration, than organisations that did not possess that characteristic. In only eight cases was the opposite true, with organisations displaying a characteristic being less likely to include the impact category. The most commonly linked impact category was “Socio-economic” which showed a significant association in 12 of 61 comparisons.

For country categories, the only significant difference was in the comparison of country and the inclusion of “Heritage” category impacts. For all countries, “Heritage” was included in fewer reports than it was omitted from. However post hoc comparisons showed this difference only existed between Canada and New Zealand. This and the lack of any significant results for other impact categories means that drawing any conclusion on the link between country of organisation and the inclusion of specific impacts is therefore not possible.

Comparing size categories showed significant results for “Socio-economic”, “Soils, geology, geomorphology”, and “Water” category impacts. However, post hoc tests showed that “Large” organisations included “Socio-economic” category impacts significantly more frequently than “Micro” category organisations. For both “Soils, geology, geomorphology” and “Water” category impacts there were no significant differences. It is possible to conclude that the organisations in the smallest size category include significantly fewer “Socio-economic” impacts than other sized organisations. However, this very limited number of significant associations makes it impossible to draw wider conclusions about organisational size categories and the inclusion of specific impact categories in reports.

Comparison of the presence / absence of organisational aim with the inclusion of specific impact categories in reports showed a number of significant results. In most cases the presence of the aim is linked to an increased likelihood of including the impact category in question. Surprisingly the only exception was in “Campaigns” which were less likely to include “Socio-economic” impacts. This appears counterintuitive as the expectation would be that a campaigning effort would require a change in people, through education for

example, but this is not reflected here. Again, the very limited number of significant associations (five from 80 comparisons) makes it impossible to draw wider conclusions about organisational aims and the inclusion of specific impact categories in reports.

The link between the use of paid staff and the inclusion of specific impact categories is the most notable of the characteristic comparisons. Organisations employing paid staff were significantly more likely to include “Ecological”, “Landscape and visual”, “Air quality and climate”, “Soils, geology, geomorphology”, and “Water” category impacts than organisations not employing paid staff. This is the clearest indication that in five of the eight impact categories there was a positive association between inclusion of the impact and the presence of the characteristic (employment of paid staff). It can reasonably be concluded therefore that employment of paid staff equates to the inclusion of a higher number of impact categories in reports.

Across the other characteristics the conclusions are less clear. Organisations employing volunteers were significantly less likely to include “Socio-economic” impacts than organisations not employing volunteers, but as this is the only significant result it is possible to conclude there is no link between use of volunteers and a reduced number of impact categories included in reports.

Organisations providing details of project management approaches were significantly more likely to include “Socio-economic” and “Soils, geology, geomorphology” impacts than organisations that did not. Again with so few significant results it must be concluded that there is no link between the provision of project management details and the inclusion of a higher number of impact categories in reports.

Organisations providing staff lists were significantly more likely to include “Socio-economic”, “Landscape and visual”, “Air quality and climate” category impacts than organisations that did not. The three significant results indicate a potential link between the provision of staff lists and the inclusion of a higher number of impact categories in reports, but there is not sufficient evidence to confidently draw this conclusion.

Organisations providing details of trustees were significantly more likely to include “Socio-economic” impacts than organisations that did not. As this is the only significant result it must be concluded that there is no link between the provision of trustees details (i.e. a

tendency for providing comprehensive information) and the number of impact categories included in reports.

Projects within the country of the organisation were found to be significantly more likely to include “Water” impacts than projects outside the country of the organisation. With only a single significant result it must again be concluded that there is no link between the location of projects and the number of impact categories included in reports.

When comparing project approach with the inclusion of specific impacts in reports, there were nine significant results from 72 comparisons, found in five of the eight “approach” categories. In most cases projects using an approach were significantly more likely to include the impact category. This suggests at least a partial link between use of that approach and the inclusion of these impact categories in reports. In one case only, for projects using a “Research / Monitoring” approach the significant result was the opposite. Such projects were significantly less likely to include “Landscape and visual” category impacts than those not using the approach. Again the single significant result means there is no clear link between the use of the approach and the inclusion of specific impacts in reports.

Comparison of measures of project timescales revealed few significant links. Considering the end year category showed that “Ongoing” projects were significantly more likely to include “Heritage” impacts than projects ending in “2010 and later”. This single significant result means that it must be concluded that there is no link between end year category and the inclusion of specific impacts in reports. Comparing project duration categories showed that “1-5 year” duration projects were more likely to include “Socio-economic” impacts than projects of “Less than 1 year” and projects of “Unspecified” duration. “Ongoing” projects were significantly more likely to include “Heritage” impacts than projects of “Less than 1 year”. Duration “to date” comparison again showed significant results for “Socio-economic” and “Heritage” category impacts, but post hoc tests showed no significant differences between the duration “to date” categories. Again this very limited number of significant results means that it must be concluded that there is no definitive link between either the duration or the duration “to date” categories and the inclusion of specific impacts in reports.

Comparison of expenditure category and the inclusion of specific impact categories in reports provided a significant result in the “Transport” category, but post hoc testing

showed no specific differences between the expenditure categories. There were also no significant results in any other expenditure or impact categories (52 comparisons) so it must be concluded that there is no link between the expenditure category and the inclusion of specific impact categories in reports.

“Comprehensive” reports were more likely to include “Ecological” and “Socio-economic” impacts than “Paragraphs” and “Short” reports, and were more likely to include “Water” impacts than “Short” reports.. “Multiple” format reports included “Soils, geology and geomorphology” impacts more frequently than “Short” reports. Drawing strong conclusions from these limited significant results is not possible but the pattern suggests a trend of more detailed reports being more likely to include some impact categories, while less detailed reports were less likely to include impact categories.

In summary for most characteristics and impact categories there were no significant results. Where significant results were identified, the number of cases where significance was found was so limited that drawing wider conclusions on the link between the characteristic and the inclusion of specific impacts is not possible.

These initial results suggest that the links between organisational characteristics and the impacts included in project documentation were limited. While there were potential links, for the majority of characteristics there was no linkage.

The further sections of this study will therefore explore the appropriateness of the exclusion of particular impacts, before linking these back to project and organisational characteristics to develop best practice guidance.

Table 6.39: Inclusion of specific impacts summary of significant results

Characteristic	Significant impact category	Specific difference
Country	Heritage	No specific difference between countries
Size	Socio-economic	“Micro” category organisations significantly less likely to include “Socio-economic” category impacts than other size category organisations
	Soils, geology, geomorphology	No specific difference between size categories
	Water	No specific difference between size categories
Aim		
Habitat protection	Soils, geology, geomorphology	Organisations with “Habitat protection” as an aim significantly more likely to include “Soils, geology, geomorphology” category impacts than those without that aim
Breeding	No significant result	No significant result
Species protection	Water	Organisations with “Species protection” as an aim significantly more likely to include “Water” category impacts than those without that aim
Education	No significant result	No significant result
Legislation	No significant result	No significant result
Alternative livelihoods	No significant result	No significant result
Research / Monitoring	No significant result	No significant result
Campaigns	Socioeconomic	Organisations with “Campaigns” as an aim significantly less likely to include “Socio-economic” category impacts than those without that aim
Funding	No significant result	No significant result
Representation	Noise	Organisations with “Representation” as an aim significantly more likely to include “Noise” category impacts than those without that aim
	Transport	Organisations with “Representation” as an aim significantly more likely to include “Transport” category impacts than those without that aim
	Heritage	Organisations with “Representation” as an aim significantly more likely to include “Heritage” category impacts than those without that aim

Table 6.39 Continued:

Paid staff	Ecological	Organisations employing paid staff significantly more likely to include “Ecological” category impacts than those not employing paid staff
	Landscape and visual	Organisations employing paid staff significantly more likely to include “Landscape and visual” category impacts than those not employing paid staff
	Air quality and climate	Organisations employing paid staff significantly more likely to include “Air quality and climate” category impacts than those not employing paid staff
	Soils, geology, geomorphology	Organisations employing paid staff significantly more likely to include “Soils, geology, geomorphology” category impacts than those not employing paid staff
	Water	Organisations employing paid staff significantly more likely to include “Water” category impacts than those not employing paid staff
Volunteers	Socio economic	Organisations employing volunteers significantly less likely to include “Socio-economic” category impacts than those not employing volunteers
Project management	Socio economic	Organisations providing details of project management approaches significantly more likely to include “Socio-economic” category impacts than those that did not
	Soils, geology, geomorphology	Organisations providing details of project management approaches significantly more likely to include “Soils, geology, geomorphology” category impacts than those that did not
Staff list	Socio-economic	Organisations providing staff lists significantly more likely to include “Socio-economic” category impacts than orgs that did not
	Landscape and visual	Organisations providing staff lists significantly more likely to include “Landscape and visual” category impacts than those that did not
	Air quality and climate	Organisations providing staff lists significantly more likely to include “Air quality and climate” category impacts than those that did not

Table 6.39 Continued:

Trustees	Socio economic	Organisations providing details of trustees significantly more likely to include “Socio-economic” category impacts than those that did not
Location	Water	Projects within the country of the organisation significantly more likely to include “Water” category impacts than projects outside the country of the organisation
Approach		
Habitat protection	Socio-economic	Projects using “Habitat protection” approach significantly more likely to include “Socio-economic” category impacts than those not
	Landscape and visual	Projects using “Habitat protection” approach significantly more likely to include “Landscape and visual” category impacts than those not
	Soils, geology, geomorphology	Projects using “Habitat protection” approach significantly more likely to include “Soils, geology, geomorphology” category impacts than those not
	Water	Projects using “Habitat protection” as an approach significantly more likely to include “Water” category impacts than those not
Breeding	No significant result	No significant result
Species protection	Ecological	Projects using “Species protection” approach significantly more likely to include “Ecological” category impacts than those not
Education	Socio-Economic	Projects using “Education” approach significantly more likely to include “Socio-economic” category impacts than those not
Legislation	Heritage	Projects using “Legislation” approach significantly more likely to include “Heritage” category impacts than those not
Alternative livelihoods	Socio-economic	Projects using “Alternative livelihoods” approach significantly more likely to include “Socio-economic” category impacts than those not
Research / Monitoring	Landscape and visual	Projects using “Research / Monitoring” approach significantly less likely to include “Landscape and visual” category impacts than those not
Campaigns	No significant result	No significant result

Table 6.39 Continued:

Start year	No significant result	No significant result
End year	Heritage	“Ongoing” projects significantly more likely to include “Heritage” category impacts than those in other end year categories
Duration	Socio-economic	“Ongoing” projects significantly more likely to include “Socio-economic” category impacts than those in other duration categories
	Heritage	“1-5 year” projects significantly more likely to include “Heritage” category impacts than those in other duration categories
Duration to date	Socio-economic	No significant difference in categorical comparison
	Heritage	No significant difference in categorical comparison
Project Staff	No significant result	No significant result
Expenditure	Transport	“101-1,000% GDP PPP” projects significantly more likely to include “Transport” category impacts than those in other expenditure categories
		“Unspecified” expenditure projects significantly more likely to include “Transport” category impacts than those in other expenditure categories
Report format	Ecological	“Short Report” category projects significantly less likely to include “Ecological” category impacts than those in other report categories
	Socio-economic	“Paragraph” category projects significantly less likely to include “Socio-economic” category impacts than those in other report categories “Comprehensive Report” category projects significantly more likely to include “Socio-economic” category impacts than those in other report categories
	Soils, geology, geomorphology	“Short Report” category projects significantly less likely to include “Soils, geology, geomorphology” category impacts than those in other report categories “Multiple Reports” category projects significantly more likely to include “Soils, geology, geomorphology” category impacts than those in other report categories

Water

“Short Report” category projects significantly less likely to include “Water” category impacts than those in other report categories

“Comprehensive Report” category projects significantly more likely to include “Water” category impacts than those in other report categories

7. Results: Accuracy of impact reporting (inclusion / omission of “likely” impacts from project reports)

7.1. Aims and Objectives

This section aims to assess the current status of incorrectly omitted impacts within non-profit conservation organisations’ project reports. While the low level of impact inclusion was shown in the previous section, it is not clear whether this reflects actual low levels of impacts, or shows a high level of under-reporting of impacts. This section will test hypotheses that both organisational characteristics and project characteristics are linked to the incorrect omission of ‘impacts’ within conservation project case studies. This section of the study therefore has two aims:

1. To compare the frequency of correctly included impacts and incorrectly omitted impacts from the case studies.
2. To identify whether the same organisational and project characteristics identified in the first stage are linked to the correct inclusion and incorrect omission of impacts.

Each section therefore provides summary data regarding the impacts incorrectly omitted and tests the null hypothesis that Characteristic “X” has no link to the accuracy of inclusion of impacts.

7.2. Hypotheses

Two tests of comparison were undertaken (where appropriate) for each organisational and project characteristic to assess the correctness of inclusion and omission of impacts from case studies. Characteristics were compared to the “comprehensiveness” category in order to identify factors which may be linked to the comprehensiveness of incorrect impact omission, across the range of impact categories. Characteristics were compared to the omission of specific impacts in order to identify factors which may be linked to the incorrect omission of specific impact categories.

Two hypotheses were tested for each area of organisational and project characteristic:

Hypothesis 1: Organisational / project characteristic “X” is not linked to the incorrect omission of any impact from project reports.

Hypothesis 2: Organisational / project characteristic “X” is not linked to the incorrect omission of impact “Y” from project reports

7.3. Statistical tests

For both hypotheses extensions of Fisher’s exact test were used (Rose and Sullivan, 1996). Where significant differences were identified Fisher’s exact tests were repeated between individual pairs to identify the specific differences, using the Bonferroni correction to set appropriate significance levels (McDonald, 2014). The tests were carried out using IBM SPSS Statistics 25. Where contingency tables exceeded the capacity of the software to calculate exact significance, Monte Carlo estimates were used (Mehta and Patel, 2010).

One important consideration for this comparison was that removing the “no impact” results (see Section 7.6) and the process of assessing probable impacts (see Section 7.7.1) means that each study has an individual number of possible results. For example one project may only result in three impacts, while another may result in nine. Comparing the proportions of impacts incorrectly omitted as a simple percentage is therefore not valid as the ‘sample size’ (the number of probable impacts) differs according to the project. Therefore case studies were grouped by the proportions of impacts omitted (Table 7.1).

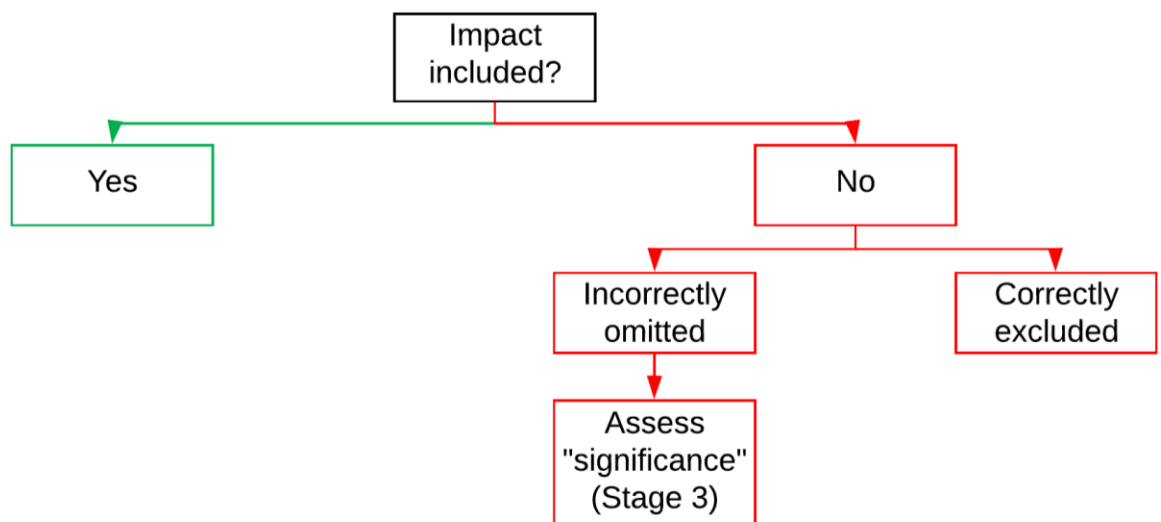
Table 7.1: Comprehensiveness categories

Comprehensiveness Category	% of assessed probable impacts omitted
No omission	0
Minimal omission	>0 <19.9
Moderate omission	>20 <39.9
Partial omission	>40 <59.9
Significant omission	>60 <79.9
Comprehensive omission	>80 <99.9
Complete omission	100

This provided a categorical variable ("Comprehensiveness") which could be used for comparison with characteristics.

7.4. General methodology

Following the initial assessment of current practice in impact assessment in conservation organisations, this secondary methodology provides a simplified, systematic approach to identifying the full range of impacts of conservation actions. For each impact the process of review involved a decision process as shown in Figure 7.1. This involves a secondary assessment of all projects where an impact topic was shown not to have been considered in the initial review.

**Figure 7.1: Simplified process for secondary assessment of case studies**

This process allowed the identification of incorrectly omitted impacts which can be compared to included impacts to provide an assessment of the correctness of impact inclusion within case studies.

7.5. Assessing omitted probable impacts

For each project where an area of impact was not included the documentation was reviewed to understand whether the impact was correctly omitted (there was no impact from the described activities) or incorrectly omitted (the impact was probable from the described activities).

For each omission the basis for assessment is the project description. Project descriptions were reviewed to identify activities and the subsequent likely impacts of those activities. Where an impact was deemed to be likely but was not referred to in project descriptions, this was categorised as “omitted”. While this process required interpretation of the description(s), the use of the protocol described in Table 7.2 meant that for each impact reviewed there was an impartial, logical basis for the assessment. Even in cases where descriptions of project activities were brief, containing minimal details of activities undertaken and the methods used, an assessment of likely impacts could still be made. In these cases a more detailed logical assessment of the probable impacts was required. This process is shown in the exemplar project description below.

A brief project description might read as follows:

“On Saturday 10 May 2014 a work party of volunteers cleared invasive Himalayan balsam and removed fallen trees from a 200m stretch of the stream running through the reserve.”

By the process of breaking down the statements into thematic categories as shown in Figure 7.2 it is possible to assess the probable impacts (and in this example also information regarding spatial scale and activity duration) relating to the project. The logical argument for each assessment and the requirements for additional information are highlighted in Table 7.2.

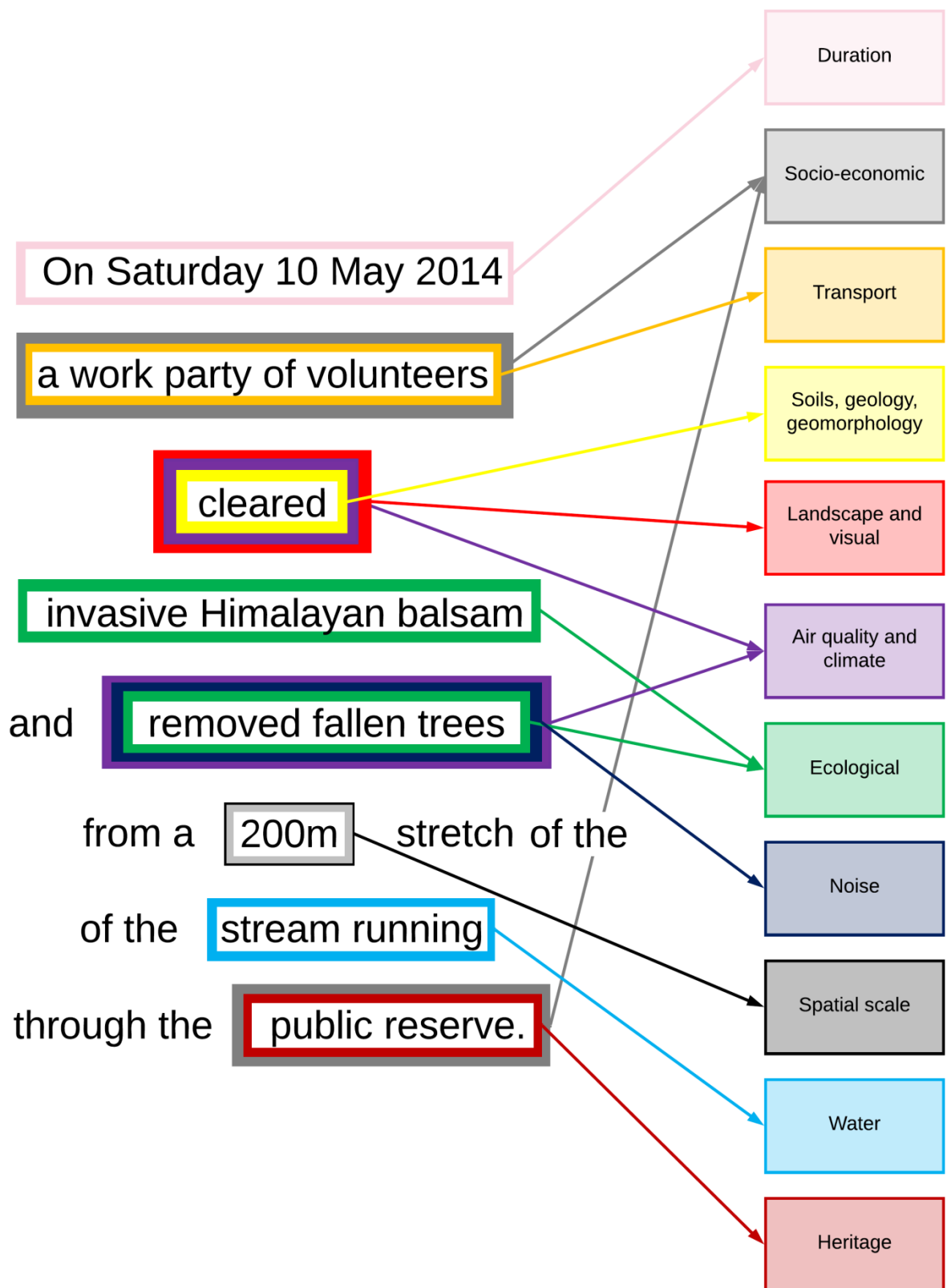


Figure 7.2: Exemplar assessment of probable impacts

Table 7.2: Logical inference of probable impacts

Area of probable impact	Justification	Additional information / questions for next steps
Ecological	Removal of invasive plant species creates positive impacts for native plants. Removal of fallen trees creates a negative impact for invertebrate species. Other ecological communities rely on the invasive plant.	What is the local value of the removed species and the removed trees?
Socio-economic	Volunteers are engaged in the project, providing a positive socio-economic impact. Alterations to the public reserve may affect users.	Information needed on volunteer numbers. Are users supportive of changes? Are access rights maintained?
Noise	Removal methods involving machinery or manual methods create disturbance (potentially relating to “Ecological” impacts).	Information needed on removal methods.
Transport	Volunteers must have travelled to the site creating a negative transport impact (linked to “Air quality and climate” impacts).	Information needed on transport methods and numbers.
Landscape/visual	Removal of vegetation and fallen trees alters visual aspect of site.	Does removal create a positive or negative alteration to the visual aspect?
Heritage	As a public reserve there are potential heritage values to the site.	Does the site have heritage value? Are users supportive of changes? Are access rights maintained?
Air quality/climate	Emissions from electricity/fossil fuel power machinery.	Information needed on removal methods.
Soils, geology, geomorphology	Removal of vegetation and fallen trees has potential to alter soil structure and change soil characteristics.	Information needed on the level of removal.
Water	Alterations are adjacent to a water body which will be affected by changes to vegetation structure.	Do removals improve water quality?

For certain activities, impacts can be attributed to more than one category (primary impact and secondary impact(s)). In the case of road “Transport” impacts (Primary) for example, these are likely accompanied by “Air quality and climate” impacts (Secondary 1) through fossil fuel derived emissions or “Noise” impacts (Secondary 2) through road noise. For both those impacts that were included in case studies and for those impacts that were not included, secondary categorisation was noted, but impacts were only categorised against the primary impact. This process avoided the issue of double counting of impacts that were omitted.

7.6. Treatment of “no impact” results

The process of review allowed assessment of impacts into three categories; “impact probable and included”, “impact probable and incorrectly omitted” and “no impact probable” (Figure 7.3).

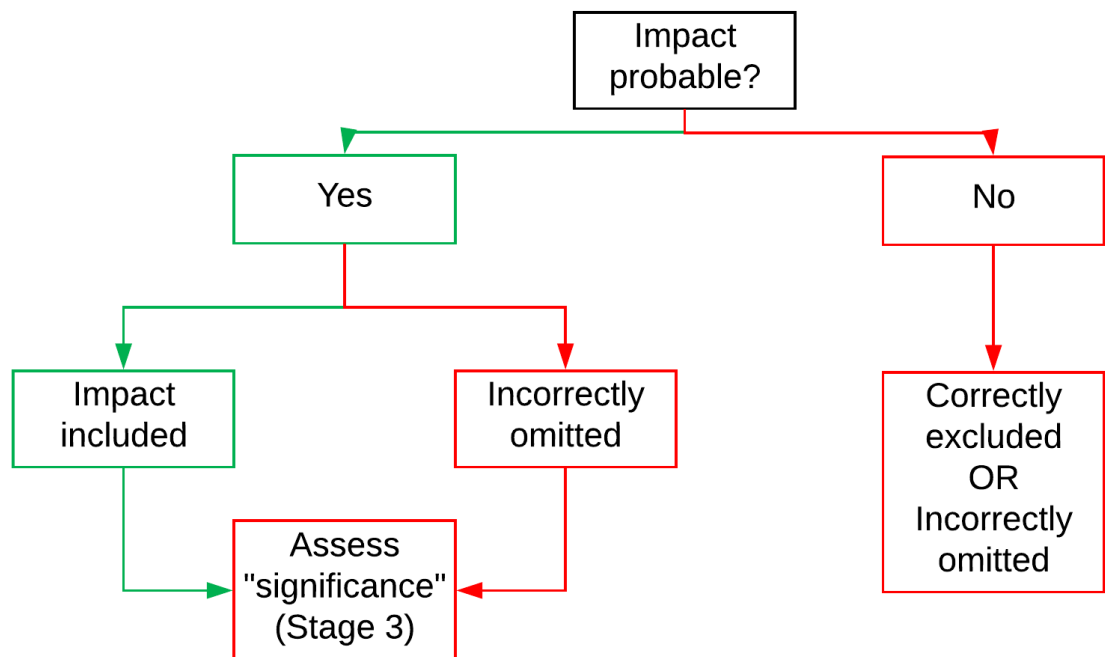


Figure 7.3: Impact likelihood categories

For “no impact” results there are two possible scenarios:

1. The impact has been assessed, identified as having no impact and correctly excluded from the case study as not relevant.

2. The impact has not been assessed and therefore not identified as having no impact therefore has been incorrectly excluded from the case study through lack of consideration.

Without any information available on the decision process, assessment of the correctness of the omission of “no impact” category impacts is not possible (by definition this information is not included). Therefore all “no impact” category impacts were removed from the analysis in this section. Comparison and analysis here is based only on the categories of “impact included” and “impact probable but not included” to provide an assessment of the correct and incorrect inclusion of impacts, and potential contributory factors. Similarly impacts that are considered “secondary” (see Section 7.5) are only considered in the primary area of impact, and secondary impacts were classified as “no impacts”.

7.7. Summary of study

7.7.1. Probable impacts

Following the process of review described above, details of the probable impacts for all case studies were calculated (Table 7.3). Ecological impacts were probable in 151 projects (99.3%), while air and climate impacts were probable in only 36 projects (23.7%).

Table 7.3: Probable impact frequency

	Impact Probable in Project (<i>n</i> =152)	
Ecological	151	(99.3%)
Socio-economic	119	(78.3%)
Noise	81	(53.3%)
Transport	110	(72.4%)
Landscape and visual	78	(51.3%)
Heritage	65	(42.8%)
Air quality and climate	36	(23.7%)
Soils, geology, geomorphology	63	(41.4%)
Water	77	(50.7%)

7.7.2. Incorrect omission / correct inclusion of impact

Comparison of those impacts that were included in case studies was made with those impacts that were identified as probable but which were not included. Across all probable impacts, 359 of 780 impacts (46.0%) were incorrectly omitted from case studies. Of these “Ecological” category impacts were the least commonly incorrectly omitted in only ten of 151 (6.6%) case studies. “Noise” category impacts were the most commonly incorrectly omitted in 74 of 81 (91.4%) case studies, with “Transport” category impacts omitted in 97 of 110 (88.2%) case studies (Figure 7.4).

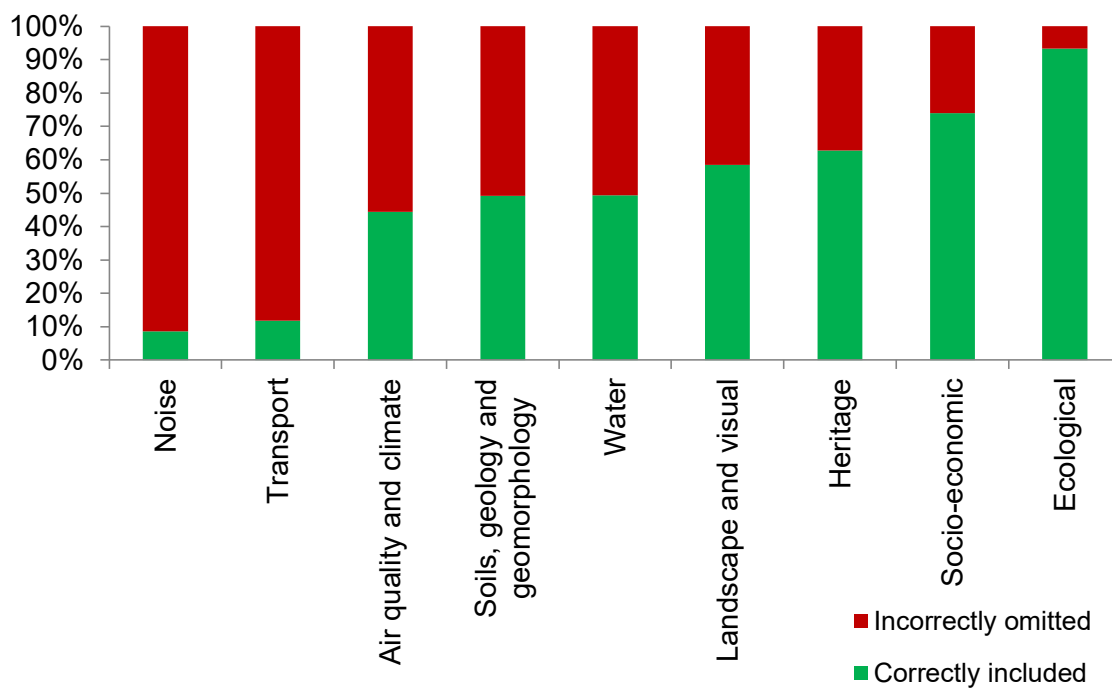


Figure 7.4: Percentages of incorrectly omitted / correctly included impacts across all impact categories

7.8. Organisational characteristics and links to incorrect impact omission

7.8.1. Country of organisation

It is possible that level of omission and the incorrect omission of each impact may vary between the countries of the organisations.

Levels of omitted impacts

Canadian organisations omitted the lowest average percentage of probable impacts at 40.8%. Australian organisations omitted 42.7%, Irish organisations 48.1%, and New Zealand organisations 48.6%. UK organisations omitted the highest average percentage of probable impacts at 50.7%.

When country of organisation was compared to the omissions categories, similar levels of omission were seen across the countries (Table 7.4). Across all five countries few organisations achieve the “no omission” category. Australian organisations were the most likely to omit all impacts while UK organisations were the least likely. There was no significant difference between the countries of organisation for the impact omission categories (Fisher’s Exact Test (2-sided) $P=0.414$).

Table 7.4: Countries and levels of omitted impacts

	Australia (n=37)		Canada (n=37)		Ireland (n=11)		New Zealand (n=33)		UK (n=34)	
										
No omission	1	(3%)	1	(3%)	1	(9%)	1	(3%)	2	(6%)
Minimal omission	3	(8%)	0	(0%)	0	(0%)	3	(9%)	0	(0%)
Moderate omission	7	(19%)	6	(16%)	3	(27%)	7	(21%)	9	(26%)
Partial omission	10	(27%)	13	(35%)	4	(36%)	8	(24%)	10	(29%)
Significant omission	7	(19%)	9	(24%)	0	(0%)	10	(30%)	10	(29%)
Comprehensive omission	0	(0%)	2	(5%)	1	(9%)	1	(3%)	1	(3%)
Complete omission	9	(24%)	6	(16%)	2	(18%)	3	(9%)	2	(6%)

Omission of specific impacts

Comparison using Fisher's exact tests showed no significant differences between the countries regarding the incorrect omission of specific impacts (Table 7.5). For the majority of impact categories incorrect omission was consistent from country to country (Figure 7.5). Impacts in the "Ecological" and "Socio-economic" categories were consistently included. However, other impacts such as those in the "Noise" and "Transport" categories were more frequently incorrectly omitted across all countries. For the majority of impacts, incorrect omission of each area of impact was consistently low from country to country.

Table 7.5: Country and incorrectly omitted impacts significance summary

	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	0.486
Socio-economic	0.983
Noise	0.579
Transport	0.230
Landscape and visual	0.468
Heritage	0.267
Air quality and climate	1.000
Soils, geology, geomorphology	0.422
Water	0.137

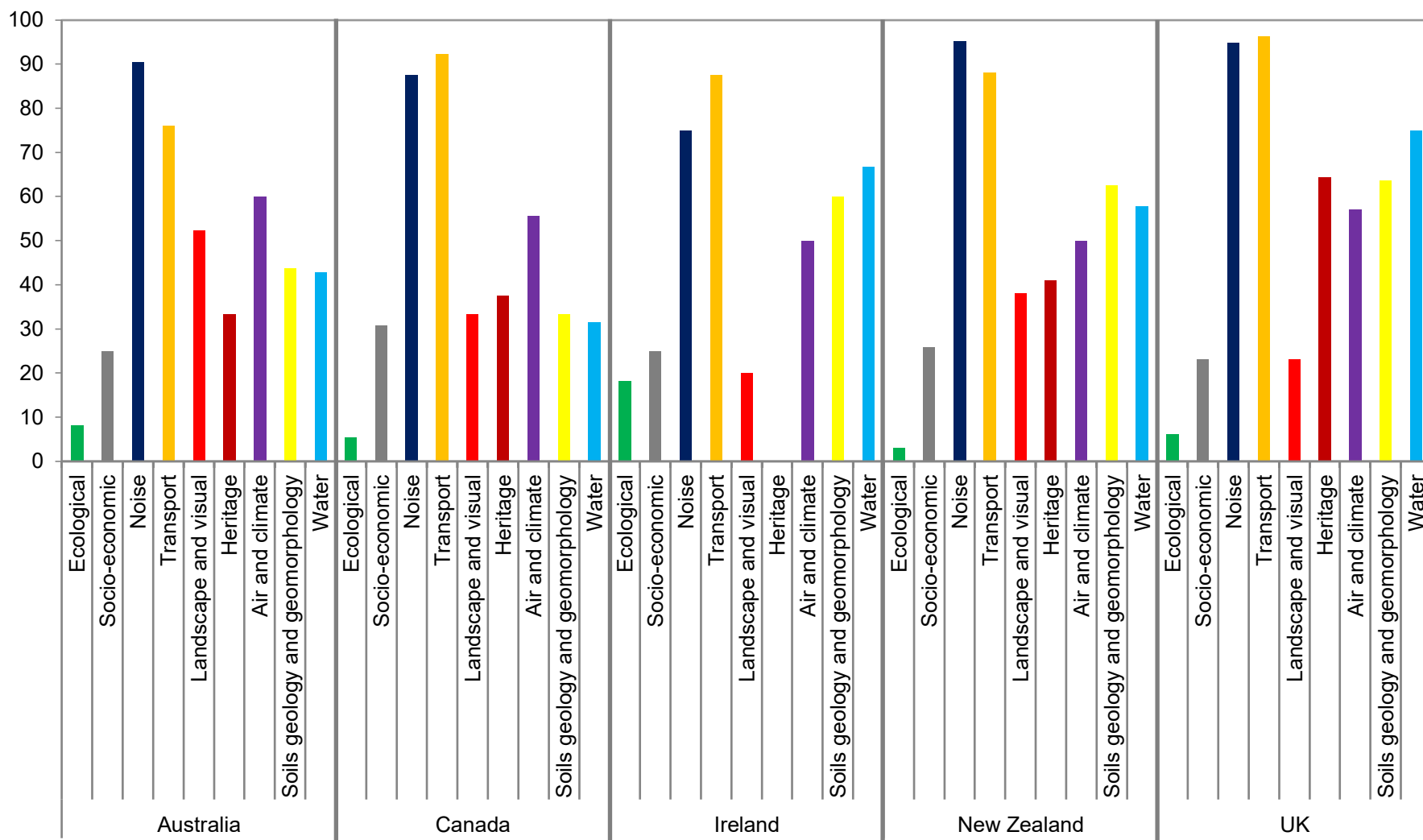


Figure 7.5: Percentage of country category incorrectly omitting impact

7.8.2. Organisation size

Potentially that level of omission and the incorrect omission of each impact may vary by the size of the organisation.

Levels of omitted impacts

Organisations categorised as “Small” omitted the highest average percentage of probable impacts (57.3%) while “Very large” organisations omitted the lowest average percentage of probable impacts (40.9%) (Table 7.6). Across all five size categories few organisations achieve the “no omission” category. There was no significant difference between the organisation sizes regarding the impact omission category (Fisher’s Exact Test (2-sided) Monte Carlo estimate $P=0.108$).

Table 7.6: Organisation size and levels of omitted impacts

	Micro (<i>n</i> =37)		Small (<i>n</i> =37)		Medium (<i>n</i> =11)		Large (<i>n</i> =33)		Very large (<i>n</i> =34)	
No omission	1	(4.0%)	2	(9.1%)	1	(2.9%)	2	(5.3%)	0	(0.0%)
Minimal omission	3	(12.0%)	0	(0.0%)	1	(2.9%)	0	(0.0%)	2	(6.3%)
Moderate omission	8	(32.0%)	7	(31.8%)	5	(14.3%)	6	(15.8%)	6	(18.8%)
Partial omission	6	(24.0%)	10	(45.5%)	12	(34.3%)	10	(26.3%)	7	(21.9%)
Significant omission	2	(8.0%)	2	(9.1%)	10	(28.6%)	12	(31.6%)	10	(31.3%)
Comprehensive omission	0	(0.0%)	0	(0.0%)	0	(0.0%)	3	(7.9%)	2	(6.3%)
Complete omission	5	(20.0%)	1	(4.5%)	6	(17.1%)	5	(13.2%)	5	(15.6%)

Omission of specific impacts

There were no significant differences between the omissions of specific impacts between different size classifications (Table 7.7). Across all size categories “Noise” and “Transport” category impacts were consistently incorrectly omitted (Figure 7.6). Again impacts in the “Ecological” and “Socio-economic” categories were consistently included. In two size categories (“Micro” and “Small”) “Noise” category impacts were incorrectly omitted in all cases.

Table 7.7: Size and incorrectly omitted impacts significance summary

	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	0.112
Socio-economic	0.094
Noise	0.517
Transport	0.200
Landscape and visual	0.192
Heritage	0.289
Air quality and climate	0.734
Soils, geology, geomorphology	0.232
Water	0.045

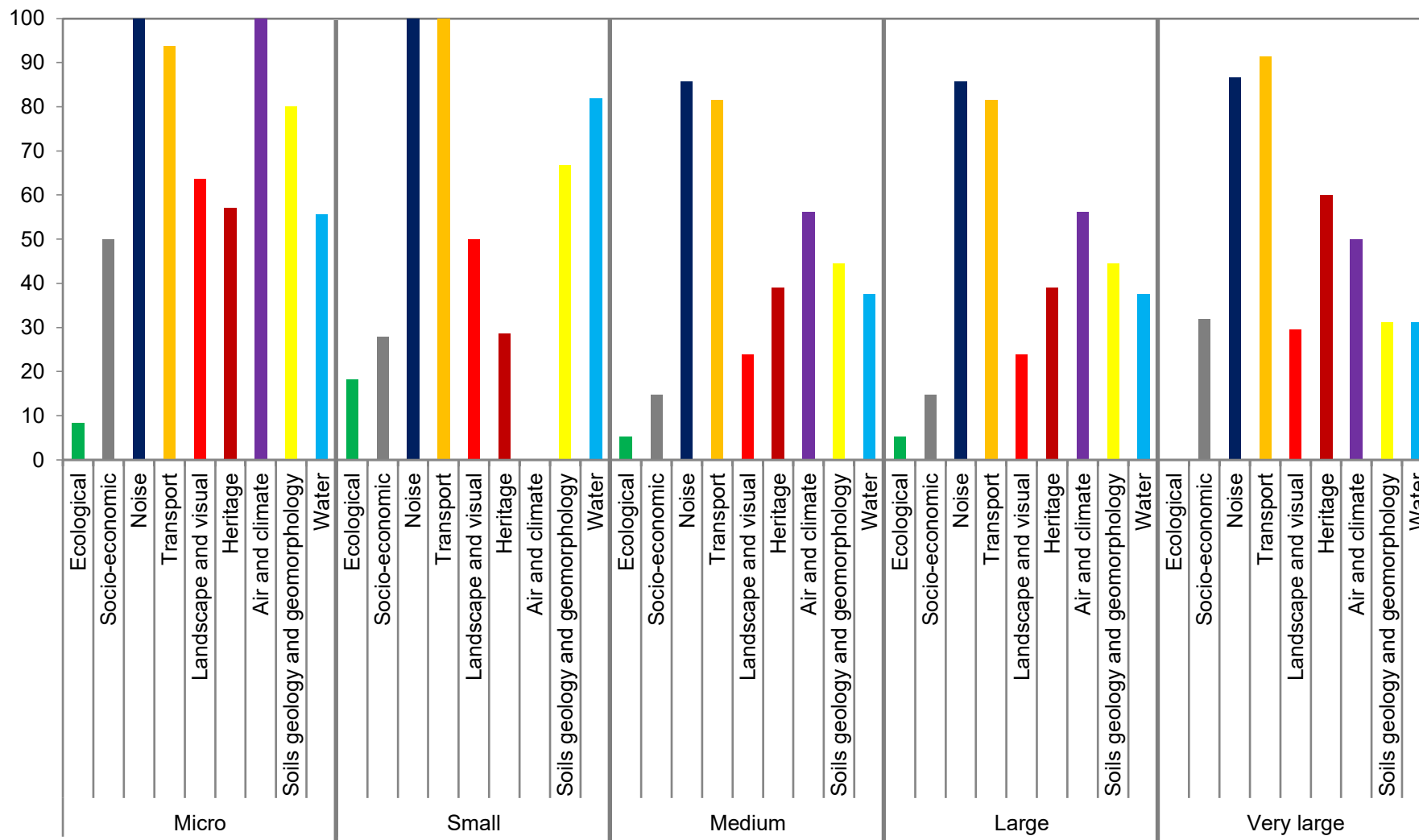


Figure 7.6: Percentage of size category incorrectly omitting impact

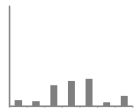
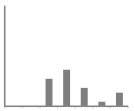
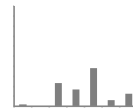
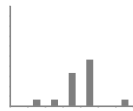
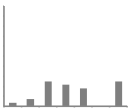
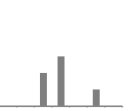
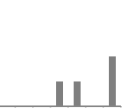
7.8.3. Organisational aim

Organisations with different aims may vary in the level of omission and the incorrect omission of each impact.

Levels of omitted impacts

When the inclusion / non-inclusion of organisational aims were compared for the omissions categories, similar levels of omission were seen across the aims. Few reports in any aim category achieved the “no omission” category, the highest being 6.3% of reports from organisations which included the aim of “Habitat protection” (Table 7.8). Comparison of all aims and omission categories using Fisher’s exact test showed only a significant difference in the comprehensiveness of impact assessment between organisations that included the aim of “Legislation” compared to those that did not have that aim. However *post hoc* repetition of the Fisher’s exact test with the Bonferroni correction applied showed that there were no specific differences between omissions categories between organisations including the aim of “Legislation” and those that did not.

Table 7.8: Organisational aim included and levels of omitted impacts

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research / Monitoring		Campaigns		Funder		Representation	
	(n=95)		(n=22)		(n=65)		(n=112)		(n=47)		(n=15)		(n=57)		(n=28)		(n=6)		(n=4)	
																				
No omission	6	(6.3%)	0	(0.0%)	3	(4.6%)	3	(2.7%)	1	(2.1%)	0	(0.0%)	2	(3.5%)	1	(3.6%)	0	(0.0%)	0	(0.0%)
Minimal omission	5	(5.3%)	0	(0.0%)	3	(4.6%)	2	(1.8%)	0	(0.0%)	1	(6.7%)	0	(0.0%)	2	(7.1%)	0	(0.0%)	0	(0.0%)
Moderate omission	20	(21.1%)	6	(27.3%)	13	(20.0%)	23	(20.5%)	11	(23.4%)	1	(6.7%)	15	(26.3%)	7	(25.0%)	2	(33.3%)	0	(0.0%)
Partial omission	24	(25.3%)	8	(36.4%)	20	(30.8%)	32	(28.6%)	8	(17.0%)	5	(33.3%)	18	(31.6%)	6	(21.4%)	3	(50.0%)	1	(25.0%)
Significant omission	26	(27.4%)	4	(18.2%)	16	(24.6%)	28	(25.0%)	18	(38.3%)	7	(46.7%)	12	(21.1%)	5	(17.9%)	0	(0.0%)	1	(25.0%)
Comprehensive omission	4	(4.2%)	1	(4.5%)	2	(3.1%)	4	(3.6%)	3	(6.4%)	0	(0.0%)	2	(3.5%)	0	(0.0%)	1	(16.7%)	0	(0.0%)
Complete omission	10	(10.5%)	3	(13.6%)	8	(12.3%)	20	(17.9%)	6	(12.8%)	1	(6.7%)	8	(14.0%)	7	(25.0%)	0	(0.0%)	2	(50.0%)
Significance	0.087		0.859		0.991		0.085		0.016		0.306		0.510		0.384		0.252		0.555	

Omission of specific impacts

Again the proportions of impacts incorrectly omitted were broadly consistent when comparing across the organisational aims (Table 7.9). Comparison using Fisher's exact tests showed that organisations with "Breeding" as an aim incorrectly omitted "Socio-economic" category impacts less frequently than organisations without that aim. Organisations with "Education" as an aim incorrectly omitted "Soils, geology, geomorphology" category impacts less frequently than organisations without that aim. Organisations with "Legislation" as an aim incorrectly omitted "Water" category impacts less frequently than organisations without that aim. Organisations with "Representation" as an aim incorrectly omitted "Noise" category impacts less frequently than organisations without that aim. Organisations with "Representation" as an aim incorrectly omitted "Transport" category impacts less frequently than organisations without that aim.

However, organisations with "Breeding" as an aim incorrectly omitted "Water" category impacts more frequently than organisations without that aim, while organisations with "Campaigns" as an aim incorrectly omitted "Socio-economic" category impacts more frequently than organisations without that aim.

For the majority of comparisons (83/90) there was no significant association between organisational activities and incorrect omission of impacts.

Table 7.9: Organisational aim and percentage of probable impacts incorrectly omitted by impact category

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research / Monitoring		Campaigns		Funder		Representation	
	%	P	%	P	%	P	%	P	%	P	%	P	%	P	%	P	%	P	%	P
Ecological	8.4	0.324	22.0	0.359	6.2	1.000	4.5	0.131	2.1	0.174	0.0	0.599	7.1	1.000	3.6	0.689	0.0	1.000	25.0	0.242
Socio-economic	23.1	0.380	0.0	0.011	23.9	0.831	25.3	0.815	27.0	1.000	23.3	1.000	28.6	0.667	50.0	0.007	16.1	1.000	25.0	1.000
Noise	90.3	1.000	81.8	0.240	91.2	1.000	88.3	0.181	90.9	1.000	100.0	1.000	90.3	1.000	100.0	1.000	75.0	0.308	33.3	0.019
Transport	89.6	0.525	94.4	0.690	89.8	0.770	85.7	0.337	96.4	0.178	100.0	0.604	92.7	0.364	81.3	0.402	100.0	1.000	33.3	0.036
Landscape and visual	41.0	0.260	23.1	0.351	37.5	1.000	30.2	0.081	23.8	0.189	50.0	0.665	28.6	0.432	40.0	1.000	66.7	0.552	0.0	0.290
Heritage	34.1	0.128	42.9	1.000	38.7	0.802	45.1	0.363	45.5	0.791	50.0	0.709	45.0	0.788	28.6	0.363	100.0	0.415	0.0	0.260
Air quality and climate	53.8	1.000	71.4	0.426	73.3	0.096	50.0	0.456	33.3	0.081	100.0	0.238	60.0	1.000	44.4	0.470	0.0	0.444	0.0	0.190
Soils, geology, geomorphology	50.0	1.000	63.6	0.509	50.0	1.000	40.5	0.032	31.6	0.058	20.0	0.196	31.3	0.088	50.0	1.000	33.3	0.613	0.0	0.238
Water	53.2	0.401	75.0	0.047	65.5	0.060	44.6	0.125	27.3	0.012	66.7	0.675	42.9	0.451	42.9	0.567	66.7	1.000	0.0	0.240

P shown as Fisher's Exact Test (2-sided)

7.8.4. Organisational employment of paid staff

It may be expected that organisations that use paid staff more likely to have (time) resources to dedicate to reporting and therefore may incorrectly omit fewer impacts and incorrectly omit each impact less frequently.

Levels of omitted impacts

There was no difference between organisations using paid staff and organisations not using paid staff (Fisher's Exact Test (2-sided) $P=0.070$) (Table 7.10). Organisations using paid staff incorrectly omitted on average 42.8% of impacts, while organisations not employing paid staff incorrectly omitted on average 52.0% of impacts.

Table 7.10: Employment of paid staff and levels of omitted impacts

	Organisations using Paid Staff (<i>n</i> =104)		Organisations NOT using Paid Staff (<i>n</i> =48)	
				
No omission	3	(2.9%)	3	(6.3%)
Minimal omission	4	(3.8%)	2	(4.2%)
Moderate omission	17	(16.3%)	15	(31.3%)
Partial omission	29	(27.9%)	16	(33.3%)
Significant omission	30	(28.8%)	6	(12.5%)
Comprehensive omission	5	(4.8%)	0	(0.0%)
Complete omission	16	(15.4%)	6	(12.5%)

Omission of specific impacts

Organisations not specifying employment of paid staff tended to omit “Landscape and visual” category impacts more frequently than those that did not (Table 7.11). There was no difference between the use of paid staff and the omission of other areas of impact.

Table 7.11: Employment of paid staff and incorrect omission of impacts significance summary

	Organisations using Paid Staff incorrectly omitting impact		Organisations NOT using Paid Staff incorrectly omitting impact		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	4	(3.8%)	6	(12.8%)	0.071
Socio-economic	20	(23.5%)	11	(32.4%)	0.359
Noise	48	(87.3%)	26	(100.0%)	0.090
Transport	65	(86.7%)	32	(91.4%)	0.545
Landscape and visual	16	(28.6%)	13	(59.1%)	0.019
Heritage	21	(42.9%)	6	(37.5%)	0.777
Air quality and climate	17	(53.1%)	3	(75.0%)	0.613
Soils, geology, geomorphology	22	(45.8%)	10	(66.7%)	0.237
Water	28	(47.5%)	11	(61.1%)	0.421

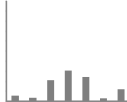
7.8.5. Organisational use of volunteers

Organisations that rely on volunteers have less skill / experience in reporting and therefore may incorrectly omit more impacts and incorrectly omit each impact more frequently.

Levels of omitted impacts

There was no difference in the level of comprehensiveness of impact assessment between the organisations using volunteers and organisations not using volunteers (Fisher's Exact Test (2-sided) $P=0.613$) (Table 7.12). Organisations using volunteers incorrectly omitted on average 47.8% of impacts, while organisations not employing paid staff incorrectly omitted on average 40.5% of impacts.

Table 7.12: Employment of volunteers and levels of omitted impacts

	Organisations using Volunteers (<i>n</i> =108)		Organisations NOT using Volunteers (<i>n</i> =44)	
				
No omission	6	(5.6%)	0	(14%)
Minimal omission	4	(3.7%)	2	(9%)
Moderate omission	23	(21.3%)	9	(52%)
Partial omission	33	(30.6%)	12	(75%)
Significant omission	26	(24.1%)	10	(59%)
Comprehensive omission	3	(2.8%)	2	(7%)
Complete omission	13	(12.0%)	9	(30%)

Omission of specific impacts

Organisations that use volunteers omit more “Socio-economic” category impacts than organisations that do not use volunteers. There was no difference between the use and non-use of volunteers in the other impact categories.

Table 7.13: Employment of volunteers and incorrect omission of impacts significance summary

	Organisations using Volunteers incorrectly omitting impact		Organisations NOT using Volunteers incorrectly omitting impact		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	9	(8.4%)	1	(2.3%)	0.282
Socio-economic	27	(32.9%)	4	(10.8%)	0.013
Noise	54	(90.0%)	20	(95.2%)	0.670
Transport	68	(86.1%)	29	(93.5%)	0.344
Landscape and visual	19	(33.9%)	10	(45.5%)	0.436
Heritage	17	(37.0%)	10	(52.6%)	0.278
Air quality and climate	14	(51.9%)	6	(66.7%)	0.700
Soils, geology, geomorphology	24	(55.8%)	8	(40.0%)	0.287
Water	29	(55.8%)	10	(40.0%)	0.230

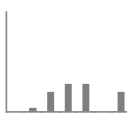
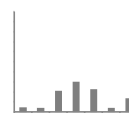
7.8.6. Project management approach

Organisations that detail their approach to project management may be more likely to consider any impacts, and therefore may incorrectly omit fewer impacts and incorrectly omit each impact less frequently.

Levels of omitted impacts

There was no significant difference between organisations that provide details of project management approaches and those that do not (Fisher's Exact Test (2-sided) $P=0.918$) (Table 7.14). Organisations providing information on project management approaches omitted on average 43.2% of impacts, while organisations not providing information on project management approaches incorrectly omitted on average 46.2% of impacts.

Table 7.14: Project management approach provided and levels of omitted impacts

	Organisations providing Project Management Approach (<i>n</i> =108)		Organisations NOT providing Project Management Approach (<i>n</i> =44)	
				
No omission	0	(0.0%)	6	(4.7%)
Minimal omission	1	(4.0%)	5	(3.9%)
Moderate omission	5	(20.0%)	27	(21.3%)
Partial omission	7	(28.0%)	38	(29.9%)
Significant omission	7	(28.0%)	29	(22.8%)
Comprehensive omission	0	(0.0%)	5	(3.9%)
Complete omission	5	(20.0%)	17	(13.4%)

Omission of specific impacts

Organisations that do not provide detail of project management approaches omit more “Socio-economic” category impacts than organisations that do provide details. There was no difference between the inclusion / non-inclusion of project management approaches and the other impact categories (Table 7.15).

Table 7.15: Project management approach provided and incorrect omission of impacts significance summary

	Project Management Approach provided incorrectly omitting impact		Project Management Approach NOT provided incorrectly omitting impact		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	0	(0.0%)	10	(7.9%)	0.215
Socio-economic	1	(5.0%)	30	(30.3%)	0.023
Noise	14	(87.5%)	60	(92.3%)	0.620
Transport	17	(81.0%)	80	(89.9%)	0.268
Landscape and visual	6	(35.3%)	23	(37.7%)	1.000
Heritage	7	(43.8%)	20	(40.8%)	1.000
Air quality and climate	3	(50.0%)	17	(56.7%)	1.000
Soils, geology, geomorphology	8	(44.4%)	24	(53.3%)	0.585
Water	10	(55.6%)	29	(49.2%)	0.789

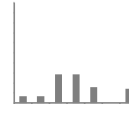
7.8.7. Staff list provided

The inclusion of a staff list suggests that an organisation includes more details in general so therefore may incorrectly omit fewer impacts and incorrectly omit each impact less frequently.

Levels of omitted impacts

There was a significant difference in the comprehensiveness of impact assessment between organisations providing staff lists and organisations not providing staff lists (Fisher's Exact Test (2-sided) $P=0.003$) (Table 7.16). Organisations providing staff lists incorrectly omitted on average 39.4% of impacts, while organisations not providing staff lists incorrectly omitted on average 51.8% of impacts. However, no specific differences were found between the individual omissions categories using *post hoc* repetition of the Fisher's exact test (applying Bonferroni correction).

Table 7.16: Staff list provided and levels of omitted impacts

	Organisations providing staff lists ($n=75$)		Organisations NOT providing staff lists ($n=77$)	
				
No omission	1	(1.3%)	5	(6.5%)
Minimal omission	1	(1.3%)	5	(6.5%)
Moderate omission	10	(13.3%)	22	(28.6%)
Partial omission	23	(30.7%)	22	(28.6%)
Significant omission	24	(32.0%)	12	(15.6%)
Comprehensive omission	5	(6.7%)	0	(0.0%)
Complete omission	11	(14.7%)	11	(14.3%)

Omission of specific impacts

Organisations that did not provide staff lists incorrectly omitted “Socio-economic” and “Landscape and visual” category impacts more frequently than organisations that did provide staff lists (Table 7.17). There was no difference between the provision / non-provision of staff lists and the other impact categories.

Table 7.17: Staff list provided and incorrect omission of impacts significance summary

	Organisations providing staff lists incorrectly omitting impact		Organisations NOT providing staff lists incorrectly omitting impact		Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	2	(2.7%)	8	(10.5%)	0.098
Socio-economic	11	(17.7%)	20	(35.1%)	0.038
Noise	36	(87.8%)	38	(95.0%)	0.432
Transport	48	(87.3%)	49	(89.1%)	1.000
Landscape and visual	10	(24.4%)	19	(51.4%)	0.019
Heritage	13	(35.1%)	14	(50.0%)	0.310
Air quality and climate	12	(50.0%)	8	(66.7%)	0.481
Soils, geology, geomorphology	14	(42.4%)	18	(60.0%)	0.210
Water	17	(43.6%)	22	(57.9%)	0.257

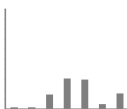
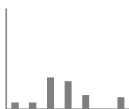
7.8.8. Trustees / advisory board list provided

It may be expected that organisations that have a list of trustees have a higher level of oversight so therefore may incorrectly omit fewer impacts and incorrectly omit each impact less frequently.

Levels of omitted impacts

There was a significant difference in the comprehensiveness of impact assessment between organisations providing trustee / advisory board lists and organisations not providing trustee / advisory board lists (Fisher's Exact Test (2-sided) $P=0.011$) (Table 7.18). Organisations providing trustee / advisory board lists incorrectly omitted on average 40.6% of impacts, while organisations not giving these details incorrectly omitted on average 54.1% of impacts. Repetition of the Fisher's exact test *post hoc* comparing each pair showed no specific differences between the individual omissions categories (applying Bonferroni correction).

Table 7.18: Trustees / advisory board list provided and levels of omitted impacts

	Organisations providing details of trustees / advisory boards (<i>n</i> =95)		Organisations NOT providing details of trustees / advisory boards (<i>n</i> =57)	
				
No omission	2	(2.1%)	4	(7.0%)
Minimal omission	2	(2.1%)	4	(7.0%)
Moderate omission	14	(14.7%)	18	(31.6%)
Partial omission	29	(30.5%)	16	(28.1%)
Significant omission	28	(29.5%)	8	(14.0%)
Comprehensive omission	5	(5.3%)	0	(0.0%)
Complete omission	15	(15.8%)	7	(12.3%)

Omission of specific impacts

Organisations not providing lists of trustees / advisory boards omitted “Ecological”, “Landscape and visual” and “Water” category impacts more frequently than organisations that did provide this detail (Table 7.19). For the other impact categories there was no difference.

Table 7.19: Trustees / advisory board information provided and incorrect omission of impacts significance summary

	Organisations providing details of trustees / advisory boards incorrectly omitting impact		Organisations NOT providing details of trustees / advisory boards incorrectly omitting impact		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	3	(3.2%)	7	(12.3%)	0.042
Socio-economic	16	(20.5%)	15	(36.6%)	0.078
Noise	43	(87.8%)	31	(96.9%)	0.235
Transport	59	(86.8%)	38	(90.5%)	0.763
Landscape and visual	14	(28.0%)	15	(53.6%)	0.030
Heritage	18	(38.3%)	9	(50.0%)	0.414
Air quality and climate	14	(53.8%)	6	(60.0%)	1.000
Soils, geology, geomorphology	19	(46.3%)	13	(59.1%)	0.430
Water	18	(39.1%)	21	(67.7%)	0.020

7.9. Project specific characteristics and links to incorrect omission of impacts

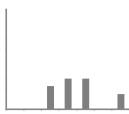
7.9.1. Project location

It is possible that the level of omission and the incorrect omission of each impact may vary by project location.

Levels of omitted impacts

There was no difference in the level of impact omission between projects within the country of the organisation and projects outside the country of the (Fisher's Exact Test (2-sided) $P=0.869$) (Table 7.20). Projects within the country of the organisation omitted, on average, 46.0% of impacts, while projects outside the country of the organisation incorrectly omitted, on average, 44.3% of impacts.

Table 7.20: Project location (within country of organisation or outside country of organisation) and levels of omitted impacts

	Project within country of organisation ($n=126$)		Project outside country of organisation ($n=26$)	
				
No omission	6	(4.8%)	0	(0.0%)
Minimal omission	6	(4.8%)	0	(0.0%)
Moderate omission	26	(20.6%)	6	(23.1%)
Partial omission	37	(29.4%)	8	(30.8%)
Significant omission	28	(22.2%)	8	(30.8%)
Comprehensive omission	5	(4.0%)	0	(0.0%)
Complete omission	18	(14.3%)	4	(15.4%)

Omission of specific impacts

Projects outside the country of organisation incorrectly omitted “Heritage” category impacts more frequently than projects within the country of organisation (Table 7.21). There was no difference between project locations in the other impact categories.

Table 7.21: Project location (within country of organisation or outside country of organisation) and incorrect omission of impacts significance summary

	Project within country of organisation incorrectly omitting impact		Project outside country of organisation incorrectly omitting impact		Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	10	(8.0%)	0	(0.0%)	0.212
Socio-economic	27	(27.6%)	4	(19.0%)	0.586
Noise	64	(91.4%)	10	(90.9%)	1.000
Transport	80	(87.0%)	17	(94.4%)	0.690
Landscape and visual	25	(36.8%)	4	(40.0%)	1.000
Heritage	18	(34.6%)	9	(69.2%)	0.031
Air quality and climate	17	(53.1%)	3	(75.0%)	0.613
Soils, geology, geomorphology	27	(48.2%)	5	(71.4%)	0.426
Water	32	(46.4%)	7	(87.5%)	0.056

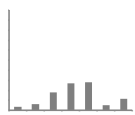
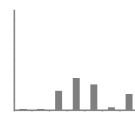
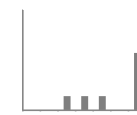
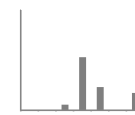
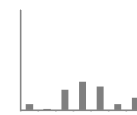
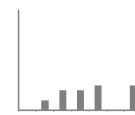
7.9.2. Conservation approaches

Projects using different conservation approaches may vary in the level of omission and the incorrect omission of each impact.

Levels of omitted impacts

When project conservation approaches were compared to the omissions categories, differing levels of omission were seen across the aims (Table 7.22). Across all aims, few organisations omit no likely impacts, the highest level being 6.3% in projects involving “Research / Monitoring”. Comparisons of all conservation approaches and omission categories using Fisher’s exact test shows no significant difference in the comprehensiveness of impact assessment (Table 7.22).

Table 7.22: Conservation approach and levels of omitted impacts

	Habitat protection (n=78)		Breeding (n=12)		Species protection (n=59)		Education (n=62)		Legislation (n=7)		Alternative Livelihoods (n=17)		Research / Monitoring (n=63)		Campaigning (n=20)	
																
No omission	3	(3.8%)	0	(0.0%)	0	(0.0%)	1	(1.6%)	0	(0.0%)	0	(0.0%)	4	(6.3%)	0	(0.0%)
Minimal omission	5	(6.4%)	0	(0.0%)	3	(5.1%)	1	(1.6%)	0	(0.0%)	0	(0.0%)	1	(1.6%)	2	(10.0%)
Moderate omission	14	(17.9%)	5	(41.7%)	14	(23.7%)	12	(19.4%)	1	(14.3%)	1	(5.9%)	13	(20.6%)	4	(20.0%)
Partial omission	21	(26.9%)	2	(16.7%)	16	(27.1%)	20	(32.3%)	1	(14.3%)	9	(52.9%)	18	(28.6%)	4	(20.0%)
Significant omission	22	(28.2%)	3	(25%)	12	(20.3%)	16	(25.8%)	1	(14.3%)	4	(23.5%)	15	(23.8%)	5	(25.0%)
Comprehensive omission	4	(5.1%)	0	(0.0%)	1	(1.7%)	2	(3.2%)	0	(0.0%)	0	(0.0%)	4	(6.3%)	0	(0.0%)
Complete omission	9	(11.5%)	2	(16.7%)	13	(22.0%)	10	(16.1%)	4	(57.1%)	3	(17.6%)	8	(12.7%)	5	(25.0%)
<i>P</i>	0.291		0.701		0.137		0.768		0.220		0.352		0.425		0.433	

P= Fisher's exact test (2-sided) Significance

Omission of specific impacts

Conservation approaches were compared with the incorrect omission of impacts (Table 7.23). The proportions of impacts incorrectly omitted were broadly consistent across the approaches used. Projects involving “Habitat protection” omitted “Socio-economic” and “Heritage” category impacts less frequently than projects that did not. Projects involving “Species protection” omitted “Ecological” and “Socio-economic” category impacts less frequently than projects that did not. Finally, projects that included “Alternative livelihoods” activities omitted “Socio-economic” category impacts less frequently than those that did not.

However projects involving “Campaigns” omitted “Socio-economic” category impacts more frequently than projects that did not.

For the majority of comparisons (66/72) there was no significant association between conservation approach and incorrect omission of impacts.

Table 7.23: Conservation approaches and incorrect omission of impacts significance summary

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative Livelihoods		Research / Monitoring		Campaigns	
	<i>n</i> =78		<i>n</i> =12		<i>n</i> =59		<i>n</i> =17		<i>n</i> =7		<i>n</i> =62		<i>n</i> =63		<i>n</i> =20	
	%	<i>P</i>	%	<i>P</i>	%	<i>P</i>	%	<i>P</i>	%	<i>P</i>	%	<i>P</i>	%	<i>P</i>	%	<i>P</i>
Ecological	5.1	0.524	0.0	1.000	0.0	0.007	3.3	0.204	0.0	1.000	0.0	0.604	9.5	0.321	0.0	0.360
Socio-economic	18.2	0.036	0.0	0.325	12.2	0.015	18.3	0.062	16.7	1.000	0.0	0.006	21.7	0.521	47.4	0.042
Noise	90.6	1.000	75.0	0.308	93.5	0.702	88.9	0.694	100.0	1.000	100.0	1.000	91.2	1.000	100.0	1.000
Transport	87.1	0.772	90.0	1.000	93.0	0.170	82.6	0.144	50.0	0.068	83.3	0.632	93.3	0.233	70.0	0.095
Landscape and visual	36.1	0.779	28.6	1.000	50.0	0.092	34.3	0.647	0.0	0.291	50.0	0.487	38.1	1.000	36.4	1.000
Heritage	27.3	0.024	45.5	1.000	50.0	0.309	45.2	0.621	0.0	0.071	70.0	0.079	45.0	0.788	38.5	1.000
Air quality and climate	57.7	0.722	75.0	0.613	70.0	0.456	50.0	0.729	33.3	0.574	66.7	1.000	46.2	0.493	42.9	0.675
Soils, geology, geomorphology	53.8	0.337	50.0	1.000	38.1	0.188	48.3	0.802	25.0	0.355	44.4	0.732	36.8	0.177	42.9	0.708
Water	47.3	0.451	71.4	0.431	52.0	1.000	46.9	0.647	0.0	0.055	55.6	1.000	41.7	0.332	40.0	0.517

P = Fisher's Exact Test (2-sided)

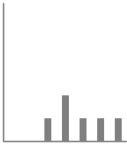
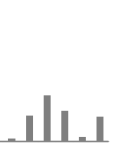
7.9.3. Project start year

Projects with an earlier start date may be less subject to trends in impact assessment so therefore may incorrectly omit more impacts and incorrectly omit each impact more frequently.

Levels of omitted impacts

There was no difference in the level of omitted impacts between project start year categories (Fisher's Exact Test (2-sided) Monte Carlo estimate $P=0.175$) (Table 7.24).

Table 7.24: Project start year and omitted impacts

	Pre-1990 (<i>n</i> =2)		1990-1999 (<i>n</i> =6)		2000-2009 (<i>n</i> =29)		Post 2010 (<i>n</i> =90)		Undated (<i>n</i> =25)	
										
No omission	0	(0.0%)	0	(0.0%)	1	(3.4%)	2	(2.2%)	3	(12.0%)
Minimal omission	1	(50.0%)	0	(0.0%)	0	(0.0%)	2	(2.2%)	3	(12.0%)
Moderate omission	0	(0.0%)	1	(16.7%)	7	(24.1%)	17	(18.9%)	7	(28.0%)
Partial omission	0	(0.0%)	2	(33.3%)	9	(31.0%)	30	(33.3%)	4	(16.0%)
Significant omission	1	(50.0%)	1	(16.7%)	9	(31.0%)	20	(22.2%)	5	(20.0%)
Comprehensive omission	0	(0.0%)	1	(16.7%)	1	(3.4%)	3	(3.3%)	0	(0.0%)
Complete omission	0	(0.0%)	1	(16.7%)	2	(6.9%)	16	(17.8%)	3	(12.0%)

Omission of specific impacts

There were no significant differences between the project start year categories and the incorrect omission of any of the impact categories (Table 7.25).

Table 7.25: Project start year and incorrect omission of impacts significance summary

	Pre-1990	1990-1999	2000-2009	Post 2010	Undated	Fisher's Exact Test (2-sided) <i>P</i>
Ecological	0 (0.0%)	0 (0.0%)	2 (6.9%)	5 (5.6%)	3 (12.0%)	0.720
Socio-economic	1 (50.0%)	0 (0.0%)	4 (16.7%)	19 (27.1%)	7 (35.0%)	0.433
Noise	1 (100.0%)	4 (100.0%)	17 (81.0%)	43 (93.5%)	9 (100.0%)	0.373
Transport	2 (100.0%)	4 (80.0%)	19 (79.2%)	53 (88.3%)	19 (100.0%)	0.639
Landscape and visual	1 (50.0%)	1 (25.0%)	7 (46.7%)	13 (29.5%)	7 (53.8%)	0.408
Heritage	0 (0.0%)	1 (50.0%)	10 (52.6%)	10 (32.3%)	6 (50.0%)	0.518
Air quality and climate	N/A	1 (33.3%)	5 (62.5%)	10 (47.6%)	4 (100.0%)	0.241
Soils, geology, geomorphology	2 (100.0%)	1 (50.0%)	5 (38.5%)	16 (43.2%)	8 (88.9%)	0.883
Water	1 (50.0%)	0 (0.0%)	9 (56.3%)	21 (46.7%)	8 (72.7%)	0.207

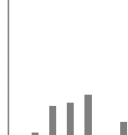
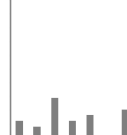
7.9.4. Project end year

It may be expected that projects with an earlier finish date are also less subject to trends in impact assessment so therefore may incorrectly omit more impacts and incorrectly omit each impact more frequently.

Levels of omitted impacts

There were no differences between the project end year categories in terms of omissions levels categories (Fisher's Exact Test (2-sided) Monte Carlo estimate $P=0.341$) (Table 7.26).

Table 7.26: Project end year and omitted impacts

	2000-2010 (n=9)		Post 2010 (n=68)		Ongoing (n=51)		Undated (n=24)	
								
No omission	0	(0.0%)	2	(2.9%)	1	(2.0%)	3	(12.5%)
Minimal omission	0	(0.0%)	2	(2.9%)	2	(3.9%)	2	(8.3%)
Moderate omission	3	(33.3%)	10	(14.7%)	12	(23.5%)	7	(29.2%)
Partial omission	3	(33.3%)	26	(38.2%)	13	(25.5%)	3	(12.5%)
Significant omission	2	(22.2%)	14	(20.6%)	16	(31.4%)	4	(16.7%)
Comprehensive omission	0	(0.0%)	4	(5.9%)	1	(2.0%)	0	(0.0%)
Complete omission	1	(11.1%)	10	(14.7%)	6	(11.8%)	5	(20.8%)

Omission of specific impacts

Comparing the project end year categories to the incorrect omission of specific areas of impacts showed a difference only for “Heritage” category impacts (Table 7.27). However, no specific differences were found between the individual project year end categories and the omissions categories through *post hoc* repetition of the Fisher’s exact test between individual pairs (applying Bonferroni correction). There were also no differences between the other impact categories.

Table 7.27: Project end year and incorrect omission of impacts significance summary

	2000-2010		Post-2010		Ongoing		Undated		Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	0	(0.0%)	4	(6.0%)	3	(5.9%)	3	(12.5%)	0.665
Socio-economic	1	(16.7%)	10	(20.0%)	15	(33.3%)	5	(27.8%)	0.502
Noise	6	(100.0%)	35	(94.6%)	27	(87.1%)	6	(85.2%)	0.497
Transport	6	(85.7%)	46	(90.2%)	30	(83.3%)	15	(93.8%)	0.639
Landscape and visual	2	(50.0%)	12	(37.5%)	9	(31.0%)	6	(46.2%)	0.724
Heritage	5	(100.0%)	5	(29.4%)	10	(32.3%)	7	(58.3%)	0.013
Air quality and climate	1	(50.0%)	8	(50.0%)	6	(50.0%)	5	(83.3%)	0.610
Soils, geology, geomorphology	2	(50.0%)	13	(46.4%)	10	(50.0%)	7	(63.6%)	0.883
Water	2	(66.7%)	15	(45.5%)	13	(50.0%)	9	(60.0%)	0.763

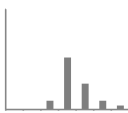
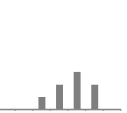
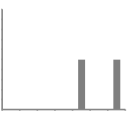
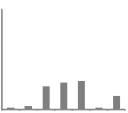
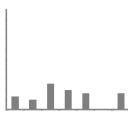
7.9.5. Project duration

Shorter duration projects have less time available for planning / assessment so therefore may incorrectly omit more impacts and incorrectly omit each impact more frequently.

Levels of omitted impacts

There was no difference in the level of omitted impacts between project duration categories (Fisher's Exact Test (2-sided) Monte Carlo estimate $P=0.062$) (Table 7.28).

Table 7.28: Project duration and omitted impacts

	Less than 1 year (n=36)	1-5 years (n=23)	5-10 years (n=8)	10 years or longer (n=2)	Ongoing (n=52)	Not specified (n=31)
						
No omission	1 (2.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.9%)	4 (12.9%)
Minimal omission	1 (2.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (3.8%)	3 (9.7%)
Moderate omission	9 (25.0%)	2 (8.7%)	1 (12.5%)	0 (0.0%)	12 (23.1%)	8 (25.8%)
Partial omission	11 (30.6%)	1 (4.3%)	2 (25.0%)	0 (0.0%)	14 (26.9%)	6 (19.4%)
Significant omission	6 (16.7%)	6 (26.1%)	3 (37.5%)	1 (50.0%)	15 (28.8%)	5 (16.1%)
Comprehensive omission	0 (0.0%)	2 (8.7%)	2 (25.0%)	0 (0.0%)	1 (1.9%)	0 (0.0%)
Complete omission	8 (22.2%)	1 (4.3%)	0 (0.0%)	1 (50.0%)	7 (13.5%)	5 (16.1%)

Omission of specific impacts

There were no differences in the omissions of specific impacts between the project duration categories (Table 7.29).

Table 7.29: Project duration and incorrect omission of impacts significance summary

	Less than 1 year omitted		1-5 years omitted		5-10 years omitted		10 years or longer omitted		Ongoing omitted		Not specified omitted		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	3	(8.6%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	3	(5.8%)	4	(12.9%)	0.505
Socio-economic	7	(31.8%)	1	(4.8%)	0	(0.0%)	0	(0.0%)	15	(32.6%)	8	(34.8%)	0.051
Noise	17	(100.0%)	13	(92.9%)	4	(80.0%)	1	(100.0%)	27	(87.1%)	12	(92.3%)	0.472
Transport	22	(88.0%)	17	(94.4%)	6	(75.0%)	1	(100.0%)	30	(83.3%)	21	(95.5%)	0.471
Landscape and visual	7	(53.8%)	3	(21.4%)	0	(0.0%)	0	(0.0%)	9	(32.1%)	10	(55.6%)	0.112
Heritage	4	(50.0%)	6	(60.0%)	0	(0.0%)	0	(0.0%)	11	(34.4%)	6	(54.5%)	0.333
Air quality and climate	2	(50.0%)	4	(50.0%)	1	(33.3%)	1	(100.0%)	6	(54.5%)	6	(66.7%)	0.936
Soils, geology, geomorphology	5	(50.0%)	6	(42.9%)	2	(50.0%)	0	(0.0%)	9	(47.4%)	10	(66.7%)	0.748
Water	7	(58.3%)	7	(50.0%)	1	(20.0%)	0	(0.0%)	13	(50.0%)	11	(57.9%)	0.663

7.9.6. Project duration “to date”

Levels of omitted impacts

There was no difference in the impact omissions levels between project duration “to date” categories (Fisher’s Exact Test (2-sided) Monte Carlo estimate $P=0.424$) (Table 7.30).

Table 7.30: Project duration “to date” and omitted impacts

	Less than 1 year (<i>n</i> =36)		1-5 years (<i>n</i> =38)		5-10 years (<i>n</i> =22)		10 years or longer (<i>n</i> =25)		Not specified (<i>n</i> =31)	
										
No omission	1	(2.8%)	0	(0.0%)	1	(4.5%)	0	(0.0%)	4	(12.9%)
Minimal omission	1	(2.8%)	1	(2.6%)	0	(0.0%)	1	(4.0%)	3	(9.7%)
Moderate omission	9	(25.09%)	7	(18.4%)	3	(13.6%)	5	(20.0%)	8	(25.8%)
Partial omission	11	(30.6%)	14	(36.8%)	8	(36.4%)	6	(24.0%)	6	(19.4%)
Significant omission	6	(16.7%)	10	(26.3%)	6	(27.3%)	9	(36.0%)	5	(16.1%)
Comprehensive omission	0	(0.0%)	2	(5.3%)	2	(9.1%)	1	(4.0%)	0	(0.0%)
Complete omission	8	(22.2%)	4	(10.5%)	2	(9.1%)	3	(12.0%)	5	(16.1%)

Omission of specific impacts

There was a significant difference between project duration “to date” categories in the incorrect omission of “Landscape and visual” category impacts (Table 7.31). However, no specific differences were found between the individual project duration “to date” categories using *post hoc* repetition of the Fisher’s exact test between individual pairs (applying Bonferroni correction). There were no further differences between the project duration “to date” categories and the other impact categories.

Table 7.31: Project duration “to date” and incorrect omission of impacts significance summary

	Less than 1 year omitted		1-5 years omitted		5-10 years omitted		10 years or longer omitted		Not specified omitted		Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	3	(8.6%)	1	(2.6%)	1	(4.5%)	1	(4.0%)	4	(12.9%)	0.512
Socio-economic	7	(20.0%)	7	(21.1%)	4	(25.0%)	5	(34.8%)	8	(26.1%)	0.696
Noise	17	(100.0%)	19	(90.5%)	12	(85.7%)	14	(87.5%)	12	(92.3%)	0.618
Transport	22	(88.0%)	23	(92.0%)	14	(77.8%)	17	(85.0%)	21	(95.5%)	0.488
Landscape and visual	7	(53.8%)	5	(23.8%)	1	(9.1%)	6	(40.0%)	10	(55.6%)	0.047
Heritage	4	(50.0%)	10	(50.0%)	3	(27.3%)	4	(26.7%)	6	(54.5%)	0.428
Air quality and climate	2	(50.0%)	6	(50.0%)	3	(50.0%)	3	(60.0%)	6	(66.7%)	0.969
Soils, geology, geomorphology	5	(50.0%)	7	(36.8%)	6	(66.7%)	4	(40.0%)	10	(66.7%)	0.378
Water	7	(58.3%)	11	(50.0%)	7	(53.8%)	3	(27.3%)	11	(57.9%)	0.553

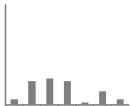
7.9.7. Project staff details

Projects with evidence of dedicated staff appear to have more staff resource to undertake planning and assessment so therefore may incorrectly omit fewer impacts and incorrectly omit each impact less frequently.

Levels of omitted impacts

There were no significant differences in the impact omissions levels between organisations providing details of project staff and those that did not (Fisher's Exact Test (2-sided) $P=0.869$) (Table 7.32).

Table 7.32: Project staff details provided and levels of omitted impacts

	Project Staff Details Provided (<i>n</i> =42)		Project Staff Details NOT Provided (<i>n</i> =110)	
				
No omission	0	(0.0%)	6	(5.5%)
Minimal omission	6	(14.3%)	26	(23.6%)
Moderate omission	16	(38.1%)	29	(26.4%)
Partial omission	10	(23.8%)	26	(23.6%)
Significant omission	2	(4.8%)	3	(2.7%)
Comprehensive omission	7	(16.7%)	15	(13.6%)
Complete omission	0	(0.0%)	6	(5.5%)

Omission of specific impacts

There were also no differences in the omission of any of the specific impact categories between organisations providing project staff details and those not providing project staff details (Table 7.33).

Table 7.33: Project staff details and incorrect omission of impacts significance summary

	Project Staff Details Provided (<i>n</i> =42)		No Project Staff Details Provided (<i>n</i> =110)		Fisher's Exact Test (2-sided) <i>P</i>
Ecological	2	(4.8%)	8	(7.3%)	0.727
Socio-economic	5	(15.2%)	26	(30.2%)	0.107
Noise	22	(91.7%)	52	(91.2%)	1.000
Transport	27	(93.1%)	70	(86.4%)	0.507
Landscape and visual	6	(28.6%)	23	(40.4%)	0.432
Heritage	6	(28.6%)	21	(47.7%)	0.183
Air quality and climate	4	(57.1%)	16	(55.2%)	1.000
Soils, geology, geomorphology	8	(57.1%)	24	(49.0%)	0.763
Water	9	(50.0%)	30	(50.8%)	1.000

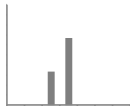
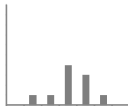
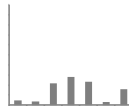
7.9.8. Project expenditure

Projects with higher expenditure have more financial resources available in general so can allocate more to planning and assessment so therefore may incorrectly omit fewer impacts and incorrectly omit each impact less frequently.

Levels of omitted impacts

There was no difference in levels of omitted impacts between project expenditure categories (Fisher's Exact Test (2-sided) $P=0.749$) (Table 7.34). The category also included a high proportion of unspecified expenditure. Even when this group was removed from the analysis there were still no significant differences (Fisher's Exact Test (2-sided) $P=0.663$).

Table 7.34: Project expenditure as % of GDP PPP and levels of omitted impacts

	<10% GDP PPP		11-100% GDP PPP		101-1,000% GDP PPP		1,001-10,000% GDP PPP		10,001+% GDP PPP		Not specified	
	(n=3)		(n=1)		(n=10)		(n=3)		(n=2)		(n=133)	
												
No omission	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	6	(4.5%)
Minimal omission	0	(0.0%)	0	(0.0%)	1	(10.0%)	0	(0.0%)	0	(0.0%)	5	(3.8%)
Moderate omission	1	(33.3%)	1	(100.0%)	1	(10.0%)	0	(0.0%)	0	(0.0%)	29	(21.8%)
Partial omission	2	(66.7%)	0	(0.0%)	4	(40.0%)	2	(66.7%)	0	(0.0%)	37	(27.8%)
Significant omission	0	(0.0%)	0	(0.0%)	3	(30.0%)	1	(33.3%)	1	(50.0%)	31	(23.3%)
Comprehensive omission	0	(0.0%)	0	(0.0%)	1	(10.0%)	0	(0.0%)	0	(0.0%)	4	(3.0%)
Complete omission	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(50.0%)	21	(15.8%)

Omission of specific impacts

There was a significant difference between project expenditure categories in the omission of “Transport” category impacts (Table 7.35). However *post hoc* repetition of the Fisher’s exact test between individual pairs showed no specific differences between the expenditure categories (applying Bonferroni correction). There was no difference between project expenditure categories in the other areas of impact.

Table 7.35: Project expenditure as % of GDP PPP and incorrect omission of impacts significance summary

	<10 (n=3)	11-100 (n=1)	101- 1,000 (n=10)	1,001- 10,000 (n=3)	10,001+ (n=2)	Not specified (n=133)	Fisher’s Exact Test (2-sided) <i>P</i>
Ecological	33.3%	0.0%	0.0%	0.0%	0.0%	6.8%	0.480
Socio-economic	50.0%	20.0%	0.0%	0.0%	27.5%	26.1%	0.766
Noise	100.0%	N/A	88.9%	100.0%	0.0%	92.4%	0.176
Transport	100.0%	100.0%	55.6%	100.0%	50.0%	91.4%	0.030
Landscape and visual	0	N/A	40.0%	50.0%	0.0%	37.5%	1.000
Heritage	N/A	100.0%	25.0%	50.0%	0.0%	42.9%	0.643
Air quality and climate	N/A	100.0%	75.0%	N/A	0.0%	53.3%	0.599
Soils, geology, geomorphology	N/A	N/A	77.8%	0.0%	0.0%	48.1%	0.148
Water	N/A	100.0%	37.5%	100.0%	0.0%	51.5%	0.593

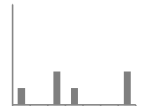
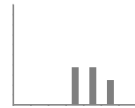
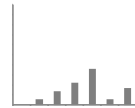
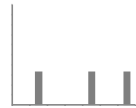
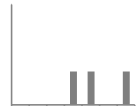
7.9.9. Report format

Longer reports are likely to include greater detail of projects in general, so therefore may incorrectly omit fewer impacts and incorrectly omit each impact less frequently.

Levels of omitted impacts

There was a significant difference in the levels of impact omissions (Fisher's Exact Test (2-sided) Monte Carlo estimate $P=0.028$) (Table 7.36). However *post hoc* Fisher's exact pairwise testing of the impacts and omissions categories showed no specific differences (applying Bonferroni correction).

Table 7.36: Report format and levels of omitted impacts

	Paragraph (n=6)		Short report (n=55)		Comprehensive report (n=41)		Website (n=8)		Multiple reports (n=36)		Video (n=3)		Academic paper (n=3)	
														
No omission	1	(16.7%)	5	(9.1%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Minimal omission	0	(0.0%)	2	(3.6%)	1	(2.4%)	0	(0.0%)	2	(5.6%)	1	(33.3%)	0	(0.0%)
Moderate omission	2	(33.3%)	17	(30.9%)	8	(19.5%)	0	(0.0%)	5	(13.9%)	0	(0.0%)	0	(0.0%)
Partial omission	1	(16.7%)	17	(30.9%)	15	(36.6%)	3	(37.5%)	8	(22.2%)	0	(0.0%)	1	(33.3%)
Significant omission	0	(0.0%)	8	(14.5%)	10	(24.4%)	3	(37.5%)	13	(36.1%)	1	(33.3%)	1	(33.3%)
Comprehensive omission	0	(0.0%)	0	(0.0%)	1	(2.4%)	2	(25.0%)	2	(5.6%)	0	(0.0%)	0	(0.0%)
Complete omission	2	(33.3%)	6	(10.9%)	6	(14.6%)	0	(0.0%)	6	(16.7%)	1	(33.3%)	1	(33.3%)

Omission of specific impacts

There were significant differences between report formats and the incorrect omission of “Socio-economic”, “Noise”, “Soils, geology, geomorphology” and “Water” category impacts (Figure 7.7, Table 7.37). Repetition of the Fisher’s exact test for each pair within each impact category showed no significant difference between report types for “Socio-economic”, “Noise” or “Soils, geology, geomorphology” category impacts. However for “Water” category impacts “Short” reports were shown to include the impact more frequently than “Multiple” reports (Fisher’s Exact Test (2-sided) $P=0.003$, applying Bonferroni correction).

Table 7.37: Report format and incorrect omission of impacts significance summary

	Fisher’s Exact Test (2-sided) P
Ecological	0.069
Socio-economic	0.042
Noise	0.040
Transport	0.250
Landscape and visual	0.650
Heritage	0.290
Air quality and climate	0.477
Soils, geology, geomorphology	0.012
Water	0.004

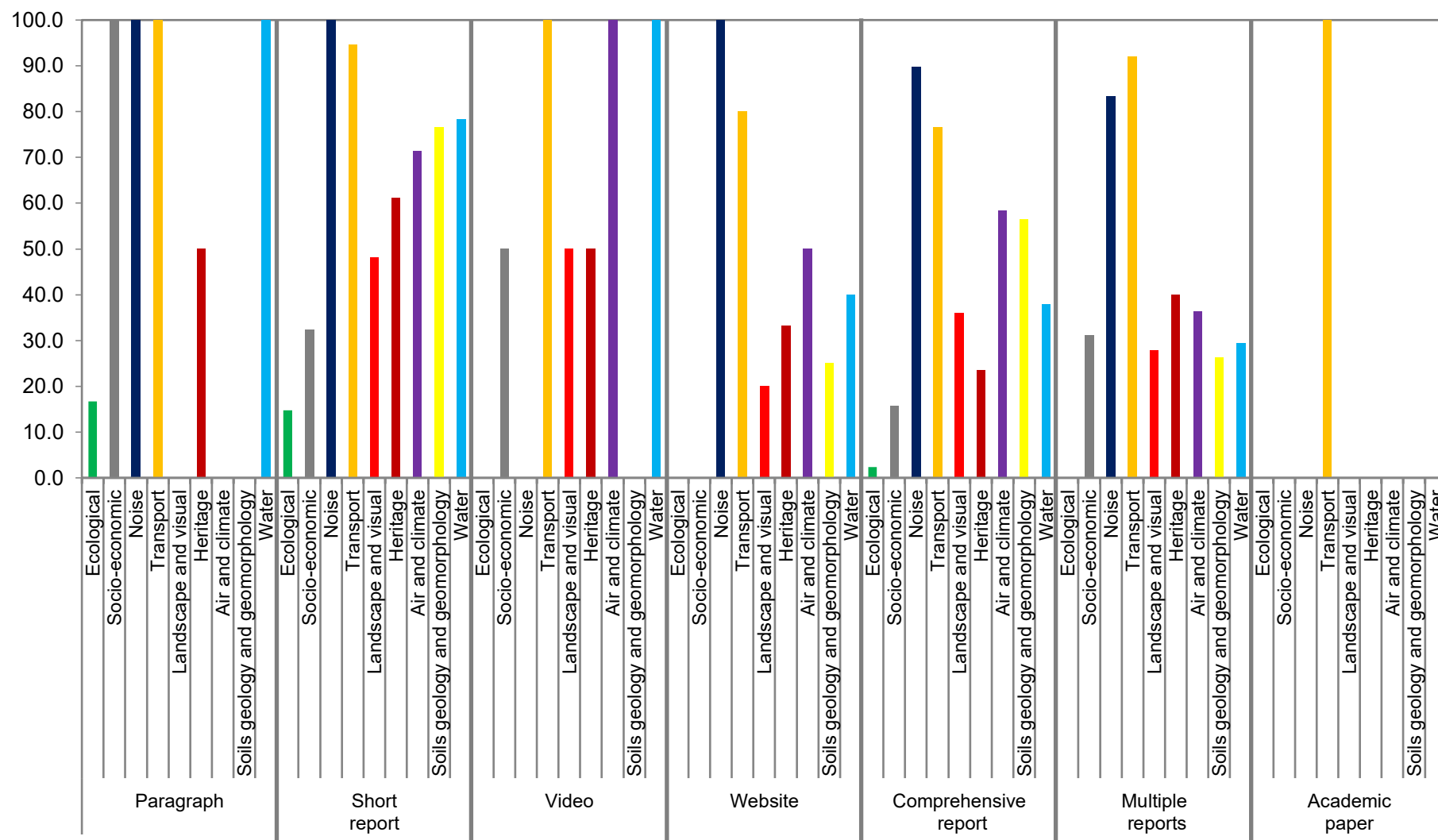


Figure 7.7: Percentage of report format incorrectly omitting impacts

7.10. Discussion

Through the review of projects it is clear that some impact categories were the more likely result of conservation activities than others. It is not surprising that “Ecological” category impacts were likely in 99.3% of projects. A second level of impacts including “Socio-economic” and “Transport” category impacts were also likely in the majority of projects. The third level of impacts were likely to occur less frequently in between around 40 to 50 percent of projects and include “Noise”, “Transport”, “Landscape and visual” “Heritage”, “Soils, geology, geomorphology” and “Water” category impacts. “Air quality and climate” impacts were least likely in comparatively few projects (23.7%).

Almost half of likely impacts (46.0%) were omitted from reports, with “Noise” and “Transport” category impacts the most likely to be omitted. This suggests that while “core” outcomes relating to “Ecological” impacts were well represented in project reports, there is a notable trend of under reporting of likely wider impacts from conservation projects.

7.10.1. Level of omitted impacts

Table 7.38 summarises all the significant findings when comparing the level of omission of impacts from reports to the various organisational and project related characteristics. From 33 statistical comparisons (excluding *post hoc* tests) only four significant results were identified, suggesting that in most cases organisational and project characteristics have very limited links to level of omissions of impact from reports. This is supported as all *post hoc* tests showed no significance, so it must be considered there are no links. The significant results are considered here.

There was a significant difference between omission levels for organisations with “Legislation” as an aim compared to organisations without that aim. *Post hoc* tests showed no significant difference between the omissions levels. There is therefore no link between organisational aim and the level of impact omission from reports.

The comparison of omissions level for organisations providing a staff list and organisations not providing a staff list also provided a significant result. However *post hoc* tests showed no significant difference between the two categories and the omissions levels. There is therefore no definitive link between the provision of a staff list and the level of impact omission from reports.

Comparing organisations that provided details of trustees with organisations that did not and the levels of impact omission provided a significant result. However no significant difference was shown between the characteristics and the omissions levels in *post hoc* tests. There is therefore no link between the provision of trustee details and the level of impact omission from reports.

Comparison of report formats showed significant difference in omissions levels. However *post hoc* tests showed no significant difference between the report categories and the omissions levels. There is therefore no link between report format and the level of impact omission from reports.

Table 7.38: Comparison of characteristics and omissions levels summary of significant results

Characteristic	Significant category	Specific difference
Country	No significant results	No significant results
Size	No significant results	No significant results
Aim	Legislation aim vs. No legislation aim	No significant difference in category comparison
Paid staff	No significant results	No significant results
Volunteers	No significant results	No significant results
Project management	No significant results	No significant results
Staff list	Staff list vs. No staff list	No significant difference in category comparison
Trustees	Trustee details vs. No Trustee details	No significant difference in category comparison
Location	No significant results	No significant results
Approach	No significant results	No significant results
Start year	No significant results	No significant results
End year	No significant results	No significant results
Duration	No significant results	No significant results
Duration to date	No significant results	No significant results
Project Staff	No significant results	No significant results
Expenditure	No significant results	No significant results
Report format	Report format	No significant difference in category comparison

7.10.2. Omission of specific impacts

Table 7.39 summarises the significant findings when comparing organisational and project characteristics with the incorrect omission of specific impacts. Significant differences between measures of characteristics were found in only 19 comparisons (from 549 comparisons undertaken excluding *post hoc* tests). In the majority of these cases (13 of 19) the presence of a characteristic was associated with a less frequent omission of that impact category, while the opposite was true in six comparisons. Generally individual comparisons of a characteristic and impact category showed significance, but these were isolated cases and therefore forming conclusions about the links between characteristics and the wider omission of impacts from reports was not possible. The majority of significant results also related to “Socio-economic” category impacts (in nine of the 19 significant results). Of these, six related to a characteristic’s presence associated with a less frequent omission of the impact, but three related to a more frequent omission. Although “Socio-economic” impacts were found to be significant so frequently, this inconsistency makes it difficult to conclude that characteristics were related to the omission / inclusion of this impact category. Associations with other impacts were less frequent.

Comparing the presence / absence of organisational aims with the incorrect omission of specific impact categories from reports shows five significant results (from 90 comparisons). The limited number of significant results means that the conclusion must be that there is no link between organisational aim and the incorrect omission of specific impact categories from reports.

Comparing the employment of paid staff and the incorrect omission of impacts from reports showed that organisations employing paid staff omitted “Landscape and visual” category impacts significantly less frequently than organisations not employing paid staff. This single significant result suggests that in general there is no link between the employment of paid staff and the incorrect omission of impacts from reports.

Organisations employing volunteers omitted “Socio-economic” category impacts significantly more frequently than organisations not employing volunteers. While this is an example of a characteristic being present but not equating to a lower level of omissions, the single significant result means that no conclusion can be drawn and the employment

of volunteers is not linked to the incorrect omission of specific impact categories from reports.

For the remaining binary characteristic comparisons, the single instances of significant results in each characteristic comparison suggests that in general there is no link between the inclusion of project management approaches, the provision of staff lists or the provision of trustee details and the incorrect omission of impacts from reports.

Projects within the country of the organisation omitted “Heritage” category impacts significantly more frequently than projects outside the country of the organisation. This single instance of a significant result means that no conclusion can be made on the link between project location and the incorrect omission of impacts from reports.

Comparing the conservation approaches with the omission of specific impacts also provided multiple significant results (six from 72 comparisons). In five cases projects using an approach omitted the impact significantly less frequently than projects not using that approach. In the case of projects using “Campaigns” as an approach, these omitted “Socio-economic” category impacts significantly more frequently than projects not using that approach. While there appear to be more significant results in the comparison of project approaches than in other sections in fact these were exceptional as most comparisons show no significance. Therefore no definitive link can be made between project approach and the incorrect omission of impacts from reports.

Project timescale characteristics provide minimal significant results. Projects in the “2000-2010” end year category omitted “Heritage” category impacts significantly more frequently than projects in other end year categories. However this is the only significant result relating to the end year category so there is no wider link between this characteristic and the incorrect omission of impacts reports. In the duration “to date” characteristic, consideration of “Landscape and visual” category impacts was shown to be significant. However, *post hoc* testing showed no significant difference between each duration “to date” category, again showing no link between the characteristic and the incorrect omission of impacts from reports.

Projects in the “101-1,000% GDP PPP” expenditure category were shown to omit “Transport” category impacts significantly less frequently than projects in the other expenditure categories. This was the only significant result relating to expenditure so

shows no wider link between the characteristic and the incorrect omission of impacts from reports.

Table 7.39: Omission of specific impacts summary of significant results

Characteristic	Significant impact category	Specific difference
Country	No significant result	No significant result
Size	No significant result	No significant result
Aim		
Habitat protection	No significant result	No significant result
Breeding	Socio economic	Organisations with “Breeding” aim omitted “Socio-economic” impacts significantly less frequently than those without that aim
	Water	Organisations with “Breeding” aim omitted “Water” impacts significantly <u>more</u> frequently than those without that aim
Species protection	No significant result	No significant result
Education	Soils, geology, geomorphology	Organisations with “Education” aim omitted “Soils, geology geomorphology” impacts significantly less frequently than those without that aim
Legislation	Water	Organisations with “Legislation” aim omitted “Water” impacts significantly less frequently than those without that aim
Alternative livelihoods	No significant result	No significant result
Research / Monitoring	No significant result	No significant result
Campaigns	Socio-economic	Organisations with “Campaigns” aim omitted “Socio-economic” impacts significantly <u>more</u> frequently than those without that aim
Funding	No significant result	No significant result
Representation	Noise	Organisations with “Representation” aim omitted “Noise” impacts significantly less frequently than those without that aim
	Transport	Organisations with “Representation” aim omitted “Transport” impacts significantly less frequently than those without that aim

Table 7.39 Continued:

Paid staff	Landscape and visual	Organisations employing paid staff omitted “Landscape and visual” impacts significantly less frequently than those not
Volunteers	Socio-economic	Organisations employing volunteers omitted “Socio-economic” impacts significantly <u>more</u> frequently than those not
Project management	Socio-economic	Organisations providing details of project management approaches omitted “Socio-economic” impacts significantly less frequently than those that did not
Staff list	Socio-economic	Organisations providing staff lists omitted “Socio-economic” impacts significantly less frequently than those that did not
	Landscape and visual	Organisations providing staff lists omitted “Landscape and visual” impacts significantly less frequently than those that did not
Trustees	Ecological	Organisations providing trustee details omitted “Ecological” impacts significantly less frequently than those that did not
	Landscape and visual	Organisations providing trustee details omitted “Landscape and visual” impacts significantly less frequently than those that did not
	Water	Organisations providing trustee details omitted “Water” impacts significantly less frequently than those that did not
Location	Heritage	Projects within the country of the organisation omitted “Heritage” impacts significantly <u>more</u> frequently than those outside the country of the organisation
Approach		
Habitat protection	Socio-economic	Projects using “Habitat protection” approach omitted “Socio-economic” impacts significantly less frequently than those not
	Heritage	Projects using “Habitat protection” approach omitted “Heritage” impacts significantly less frequently than those not

Table 7.39 Continued:

Breeding	No significant result	No significant result
Species protection	Ecological	Projects using “Species protection” approach omitted “Ecological” impacts significantly less frequently than those not
	Socio-economic	Projects using with “Species protection” approach omitted “Socio-economic” impacts significantly less frequently than those not
Education	No significant result	No significant result
Legislation	No significant result	No significant result
Alternative livelihoods	Socio-economic	Projects using “Alternative livelihoods” approach omitted “Socio-economic” impacts significantly less frequently than those not
Research / Monitoring	No significant result	No significant result
Campaigns	Socio-economic	Projects using “Campaigns” approach omitted “Socio-economic” impacts significantly <u>more</u> frequently than those not
Start year	No significant result	No significant result
End year	Heritage	Projects in the “2000-2010” end year category omitted “Heritage” impacts significantly <u>more</u> frequently than those in other end year categories
Duration	No significant result	No significant result
Duration to date	Landscape and visual	No specific difference between duration “to date” categories
Project Staff	No significant result	No significant result
Expenditure	Transport	Projects in the “101-1,000% GDP PPP” expenditure category omitted “Transport” impacts significantly less frequently than those in other expenditure categories
Report format	No significant result	No significant result

8. Results: Quantifying the severity of impacts included and omitted from reports

8.1. Aims and Objectives

This section aims to quantify the overall “significance” of the impacts (both positive and negative) that were either omitted from or included in reports, to understand the overall contribution of individual negative impacts to wider project outcomes. As in previous sections, “*significance*” scores were compared with organisational and project characteristics to establish if these characteristics influenced whether impacts were considered. First the overall score (regardless of inclusion / omission from reports) is assessed to provide an overview of the positive / negative impacts of each project on each impact area, and secondly the “*significance*” scores for impacts that were included in reports are compared with the scores for impacts that were omitted from reports.

This section closes with the provision of a cumulative assessment of the projects’ impacts (combining all impacts included and omitted, both positive and negative) giving an overall score for each project. This is used to consider the direct consideration of impacts to enhance positives and minimise or mitigate negatives.

8.2. Hypotheses

Two tests of comparison were undertaken (where appropriate) for each area of organisational and project characteristics to assess the correctness of inclusion and omission of impacts from case studies. “*Significance*” scores for impacts that were included in reports were compared with “*significance*” scores for impact categories that were omitted from reports, again comparing according to organisational and project characteristic categories.

Characteristics were also compared to the combined “*significance*” scores (scores for both impacts that were included in reports AND impacts that were omitted from reports) for each impact category in order to identify factors which may be linked to the overall “*significance*” levels (the positive or negative contribution within that impact category) for differing project types. For each assessment the following hypotheses were tested:

Hypothesis 1: Organisational characteristic “X” is not linked to the overall “significance” score of any impact.

Hypothesis 2: There is no difference in “significance” scores between impacts included in reports and impacts omitted from reports, according to organisational / project characteristic.

8.3. Statistical tests

For both hypotheses the Kruskal-Wallis test was used in combination with Dunn’s *post hoc* tests for each pair of groups. Again these statistical tests were carried out using IBM SPSS Statistics 25.

8.4. General methodology

To avoid confusion references to statistical significance are always shown without emphasis. Wherever reference is made to assigned scores indicating severity of impact “*significance*” is used.

8.4.1. Assessing “*significance*”

The initial stages of this project showed that impact assessment for many receptor types across organisation and project types is not occurring in many cases. However what this earlier analysis does not provide is an assessment of the importance of this omission. In some cases it may be that while an impact was likely and was omitted from a report its importance in the wider context of the project activities may be negligible. In this section, each case study is reviewed to understand the “*significance*” of the impacts omitted from reports and the “*significance*” of the impacts included in reports.

8.4.2. What is “*significance*”?

“*Significance*” in impact assessment is determined from a range of factors, combining the severity of the impact (the magnitude) and the level of sensitivity or the value of that receptor. In practice some elements of “*significance*” can be determined using impartial scales. For example one measure of the magnitude of a gravel extraction development could be the land requirements. However the other factors mean that magnitude is not the sole determinant of “*significance*”. A large magnitude impact might have a negligible effect on a low sensitivity receptor (for example a large housing development built on a former industrial site), but a small magnitude impact might have a significant effect on a high sensitivity receptor (for example an exploratory oil well in a protected area). The skill of “*significance*” determination comes from the capacity to weigh these varying aspects together to form a justifiable position on the impact of proposed activities on receptors.

8.4.3. Criticism of EIA “*significance*” determination in practice

Determining “*significance*” remains a difficult aspect even within the established field of EIA. Lawrence (2007a) called the process “one of the most complex and least understood of EIA activities”. Although practitioners do make use of quantitative evidence where possible, assigning “*significance*” is partially influenced by subjective decision making. Frequently approaches are ad hoc and inconsistent (Lawrence, 2007b). As Ehrlich and

Ross (2015) state “straightforward methods for reaching “significance” determinations remain challenging and sometimes unclear.” EIA methodologies have been criticised for “weak approaches to significance determination” (Greig and Duinker, 2014) which can be seen to be a combination of the complexity of assessing a range of impacts on a range of receptors, with limited guidance available. The standards applied to “*significance*” determination vary according to the regulatory body, with some jurisdictions providing detailed guidance on establishing “*significance*”, while others provide only very general approaches (Lawrence, 2007a). A further difficulty comes from the need to combine quantitative information (such as the scale of the effect) with qualitative information (such as the expert opinion on the importance of an effect) (Zulueta et al., 2016). This requirement to combine heterogeneous data can create inequitable forms of weighting for “*significance*” which can mean that impacts are ruled unimportant (and subsequently disregarded from mitigation plans), when they should be included (Toro et al., 2013). Alternatively reviews might be “wrongly focused on dealing with insignificant impacts while the more negative impacts or aggressive actions remain untreated,” (Zulueta et al., 2016).

The application of “*significance*” determination is not a simple analytical process. While scientific evidence is the basis for impact prediction, the final determination of “*significance*” is a combination of this evidence, with expert interpretation and assessment of how important these changes are to affected receptors and how they are perceived by stakeholders. Through use of available evidence, experts can make an assessment of how a certain action might change a feature, but key to the question of “*significance*” is whether that change is acceptable. This, however, often involves an “answer that is not a strictly scientific judgement” (Ehrlich and Ross, 2015). The determination of “*significance*” is therefore a combination of expert professional judgement combined with “systematic and scientific rationale”(Anjaneyulu and Manickam, 2011).

While there is consensus that methods used to determine “*significance*” could be improved, there are consistent factors which make up a ‘best practice’ approach to the problem. Jones and Morrison-Saunders, (2016) propose that all impact “*significance*” determinations should:

- Have a clear operational framework for how “*significance*” is determined throughout the EIA
- Focus EIA attention only on “*significant*” issues
- Ensure that the term “*significance*” is specified and applied consistently

- Uphold transparency in decision-making so that “*significance*” determinations are clear to all EIA stakeholders.

These elements form the basis of the “*significance*” determination methodology outlined here.

8.5. Methodology for impact “*significance*” determination

For this project a clear, transparent methodology has been developed, based on the need to demonstrate how each assessment of impact has been considered and why it has been categorised as it has, in order to avoid the criticism that “such judgements, made without the benefit of analysis, are likely to be flawed, inconsistent and biased” (Glasson, Chadwick and Therivel, 2012). This section describes the development of a protocol to assess the “*significance*” of impacts not considered in the original case study report.

The Canadian Environmental Assessment Agency (2018) provides guidance on approaches to determining impact “*significance*” for EIA. It highlights five approaches which can be used: For this study two of these approaches are utilised, shown in Table 8.1.

Table 8.1: Canadian Environmental Assessment Agency (2018) approaches to “*significance*” assessment

<i>Aggregation</i>	Attributing a scale ranking to key categories of impact (such as scale of impact, spatial coverage, longevity and probability) and applying a rule to determine the “ <i>significance</i> ” of each impact.
<i>Reasoned Argumentation</i>	Presenting a “clear, well-reasoned, substantiated and organized argument in support of a conclusion”. Taking into account relevant information, including effects and benchmarks, this approach should allow a reader to logically draw the same conclusions as the author.
Canadian Environmental Assessment Agency (2018)	

The approach to impact “*significance*” used in this assessment combines the “Aggregation” and “Reasoned Argumentation” methodologies outlined above. Scale rankings are attributed to characteristics of each impact and reasoned approach is taken to the justification of the impact “*significance*” assessments. Further details of the

approach are provided in the following sections. The Canadian Environmental Assessment Agency also provides three other approaches to “*significance*” assessment. These do not provide an appropriate basis for this assessment, requiring multiple reviewer inputs (Collaboration Method), being more appropriate to larger projects with a wider likelihood of negative impact (Risk Assessment Method) or requiring demonstrable professional EIA experience (Professional Judgement Method) so are not used here.

8.6. Key elements in determining “*significance*”

Specificity

One of the central elements for “*significance*” determination is that it needs to be appropriate to the situation that is being assessed. “The significance determination process should match the impact and environmental characteristics, as well as other aspects of context” (Lawrence, 2007a). Complex approaches to determining “*significance*” have been proposed, including mathematical approaches (Toro et al., 2013) but using this approach here, does not meet the requirements for transparency and ease of use required to improve the process for non-specialist practitioners.

Logic and substantiation

By definition, the review of case studies presented here is conducted by an individual researcher and the interpretation of potential impacts from described activities necessarily includes an element of subjectivity. However as Ehrlich and Ross (2015) discuss “Subjective does not mean arbitrary – those using subjective informed judgements to make significance determinations still must rely on the evidence that has been brought forth by the participants of the EIA, and must use cogent reasoning.” It is this approach to cogent reasoning and categorical assessment for each impact that is used here. Rossouw (2003) provides a simple series of criteria which have been adapted for use here.

Positive or negative significance?

In EIA “*significance*” determination the focus of decision makers is on the avoidance and / or mitigation of negative impacts. Ehrlich and Ross (2015) demonstrate this with the “*significance* spectrum” shown in Figure 8.1. This illustrates the capacity for a receptor to withstand an impact, to the point where it becomes “*significant*” (and if not addressed becomes catastrophic).



Figure 8.1: Ehrlich and Ross' (2015) "Significance" Spectrum

The authors allude to a theoretical spectrum which includes both a positive and negative scale. For the purpose of this study projects are designed with positive outcomes in mind so impacts are never likely to be catastrophic, allowing the "significance" spectrum to be adapted as in Figure 8.2, with the aim of assessing omitted impacts against a positive and negative scale

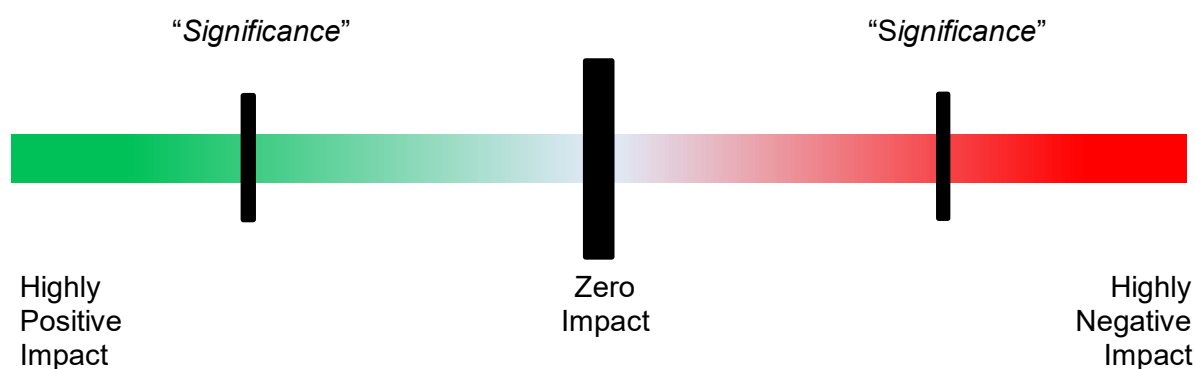


Figure 8.2: Positive-Negative "Significance" Spectrum

Already many conservation organisations seek positive impacts for non-ecological elements and it is important to capture this information here. This two-way scale also aims to further establish the value of impact inclusion, making the process more useful to conservation organisations as positive non-core impacts can be utilised in impact evaluation as a way to contextualise and further justify pro-conservation actions (i.e. "not only is our organisation doing X conservation activity, but we are also realising benefits Y and Z for other aspects of society").

Likelihood of impact

A simple assessment of the likelihood of an impact occurring was also included. Based on project descriptions an assessment was made of whether an impact was possibly, probably or definitely an outcome of that activity.

Spatial scale of impact

In assessing the “*significance*” of those impacts not assessed by organisations within the case study projects, there is a need to diverge from the measures of “*significance*” in the EIA legislation. These are designed to address large infrastructure projects that risk, for the most part, large scale, negative impacts. EIA legislation focuses on those projects that by definition will create large scale change (likely on a spatial scale, but also by changed processes, or altered resource consumption). For the majority of conservation projects the impacts that are risked will not result in the same large scale alterations as infrastructure. However conservation activities also have the potential for impacts at a range of spatial scales. For many conservation projects consideration of spatial scale is a useful measure and where appropriate this information is included here (see Table 8.2). However for other impacts, spatial scale is assessed in a way appropriate to that impact, for example the spatial scale of “Transport” category impacts might be assessed on the number of vehicle movements relative to local, national or international transport movements.

Severity of impact

Understanding the severity of an impact is the most complicated element of “*significance*” determination. The severity depends largely on the receptor and the baseline condition before the impact is created. For certain impacts this can be a quantitative change, but in many cases this involves a qualitative assessment for each impact reviewed. Decisions need to be based on societal values (Ehrlich and Ross, 2015) (where the decision maker in effect becomes a proxy for society, taking into account those values). This is part of the value of stakeholder engagement in full EIA. Taking into account stakeholder viewpoints allows decision makers to verify those societal values (and if necessary contrast local views to national views) and set thresholds for severity.

EIA projects follow a different trajectory to conservation work. The measure of their success is that the development has been completed. The aim of EIA is to minimise the harmful impacts, not necessarily to maximise the benefits. So the methodology is designed to make assessments of negative impacts on the various elements that will be affected to minimise the development’s effect on that element. However for conservation,

the initial intervention is designed with a positive outcome planned. The review of impact assessment for a conservation project therefore should not follow the same approach.

A conservation project may attempt to alter a receptor, even actively instigating a deliberate negative change (for example a species recovery plan may involve the restriction of traditional hunting rights negatively impacting cultural heritage, but subjugates that negative to the positive of species preservation). However affected receptors also have the capacity to negatively affect the conservation impact. Impacts which may be potentially attributable to the project run the risk of undermining outcomes and perhaps more importantly creating negative perceptions amongst stakeholders if not considered and/or mitigation put in place. Therefore there is a requirement to consider “*significance*” in a different way. This section outlines the development of a methodology to assess “*significance*” for those impacts that were omitted from case study projects. For negative impacts in conservation the decision comes down to “Does the impact matter enough so that it should be reduced or prevented?” (Ehrlich and Ross, 2015).

In this study, stakeholder engagement cannot be replicated. However the aim of interpretation of impacts remains the same and considering the combination of likely stakeholders and the baseline conditions for activities allows an assessment of severity.

Longevity of impact

A key element of assessment is the longevity of potential impacts. While conservation projects (meeting the project definition of being time bound) are explicitly limited in terms of immediate impact related to project activities, for different receptors this change could be long term, for others permanent. Short term impacts can reduce overall “*significance*”, particularly if these impacts are reversible at the conclusion of formal project activities. Impacts were assessed and assigned to categories of longevity and whether the impact was i) reversible and ii) likely to be reversed.

8.7. Scoring

In order to provide a comparison of assessed impacts, and to allow further analysis and establish links with other organisational factors each categorical element of the assessment was provided with a score (text fields which were used to record background information and to feed into categorical elements were not scored). Criteria for scoring are summarised in Table 8.2.

In some EIA approaches factors in “*significance*” assessment can be weighted, as in for example the Battelle Environmental Evaluation System (Ponce, Undated). However this approach is most commonly utilised as a method for reviewers of a project to compare the importance of impacts on different receptors or to different groups of stakeholders (for example a review may weigh alterations to landscape as more important than impacts on water consumption) in the final comparison (cumulative impact assessment), or it may be employed as a method to compare alternative project proposals. Walker and Johnston (1999) identified the option to apply different weights to “matrices to reflect factors such as duration, frequency and extent”, however the guidance provides no further information on how this should be applied. Weighted methodologies are also subject to criticism for applying value judgements to assessments (Wood, 2003). This criticism and the lack of information available on the process of understanding which factors contribute more or less to the overall determination of whether an impact is “significant” or not, means that within this study the impact characteristics are unweighted and cumulative scores for impacts are simply the combined total of scores for each characteristic.

8.8. Summary of criteria for assessment

The factors and categories used for impact “*significance*” assessment in this study are summarised in Table 8.2. These criteria were used in each assessment to ensure consistency across case study projects and across impact categories.

Table 8.2: Criteria, categories and scores for “*significance*” assessment

Criteria	Categories	Score	Details
Details of impact and specific receptor(s)	Text field	N/A	Information contributing to other criteria.
Status of impact	Positive	Positive multiplier	A positive impact on the receptor(s).
	Negative	Negative multiplier	A negative impact on the receptor(s).
Likelihood of impact	Possible	1	An impact that may result from described activities.
	Probable	2	An impact that is the likely result of described activities without mitigation or avoidance methods.
	Definite	3	An impact that is unavoidable or that has already happened due to described activities.
Spatial extent of impact	Vicinity	1	An impact with only very local implications. No effect beyond the immediate project activities.
	Local	2	An impact with local implications
	Regional	3	An impact with regional implications
	National	4	An impact with national implications
	International	5	An impact with international implications
Severity of impact	Minimal	1	An impact creating a minimal change.
	Moderate	2	An impact creating a moderate change.
	Severe	3	An impact creating a severe change.
Longevity of impact	Short term	1	Impacts during project set up phases / one-off impacts associated with a single activity / event.
	Medium term	2	Impacts during project operational phases or impacts likely to be repeated / recurring.
	Long term	3	Impacts continuing after project related activities finish but that may cease (at any timescale).
	Permanent	4	Impacts that create a permanent change.

8.9. Method of data collection

A “Google Form” was used as the basis for data collection, as this provided an efficient method of data collection, a simple interface and allowed for outputs as a “Google Sheet” allowing for export to other software for later analysis. For most categories, response options were scored using the criteria outlined above. In addition free text fields allowed collection of additional information and contextual information where required.

8.10. Combined scores

In order to assess the overall impact of a project within each impact category, all impact scores (both for included and omitted impacts) were combined into a single set of scores for all projects. This allowed an assessment of overall “*significance*” levels and an estimate of the central tendencies of positive or negative contribution within that impact category.

8.11. Repetition of scoring

While scoring of impacts was based on a systematic approach to assessment, the interpretative nature of the assessment is subject to potential inconsistency. In an initial scoring process, the assessments were carried out using a simpler approach, only scoring negative impacts from projects. Subsequently, this approach to scoring was considered to be over simplistic and would not provide the cumulative assessment of project impacts that was required. However this meant that scoring assessments (of negative impacts) needed to be redone as part of the complete scoring process. This inadvertently allowed the validation of initial scores against the scores given during the second review, with minimal differences shown between scores given in the two assessments.

8.12. Summary of study

The majority of impacts (both impacts included in reports and impacts omitted from reports) from described activities were positive (Table 8.3). All projects with an ecological element achieve a positive “Ecological” score. However “Noise” and “Transport” category impacts achieve a negative average score and for both categories the majority of impacts were negative.

Table 8.3: Combined impact scores for all impacts and projects

		Median Score	Min Score	Max Score	Projects achieving positive score		Projects achieving negative score	
Ecological	(n=151)	9	5	14	151	(100.0%)	0	(0.0%)
Socio-economic	(n=119)	8	-13	13	107	(87.4%)	12	(12.6%)
Noise	(n=81)	-6	-10	11	9	(11.1%)	72	(88.9%)
Transport	(n=110)	-7	-12	10	12	(10.9%)	98	(89.1%)
Landscape and visual	(n=78)	8	-11	12	66	(84.6%)	12	(15.4%)
Heritage	(n=65)	8	-14	15	55	(84.6%)	10	(15.4%)
Air quality and climate	(n=36)	7	-10	11	23	(63.9%)	13	(36.1%)
Soils, geology, geomorphology	(n=63)	7	-9	10	49	(77.8%)	14	(22.2%)
Water	(n=77)	7	-11	11	54	(70.1%)	23	(29.9%)

Median scores for impacts omitted from reports were lower for impacts included in reports across all impact categories, with the exception of “Heritage” category impacts (where included impacts score lower than omitted impacts) and for “Soils, geology, geomorphology” category impacts (where included and omitted impacts were scored equally). Minimum scores for impacts included were lower than for impacts omitted from reports in all impact categories with the exception of “Ecological” category impacts. Maximum scores were lower in four impacts categories (“Ecological”, “Socio-economic”, “Landscape and visual” and “Water” category impacts) but were higher for four impact

categories (“Noise”, “Transport”, “Heritage” and “Air and climate” category impacts) and were equal for “Soils, geology, geomorphology” category impacts”) (Figure 8.3, Table 8.4).

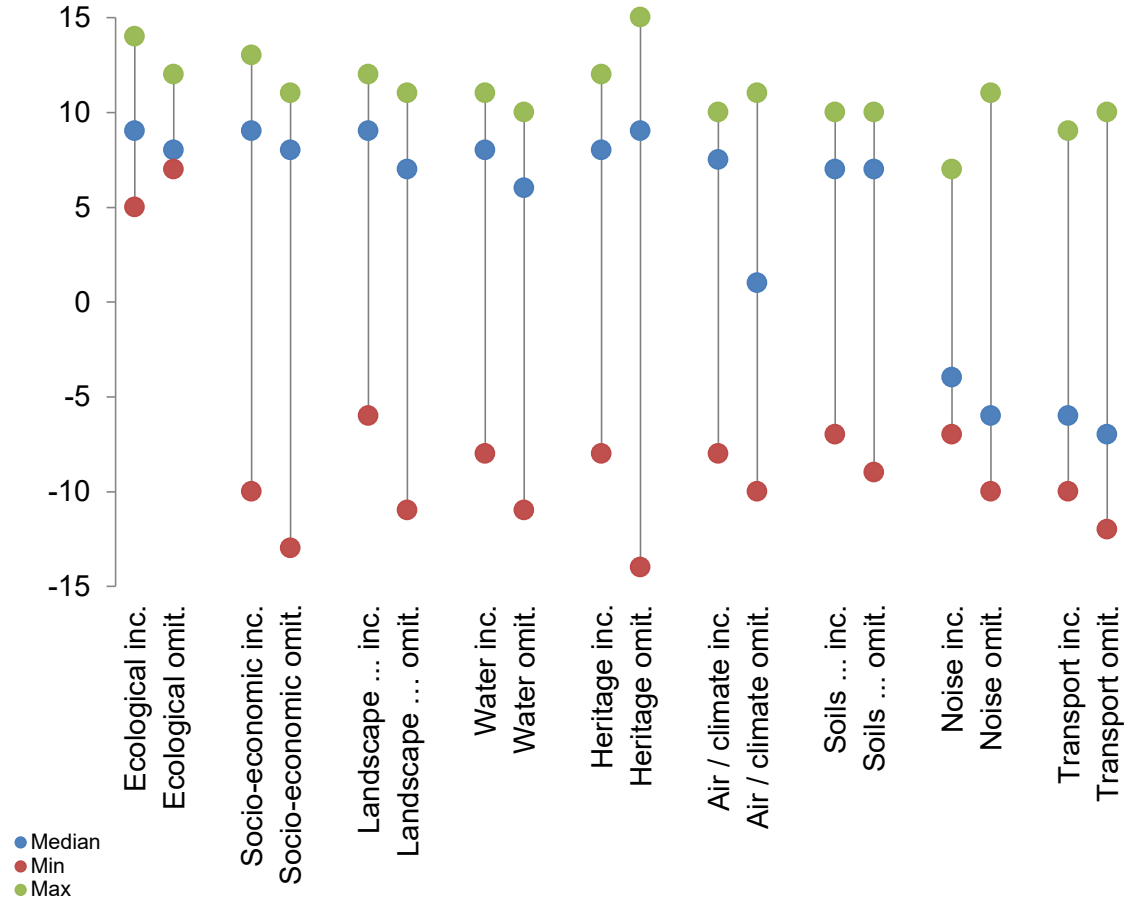


Figure 8.3: Median, Minimum, Maximum scores for impacts included (I) compared to impacts omitted (r)

Table 8.4: Median, Minimum and Maximum scores for all impacts

	Impact Included in Report			Impact Omitted from Report		
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>
Ecological	9	5	14	8	7	12
Socio-economic	9	-10	13	8	-13	11
Noise	-4	-7	7	-6	-10	11
Transport	-6	-10	9	-7	-12	10
Landscape and visual	9	-6	12	7	-11	11
Heritage	8	-8	12	9	-14	15
Air quality and climate	7.5	-8	10	1	-10	11
Soils, geology, geomorphology	7	-7	10	7	-9	10
Water	8	-8	11	6	-11	10

Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

8.13. Organisational characteristics and links to incorrect omission of impacts

8.13.1. Country of organisation

It is possible that the scores for each area of impact may vary between the countries of the organisations. It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Country and impact “significance” scores

There was very strong evidence of a difference between the countries in the case of significance scores for “Socio-economic” category impacts (Figure 8.4, Table 8.5). Specifically, scores for the UK were significantly different from New Zealand (Dunn’s test $P=0.001$, applying Bonferroni correction) and scores for Ireland were significantly different from New Zealand (Dunn’s test $P=0.046$, applying Bonferroni correction). There was no evidence of a difference in scores in other areas of impacts or between the other pairs.

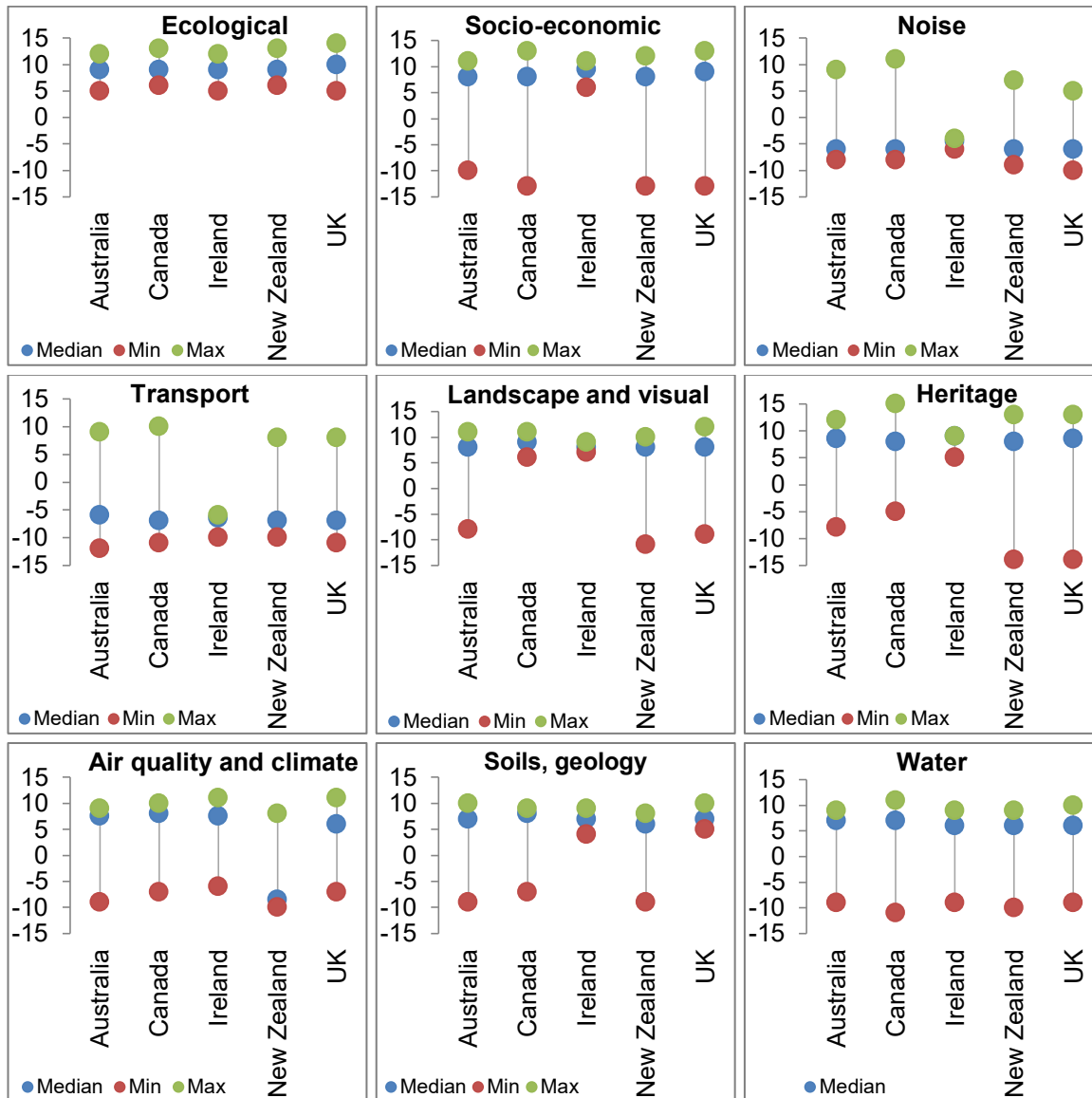


Figure 8.4: Country and impact “significance” scores

Table 8.5: Country and impact “significance” scores

	Australia			Canada			Ireland			New Zealand			UK			Kruskal-Wallis Test
	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	
Ecological	9	5	12	9	6	13	9	5	12	9	6	13	10	5	14	H=5.793 P=0.215
Socio-economic	8	-10	11	8	-13	13	9.5	6	11	8	-13	12	9	-13	13	H=18.092 P=0.001
Noise	-6	-8	9	-6	-8	11	-4.5	-6	-4	-6	-9	7	-6	-10	5	H=3.254 P=0.516
Transport	-6	-12	9	-7	-11	10	-6.5	-10	-6	-7	-10	8	-7	-11	8	H=3.927 P=0.416
Landscape and visual	8	-8	11	9	6	11	8	7	9	8	-11	10	8	-9	12	H=4.335 P=0.363
Heritage	8.5	-8	12	8	-5	15	9	5	9	8	-14	13	8.5	-14	13	H=0.719 P=0.949
Air quality and climate	7.5	-9	9	8	-7	10	7.5	-6	11	-8.5	-10	8	6	-7	11	H=7.862 P=0.097
Soils, geology, geo-morphology	7	-9	10	8	-7	9	7	4	9	6	-9	8	7	5	10	H=6.221 P=0.183
Water	7	-9	9	7	-11	11	6	-9	9	6	-10	9	6	-9	10	H=3.457 P=0.484

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 4.
Med = Median score. Min = Minimum score. Max = Maximum score.

Country and comparison of scores for impacts included in case studies with impacts omitted from case studies

Comparison of the “significance” scores of impacts that were included (and described) within the case study reports with the “significance” scores of impacts omitted from reports (and scored by the case study review process described) by country was undertaken. This process allowed the examination of whether the “significance” scores differed between included and omitted impacts, and whether any difference could be linked to the country of origin of the organisation.

There were significant differences in the scores for impacts included in case study reports and impacts omitted from case study reports in a number of cases (11/40) (Table 8.6). In

all cases where a significant difference was found, the omitted scores were lower (less positive/more negative) than the included score.

This pattern was most frequently observed in Australian case studies where difference was demonstrated in six out of nine cases. These included “Socio-economic”, “Noise”, “Transport”, “Air quality and climate”, Soils, geology, geomorphology” and “Water” category impacts.

For the other countries significant differences were observed in fewer comparisons. For the UK this difference was only seen in two cases (“Socio-economic” and “Landscape and visual” category impacts). This difference was also seen in two cases for New Zealand (“Landscape and visual” and “Air quality and climate” category impacts). For Canada this was only one (“Socio-economic” category impacts). No significant differences were shown in any of the Ireland case studies.

Table 8.6: Kruskal-Wallis test comparisons of scores for impacts “included” and impacts “omitted” by country

	Australia		Canada		Ireland		New Zealand		UK	
	H	P	H	P	H	P	H	P	H	P
Ecological	0.040	0.842	0.563	0.453	0.230	0.632	2.098	0.148	1.911	0.167
Socio-economic	8.644	0.003	4.333	0.037	0.029	0.865	0.667	0.414	6.584	0.010
Noise	4.259	0.039	0.026	0.872	0.889	0.346	0.573	0.449	1.690	0.194
Transport	6.675	0.010	1.316	0.251	0.914	0.339	0.067	0.795	1.855	0.173
Landscape and visual	2.275	0.131	0.584	0.445	0.139	0.709	6.469	0.011	5.185	0.023
Heritage	0.587	0.444	1.129	0.288	N/A	N/A	0.365	0.546	0.041	0.840
Air quality and climate	4.257	0.039	0.062	0.804	0.000	1.000	3.971	0.046	0.509	0.476
Soils, geology, geomorphology	8.761	0.003	0.479	0.489	0.000	1.000	0.200	0.655	0.148	0.701
Water	6.691	0.010	0.385	0.535	1.379	0.240	0.923	0.337	0.705	0.401

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.13.2. Organisation size

Potentially the scores for each area of impact may vary by the size of the organisation. It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Organisation size and impact “significance” scores

There was a strong difference in scores for “Ecological” category impacts (Figure 8.5, Table 8.7). *Post hoc* tests revealed a trend for larger organisations to achieve more positive “Ecological” impact category scores. Specific differences were shown between “Micro” and “Large” organisations (Dunn’s test $P=0.009$, applying Bonferroni correction), between “Micro” and “Very large” organisations (Dunn’s test $P=0.006$, applying Bonferroni correction), between “Small” and “Large” organisations (Dunn’s test $P=0.005$, applying Bonferroni correction), and between “Small” and “Very large” organisations (Dunn’s test $P=0.003$, applying Bonferroni correction). In all cases the larger size category scored higher. There was no evidence of a difference in scores between the other pairs.

There was also a strong difference in scores for “Landscape and visual” category impacts (Figure 8.5, Table 8.7). *Post hoc* tests showed differences in scores between “Micro” and “Large” organisations (Dunn’s test $P=0.010$, applying Bonferroni correction) and between “Small” and “Large” organisations (Dunn’s test $P=0.024$, applying Bonferroni correction). Again this suggests that for “Landscape and visual” category impacts larger organisations may achieve more positive impacts. There was no difference in scores between the other pairs.

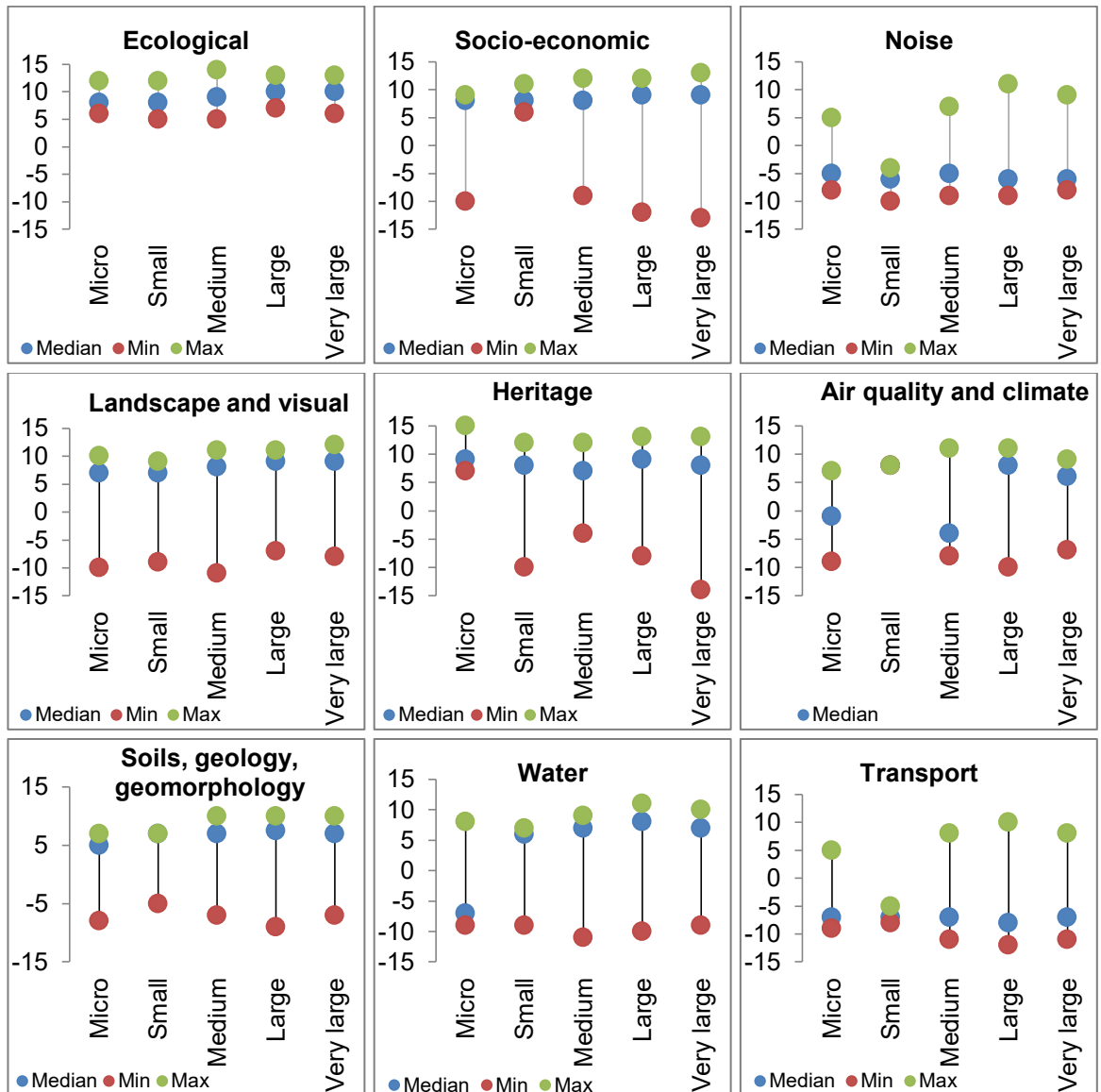


Figure 8.5: Organisation size and impact “significance” scores

Table 8.7: Organisation size and impact “significance” scores

	Micro			Small			Medium			Large			Very large			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	8	6	12	8	5	12	9	5	14	10	7	13	10	6	13	H=24.439 P<0.001
Socio-economic	8	-10	9	8	6	11	8	-9	12	9	-12	12	9	-13	13	H=6.096 P=0.192
Noise	-5	-8	5	-6	-10	4	-5	-9	7	-6	-9	11	-6	-8	9	H=2.628 P=0.622
Transport	-7	-9	5	-7	-8	-5	-7	-11	8	-8	-12	10	-7	-11	8	H=6.027 P=0.197
Landscape and visual	7	-10	10	7	-9	9	8	-11	11	9	-7	11	10	-8	12	H=16.611 P=0.002
Heritage	9	7	15	8	-10	12	7	-4	12	9	-8	13	8	-14	13	H=0.797 P=0.939
Air quality and climate	-1	-9	7	8	8	8	-4	-8	11	8	-10	11	6	-7	9	H=1.885 P=0.757
Soils, geology, geo-morphology	5	-8	7	7	-5	7	7	-7	10	7.5	-9	10	7	-7	10	H=5.055 P=0.282
Water	-7	-9	8	6	-9	7	7	-11	9	8	-10	11	7	-9	10	H=7.948 P=0.094

H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 1
Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

Organisation size and comparison of scores for impacts included in case studies with impacts omitted from case studies

There were significant differences between the scores for some impacts included and impacts omitted according to organisation size (Table 8.8). In all cases where a significant difference was shown, the scores for impacts omitted from reports were lower (less positive / more negative) than the included scores.

Significant results were observed in two of nine impact categories for each of the organisation categories of “Very large” (“Socio-economic”, “Landscape and visual), “Large” (“Ecological”, “Socio-economic”) and “Medium” (“Noise”, “Soils, geology, geomorphology”).

Table 8.8: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by size

	Micro		Small		Medium		Large		Very large	
	H	P	H	P	H	P	H	P	H	P
Ecological	0.474	0.491	0.284	0.594	0.047	0.829	4.379	0.036	N/A	N/A
Socio-economic	0.360	0.549	2.015	0.156	2.718	0.099	13.429	<0.001	8.016	0.005
Noise	N/A	N/A	N/A	N/A	3.866	0.049	2.011	0.156	0.008	0.929
Transport	0.331	0.565	N/A	N/A	3.136	0.077	0.636	0.425	1.943	0.163
Landscape and visual	1.334	0.248	3.788	0.052	0.098	0.754	1.795	0.180	5.877	0.015
Heritage	1.681	0.195	0.000	1.000	1.049	0.306	1.615	0.204	0.694	0.405
Air quality and climate	N/A	N/A	N/A	N/A	1.125	0.289	0.558	0.455	0.716	0.398
Soils, geology, geomorphology	0.000	1.000	1.906	0.167	4.227	0.040	0.399	0.528	0.333	0.564
Water	0.246	0.620	0.384	0.536	2.658	0.103	2.314	0.128	2.612	0.106

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.13.3. Organisational aim

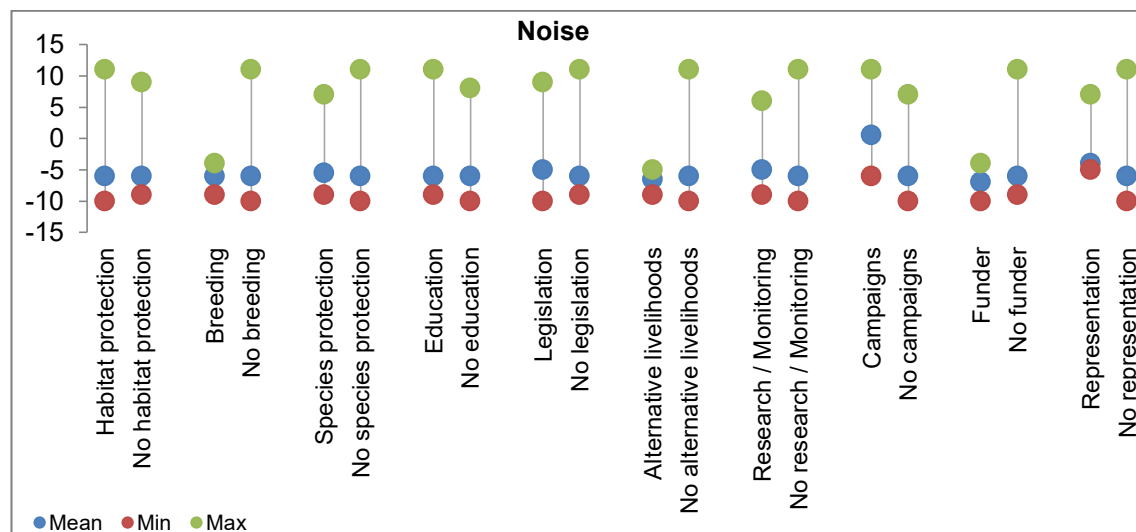
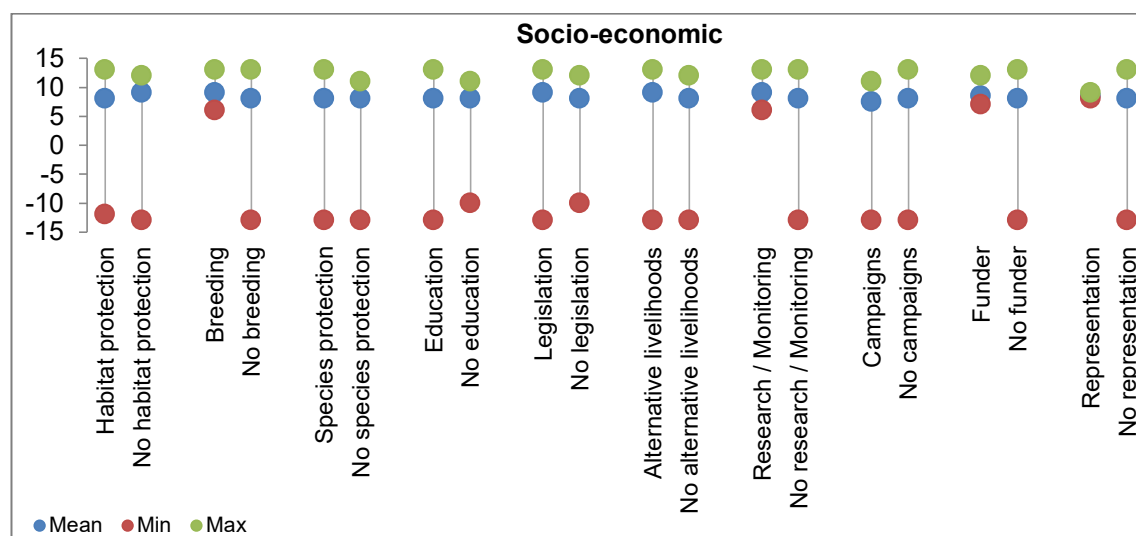
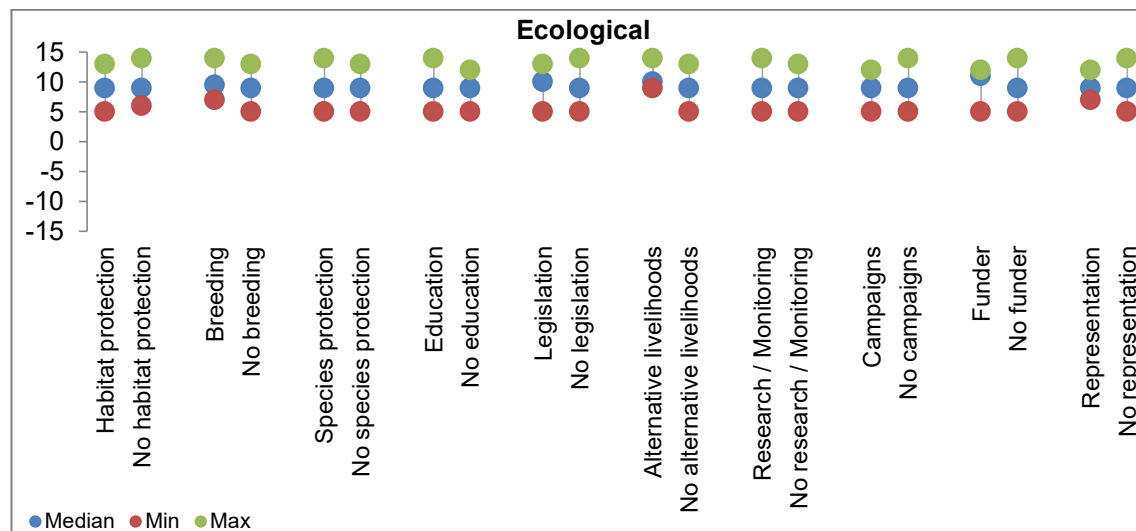
The scores for each area of impact may vary between organisations with different aims. It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

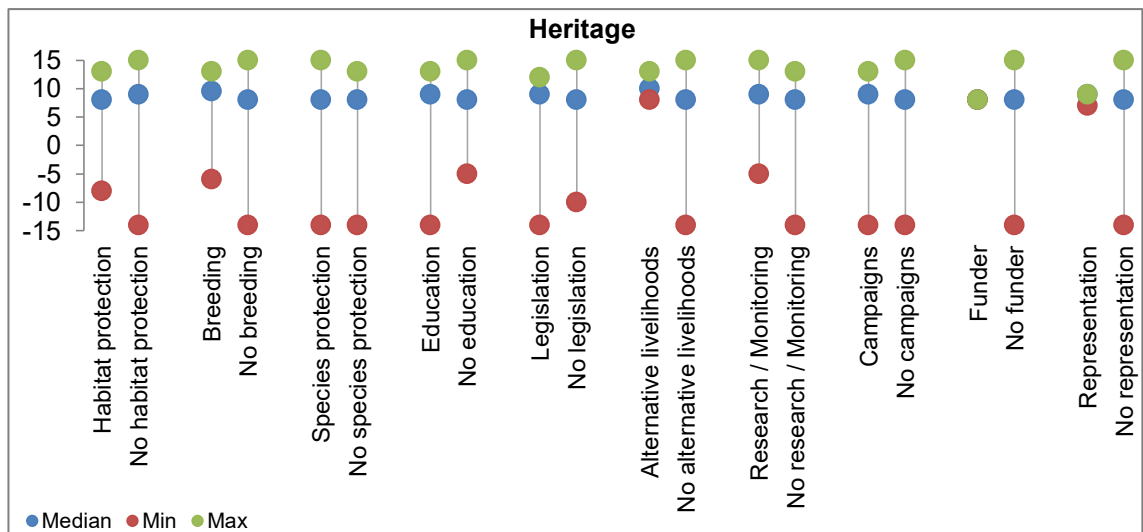
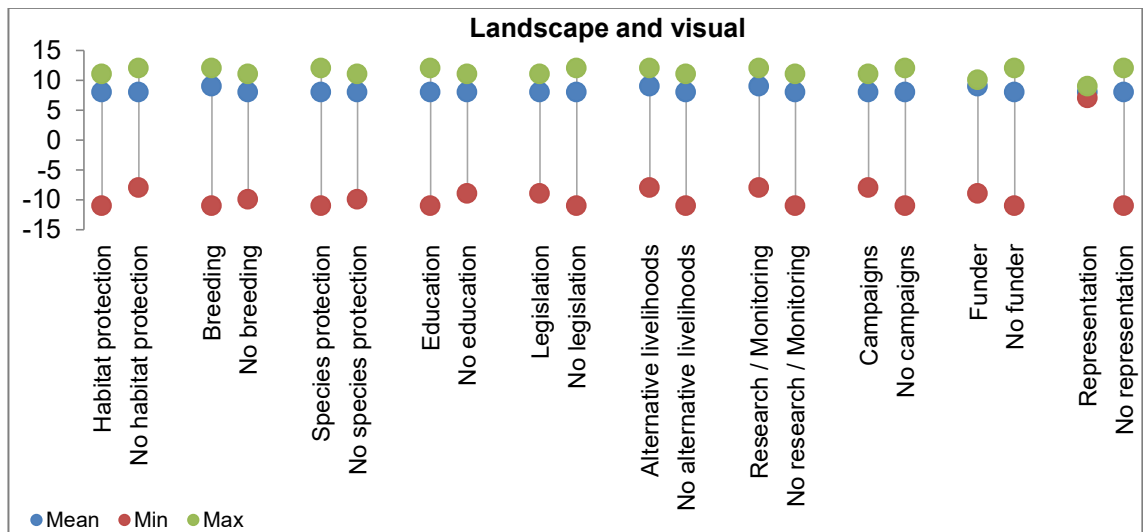
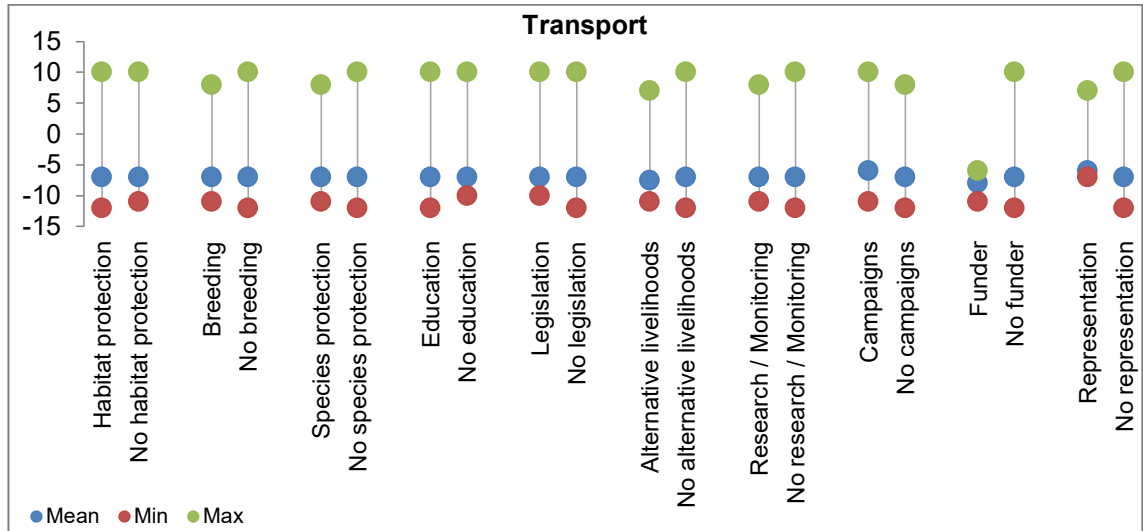
Organisational aim and impact “significance” scores

There were significant differences in scores between organisations holding specific conservation aims compared to organisations not holding that aim within a number of impact categories (Figure 8.6, Table 8.9). In total 13 of 90 comparisons were significant. In most cases the inclusion of the aim was linked to a higher overall score than for organisations without the aim.

“Legislation” (“Noise”, “Soils, geology, geomorphology”, “Water”) and “Campaigns” (“Noise”, “Transport”, “Soils, geology, geomorphology”) showed this in three impact categories each. “Alternative livelihoods” (“Ecological” and “Heritage”) showed this in two impact categories. “Research / Monitoring” (“Socio-economic”) and Breeding (“Heritage”) showed this in only one.

However, in three cases the inclusion of the aim was linked to a lower overall score than for organisations without the aim; twice for “Species protection” (“Transport” and “Air quality and climate”) and once for “Campaigns” (“Socio-economic”).





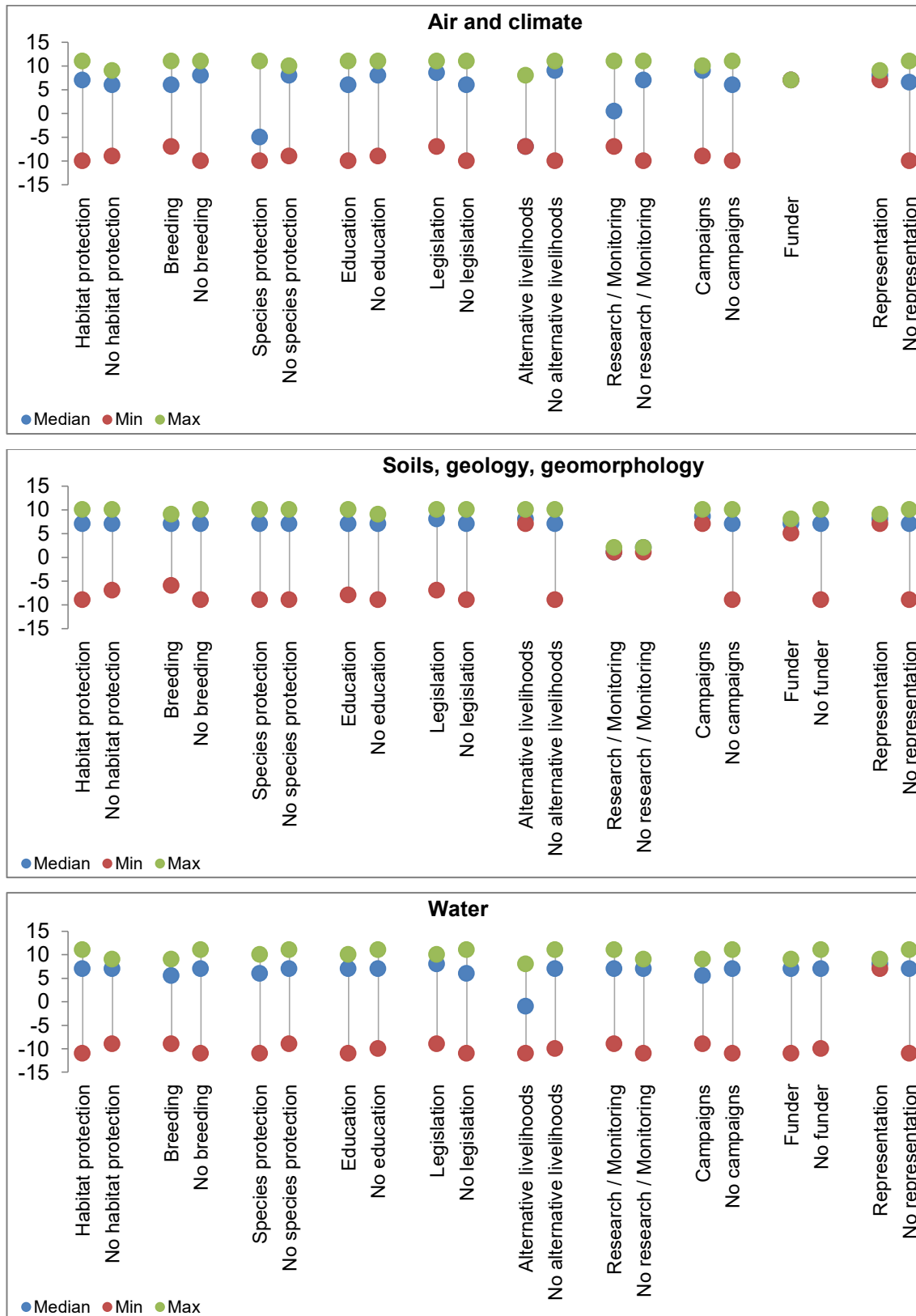


Figure 8.6: Organisational aim and impact “significance” scores

Table 8.9: Organisational aims and impact “significance” scores Kruskal Wallis test summary

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research/Monitoring		Campaigns		Funder		Representation	
	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P
Ecological	0.314	0.575	2.624	0.105	0.889	0.346	0.172	0.678	2.914	0.088	14.126	<0.001	0.513	0.474	1.355	0.244	0.125	0.724	0.000	0.995
Socio-economic	0.137	0.712	1.950	0.163	0.022	0.881	0.825	0.364	2.711	0.100	1.644	0.200	7.995	0.005	6.264	0.012	0.381	0.537	0.141	0.708
Noise	0.003	0.955	0.011	0.916	0.002	0.969	0.299	0.585	5.362	0.021	2.771	0.096	1.353	0.245	8.550	0.002	1.616	0.204	3.429	0.064
Transport	3.328	0.068	0.052	0.820	4.699	0.030	1.083	0.298	0.218	0.641	1.852	0.174	0.045	0.832	6.247	0.012	2.922	0.087	1.775	0.183
Land-scape and visual	0.784	0.376	1.188	0.276	0.116	0.733	0.103	0.748	0.066	0.797	1.119	0.290	2.318	0.128	0.000	1.000	0.025	0.874	0.050	0.822
Heritage	0.198	0.656	4.478	0.034	0.016	0.900	0.210	0.646	0.704	0.402	5.504	0.019	3.340	0.068	0.394	0.530	0.026	0.872	0.002	0.962
Air quality and climate	0.167	0.683	0.467	0.494	5.555	0.018	0.531	0.466	3.770	0.052	0.849	0.357	0.008	0.929	2.217	0.137	0.002	0.961	0.639	0.424
Soils, geology, geomorphology	1.518	0.218	0.549	0.459	0.003	0.954	0.235	0.628	5.039	0.025	2.199	0.138	1.734	0.188	6.901	0.009	0.000	0.987	0.851	0.356
Water	0.031	0.861	1.287	0.257	3.371	0.066	0.572	0.449	6.647	0.010	2.597	0.107	0.750	0.387	1.707	0.191	0.040	0.842	0.972	0.324

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

Organisational aims and comparison of scores for impacts included in case studies with impacts omitted from case studies

Across the majority of conservation aims, with the exceptions of “Funder” and “Representation” aims, there were significant differences between the scores for impacts included in case study reports and impacts omitted from case study reports (Table 8.10). In most cases the scores for impacts omitted from reports were lower (less positive / more negative) than the included scores. The most frequent significant differences were shown in five out of nine impact categories for organisations with “Education” as an aim (“Socio-economic”, “Noise”, “Transport”, “Landscape and visual” and “Water”). Four significant results were also seen in organisations with “Habitat protection” as an aim (“Socio-economic”, “Noise”, “Landscape and visual” and “Water”).

In two cases where a significant difference was identified (for “Habitat protection” and “Heritage”; and for “Research / Monitoring” and “Heritage”) the scores for impacts omitted from reports were higher (more positive / less negative) than the included scores.

A notable pattern was also seen when considering the results by impact categories. “Socio-economic” and “Water” category impacts showed significantly differing scores for impacts included compared to impacts omitted from reports across multiple aim categories. For “Socio-economic” this included “Habitat protection”, “Species protection”, “Education”, “Legislation” and “Alternative livelihoods”. For “Water” this included “Habitat protection”, “Education”, “Legislation”, “Research / Monitoring” and “Campaigns”.

Table 8.10: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” for organisations with conservation aim compared to organisations without conservation aim

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research/Monitoring		Campaigns		Funder		Representation	
	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P
Eco-logical	3.620	0.057	N/A	N/A	0.404	0.525	0.987	0.320	1.026	0.311	N/A	N/A	0.605	0.437	0.483	0.487	N/A	N/A	2.000	0.157
Socio-economic	5.145	0.023	N/A	N/A	5.487	0.019	11.397	0.001	11.144	0.001	6.536	0.011	1.864	0.172	2.907	0.088	0.364	0.546	1.000	0.317
Noise	5.454	0.020	2.519	0.112	3.653	0.056	6.580	0.010	2.541	0.111	N/A	N/A	0.864	0.353	N/A	N/A	2.000	0.157	1.500	0.221
Transport	0.062	0.804	0.985	0.321	0.330	0.566	8.015	0.005	2.311	0.128	N/A	N/A	2.030	0.154	0.794	0.373	N/A	N/A	1.500	0.221
Land-scape & visual	4.614	0.032	5.526	0.019	6.892	0.009	8.860	0.003	1.201	0.273	1.263	0.261	0.449	0.503	0.060	0.807	0.000	1.000	N/A	N/A
Heritage	4.693	0.030	0.717	0.397	2.339	0.126	1.608	0.205	0.162	0.687	0.540	0.462	4.163	0.041	0.047	0.828	N/A	N/A	N/A	N/A
Air quality & climate	0.097	0.756	0.972	0.324	0.211	0.646	2.890	0.089	0.750	0.386	N/A	N/A	0.419	0.517	3.682	0.055	N/A	N/A	N/A	N/A
Soils, geology, geomorphology	2.578	0.108	2.362	0.124	2.518	0.113	2.334	0.127	0.098	0.755	1.250	0.264	0.281	0.596	0.310	0.577	1.500	0.221	N/A	N/A
Water	7.906	0.005	0.060	0.807	3.406	0.065	9.590	0.002	4.881	0.027	2.784	0.095	4.315	0.038	6.352	0.012	1.500	0.221	N/A	N/A

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.13.4. Organisational employment of paid staff

Organisations that use paid staff may be more likely to have (time) resources to achieve positive / avoid negative impacts from projects (so score higher). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Organisational employment of paid staff and impact “significance” scores

The overall scores for “Ecological”, “Landscape and visual” and for “Socio-economic” category impacts were significantly higher for organisations employing paid staff compared to organisations not employing paid staff (Figure 8.7, Table 8.11).

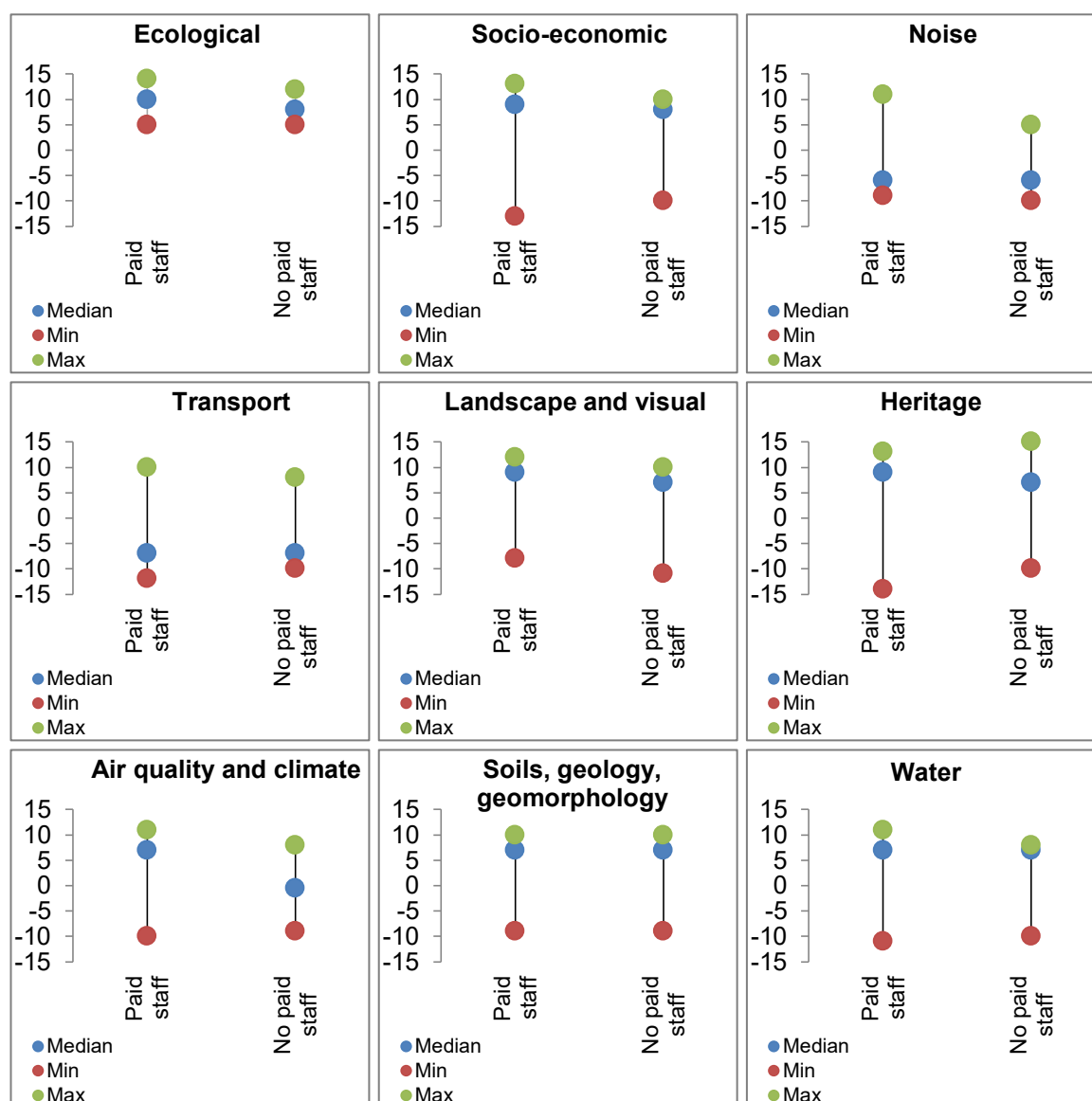


Figure 8.7: Organisations using paid staff and organisations not using paid staff and impact “significance” scores

Table 8.11: Organisations using paid staff and organisations not using paid staff and impact “significance” scores

	Organisations using Paid Staff			Organisations NOT using Paid Staff			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	10	5	14	8	5	12	H=16.914 <i>P</i><0.001
Socio-economic	9	-13	13	8	-10	10	H=6.663 <i>P</i>=0.010
Noise	-6	-9	11	-6	-10	5	H=0.148 <i>P</i> =0.700
Transport	-7	-12	10	-7	-10	8	H=2.338 <i>P</i> =0.126
Landscape and visual	9	-8	12	7	-11	10	H=17.955 <i>P</i><0.001
Heritage	9	-14	13	7	-10	15	H=2.751 <i>P</i> =0.097
Air quality and climate	7	-10	11	-0.5	-9	8	H=1.357 <i>P</i> =0.244
Soils, geology, geomorphology	7	-9	10	7	-9	10	H=1.513 <i>P</i> =0.219
Water	7	-11	11	7	-10	8	H=1.521 <i>P</i> =0.217

H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 1
Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

Use of paid staff and comparison of scores for impacts included in case studies with impacts omitted from case studies

Scores for impacts omitted from reports were shown to be lower (less positive / more negative) than the included scores (Table 8.12) in three out of nine comparisons where paid staff were employed (“Socio-economic”, “Noise” and “Water” category impacts). Only in one of nine comparisons where no use of paid staff was specified was there a significant difference (“Landscape and visual” category impacts). Again scores for impacts omitted from reports were shown to be lower than those included.

Table 8.12: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by organisations using paid staff and organisations not using paid staff

	Organisations using Paid Staff		Organisations NOT using Paid Staff	
	H	P	H	P
Ecological	1.186	0.276	0.004	0.948
Socio-economic	18.886	<0.001	0.498	0.481
Noise	5.484	0.019	N/A	N/A
Transport	2.221	0.136	N/A	N/A
Landscape and visual	0.301	0.583	5.622	0.018
Heritage	2.148	0.143	0.200	0.655
Air quality and climate	1.093	0.296	1.800	0.180
Soils, geology, geomorphology	1.137	0.286	1.071	0.301
Water	8.078	0.004	1.723	0.189

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.13.5. Organisational use of volunteers

Organisations that rely on volunteers have less skill / experience to achieve positive / avoid negative impacts from projects (so score lower). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Organisational use of volunteers and impact “significance” scores

There was evidence that overall scores were higher for organisations using volunteers compared to organisations not using volunteers (Figure 8.8, Table 8.13) for “Noise” and for “Transport” category impacts. There was no evidence of a difference in the overall scores in the other impact categories.

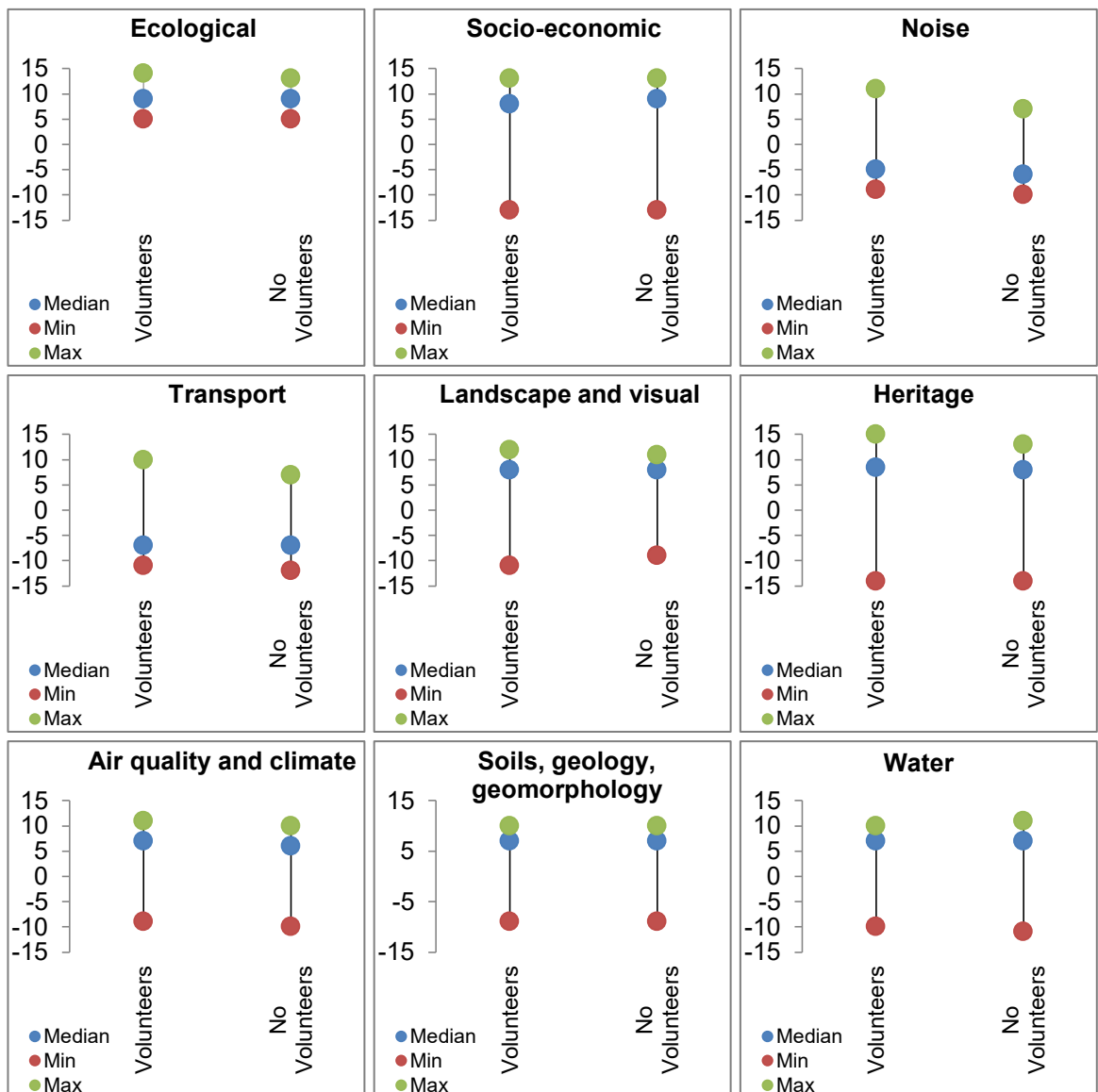


Figure 8.8: Organisations using volunteers and organisations not using volunteers and impact “significance” scores

Table 8.13: Organisations using volunteers and organisations not using volunteers and impact “significance” scores

	Organisations using volunteers			Organisations NOT using volunteers			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	9	5	14	9	5	13	H=1.026 P=0.311
Socio-economic	8	-13	13	9	-13	13	H=0.707 P=0.400
Noise	-5	-9	11	-6	-10	7	H=4.498 P= 0.034
Transport	-7	-11	10	-7	-12	7	H=5.087 P= 0.024
Landscape and visual	8	-11	12	8	-9	11	H=0.909 P=0.340
Heritage	8.5	-14	15	8	-14	13	H=1.771 P=0.183
Air quality and climate	7	-9	11	6	-10	10	H=0.109 P=0.741
Soils, geology, geomorphology	7	-9	10	7	-9	10	H=0.264 P=0.607
Water	7	-10	10	7	-11	11	H=0.301 P=0.583

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1
Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

Use of volunteers and comparison of scores for impacts included in case studies with impacts omitted from case studies

The scores for impacts omitted from reports were lower (less positive / more negative) than the included scores in two out of nine comparisons where volunteers were used ("Socio-economic and "Landscape and visual" category impacts) and in two out of nine comparisons where volunteers were not used "Soils, geology, geomorphology" and "Water" (Table 8.14).

Table 8.14: Kruskal-Wallis comparisons of scores for impacts "included" versus impacts "omitted" by organisations using volunteers and organisations not using volunteers

	Organisations using Volunteers		Organisations NOT using Volunteers	
	H	P	H	P
Ecological	1.258	0.262	0.842	0.359
Socio-economic	16.301	<0.001	0.549	0.459
Noise	3.200	0.074	2.813	0.093
Transport	3.524	0.060	0.042	0.837
Landscape and visual	7.411	0.006	1.441	0.230
Heritage	3.088	0.079	0.015	0.901
Air quality and climate	0.502	0.479	2.864	0.091
Soils, geology, geomorphology	0.053	0.819	9.458	0.002
Water	2.593	0.107	9.464	0.002

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.13.6. Project management approach

Organisations that detail their approach to project management may be more likely to consider any impacts, and therefore achieve positive / avoid negative impacts from projects (so score higher). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Project management approach included and impact “significance” scores

Overall scores for “Socio-economic” category impacts were significantly higher for organisations that provide details of project management approaches compared to organisations that do not. For the other impact categories there was no evidence of a difference in overall scores (Figure 8.9, Table 8.15).

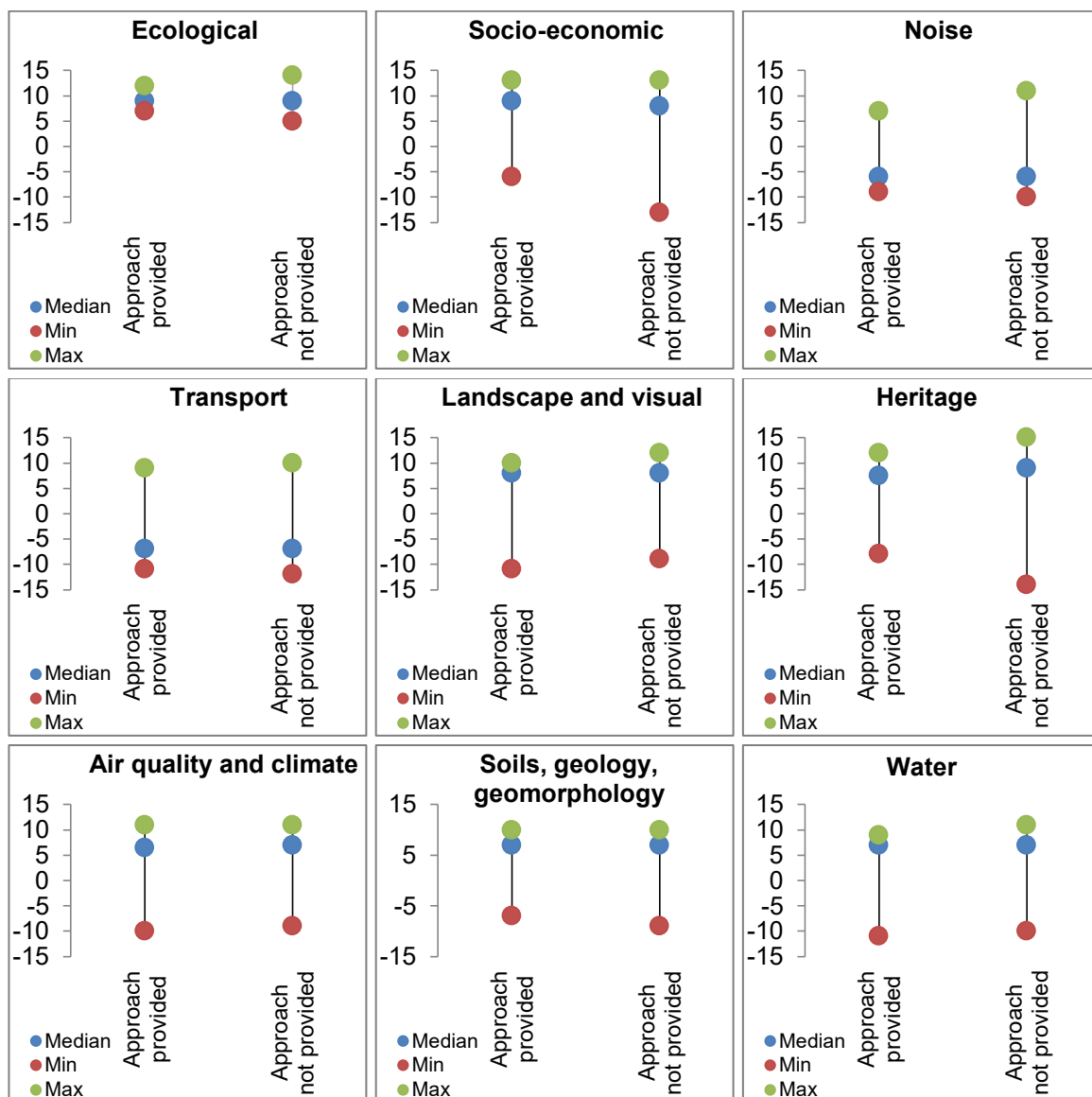


Figure 8.9: Organisations providing details of project management approaches and organisations not providing details of project management approaches and impact “significance” scores

Table 8.15: Organisations providing details of project management approaches and organisations not providing details of project management approaches and impact “significance” scores

	Project Management Approach provided			Project Management Approach NOT provided			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	9	7	12	9	5	14	H=0.209 P=0.648
Socio-economic	9	-6	13	8	-13	13	H=6.959 P= 0.008
Noise	-6	-9	7	-6	-10	11	H=0.012 P=0.914
Transport	-7	-11	9	-7	-12	10	H=0.263 P=0.608
Landscape and visual	8	-11	10	8	-9	12	H=0.492 P=0.483
Heritage	7.5	-8	12	9	-14	15	H=2.478 P=0.115
Air quality and climate	6.5	-10	11	7	-9	11	H=0.007 P=0.932
Soils, geology, geomorphology	7	-7	10	7	-9	10	H=0.218 P=0.640
Water	7	-11	9	7	-10	11	H=0.463 P=0.496

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1
Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

Details of project management approach and comparison of scores for impacts included in case studies with impacts omitted from case studies

The scores for impacts omitted from reports were lower (less positive / more negative) than the included scores (Table 8.16) in two out of nine comparisons where project management approach details were provided ("Transport" and "Landscape and visual" category impacts), but in three out of nine comparisons where project management approach details were not provided ("Socio-economic", "Landscape and visual" and "Water" category impacts).

Table 8.16: Kruskal-Wallis comparisons of scores for impacts "included" versus impacts "omitted" by organisations providing details of project management approaches and organisations not providing details of project management approaches

	Project Management Approach provided		Project Management Approach NOT provided	
	H	P	H	P
Ecological	N/A	N/A	1.782	0.182
Socio-economic	0.500	0.479	13.673	<0.001
Noise	2.917	0.088	3.781	0.052
Transport	6.312	0.012	0.359	0.549
Landscape and visual	3.957	0.047	5.188	0.023
Heritage	1.031	0.310	1.250	0.264
Air quality and climate	0.429	0.513	1.997	0.158
Soils, geology, geomorphology	2.742	0.098	1.192	0.275
Water	2.344	0.126	8.316	0.004

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.13.7. Staff list provided

The inclusion of a staff list suggests that an organisation includes more details in general, so will achieve positive / avoid negative impacts from projects (so score higher). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Staff list provided and impact “significance” scores

Overall scores were significantly higher for organisations providing staff lists compared to organisations not providing staff lists for “Ecological”, “Socio-economic” and “Landscape and visual” category impacts (Figure 8.10, Table 8.17). For other impacts there was no evidence of difference.

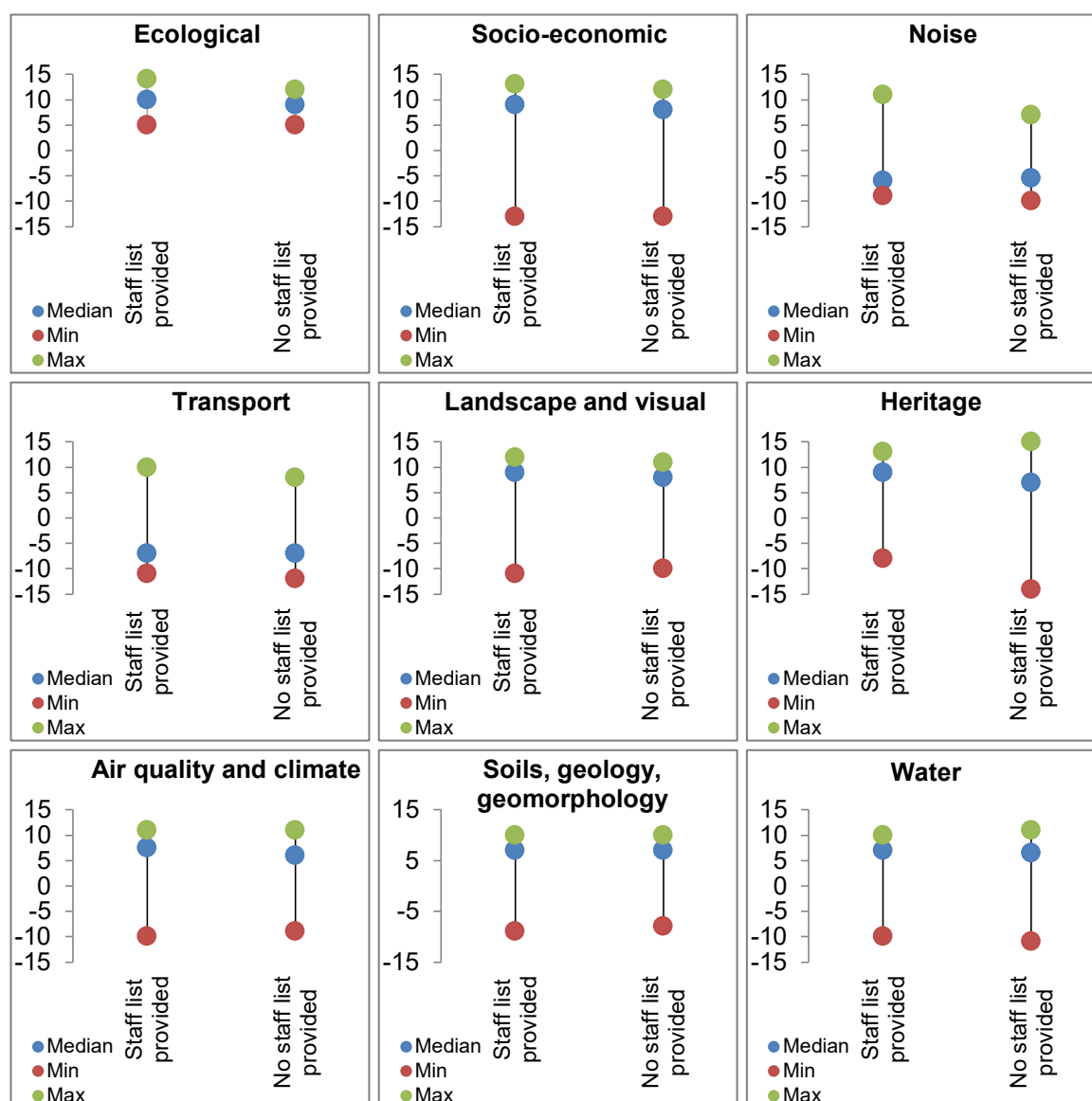


Figure 8.10: Organisations providing staff lists and organisations not providing staff lists and impact “significance” scores

Table 8.17: Organisations providing staff lists and organisations not providing staff lists and impact “significance” scores

	Organisations providing staff lists			Organisations NOT providing staff lists			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	10	5	14	9	5	12	H=12.483 P<0.001
Socio-economic	9	-13	13	8	-13	12	H=7.732 P=0.005
Noise	-6	-9	11	-5.5	-10	7	H=0.103 P=0.748
Transport	-7	-11	10	-7	-12	8	H=0.598 P=0.439
Landscape and visual	9	-11	12	8	-10	11	H=7.208 P=0.007
Heritage	9	-8	13	7	-14	15	H=3.753 P=0.053
Air quality and climate	7.5	-10	11	6	-9	11	H=0.390 P=0.532
Soils, geology, geomorphology	7	-9	10	7	-8	10	H=2.668 P=0.102
Water	7	-10	10	6.5	-11	11	H=2.811 P=0.094

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1
Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

Provision of staff list and comparison of scores for impacts included in case studies with impacts omitted from case studies

In two out of nine comparisons where staff lists were provided, scores for impacts omitted from reports were significantly lower (less positive / more negative) than the included scores for “Socio-economic” and “Water” category impacts. The same was true in only one out of nine comparisons where staff lists were not provided; “Landscape and visual” category impacts (Table 8.18).

Table 8.18: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by organisations providing staff lists and organisations not providing staff lists

	Organisations providing staff lists		Organisations NOT providing staff lists	
	H	P	H	P
Ecological	0.014	0.907	0.907	0.341
Socio-economic	11.522	0.001	1.934	0.164
Noise	3.605	0.058	2.298	0.130
Transport	1.534	0.216	2.964	0.085
Landscape and visual	1.114	0.291	3.956	0.047
Heritage	1.949	0.163	0.425	0.515
Air quality and climate	2.299	0.129	0.000	1.000
Soils, geology, geomorphology	1.157	0.282	0.470	0.493
Water	7.431	0.006	1.813	0.178

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.13.8. Trustees / advisory board list provided

It may be expected that organisations that have a list of trustees have a higher level of oversight so will achieve positive / avoid negative impacts from projects (so score higher). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Trustees / advisory board list provided and impact “significance” scores

Overall scores for organisations providing lists of trustees / advisory boards were significantly higher than for those that did not for “Ecological”, “Landscape and visual” and “Water” category impacts (Figure 8.11, Table 8.19).

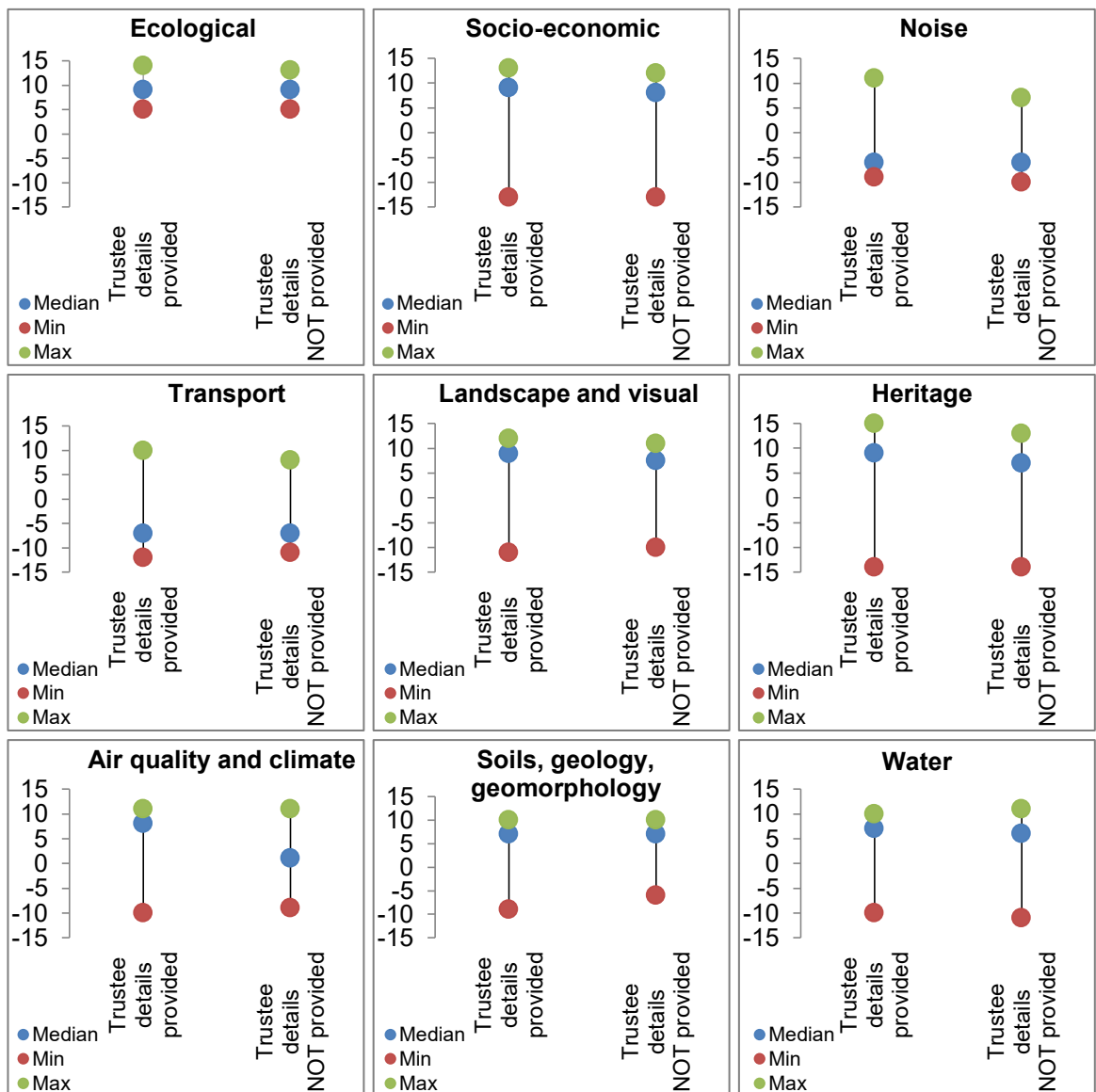


Figure 8.11: Organisations providing details of trustees / advisory boards and organisations not providing details of trustees / advisory boards impact “significance” scores

Table 8.19: Organisations providing details of trustees / advisory boards and organisations not providing details of trustees / advisory boards and impact “significance” scores

	Organisations providing details of trustees / advisory boards			Organisations NOT providing details of trustees / advisory boards			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	9	5	14	9	5	13	H=4.945 P=0.026
Socio-economic	9	-13	13	8	-13	12	H=1.933 P=0.164
Noise	-6	-9	11	-6	-10	7	H=0.400 P=0.527
Transport	-7	-12	10	-7	-11	8	H=1.942 P=0.163
Landscape and visual	9	-11	12	7.5	-10	11	H=7.604 P=0.006
Heritage	9	-14	15	7	-14	13	H=1.911 P=0.167
Air quality and climate	8	-10	11	1	-9	11	H=1.637 P=0.201
Soils, geology, geomorphology	7	-9	10	7	-6	10	H=0.120 P=0.729
Water	7	-10	10	6	-11	11	H=4.688 P=0.030

H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 1
Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

Provision of trustees / advisory board details and comparison of scores for impacts included in case studies with impacts omitted from case studies

Scores for impacts omitted from reports were significantly lower (less positive / more negative) than the included scores in two out of nine comparisons where trustees / advisory board details were provided ("Socio-economic" and "Noise" category impacts) and in one out of nine comparisons where trustees / advisory board details were not provided ("Water" category impacts) (Table 8.20).

Table 8.20: Kruskal-Wallis comparisons of scores for impacts "included" versus impacts "omitted" by organisations providing details of trustees / advisory boards and organisations not providing details of trustees / advisory boards

	Organisations providing details of trustees / advisory boards		Organisations NOT providing details of trustees / advisory boards	
	H	P	H	P
Ecological	0.123	0.726	0.786	0.375
Socio-economic	16.064	<0.001	0.386	0.534
Noise	5.229	0.022	0.439	0.508
Transport	2.978	0.084	1.477	0.224
Landscape and visual	2.971	0.085	2.512	0.113
Heritage	0.702	0.402	2.353	0.125
Air quality and climate	2.431	0.119	0.103	0.748
Soils, geology, geomorphology	2.264	0.132	1.166	0.280
Water	3.260	0.071	3.924	0.048

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14. Project specific characteristics and incorrect omission of impacts

8.14.1. Project location

It is possible that scores for each area of impact may vary by project location. It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Project location and impact “significance” scores

Overall impact scores were significantly higher for projects outside the country of organisation than for projects within the country of organisation for “Ecological” and for “Socio-economic” category impacts. For other impacts there was no evidence of difference (Figure 8.12, Table 8.21).

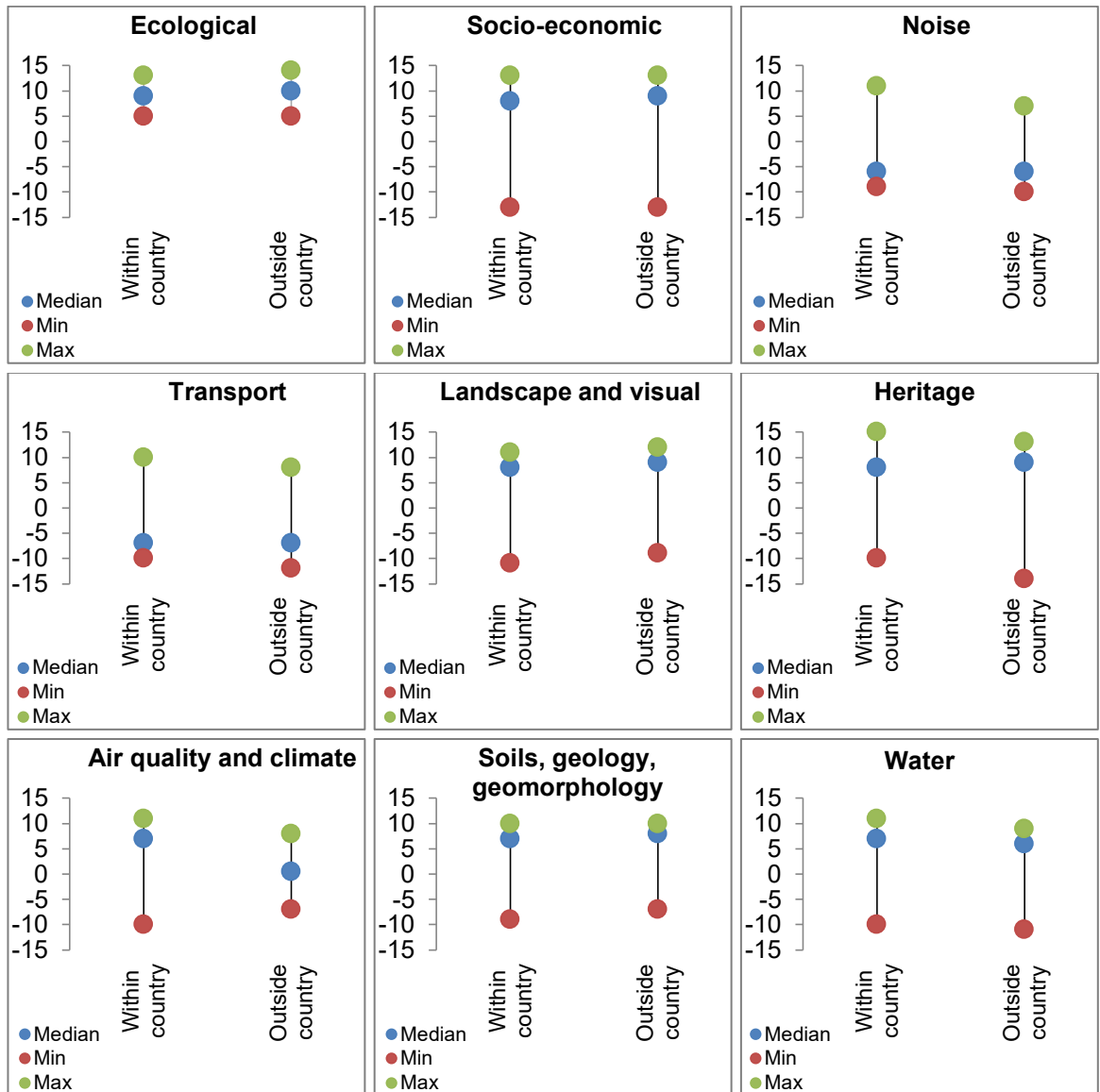


Figure 8.12: Projects within country of organisation and projects outside country of organisation and impact “significance” scores

Table 8.21: Projects within country of organisation and projects outside country of organisation and impact “significance” scores

	Project within country of organisation			Project outside country of organisation			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	9	5	13	10	5	14	H=8.011 P=0.005
Socio-economic	8	-13	13	9	-13	13	H=9.532 P=0.002
Noise	-6	-9	11	-6	-10	7	H=0.570 P=0.450
Transport	-7	-10	10	-7	-12	8	H=0.161 P=0.689
Landscape and visual	8	-11	11	9	-9	12	H=0.673 P=0.412
Heritage	8	-10	15	9	-14	13	H=0.171 P=0.679
Air quality and climate	7	-10	11	0.5	-7	8	H=0.310 P=0.577
Soils, geology, geomorphology	7	-9	10	8	-7	10	H=1.656 P=0.198
Water	7	-10	11	6	-11	9	H=0.170 P=0.680

H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 1
Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

Location and comparison of scores for impacts included in case studies with impacts omitted from case studies

Kruskal-Wallis tests showed that scores for impacts included were significantly higher than for impacts omitted from reports in four out of nine comparisons where the project was run within the country of the organisation; “Socio-economic”; “Noise”; “Landscape and visual”; “Water”. In only one out of nine comparisons where the project was run outside the country of the organisation (“Socio-economic”) was the score for impacts included significantly lower than for impacts omitted (Table 8.22).

In only one case (where the project was run within the country of organisation) the score for impacts included was lower (less positive / more negative) than for impacts omitted (“Heritage”).

Table 8.22: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” for projects within country of organisation and projects outside country of organisation

	Project within country of organisation		Project outside country of organisation	
	H	P	H	P
Ecological	1.270	0.260	N/A	N/A
Socio-economic	7.374	0.007	8.588	0.003
Noise	3.959	0.047	2.570	0.109
Transport	2.777	0.096	1.148	0.284
Landscape and visual	5.231	0.022	3.019	0.082
Heritage	5.090	0.024	1.754	0.185
Air quality and climate	1.433	0.231	1.000	0.317
Soils, geology, geomorphology	2.897	0.089	0.955	0.329
Water	9.529	0.002	1.250	0.264

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

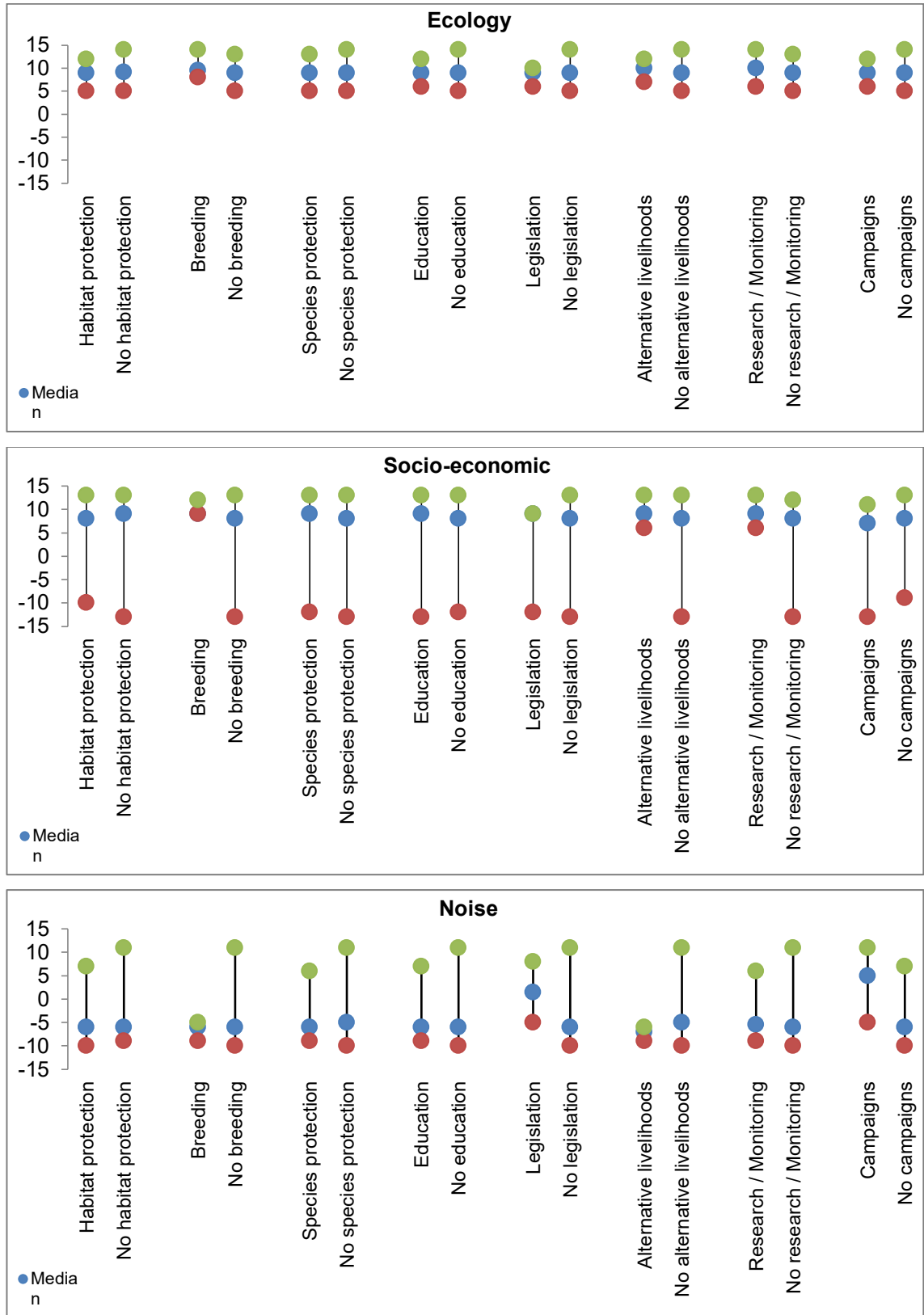
8.14.2. Conservation approaches

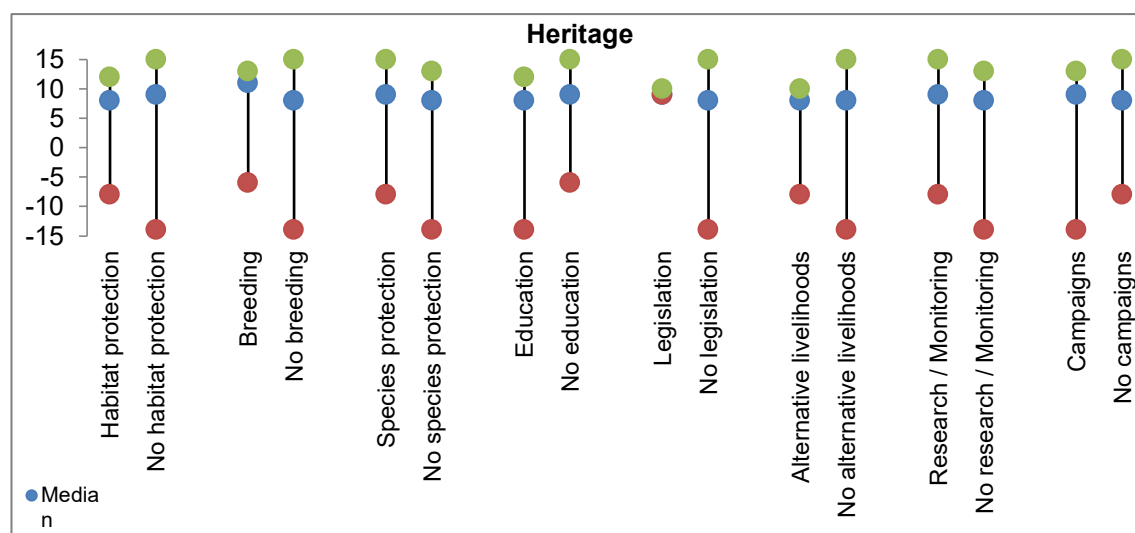
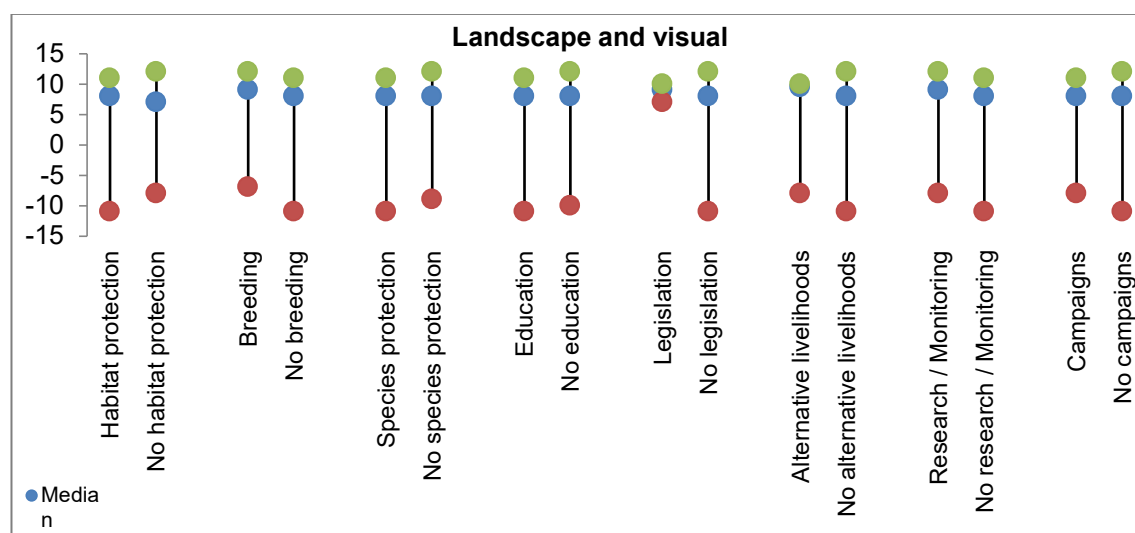
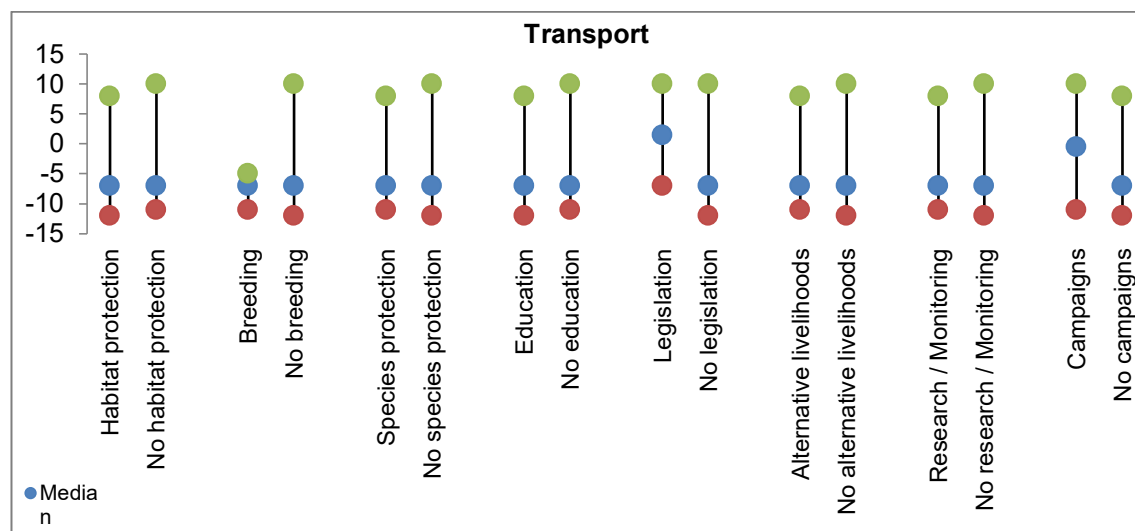
The scores for each area of impact may vary between project conservation approaches. It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Conservation approaches and impact “significance” scores

There were significant differences in the overall scores in 23 of 72 comparisons of conservation approach present / conservation approach absent and impact (Figure 8.13, Table 8.23). In the majority of these cases (15 of 23) the presence of an approach equated to a higher overall score. These included three impact categories each for “Legislation” (“Transport”, “Soils, geology, geomorphology” and “Water”); for “Research / Monitoring” (“Ecological”, “Socio-economic” and “Landscape and visual”) and for “Campaigns” (“Noise”, “Transport” and “Soils, geology, geomorphology”). This was also seen in two impact categories each for “Habitat protection” (“Landscape and visual” and “Water”); for “Breeding” (“Ecological” and “Heritage”); and for “Alternative livelihoods” (“Ecological” and “Socio-economic”).

However, in eight cases of significant difference the presence of an aim equated to a lower overall score. These included four impact categories for “Species protection”; “Noise”, “Transport”, “Air quality and climate” and “Water”. This was also seen in one impact category each for “Breeding” (“Water”); “Education” (“Heritage”); “Alternative livelihoods” (“Noise”) and “Campaigns” (“Socio-economic”).





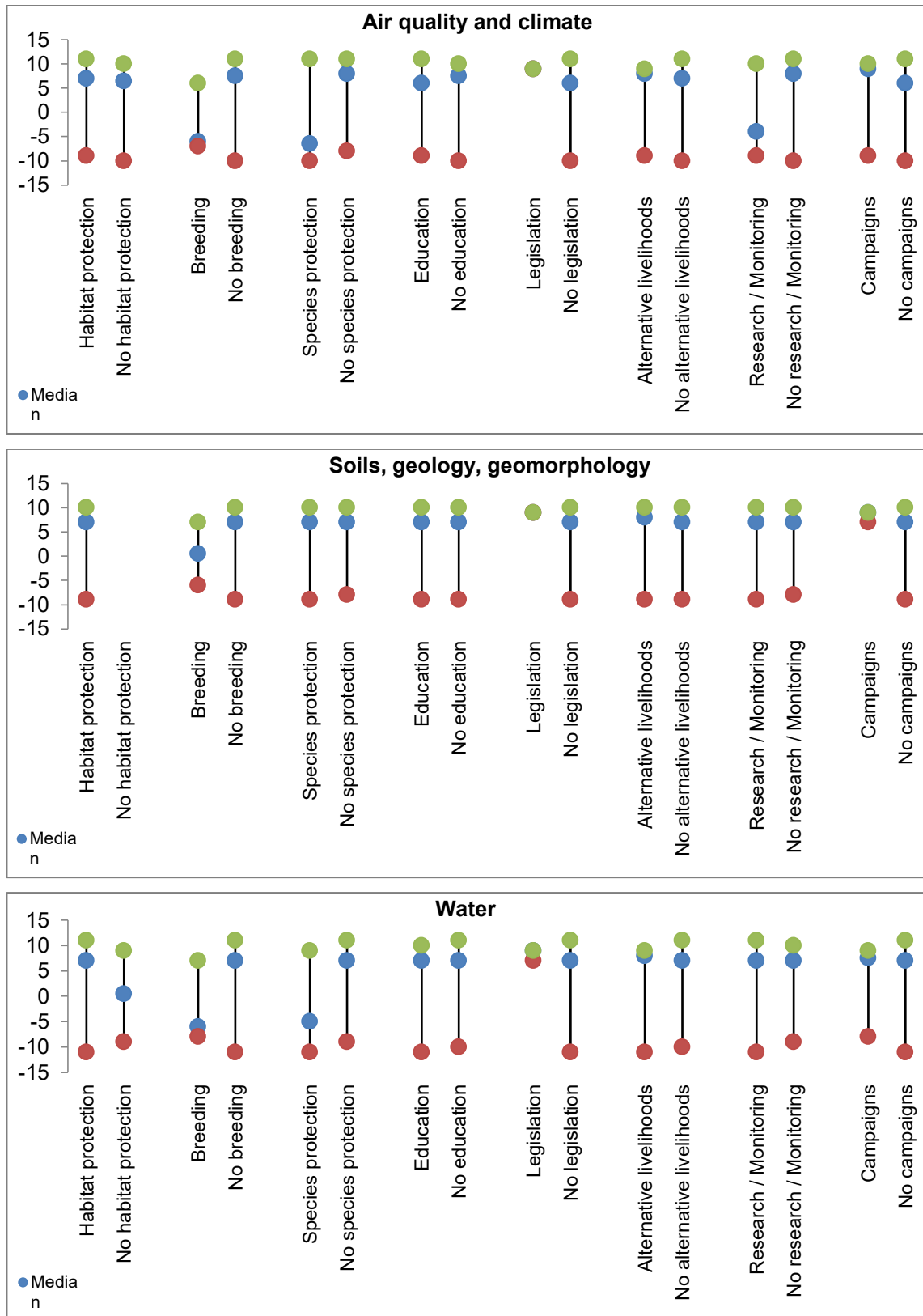


Figure 8.13: Conservation approaches and impact “significance” scores

Table 8.23: Conservation approaches and impact “significance” score Kruskal-Wallis test summary

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research / Monitoring		Campaigns	
	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P
Ecological	0.078	0.780	4.750	0.029	0.548	0.459	3.606	0.058	0.075	0.784	4.057	0.044	9.295	0.002	0.499	0.480
Socio-economic	0.305	0.581	3.531	0.060	3.364	0.067	3.191	0.074	0.107	0.743	10.422	0.001	21.707	<0.001	7.133	0.008
Noise	1.250	0.264	0.706	0.401	5.666	0.017	0.302	0.583	2.335	0.126	6.955	0.008	0.301	0.583	10.271	0.001
Transport	0.194	0.659	0.670	0.413	4.972	0.026	1.567	0.211	4.610	0.032	0.016	0.899	3.374	0.066	4.342	0.037
Landscape and visual	4.686	0.030	1.175	0.278	0.206	0.650	0.240	0.624	0.745	0.388	1.196	0.274	8.028	0.005	0.021	0.884
Heritage	1.531	0.216	8.630	0.003	2.288	0.130	4.491	0.034	1.333	0.248	0.012	0.912	2.554	0.110	0.050	0.823
Air quality and climate	0.091	0.763	2.546	0.111	5.419	0.020	0.092	0.761	3.612	0.057	0.001	0.977	3.085	0.079	3.132	0.077
Soils, geology, geomorphology	0.269	0.604	1.684	0.194	2.477	0.116	0.007	0.933	7.665	0.006	2.182	0.140	0.001	0.976	4.331	0.037
Water	7.526	0.006	5.575	0.018	5.575	0.038	0.000	0.996	4.017	0.045	0.167	0.683	0.003	0.956	1.691	0.194

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

Conservation approach and comparison of scores for impacts included in case studies with impacts omitted from case studies

Comparison using the Kruskal-Wallis test showed that in 16 of 72 cases the scores for impacts omitted from reports were significantly lower (less positive / more negative) than the included scores (Table 8.24).

The most frequent significant difference was in organisations with “Habitat protection” as a project conservation approach, which showed scores for impacts omitted from reports were significantly lower in five out of nine impact categories (“Ecological”, “Noise”, and “Landscape and visual”, “Soils, geology, geomorphology” and “Water”).

“Species protection” as a conservation approach showed scores for impacts omitted from reports were significantly lower in four out of nine impact categories (“Noise”, “Landscape and visual”, “Soils, geology, geomorphology” and “Water”).

“Research / Monitoring” as a conservation approach showed scores for impacts omitted from reports were significantly lower in three out of nine impact categories (“Noise”, “Air quality and climate” and “Water”).

“Education” as a conservation approach showed scores for impacts omitted from reports were significantly lower in two out of nine impact categories (“Socio-economic and “Noise”).

“Breeding” as a conservation approach showed scores for impacts omitted from reports were significantly lower in only one of nine impact categories (“Landscape and visual”). “Campaigns” as a conservation approach also showed scores for impacts omitted from reports were significantly lower in only one of nine impact categories (“Socio-economic”).

Across the impact categories “Noise” impacts were most frequently shown to have significantly lower scores for impacts omitted compared to impacts included, in four of the eight conservation approaches; “Habitat protection”; “Species protection”; “Education”; and “Research / Monitoring”.

Table 8.24: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” for projects using conservation approaches compared to projects not using the conservation approach

	Habitat protection		Breeding		Species protection		Education		Legislation		Alternative livelihoods		Research / Monitoring		Campaigns	
	H	P	H	P	H	P	H	P	H	P	H	P	H	P	H	P
Ecological	4.505	0.034	N/A	N/A	N/A	N/A	3.608	0.058	N/A	N/A	N/A	N/A	0.733	0.392	N/A	N/A
Socio-economic	3.774	0.052	N/A	N/A	0.456	0.499	7.460	0.006	3.000	0.083	N/A	N/A	2.581	0.108	8.842	0.003
Noise	3.966	0.046	2.000	0.157	4.083	0.043	8.408	0.004	N/A	N/A	N/A	N/A	6.013	0.014	N/A	N/A
Transport	0.009	0.923	1.623	0.203	0.384	0.535	1.603	0.205	0.600	0.439	0.187	0.666	0.432	0.511	0.210	0.646
Landscape and visual	3.941	0.047	4.038	0.044	5.157	0.023	3.267	0.071	N/A	N/A	1.502	0.220	0.399	0.527	0.037	0.847
Heritage	1.132	0.287	2.203	0.138	1.180	0.277	0.020	0.889	N/A	N/A	3.585	0.058	3.244	0.072	0.355	0.552
Air quality and climate	0.134	0.714	2.000	0.157	1.610	0.204	0.026	0.872	0.000	1.000	1.500	0.221	5.947	0.015	3.082	0.079
Soils, geology, geomorphology	4.302	0.038	3.000	0.083	5.144	0.023	3.224	0.073	0.000	1.000	0.563	0.453	1.863	0.172	1.042	0.307
Water	4.762	0.029	0.156	0.693	8.268	0.004	1.492	0.222	N/A	N/A	1.057	0.304	12.572	<0.001	3.474	0.062

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14.3. Project start year

Projects with an earlier start date may be less subject to trends in impact assessment so are less likely to achieve positive / avoid negative impacts from projects (so score lower). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Project start year and impact “significance” scores

There was no difference in overall impact scores between project start year categories in any impact categories (Figure 8.14, Table 8.25).

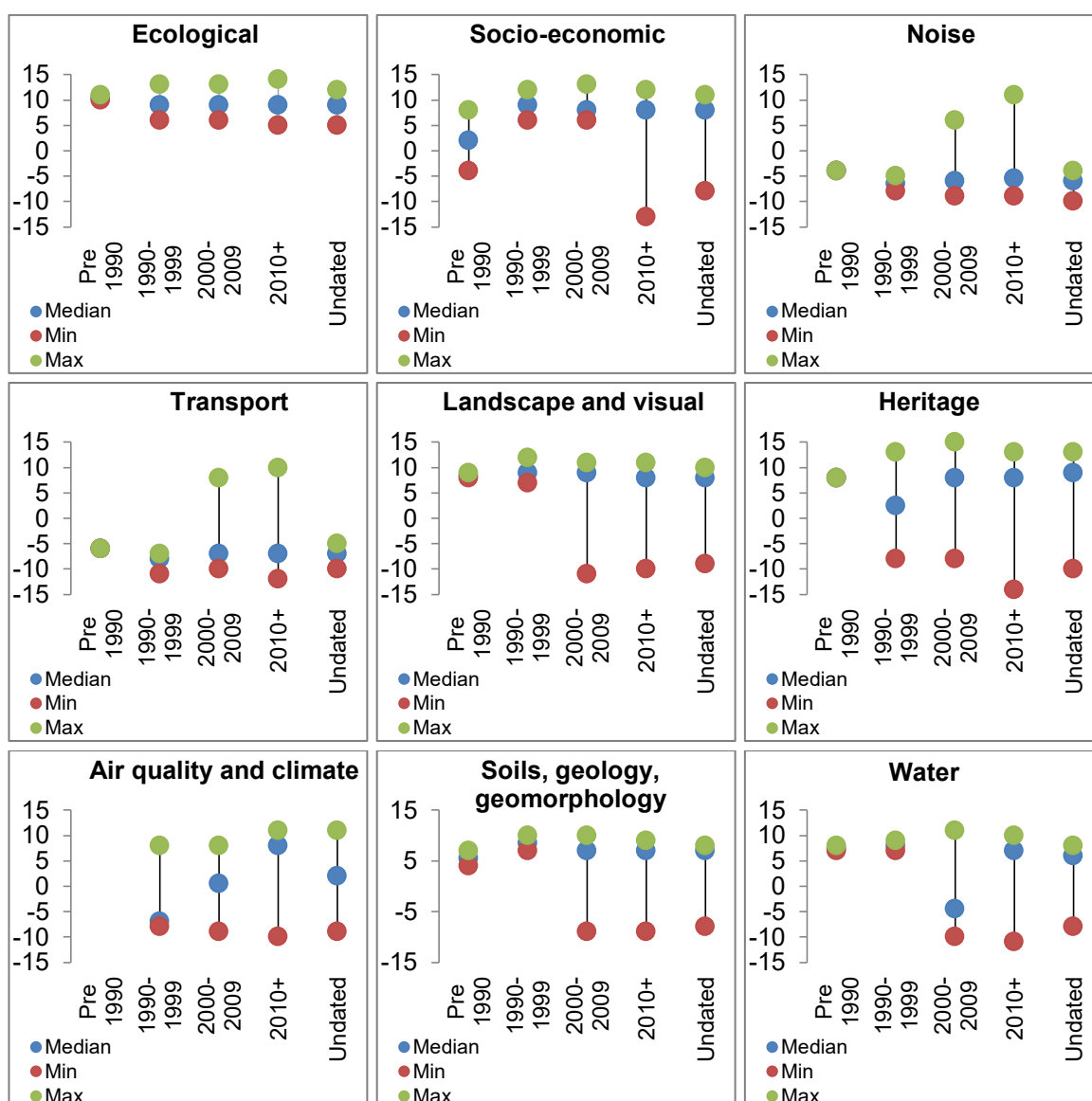


Figure 8.14: Project start year and impact “significance” scores

Table 8.25: Project start year and impact “significance” scores

	Pre 1990			1990-1999			2000-2009			2010+			Undated			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	10.5	10	11	9	6	13	9	6	13	9	5	14	9	5	12	H=3.632 P=0.458
Socio-economic	2	-4	8	9	6	12	8	6	13	8	-13	12	8	-8	11	H=3.027 P=0.553
Noise	-4	-4	-4	-6.5	-8	-5	-6	-9	6	-5.5	-9	11	-6	-10	-4	H=3.459 P=0.484
Transport	-6	-6	-6	-/	-11	-7	-7	-10	8	-7	-12	10	-7	-10	-5	H=4.743 P=0.315
Landscape and visual	8.5	8	9	9	7	12	9	-11	11	8	-10	11	8	-9	10	H=2.356 P=0.671
Heritage	8	8	8	2.5	-8	13	8	-8	15	8	-14	13	9	-10	13	H=0.844 P=0.932
Air quality and climate	N/A	N/A	N/A	-7	-8	8	0.5	-9	8	8	-10	11	2	-9	11	H=4.691 P=0.196
Soils, geology, geomorphology	5.5	4	7	8.5	7	10	7	-9	10	7	-9	9	7	-8	8	H=3.982 P=0.408
Water	7.5	7	8	8	7	9	-4.5	-10	11	7	-11	10	6	-8	8	H=7.517 P=0.111

Med = Median score. *Min* = Minimum score. *Max* = Maximum score. H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 4

Start year and comparison of scores for impacts included in case studies with impacts omitted from case studies

The scores for impacts omitted were significantly lower than for impacts included in reports in four out of nine comparisons for projects with a start year in the “2010 and later” range; for “Ecological”; “Socio-economic”; “Noise”; and “Water” category impacts. The same pattern was shown in two out of nine comparisons for projects with a start year in the “2000-2009” range; for “Transport” and “Water” category impacts (Table 8.26).

Table 8.26: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by start year categories

	Pre-1990		1990-1999		2000-2009		2010 and later		Undated	
	H	P	H	P	H	P	H	P	H	P
Ecological	N/A	N/A	N/A	N/A	3.381	0.066	4.005	0.045	1.611	0.204
Socio-economic	1.000	0.317	N/A	N/A	0.627	0.428	12.772	<0.001	1.517	0.218
Noise	N/A	N/A	N/A	N/A	2.434	0.119	4.979	0.026	N/A	N/A
Transport	N/A	N/A	0.139	0.709	4.650	0.031	1.376	0.241	N/A	N/A
Landscape and visual	1.000	0.317	2.000	0.157	0.773	0.379	2.445	0.118	3.307	0.069
Heritage	N/A	N/A	1.000	0.317	2.193	0.139	0.056	0.813	0.164	0.685
Air quality and climate	N/A	N/A	0.000	1.000	0.569	0.451	1.305	0.253	N/A	N/A
Soils, geology, geomorphology	N/A	N/A	1.000	0.317	2.416	0.120	0.671	0.413	0.180	0.671
Water	1.000	0.317	N/A	N/A	3.863	0.049	4.184	0.041	0.892	0.345

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14.4. Project end year

It may be expected that projects with an earlier finish date are also less subject to trends in impact assessment so are less likely to achieve positive / avoid negative impacts from projects (so score lower). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Project end year and impact “significance” scores

There was no difference in the overall impact scores between project end year categories (Figure 8.15, Table 8.27).

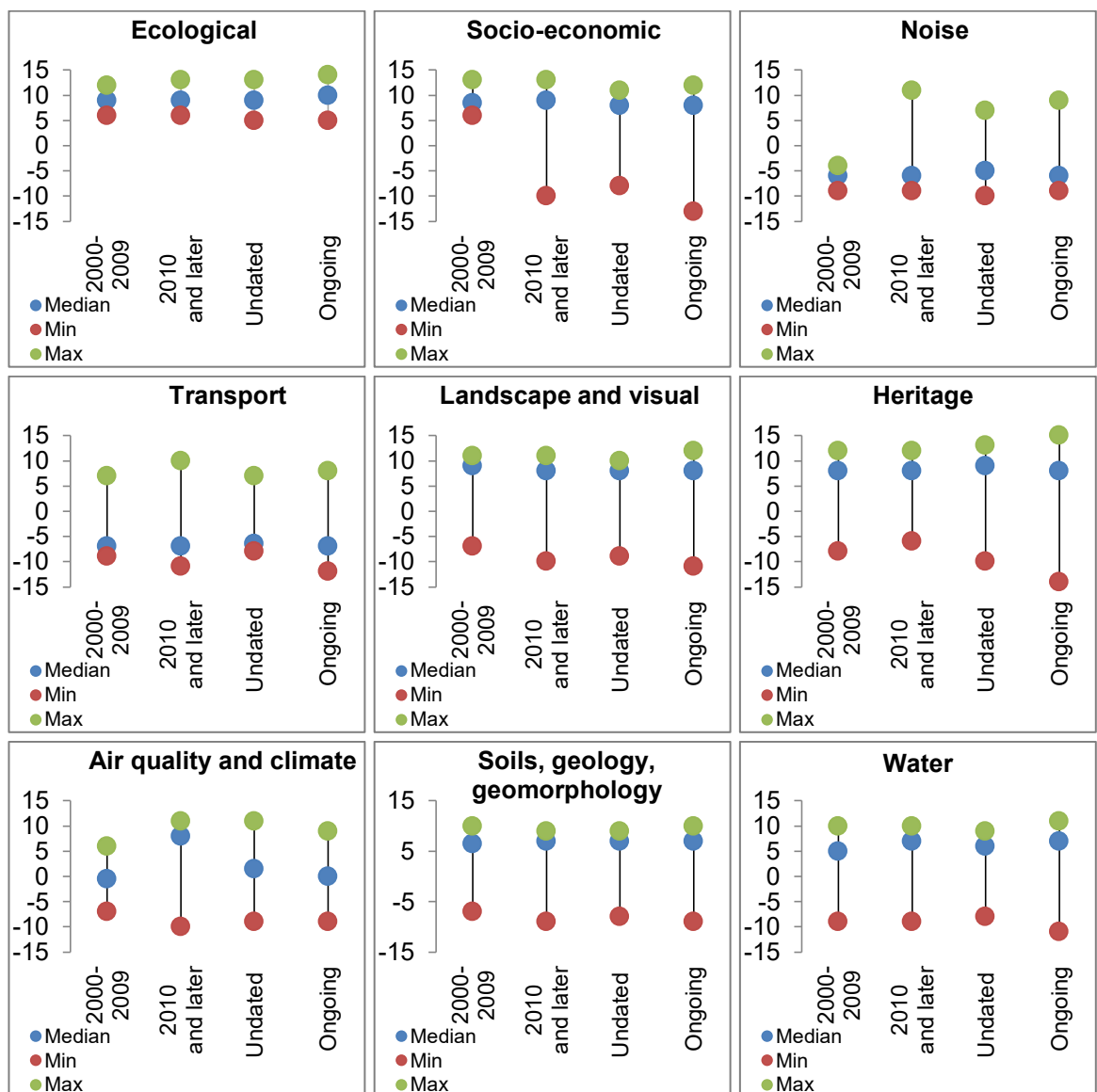


Figure 8.15: Project end year and impact “significance” scores

Table 8.27: Project end year and impact “significance” scores

	2000-2009			2010 and later			Undated			Ongoing			Kruskal-Wallis Test <i>P</i>
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	9	6	12	9	6	13	9	5	13	10	5	14	H=4.543 P=0.208
Socio-economic	8.5	6	13	9	-10	13	8	-8	11	8	-13	12	H=2.884 P=0.410
Noise	-6	-9	-4	-6	-9	11	-5	-10	7	-6	-9	9	H=0.549 P=0.908
Transport	-7	-9	7	-7	-11	10	-6.5	-8	7	-7	-12	8	H=3.455 P=0.327
Landscape and visual	9	-7	11	8	-10	11	8	-9	10	8	-11	12	H=1.489 P=0.685
Heritage	8	-8	12	8	-6	12	9	-10	13	8	-14	15	H=1.171 P=0.760
Air quality and climate	-0.5	-7	6	8	-10	11	1.5	-9	11	0	-9	9	H=5.217 P=0.157
Soils, geology, geomorphology	6.5	-7	10	7	-9	9	7	-8	9	7	-9	10	H=0.364 P=0.948
Water	5	-9	10	7	-9	10	6	-8	9	7	-11	11	H=2.156 P=0.541

Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 3

Project end year and comparison of scores for impacts included in case studies with impacts omitted from case studies

The scores for impacts omitted from reports were significantly lower than those for impacts included in reports with an “Ongoing” end year category in four of the nine impact category comparisons; “Socio-economic”; “Noise”; “Transport”; “Water”. The same pattern was shown in one of nine comparisons for projects with an end year of “2010 and later” for “Landscape and visual” category impacts (Table 8.28).

Table 8.28: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by end year categories

	2000-2009		2010 and later		Undated		Ongoing	
	H	P	H	P	H	P	H	P
Ecological	N/A	N/A	2.221	0.136	1.750	0.186	0.881	0.348
Socio-economic	0.086	0.770	1.447	0.229	2.002	0.157	11.311	0.001
Noise	N/A	N/A	0.029	0.865	2.291	0.130	5.443	0.020
Transport	1.018	0.313	0.165	0.685	2.889	0.089	6.036	0.014
Landscape and visual	0.000	1.000	4.667	0.031	3.526	0.060	1.070	0.301
Heritage	N/A	N/A	0.000	1.000	0.714	0.398	1.473	0.225
Air quality and climate	1.000	0.317	0.723	0.395	0.086	0.770	2.898	0.089
Soils, geology, geomorphology	2.400	0.121	0.220	0.639	3.198	0.074	0.040	0.842
Water	1.500	0.221	2.592	0.107	1.033	0.309	4.033	0.045

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14.5. Project duration

Shorter duration projects have less time available for planning / assessment so are less likely to achieve positive / avoid negative impacts from projects (so score lower). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Project duration and impact “significance” scores

There was a difference in overall scores between the project duration categories for “Ecological” category impacts (Figure 8.16, Table 8.29). *Post hoc* tests showed that “Ongoing” projects scored higher than projects of “Less than 1 year” (Dunn’s test $P=0.022$, applying Bonferroni correction) and that projects of “1-5 years” scored higher than projects of “Less than 1 year” (Dunn’s test $P=0.003$, applying Bonferroni correction). There was also a difference between the scores by project duration for “Transport” category impacts. However *post hoc* Dunn’s tests provided no evidence of differences in scores between the ten pairs of groups. For other impacts there was no evidence of difference.

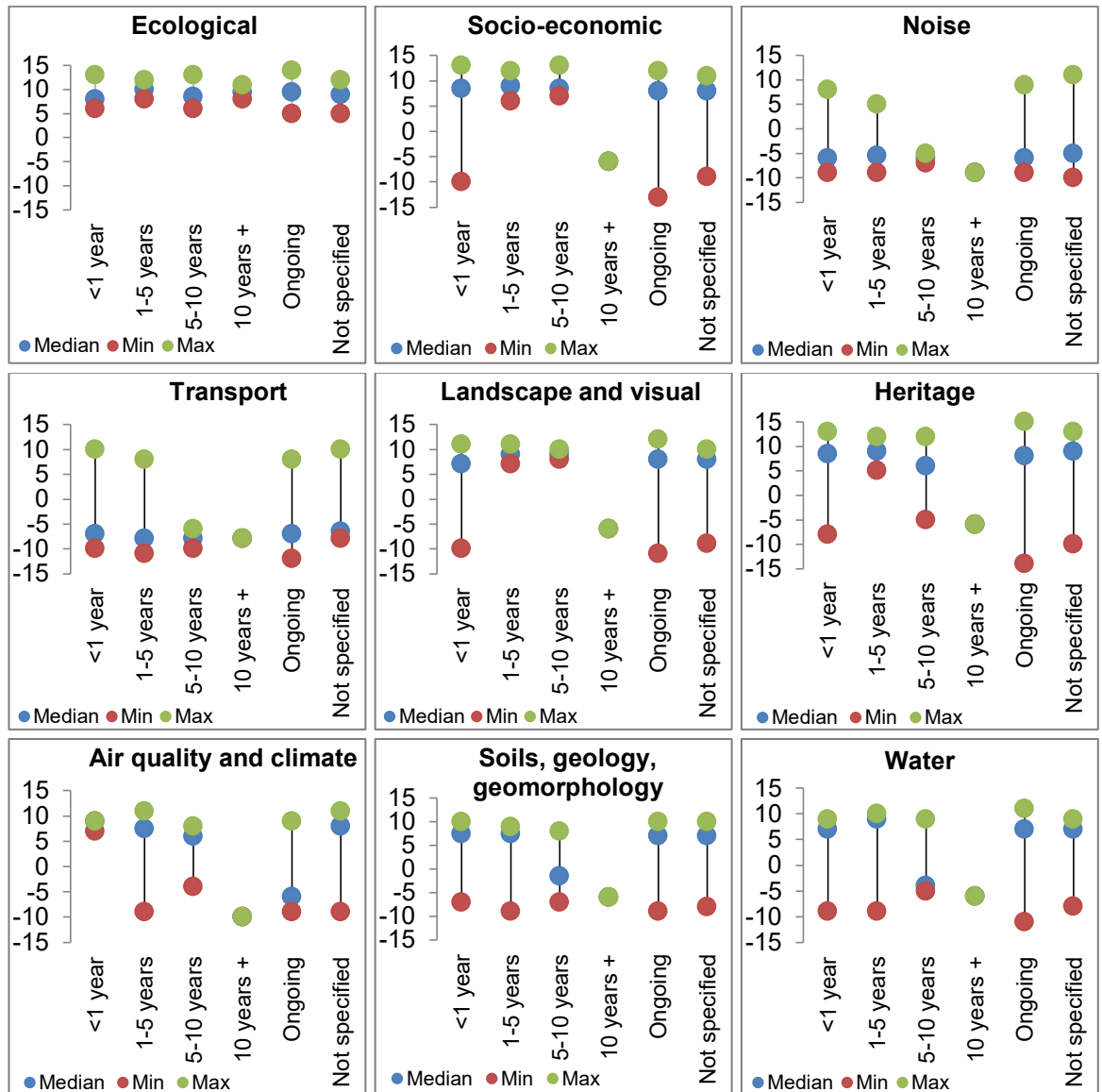


Figure 8.16: Project duration and impact “significance” scores

Table 8.29: Project duration and impact “significance” scores

	Less than 1 year			1-5 years			5-10 years			10 years +			Ongoing			Not specified			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	8	6	13	10	8	12	8.5	6	13	9.5	8	11	9.5	5	14	9	5	12	H=17.711 P=0.003
Socio-economic	8.5	-10	13	9	6	12	8.5	7	13	-6	-6	-6	8	-13	12	8	-9	11	H=8.319 P=0.139
Noise	-6	-9	8	-5.5	-9	5	-6	-7	-5	-9	-9	-9	-6	-9	9	-5	-10	11	H=3.582 P=0.611
Transport	-7	-10	10	-8	-11	8	-8	-10	-6	-8	-8	-8	-7	-12	8	-6.5	-8	10	H=12.411 P=0.030
Landscape and visual	7	-10	11	9	7	11	9	8	10	-6	-6	-6	8	-11	12	8	-9	10	H=10.722 P=0.057
Heritage	8.5	-8	13	9	5	12	6	-5	12	-6	-6	-6	8	-14	15	9	-10	13	H=2.942 P=0.709
Air quality and climate	9	7	9	7.5	-9	11	6	-4	8	-10	-10	-10	-6	-9	9	8	-9	11	H=9.044 P=0.107
Soils, geology, geomorphology	7.5	-7	10	7.5	-9	9	-1.5	-7	8	-6	-6	-6	7	-9	10	7	-8	10	H=6.301 P=0.278
Water	7	-9	9	9	-9	10	-4	-5	9	-6	-6	-6	7	-11	11	7	-8	9	H=6.829 P=0.234

Med = Median score. *Min* = Minimum score. *Max* = Maximum score. H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 5

Project duration and comparison of scores for impacts included in case studies with impacts omitted from case studies

Scores for impacts omitted from reports were shown to be lower (less positive / more negative) than the scores for included impacts using Kruskal-Wallis tests for “Ongoing” projects in “Socio-economic”, “Noise”, and “Transport” category impacts; for projects of “Less than 1 year” in “Landscape and visual” and “Water” category impacts; and for projects where the duration was “Not specified” in “Landscape and visual” category impacts (Table 8.30).

Table 8.30: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by expenditure by duration

	Less than 1 year		1-5 years		5-10 years		10 years or more		Ongoing		Not specified	
	H	P	H	P	H	P	H	P	H	P	H	P
Ecological	0.519	0.471	N/A	N/A	N/A	N/A	N/A	N/A	0.956	0.328	2.135	0.144
Socio-economic	0.229	0.633	0.869	0.351	N/A	N/A	N/A	N/A	10.775	0.001	2.936	0.087
Noise	N/A	N/A	1.300	0.254	1.250	0.264	N/A	N/A	5.576	0.018	1.831	0.176
Transport	1.965	0.161	2.301	0.129	0.123	0.726	N/A	N/A	6.036	0.014	2.410	0.121
Landscape and visual	4.101	0.043	0.326	0.568	N/A	N/A	N/A	N/A	0.959	0.327	3.968	0.046
Heritage	0.554	0.457	0.425	0.515	N/A	N/A	N/A	N/A	1.441	0.230	0.230	0.631
Air quality and climate	1.000	0.317	0.083	0.773	1.500	0.221	N/A	N/A	2.173	0.140	0.420	0.517
Soils, geology, geomorphology	1.938	0.164	0.728	0.393	0.167	0.683	N/A	N/A	0.368	0.544	2.615	0.106
Water	4.704	0.030	2.090	0.148	2.105	0.147	N/A	N/A	2.786	0.095	1.794	0.180

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14.6. Project duration “to date”

Project duration “to date” and impact “significance” scores

There was a difference in overall scores between the project duration “to date” categories for “Ecological” category impacts (Figure 8.17, Table 8.31). *Post hoc* tests showed that “1-5 year” duration “to date” projects scored higher than projects of “Less than 1 year” (Dunn’s test $P=0.001$, applying Bonferroni correction). For other impacts there was no evidence of difference.

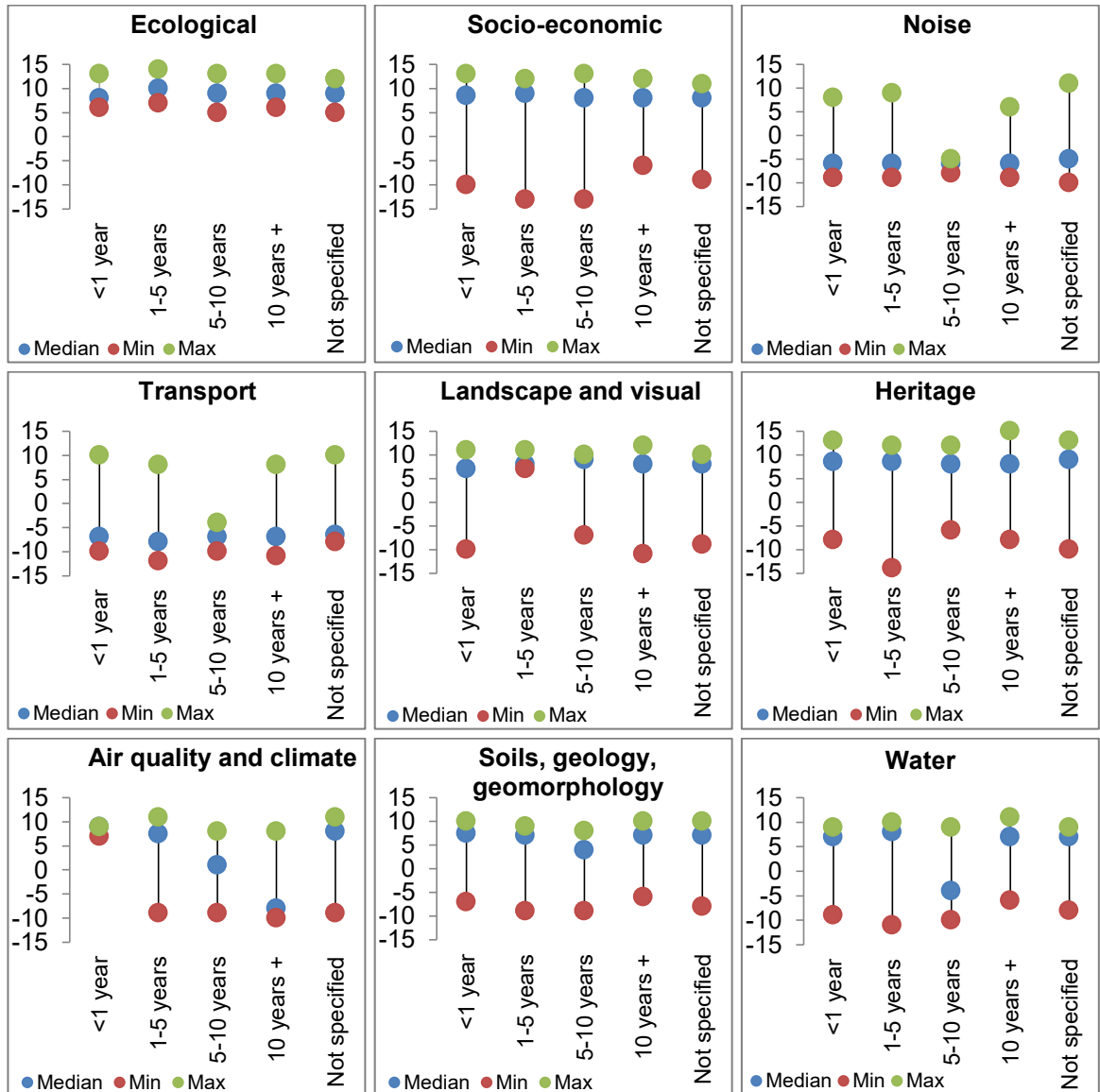


Figure 8.17: Project duration “to date” and impact “significance” scores

Table 8.31: Project duration “to date” and impact “significance” scores

	Less than 1 year			1-5 years			5-10 years			10 years +			Not specified			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	8	6	13	10	7	14	9	5	13	9	6	13	9	5	12	H=16.971 P=0.002
Socio-economic	8.5	-10	13	9	-13	12	8	-13	13	8	-6	12	8	-9	11	H=0.184 P=0.996
Noise	-6	-9	8	-6	-9	9	-6	-8	-5	-6	-9	6	-5	-10	11	H=1.832 P=0.767
Transport	-7	-10	10	-8	-12	8	-7	-10	-4	-7	-11	8	-6.5	-8	10	H=9.083 P=0.059
Landscape and visual	7	-10	11	8	7	11	9	-7	10	8	-11	12	8	-9	10	H=6.148 P=0.188
Heritage	8.5	-8	13	8.5	-14	12	8	-6	12	8	-8	15	9	-10	13	H=0.296 P=0.990
Air quality and climate	9	7	9	7.5	-9	11	1	-9	8	-8	-10	8	8	-9	11	H=9.377 P=0.052
Soils, geology, geomorphology	7.5	-7	10	7	-9	9	4	-9	8	7	-6	10	7	-8	10	H=5.832 P=0.212
Water	7	-9	9	8	-11	10	-4	-10	9	7	-6	11	7	-8	9	H=9.428 P=0.051

Med = Median score. *Min* = Minimum score. *Max* = Maximum score. H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 4

Project duration “to date” and comparison of scores for impacts included in case studies with impacts omitted from case studies

Scores for impacts omitted from reports were shown to be lower (less positive / more negative) than the included scores using Kruskal-Wallis tests for projects of “Less than 1 year” for “Landscape and visual” and “Water” category impacts. This was also the case for projects of “1-5 years” and “Socio-economic” category impacts; for projects of “5-10 years” and “Socio-economic” category impacts; for projects of “10 years or more” and “Noise” category impacts; and for durations that were “Not specified” and “Landscape and visual” category impacts (Table 8.32).

Table 8.32: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by duration “to date”

	Less than 1 year		1-5 years		5-10 years		10 years or more		Not specified	
	H	P	H	P	H	P	H	P	H	P
Ecological	0.519	0.471	1.977	0.160	1.633	0.201	2.411	0.120	2.135	0.144
Socio-economic	0.229	0.633	13.126	<0.001	4.517	0.034	0.103	0.748	2.936	0.087
Noise	N/A	N/A	2.711	0.100	0.000	1.000	4.046	0.044	1.831	0.176
Transport	1.965	0.161	0.043	0.836	0.974	0.324	1.577	0.209	2.410	0.121
Landscape and visual	4.101	0.043	1.072	0.300	2.644	0.104	0.913	0.339	3.968	0.046
Heritage	0.554	0.457	0.001	0.969	1.785	0.182	3.389	0.066	0.230	0.631
Air quality and climate	1.000	0.317	0.416	0.519	0.441	0.507	0.789	0.374	0.420	0.517
Soils, geology, geomorphology	1.938	0.164	0.413	0.520	0.852	0.356	0.306	0.580	2.615	0.106
Water	4.704	0.030	1.706	0.191	0.629	0.428	0.933	0.334	1.794	0.180

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14.7. Project staff details provided

Projects with evidence of dedicated staff appear to have more staff resource to undertake planning and assessment so are more likely to achieve positive /avoid negative impacts from projects (so score higher). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Project staff details provided “significance” scores

Overall scores were significantly higher for organisations providing project staff lists compared to organisations not providing this detail for “Landscape and visual” category impacts (Figure 8.18, Table 8.33). For the other impact categories there was no evidence of difference.

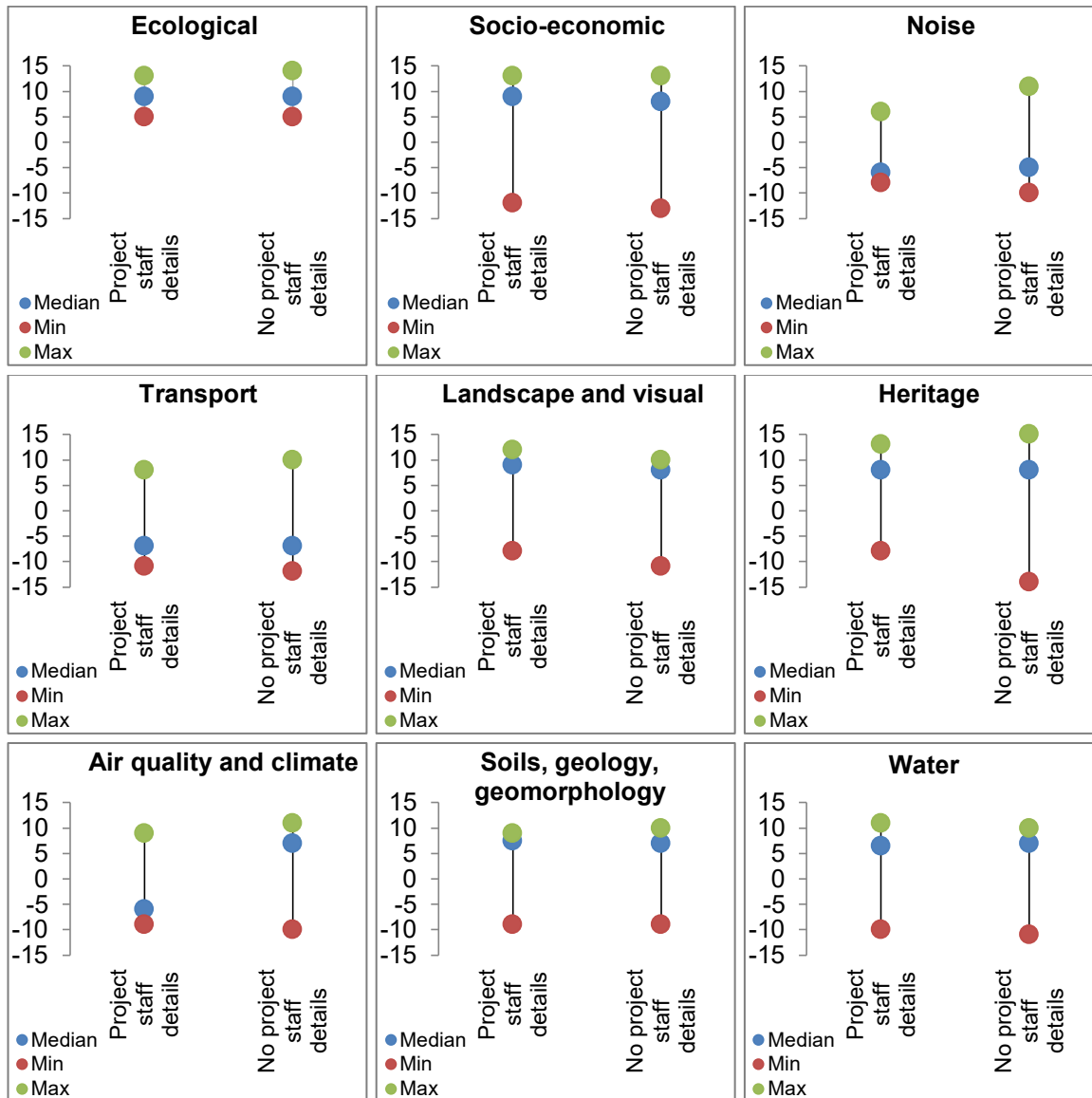


Figure 8.18: Project staff details provided and impact “significance” scores

Table 8.33: Project staff details provided and project staff details not provided and impact “significance” scores

	Project Staff Details Provided			No Project Staff Details Provided			Kruskal-Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	9	5	13	9	5	14	H=0.002 P=0.968
Socio-economic	9	-12	13	8	-13	13	H=3.548 P=0.060
Noise	-6	-8	6	-5	-10	11	H=1.520 P=0.218
Transport	-7	-11	8	-7	-12	10	H=1.047 P=0.306
Landscape and visual	9	-8	12	8	-11	10	H=4.106 P= 0.043
Heritage	8	-8	13	8	-14	15	H=0.010 P=0.921
Air quality and climate	-6	-9	9	7	-10	11	H=1.925 P=0.165
Soils, geology, geomorphology	7.5	-9	9	7	-9	10	H=0.151 P=0.697
Water	6.5	-10	11	7	-11	10	H=0.007 P=0.932

Med = Median score. *Min* = Minimum score. *Max* = Maximum score.

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

Project staff details provided and comparison of scores for impacts included in case studies with impacts omitted from case studies

In two out of nine comparisons where project staff details were provided scores for omitted impacts were significantly lower than for included impacts (Table 8.34) (“Ecological”, “Water”).

The same pattern of omitted impacts being lower than included impacts was repeated in five out of nine comparisons where project staff details were not provided (“Socio-economic” “Noise”, “Transport”, “Landscape and visual”, “Water”) (Table 8.34). In only one case (“Heritage”) was the reverse true, where included impacts scored significantly lower than omitted impacts.

Table 8.34: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by organisations providing details of project staff and organisations not providing details of project staff

	Project Staff Details Provided		No Project Staff Details Provided	
	H	P	H	P
Ecological	4.046	0.040	0.318	0.573
Socio-economic	1.832	0.176	11.594	0.001
Noise	0.349	0.555	5.748	0.017
Transport	0.239	0.625	5.678	0.017
Landscape and visual	0.056	0.812	8.523	0.004
Heritage	4.830	0.028	0.081	0.776
Air quality and climate	0.500	0.480	1.420	0.233
Soils, geology, geomorphology	0.735	0.391	2.913	0.088
Water	5.921	0.009	4.392	0.036

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14.8. Project expenditure

Projects with higher expenditure have more financial resources available in general so can allocate more to planning and assessment so are more likely to achieve positive /avoid negative impacts from projects (so score higher). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Project expenditure and impact “significance” scores

There was no difference between the project expenditure categories and the overall impact scores (Figure 8.19, Table 8.35).

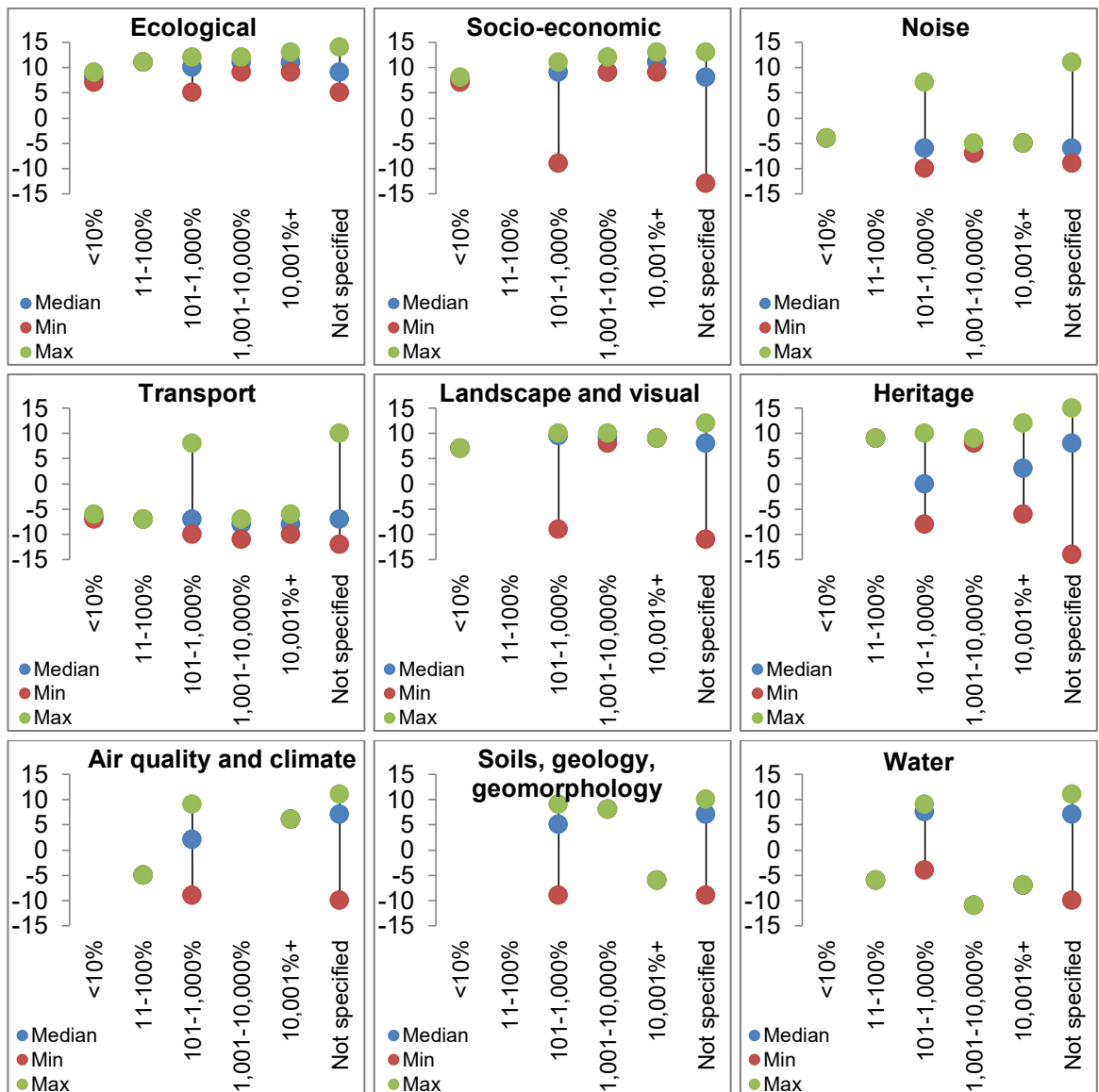


Figure 8.19: Project expenditure (as % GDP PPP) and impact “significance” scores

Table 8.35: Project expenditure (as % of GDP PPP) and impact “significance” scores

	<10% GDP PPP			11-100% GDP PPP			101-1,000% GDP PPP			1,001-10,000% GDP PPP			10,00%+ GDP PPP			Not specified			Kruskal- Wallis Test
	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	<i>Med</i>	<i>Min</i>	<i>Max</i>	
Ecological	8	7	9	11	11	11	10	5	12	11	9	12	11	9	13	9	5	14	H=7.052 P=0.217
Socio-economic	7.5	7	8	N/A	N/A	N/A	9	-9	11	9	9	12	11	9	13	8	-13	13	H=6.880 P=0.142
Noise	-4	-4	-4	N/A	N/A	N/A	-6	-10	7	-7	-7	-5	-5	-5	-5	-6	-9	11	H=4.495 P=0.343
Transport	-6.5	-7	-6	-7	-7	-7	-7	-10	8	-8	-11	-7	-8	-10	-6	-7	-12	10	H=3.130 P=0.680
Landscape and visual	7	7	7	N/A	N/A	N/A	9.5	-9	10	9	8	10	9	9	9	8	-11	12	H=3.508 P=0.477
Heritage	N/A	N/A	N/A	9	9	9	0	-8	10	8.5	8	9	3	-6	12	8	-14	15	H=2.692 P=0.611
Air quality and climate	N/A	N/A	N/A	-5	-5	-5	2	-9	9	N/A	N/A	N/A	6	6	6	7	-10	11	H=0.742 P=0.863
Soils, geology, geomorphology	N/A	N/A	N/A	N/A	N/A	N/A	5	-9	9	8	8	8	-6	-6	-6	7	-9	10	H=5.174 P=0.159
Water	N/A	N/A	N/A	-6	-6	-6	7.5	-4	9	-11	-11	-11	7	-7	-7	7	-10	11	H=6.002 P=0.199

Med = Median score. *Min* = Minimum score. *Max* = Maximum score. H=Kruskal-Wallis Test. *P*=Significance. For all tests, Degrees of Freedom = 5

Project expenditure and comparison of scores for impacts included in case studies with impacts omitted from case studies

The scores for impacts omitted from reports were lower (less positive / more negative) than the included scores in five of nine impact category comparisons where expenditure was “Not specified”; “Socio-economic”, “Noise”, “Transport”; “Landscape and visual” and “Water” (Table 8.36).

The scores for impacts omitted from reports were also significantly lower than the included scores for the expenditure category “101-1,000% of GDP PPP” for “Socio-economic” category impacts (Table 8.36).

Table 8.36: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by expenditure by % GDP PPP categories

	<10% GDP PPP		11-100% GDP PPP		101-1,000% GDP PPP		1,001-10,000% GDP PPP		10,001%+ GDP PPP		Not specified	
	H	P	H	P	H	P	H	P	H	P	H	P
Ecological	0.000	1.000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.228	0.268
Socio-economic	1.000	0.317	N/A	N/A	4.528	0.033	N/A	N/A	N/A	N/A	9.779	0.002
Noise	N/A	N/A	N/A	N/A	0.643	0.423	N/A	N/A	N/A	N/A	9.519	0.002
Transport	N/A	N/A	N/A	N/A	0.747	0.387	N/A	N/A	1.000	0.317	7.477	0.006
Landscape and visual	N/A	N/A	N/A	N/A	2.930	0.087	1.000	0.317	N/A	N/A	7.957	0.005
Heritage	N/A	N/A	N/A	N/A	1.800	0.180	1.000	0.317	N/A	N/A	2.524	0.112
Air quality and climate	N/A	N/A	N/A	N/A	0.200	0.655	N/A	N/A	N/A	N/A	2.461	0.117
Soils, geology, geomorphology	N/A	N/A	N/A	N/A	0.358	0.550	N/A	N/A	N/A	N/A	1.767	0.184
Water	N/A	N/A	N/A	N/A	0.024	0.878	N/A	N/A	N/A	N/A	10.635	0.001

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.14.9. Report format

Longer reports are likely to include greater detail of projects in general, so are more likely to achieve positive /avoid negative impacts from projects (so score higher). It was also predicted that scores for impacts included would be higher than scores for impacts omitted for all cases.

Report format and impact “significance” scores

There were significant differences in the overall impact scores between report formats (Figure 8.20, Table 8.37) for “Ecological” category impacts. *Post hoc* tests showed “Multiple report projects” were on the whole more positive than projects with “Short reports” (Dunn’s test $P=0.004$, applying Bonferroni correction). There was no evidence of a difference in scores between the other pairs.

The same significant difference was shown for “Socio-economic” category impacts. Subsequent *post hoc* tests suggested that “Comprehensive reports” were generally more positive than projects with “Short reports” (Dunn’s test $P=0.037$, applying Bonferroni correction).

A Kruskal-Wallis test also provided evidence of a difference between the scores for “Transport” category impacts. However Dunn’s pairwise tests provided no evidence of differences in scores between the report formats.

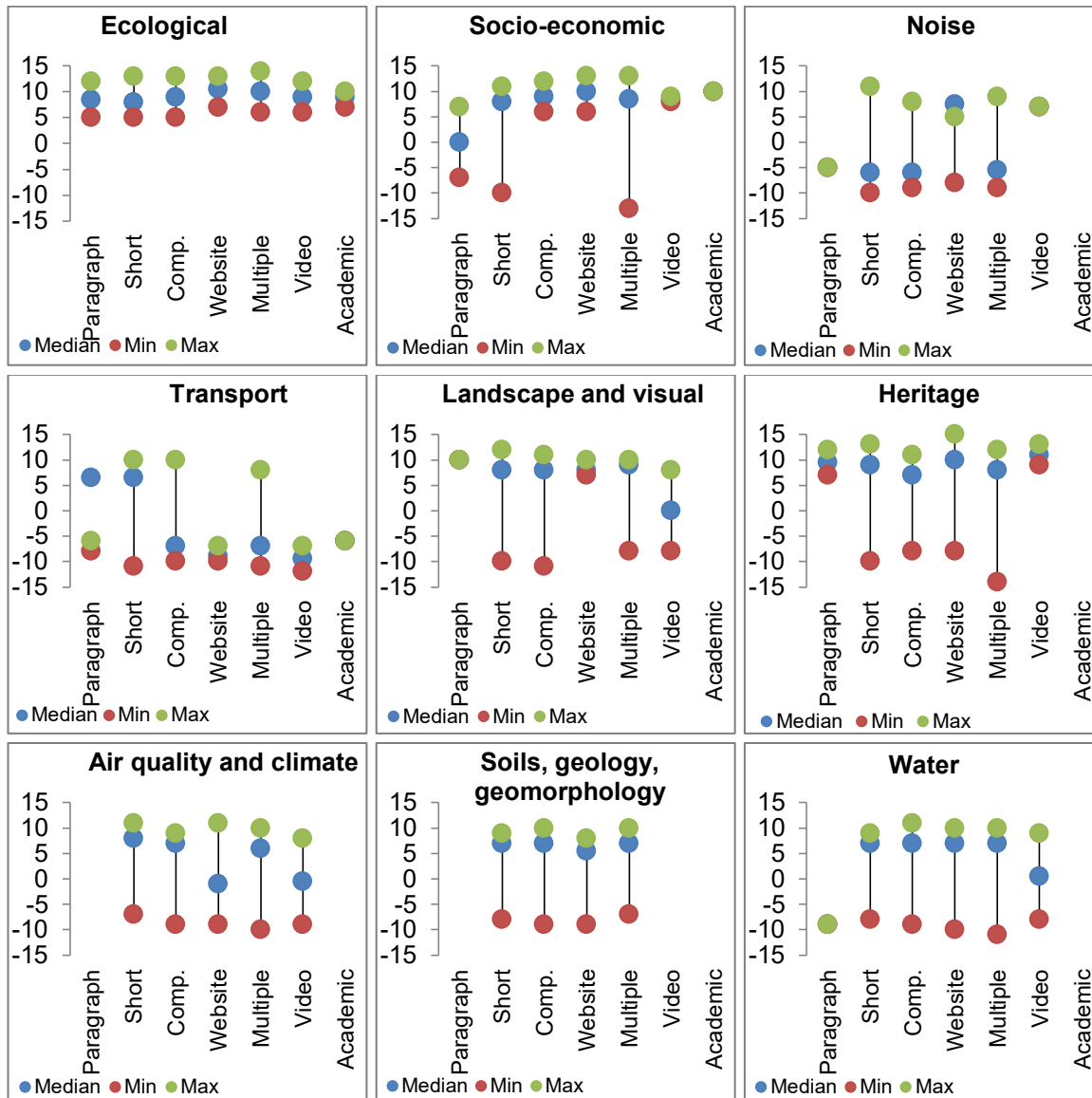


Figure 8.20: Report format and impact “significance” scores

Table 8.37: Report format and impact “significance” scores

	Paragraph			Short report			Comprehensive report			Website			Multiple reports			Video			Academic paper			Kruskal-Wallis Test
	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	
Ecological	8.5	5	12	8	5	13	9	5	13	10.5	7	13	10	6	14	9	6	12	9	7	10	H=18.670 P=0.005
Socio-economic	0	-7	7	8	-10	11	9	6	12	10	6	13	8.5	-13	13	8.5	8	9	10	10	10	H=18.010 P=0.006
Noise	-5	-5	-5	-6	-10	11	-6	-9	8	7.5	-8	5	-5.5	-9	9	7	7	7	N/A	N/A	N/A	H=4.943 P=0.423
Transport	6.5	-8	-6	6.5	-11	-7	-7	-10	10	-9	-10	-7	-7	-11	8	-9.5	-12	-7	-6	-6	-6	H=12.652 P=0.049
Landscape and visual	10	10	10	8	-10	12	8	-11	11	8	7	10	9	-8	10	0	-8	8	N/A	N/A	N/A	H=4.049 P=0.542
Heritage	9.5	7	12	9	-10	13	7	-8	11	10	-8	15	8	-14	12	11	9	13	N/A	N/A	N/A	H=8.792 P=0.118
Air quality and climate	N/A	N/A	N/A	8	-7	11	7	-9	9	-1	-9	11	6	-10	10	-0.5	-9	8	N/A	N/A	N/A	H=2.635 P=0.621
Soils, geology, geomorphology	N/A	N/A	N/A	7	-8	9	7	-9	10	5.5	-9	8	7	-7	10	N/A	N/A	N/A	N/A	N/A	N/A	H=1.505 P=0.681
Water	-9	-9	-9	7	-8	9	7	-9	11	7	-10	10	7	-11	10	0.5	-8	9	N/A	N/A	N/A	H=3.605 P=0.608

Med = Median score. Min = Minimum score. Max = Maximum score. H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 6

Report format and comparison of scores for impacts included in case studies with impacts omitted from case studies

In two out of nine impact categories (“Socio-economic” and “Transport”) for projects providing “Multiple reports”, impacts omitted from reports were lower than the included impacts. This was also the case in two out of nine impact categories for “Comprehensive reports” (“Landscape and visual” and “Water”) (Table 8.38).

Table 8.38: Kruskal-Wallis comparisons of scores for impacts “included” versus impacts “omitted” by report format

	Paragraph		Short report		Comprehensive report		Website		Multiple reports		Video		Academic paper	
	H	P	H	P	H	P	H	P	H	P	H	P	H	P
Ecological	2.206	0.137	1.483	0.223	2.051	0.152	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Socio-economic	N/A	N/A	2.792	0.095	0.000	1.000	N/A	N/A	8.303	0.004	1.000	0.317	N/A	N/A
Noise	N/A	N/A	N/A	N/A	1.041	0.308	N/A	N/A	2.863	0.091	N/A	N/A	N/A	N/A
Transport	N/A	N/A	0.513	0.474	1.919	0.166	0.526	0.468	4.102	0.043	N/A	N/A	N/A	N/A
Landscape and visual	N/A	N/A	0.524	0.469	4.840	0.028	2.105	0.147	0.920	0.338	1.000	0.317	N/A	N/A
Heritage	1.000	0.317	2.869	0.090	0.029	0.864	1.929	0.165	0.809	0.368	1.000	0.317	N/A	N/A
Air quality and climate	N/A	N/A	0.344	0.558	1.946	0.163	0.000	1.000	2.616	0.106	N/A	N/A	N/A	N/A
Soils, geology, geomorphology	N/A	N/A	0.015	0.902	1.500	0.221	1.800	0.180	0.899	0.343	N/A	N/A	N/A	N/A
Water	N/A	N/A	1.120	0.290	12.570	<0.001	0.000	1.000	2.563	0.109	N/A	N/A	N/A	N/A

H=Kruskal-Wallis Test. P=Significance. For all tests, Degrees of Freedom = 1

8.15. Cumulative assessment scores

In order to assess the cumulative impact of all likely impacts arising from a project, a combined score for each project was calculated. This involved adding the unweighted score for each likely impact then dividing that by the total possible score for all likely impacts. For example if a project was determined to have scored “8” for “Ecological” category impacts, “-3” for “Socio-economic” category impacts, “-3” for “Noise” category impacts and “6” for “Transport” category impacts, with no other areas of impact found to be likely, then the overall score would be 8 from a possible total of 60.

As each report was found to have a different potential number of likely impacts then comparison of the total scores was not possible. Therefore, each score was converted to a percentage total impact score equating to one of the cumulative impact score categories shown in Table 8.39.

Table 8.39: Cumulative impact score categories

Percentage Score	Cumulative impact score category
> 75%	Extremely positive combined impact score
> 50% < 75%	Very positive combined impact score
> 25% < 50%	Positive combined impact score
> 0% < 25%	Slightly positive combined impact score
0%	Neutral combined impact score
< 0% > -25%	Slightly negative combined impact score
< -25% > -50%	Positive combined impact score
< -50% > -75%	Very negative combined impact score
< -75%	Extremely negative combined impact score

There was a general trend towards positive cumulative impact scores. The majority of projects (82.9%) achieved an overall positive cumulative impact score (126/152) including 38.8% in the “Slightly positive” category, 28.3% in the “Positive” category, 15.1% in the “Very positive” category and 0.7% in the “Extremely positive” category. By contrast only 16.4% (25/152) were categorised as having a negative cumulative impact score with

14.5% in the “Slightly negative” category and 2.0% in the “Negative” category. No projects were found to have “Very negative” or “Extremely negative” cumulative impact scores, suggesting that for conservation projects the likelihood of extreme negative combined impacts is unlikely.

Across all reports the median score was 20.4%, the mean score was 23.4%, with a maximum score of 80.0% and a minimum score of -34.1%.

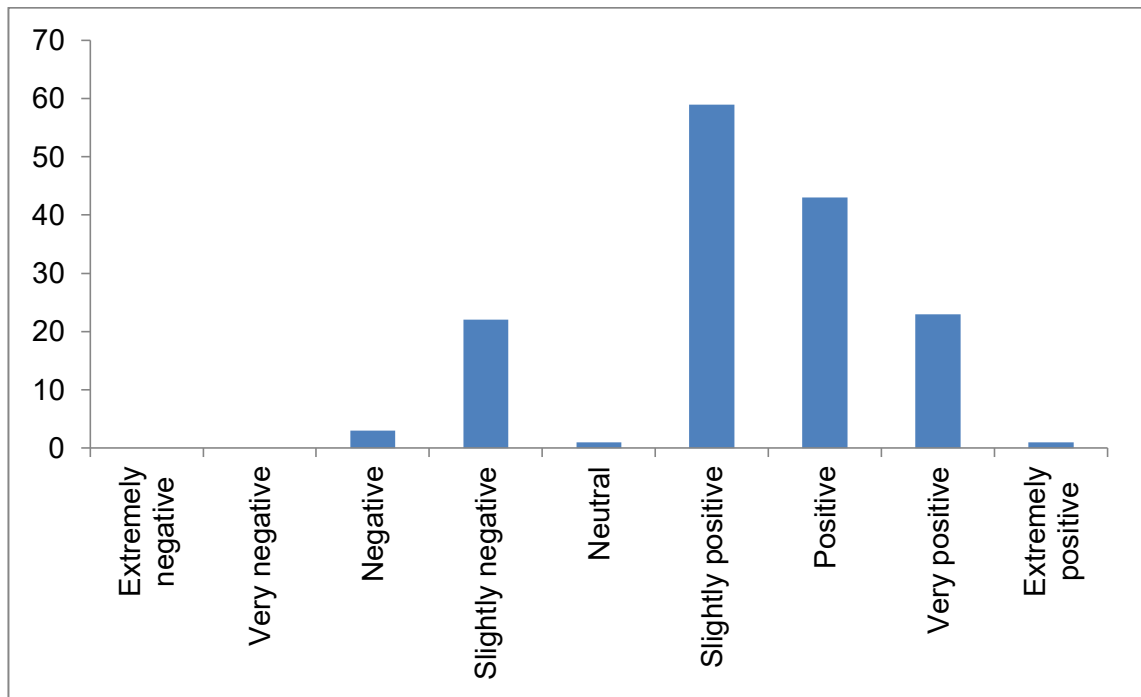


Figure 8.21: Frequency of cumulative impact score categories

8.16. Discussion

8.16.1. Combined impact “*significance*” scores

Table 8.40 summarises all of the significant findings when comparing the combined impact “*significance*” scores (impacts included and impacts omitted) to the various organisational and project characteristics. From 612 statistical comparisons only 60 significant results were identified, suggesting that in most cases organisational and project characteristics play a small role in the overall impact “*significance*” scores.

Comparison of country and all “*significance*” scores provides minimal evidence of difference. The only significant result was in the “Socio-economic” category where the mean rank scores for both Ireland and the UK were higher than that for New Zealand. While this could equate to projects from those countries achieving more positive overall outcomes for projects, the fact that the difference was only seen in one impact category (of nine comparisons) makes this suggestion unlikely.

Comparing the organisation size and “*significance*” scores provides some evidence of difference. The sample shows differences between larger category and smaller category organisations and the “*significance*” scores. However this was not consistently shown across impact categories (only in “Ecological” and “Landscape and visual” category impacts) so the link is not clear. The consistently positive impacts across these categories in relation to organisation size may be because larger organisations are likely to be equipped to deliver larger projects with more wide reaching (and therefore more positive) impacts compared with smaller organisations which cannot achieve the same level of positive impact (but still achieve positive outcomes).

Drawing any conclusions on the links between organisational aims and the impact “*significance*” scores is not straight forward. There were only 13 significant results from 90 comparisons. The general trend is that where a significant result was found the mean rank of scores is higher where an aim is specified compared to occasions when that aim is not specified.

Statistical comparison of many of the characteristics (Employment of paid staff; Employment of volunteers; Provision of project management methods; Provision of staff lists; Provision of trustee / advisory board details, Location; Provision of project staff details) with the “*significance*” scores found minimal significant results.

It might be expected that the provision of such details would suggest a project with a more thorough overall approach to reporting might equate to a greater overall inclusion of project information, including impact assessment. However, this was not the case. All the comparisons provided examples where the mean rank of “*significance*” scores is higher where details of the characteristic were provided compared to when details of characteristic were not provided. Perhaps more importantly, on no occasion when details of the characteristic were not provided did the project score higher. Again while the significant results were not found in every impact category, this suggests that there is a link between the provision of more information, and achieving a higher impact score. In effect organisations that provide greater detail about their organisation achieve more positive outcomes in some cases, when compared to organisations that do not.

Project approaches are also difficult to draw conclusions from. There were 23 significant results from 72 comparisons. There is a general trend that where a significant result was found, the mean rank of scores was higher where a project approach is specified compared to occasions when that approach is not specified. However in some cases, the opposite was found. Specifying an approach resulted in a lower ranked score (found in nine of the 23 cases). For some conservation approaches it can be concluded that use of the approach (of “Legislation”; “Research / Monitoring”) results in a higher combined score for some areas of impacts. However, for “Species Protection” projects the result appears to be a lower combined score.

Considering project timescales provides very few significant results. duration and duration “to date” comparisons provide significant results in the “Ecological” and “Transport” category impacts, with an indication that longer duration projects provide higher impact scores. However, this conclusion is not repeated across most impact categories.

The comparison of expenditure provided no significant results, so no conclusions on impact “*significance*” scores can be drawn.

Comparing the report categories suggests that the longer, more detailed, report categories provide higher “*significance*” scores in the “Ecological” and “Socio-economic” impact categories. However, the majority of impact categories show no significant result. The evidence that a longer report format equates to better (more positive) outcomes is therefore limited.

In summary, for most characteristics and impact categories there were no significant results. Where significant results were identified, there is the suggestion that provision of more information by organisations equates to better outcomes (higher mean impact “significance” scores). However, this finding is not consistently shown across the comparisons, and only exists in a minority of cases.

Table 8.40: Summary of significant results for characteristics and combined impact “significance” scores comparisons

Characteristic	Significant comparisons	Specific difference
Country	Socio-economic	UK score mean rank higher than NZ Ireland score mean rank higher NZ
Size	Ecological	“Large” score mean rank higher “Micro” “Large” score mean rank higher “Small” “Very large” score mean rank higher “Small”
	Landscape	“Large” score mean rank higher “Micro” “Large” score mean rank higher “Small”
Aim		
Habitat protection	No significant result	No significant result
Breeding	Heritage	Score mean rank higher when aim listed
Species protection	Transport	Score mean rank <u>lower</u> when aim listed*
	Air quality and climate	Score mean rank <u>lower</u> when aim listed*
Education	No significant result	No significant result
Legislation	Noise	Score mean rank higher when aim listed
	Soils, geology, geomorphology	Score mean rank higher when aim listed
	Water	Score mean rank higher when aim listed
Alternative livelihoods	Heritage	Score mean rank higher when aim listed
	Ecological	Score mean rank higher when aim listed
Research / Monitoring	Socio-economic	Score mean rank higher when aim listed
Campaigns	Socio-economic	Score mean rank <u>lower</u> when aim listed*
	Noise	Score mean rank higher when aim listed

Table 8.40 Continued:

Funding	Transport	Score mean rank higher when aim listed
	Soils, geology, geomorphology	Score mean rank higher when aim listed
	No significant result	No significant result
Representation	No significant result	No significant result
Paid staff	Ecological	Score mean rank higher when paid staff specified
	Landscape	Score mean rank higher when paid staff specified
	Socio-economic	Score mean rank higher when paid staff specified
Volunteers	Noise	Score mean rank higher when volunteers specified
	Transport	Score mean rank higher when volunteers specified
Project management	Socio-economic	Score mean rank higher when project management method specified
Staff list	Ecological	Score mean rank higher when staff list provided
	Socio-economic	Score mean rank higher when staff list provided
	Landscape	Score mean rank higher when staff list provided
Trustees	Ecological	Score mean rank higher when trustees / advisory board details specified
	Landscape	Score mean rank higher when trustees / advisory board details specified
	Water	Score mean rank higher when trustees / advisory board details specified
Location	Ecological	Score mean rank higher when outside country of organisation
	Socio-economic	Score mean rank higher when outside country of organisation
Approach		
Habitat protection	Landscape and visual	Score mean rank higher when approach used
	Water	Score mean rank higher when approach used
Breeding	Ecological	Score mean rank higher when approach used
	Heritage	Score mean rank higher when approach used
Species protection	Water	Score mean rank <u>lower</u> when approach used*
	Noise	Score mean rank <u>lower</u> when approach used*
	Transport	Score mean rank <u>lower</u> when approach used*
	Air quality and climate	Score mean rank <u>lower</u> when approach used*

Table 8.40 Continued:

Education	Water	Score mean rank <u>lower</u> when approach used*
	Heritage	Score mean rank <u>lower</u> when approach used*
Legislation	Transport	Score mean rank higher when approach used
	Soils, geology, geomorphology	Score mean rank higher when approach used
Alternative livelihoods	Water	Score mean rank higher when approach used
	Ecological	Score mean rank <u>lower</u> when approach used
Research / Monitoring	Socio-economic	Score mean rank higher when approach used
	Noise	Score mean rank <u>lower</u> when approach used*
	Ecological	Score mean rank higher when approach used
Campaigns	Socio-economic	Score mean rank higher when approach used
	Landscape and visual	Score mean rank higher when approach used
	Socio-economic	Score mean rank <u>lower</u> when approach used*
	Noise	Score mean rank higher when approach used
	Transport	Score mean rank higher when approach used
	Soils, geology, geomorphology	Score mean rank higher when approach used
Start year	No significant result	No significant result
End year	No significant result	No significant result
Duration	Ecological	“Ongoing” score mean rank higher than “Less than 1 year”
		“1-5 years” score mean rank higher than “Less than 1 year”
	Transport	No significant difference in pairwise comparison
Duration to date	Ecological	“1-5 years” score mean rank higher than “Less than 1 year”
Project Staff details	Landscape and visual	Score mean rank higher when project staff details specified
Expenditure	No significant result	No significant result
Report format	Ecological	“Multiple” score mean rank higher than “Short” report
	Socio-economic	“Comprehensive” score mean rank higher than “Short” report
	Transport	No significant difference in pairwise comparison

* indicates occasions where characteristic presence equates to a lower mean rank score

8.16.2. Comparison of “*significance*” scores for impacts included in case studies with impacts omitted from case studies

Table 8.41 summarises the significant findings in comparisons between impacts included and impacts omitted from reports. In almost all cases where a significant difference was found (111 cases from 839 comparisons), the “*significance*” ranking was higher for included impacts than for omitted impacts, suggesting an over inclusion of positive / less negative impacts and an over omission of negative / less positive impacts. The reverse was true in only three cases (all within “Heritage” category impacts) (highlighted in Table 8.41). The trend for inclusion of positive impacts largely focussed on four impact categories (“Socio-economic” (27/83 comparisons); “Landscape and visual” (22/83 comparisons); “Water” (22/83 comparisons) and “Noise” (16/83 comparisons). This suggests a trend, in these impact categories at least, of reporting on positive impacts, while negative impacts were omitted from reports.

For country categories, all significant results showed higher ranking for included impacts over omitted impacts. In particular Australia showed this in five of the nine impact categories, suggesting that this pattern of reporting on positives and omitting negatives is prevalent in that country. For the other countries (except Ireland) the same trend was shown, but only in a minority of impact categories was this statistically significant.

Comparing size categories showed significant results in the larger categories (“Medium”, “Large”, “Very Large”), but only for a minority of impact categories. This suggests that the inclusion of positive impacts is more likely in larger organisations, but this link is limited.

Forming conclusions about the link between organisational aims and the significant results in comparisons between included and omitted impact scores is difficult. Significant results were seen in all aim categories except “Funding” and “Representation”. However, for most categories, significant results were only shown in a minority of impact categories. The exceptions to this were “Education” (five from nine significant results) and “Habitat Protection” (four from nine significant results), showing included impacts as more positive than negative. In addition for “Habitat Protection” one impact category, “Heritage” shows the opposite. For these two categories it appears that there is a trend to reporting positive impacts and omitting negative impacts, however the association is only partial.

Again the assessments of many characteristics (Employment of paid staff; Employment of volunteers; Provision of project management methods; Provision of staff lists; Provision of trustee / advisory board details; Provision of project staff details) provide repeated examples of significant difference between the mean ranks of scores for included and omitted impacts. However, in all comparisons significant results were shown both between scores when the characteristic was present and when it was absent. In three cases (Employment of paid staff; Provision of staff lists; Provision of trustee / advisory board details) significant results were shown more frequently when the characteristic was present, while in two comparisons (Provision of project management methods; Provision of project staff details) significant results was shown more frequently when the characteristic was not present. In the cases of “Employment of volunteers” the significant results were shown in the same number of cases when the characteristic was present and when it was absent. This inconsistency makes it impossible to draw any links between the characteristics and the inclusion / omission of positive / negative impacts from reports.

For location, when the project is in the country of the organisation the majority of impact categories show significant results, with included impact rank scores being higher than omitted impact rank scores in five of nine impact categories. This indicates that for most categories for projects at “home” there is a trend to report positives and omit negatives. For impacts outside the country of the organisation only one category shows a significant result. It is this category that is most interesting. The only significant result is shown in the “Socio-economic” category. While for most characteristics this is of limited interest, in this case positive reporting on “Socio-economics” in projects carried out outside the country of the organisations is a logical response to funding priorities that put people and economic development at the centre of conservation activities (see for example The Darwin Initiative guidance on funding for conservation projects in developing countries (UK Government and Darwin Initiative, 2018)). Where organisations are obliged to provide projects that deliver such benefits (and in fact pre-project funding applications must detail the likely successes of a project in order to even secure funding) it is perhaps unsurprising that positive results are over-reported compared to negative results. Even recipients of funding sources which require less clearly defined outcomes are likely to imitate this positivist approach with regard to reporting the outcomes of projects and their effects on people to donors.

Project approaches are also difficult to draw conclusions from. There were 16 significant results from 72 comparisons, found in six of the eight “approach” categories. In all cases

these significant results show included impact mean rank scores as higher than omitted impact rank scores. For “Habitat Protection” approach projects five of nine comparisons were significant, showing included impacts as more positive than negative, while “Species protection” shows significant results in four of nine comparisons. Again drawing conclusions on the role of project approach on the inclusion / omission of positive / negative impacts is not clear, but for these approaches at least it appears that there is a tendency to report on positive impacts at the expense of negative impacts.

Considering project timescales provides very few significant results. Project start year provides four significant results of nine for projects starting in 2010 and later, again reflecting the tendency to report positive impacts. This is echoed by “Ongoing” projects within the end year characteristic assessment. The duration “to date” comparisons provide significant results in all characteristic categories, but with no consistency so linking this characteristic to inclusion/omission of specific impacts is not possible.

Expenditure shows significant results in five of nine impact categories for projects where the expenditure level is not specified, but for none where expenditure information was given, so conclusions on this characteristic cannot be made.

Comparing the report categories suggests that the longer more detailed report categories “Comprehensive” report and “Multiple” report show significant results in two impact categories. No significant results were shown in any of the other report categories. There is the suggestion that the longer reports provide more focus on positive impacts compared to negative impacts, but this is very limited.

In summary for most characteristics and impact categories there were no significant results. Where significant results were identified, there is evidence that impacts that were included in reports were more positive / less negative, compared to impacts that were omitted from reports which were more negative / less positive. However, this finding is not consistently shown across the comparisons, and only exists in a minority of cases. It is most clear in the comparison of countries, where the inferred conclusion is that Australian organisations tend to follow this pattern (which again was not shown in all impact categories).

Table 8.41: Summary of significant results for characteristics and included / omitted impact scores comparisons

Characteristic	Significant impact category	Specific difference
Country		
Australia	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Transport	"Significance" score more positive if impact included
	Air quality and climate	"Significance" score more positive if impact included
	Soils, geology, geomorphology	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Canada	Socio-economic	"Significance" score more positive if impact included
Ireland	No significant result	No significant result
New Zealand	Landscape and visual	"Significance" score more positive if impact included
	Air quality and climate	"Significance" score more positive if impact included
UK	Socio-economic	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
Size		
Micro	No significant result	No significant result
Small	No significant result	No significant result
Medium	Noise	"Significance" score more positive if impact included
Large	Soils, geology, geomorphology	"Significance" score more positive if impact included
	Ecological	"Significance" score more positive if impact included
	Socio-economic	"Significance" score more positive if impact included

Table 8.41 Continued:

Very large	Socio-economic	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
Aim		
Habitat protection	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
	Heritage	"Significance" score more <u>negative</u> if impact included *
	Water	"Significance" score more positive if impact included
Breeding	Landscape and visual	"Significance" score more positive if impact included
Species protection	Socio-economic	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
Education	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Transport	"Significance" score more positive if impact included
Legislation	Landscape and visual	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
	Socio-economic	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Alternative livelihoods	Socio-economic	"Significance" score more positive if impact included
Research / Monitoring	Heritage	"Significance" score more <u>negative</u> if impact included *
	Water	"Significance" score more positive if impact included

Table 8.41 Continued:

Campaigns	Water	"Significance" score more positive if impact included
Funding	No significant result	No significant result
Representation	No significant result	No significant result
Paid staff		
Paid staff used	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Paid staff not used	Landscape and visual	"Significance" score more positive if impact included
Volunteers		
Volunteers used	Socio-economic	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
Volunteers not used	Soils, geology, geomorphology	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Project management		
Method provided	Transport	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
Method not provided	Socio-economic	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Staff list		
List provided	Socio-economic	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included

Table 8.41 Continued:

List not provided	Landscape and visual	"Significance" score more positive if impact included
Trustees		
List provided	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
List not provided	Water	"Significance" score more positive if impact included
Location		
Within country	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
	Heritage	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Outside country	Socio-economic	"Significance" score more positive if impact included
Approach		
Habitat protection	Ecological	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
	Soils, geology, geomorphology	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Breeding	Landscape and visual	"Significance" score more positive if impact included
Species protection	Noise	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
	Soils, geology, geomorphology	"Significance" score more positive if impact included

Table 8.41 Continued:

Education	Water	"Significance" score more positive if impact included
	Socio-economic	"Significance" score more positive if impact included
Legislation	Noise	"Significance" score more positive if impact included
	No significant result	No significant result
Alternative livelihoods	No significant result	No significant result
Research / Monitoring	Noise	"Significance" score more positive if impact included
Campaigns	Air quality and climate	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
	Socio-economic	"Significance" score more positive if impact included
Start year		
Pre-1990	No significant result	No significant result
1990-1999	No significant result	No significant result
2000-2009	Transport	"Significance" score more positive if impact included
2010 and later	Water	"Significance" score more positive if impact included
	Ecological	"Significance" score more positive if impact included
	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
Undated	Water	"Significance" score more positive if impact included
	No significant result	No significant result
End year		
2000-2009	No significant result	No significant result
2010 and later	Landscape and visual	"Significance" score more positive if impact included

Table 8.41 Continued:

Undated	No significant result	No significant result
Ongoing	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Transport	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Duration	No significant result	No significant result
Duration to date		
Less than 1 year	Landscape and visual	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
1-5 years	Socio-economic	"Significance" score more positive if impact included
5-10 years	Socio-economic	"Significance" score more positive if impact included
10 years or more	Noise	"Significance" score more positive if impact included
Not specified	Landscape and visual	"Significance" score more positive if impact included
Project Staff		
Project staff detailed	Ecological	"Significance" score more positive if impact included
	Heritage	"Significance" score more <u>negative</u> if impact included *
	Water	"Significance" score more positive if impact included
Project staff not detailed	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Transport	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included

Table 8.41 Continued:

Expenditure		
<10% GDP PPP	No significant result	No significant result
11-100% GDP PPP	No significant result	No significant result
101-1,000% GDP PPP	No significant result	No significant result
1,001-10,000% GDP PPP	No significant result	No significant result
10,001%+ GDP PPP	Socio-economic	"Significance" score more positive if impact included
Not specified	Socio-economic	"Significance" score more positive if impact included
	Noise	"Significance" score more positive if impact included
	Transport	"Significance" score more positive if impact included
	Landscape and visual	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Report format		
Paragraph	No significant result	No significant result
Short report	No significant result	No significant result
Comprehensive report	Landscape and visual	"Significance" score more positive if impact included
	Water	"Significance" score more positive if impact included
Website	No significant result	No significant result
Multiple reports	Socio-economic	"Significance" score more positive if impact included
	Transport	"Significance" score more positive if impact included
Video	No significant result	No significant result
Academic paper	No significant result	No significant result

* Indicates occasions where "*significance*" scores more negative for impacts included in reports

8.16.3. Cumulative assessment scores

Cumulatively the majority of projects made an overall positive contribution when all impacts were combined. Comparatively few were categorised as having a negative cumulative impact, with no projects classified within the most extreme negative category. This represents a dual opportunity for conservation organisations. On the whole their activities contribute to a wider 'net positive' outcome, in addition to the positive effects on conservation targets. Secondly, while some projects do result in a 'net negative', the fact that this is not at the extreme level of negativity suggests that changes to other areas of impact through mitigation or avoidance should require minimal changes in order to shift such projects to providing a 'net positive' contribution.

9. Discussion and Conclusions

9.1. Summary

This study is the first to assess current practice of impact assessment in non-profit conservation projects. In developing a number of novel methods for classification and review of organisational and project characteristics and impacts, this study also provides a new direction for both academics and practitioners to increase and refine the process of impact assessment in conservation.

9.1.1. Summary of aims

The central aim of this research is to assess current practice of impact assessment in non-profit conservation organisations, in particular to understand:

- The levels of inclusion / omission of impact assessment in reports
- The accuracy of the inclusion / omission of impact assessment from reports
- The significance of those impacts that were included and omitted from reports.

In all cases the aim was to identify possible links between these measures and organisational and project characteristics which could be used to highlight potential trends and consistent factors in the approaches taken by organisations in impact assessment.

9.1.2. Summary of project

Non-profit conservation organisations are under increasing pressure to achieve more with reduced resources. They do this through various distinct approaches to conservation. In many cases these achieve successful outcomes. However, there are also multiple occasions where all conservation approaches demonstrate shortcomings and limitations which may contribute to project failures or limit levels of success.

One cause of these failures might be a lack of assessment of the wider impacts of projects at a planning stage. This study aims to assess whether impact assessment is part of current practice for conservation.

Stage 1

Current practice for environmental impact assessment in conservation projects was examined by first reviewing legislation covering impact assessment practice. Current practice with regard to the level of impact assessment included in reports from randomly selected conservation projects from five Anglophone countries was assessed based on a template drawn from EIA and asking the following questions:

- Do organisations undertake any impact assessment?
- How many impacts are included (where assessments are done)?
- Are specific areas of impact considered differently?

Where these differences were shown they were compared to characteristics of the organisations and the types of projects they are delivering to identify any intrinsic reasons that explain differences in impact assessment.

Stage 2

Following the initial assessment in Stage 1 which showed differences in the practice of impact assessment between organisations and that impacts were frequently not included in projects this section asked two supplementary questions:

- Is the level of non-consideration in Stage 1 evidence of genuine omissions or are impacts omitted simply because they do not exist?

This was tested through a complete review exercise for all projects based on their descriptions and activities to identify likely impacts which could then be compared to the impacts that were referred to in reports. Following this, the next question addressed was:

- Are specific areas of impact omitted incorrectly while others are included?

Again when differences were identified these were compared to characteristics of the organisations and their projects to identify any aspects of the organisation that explain differences in impact assessment.

Stage 3

Stage 2 demonstrated that in many cases impacts were incorrectly omitted (that is they were likely to have happened based on the described activities but were not mentioned in reports). This section asked two final supplementary questions. The first:

- Is there a difference between the “*significance*” of impacts included in reports and the “*significance*” of impacts omitted from reports?

was tested through an exercise which provided each impact with a “*significance*” score based on a series of contributory factors and allowed every likely impact (both those included in reports and those omitted from reports) to be scored objectively. This subsequently allowed the comparison of impacts included in reports with those omitted from reports to identify any differences in “*significance*” between the two.

Secondly this section also asked:

- Do projects in general achieve positive or negative impacts in each area of impact?

This was tested through establishing a combined score for all included and omitted impacts to identify positive or negative trends for each impact category. Again where differences were shown in both questions, comparison was undertaken to identify causes of these differences related to the organisations or the types of projects they are delivering. Finally, an assessment of the overall cumulative effect of each project was provided, to assess whether, considering all areas of impact as equally important whether projects provided a ‘net positive’ or a ‘net negative’ impact

9.1.3. Summary of findings

The majority of comparative assessments within this study have revealed minimal links between organisational and project characteristics and the approaches taken to impact assessment within non-profit conservation project reports.

Stage 1

Inclusion of any impact assessment

Impact assessment was included in 96.1% of projects included. However the relationship between characteristics and inclusion of any impact was very limited.

Comparison of number of impacts

Most frequently projects only considered a single impact (28.9%) or two impacts (23.7%), with an inverse relationship between the number of impacts included and the number of organisations including that number of impacts. The significant relationships between characteristics and the number of impacts included in reports were more frequent. However, in the majority of cases there was no significant link. In most cases where significant links were identified there was evidence that the presence of certain characteristics or the use of certain approaches was linked to a higher number of impacts included in reports.

Inclusion of specific impacts

“Ecological” and “Socio-economic” category impacts were most commonly included in reports. “Transport” and “Noise” category impacts were least commonly included in reports. The relationship between characteristics and the inclusion of specific impact categories was very limited. In most cases where a link was found there was evidence that the presence of a certain characteristic was linked to a higher likelihood of that impact being included in reports.

Stage 2

Level of omissions

Almost half of likely impacts (46.0%) were omitted from reports. “Ecological” category impacts were the least commonly omitted impacts from reports (only omitted from 6.6% of projects where the impact was likely). “Noise” category impacts (omitted from 91.4% of projects where the impact was likely) and “Transport” category impacts (omitted from 88.2% of projects where the impact was likely) were most commonly incorrectly omitted from reports and were least commonly included in reports. The relationship between characteristics and the level of incorrect omission was very limited. In cases where significant differences were found this was only indicative of a general difference and there was no evidence of a specific difference in the levels of incorrect omissions from reports.

Omission of specific impacts

Significant relationships between organisational characteristics and the incorrect omission of specific impacts were found in very few cases. In the majority of these cases the presence of a characteristic was associated with a less frequent omission of that impact category. The majority of significant assessments of incorrect omission related to “Socio-economic” impacts suggesting this impact category was more likely to be associated with certain characteristics than were other impact categories.

Stage 3

Combined impact significance scores

Across the impact categories the majority of impacts were positive in the majority of cases. “Ecological” category impacts were positive in 100% of cases, with most other impacts achieving positive scores in more than 60% of cases. Only “Noise” and “Transport” category impacts were found to be negative in the majority of cases. Comparing characteristics with the combined impact significance scores showed few significant relationships and concluding that any particular characteristics were linked to more or less positive outcomes was not possible.

Comparison of “significance” scores for impacts included with “significance” scores omitted

In most impact categories median scores for impacts included were higher (more positive) than scores for impacts omitted. The only exceptions to this were “Heritage” category impacts which showed the reverse and “Soils, geology, geomorphology” category impacts where median scores were equal.

Comparing characteristics also showed some significant differences, although the majority of comparisons provided no significant results. Notably comparison of country showed Australian organisations tended to include higher scoring impacts more frequently than lower scoring impacts. In the majority of cases where a significant difference was identified, included impacts on average scored higher (more positive) than omitted impacts. This was particularly the case in the “Socio-economic”, “Landscape and visual”, “Noise” and “Water” impact categories.

Cumulative assessment scores

The majority of projects made a cumulative positive contribution when all impacts were combined. A minority were categorised as having a negative cumulative impact, although no projects were found to be within the most extreme negative category.

Overall

There are clear differences in the ways in which organisations treat impact assessment as part of project reporting. Different categories of impacts are included and omitted from reports in differing frequencies but links to specific facets of the organisations or their activities are limited.

9.2. Discussion

This study reveals the level of inconsistency with which impact assessment is applied in conservation projects. While significant differences between organisational and project characteristics are limited, this inconsistency of application is striking. The difference between organisations providing minimal impact assessment and those providing comprehensive assessments cannot be attributed consistently to any features, which therefore suggests that there is a more universal attitude to this process. However the high level of impact assessment within some reports demonstrates that a number of organisations have already recognised the value of this approach. This also indicates that for others there are other issues such as lack of expertise or awareness that could result in the differences in approach. In this section some of the probable causes of these differences are explored, and a method of improving the process is put forward.

9.2.1. Positive project publication bias

The most striking element of this study is the frequency with which negative impacts (or less positive) impacts were omitted from reports. While there was no significant difference in the majority of comparisons undertaken, there is a general trend that impacts reported on were more positive / less negative than those that were omitted from reports.

This trend appears to imitate trends seen in other reviews of conservation activity. For example a review of studies published in the journal *Conservation Evidence* showed that papers published (largely by practitioners) related to successful interventions in the majority of cases (69%) (Spooner, Smith and Sutherland, 2015). In spite of calls for wider publishing of negative results (see for example Hobbs (2009) it appears that a preference for positive results is the norm in conservation. This focus on the publication of positive outcomes is a recurring theme in conservation and in wider academia. This bias was coined as the “file drawer problem” (Rosenthal, 1979) by which negative results remain, unpublished, in the drawer of researchers.

If this is the situation in conservation specifically and in academia generally then there can be no expectation that direct reporting would be any different. As the expectation in these fields is on publishing positive results and outcomes then it is very unlikely that in reviews of projects, negative impacts (which may only be a small part of the overall project) would be considered. For practitioners within non-profit organisations the difference is even

clearer. There is no obligation for them to publish problems or negatives, only to report on the general outcomes and achievements compared to predefined goals, so including information on sub-elements of projects is even less likely.

9.2.2. Relevance

For any issue based organisation the main area of expertise and the main areas of reporting are likely to centre on that issue. Organisations are likely to consider issues that are important to them as most worthy of inclusion while issues of secondary importance are likely to be relegated to a secondary position. This study reflects that idea. Ecological impacts are considered and reported consistently, while unsurprisingly, other areas of impact are omitted (to greater and lesser extents).

The difficulty associated with this approach is that practitioners need to realise that their perspective on the conservation issue (i.e. the aim of trying to provide a solution to a conservation problem) may not be shared by other stakeholders. In many cases a conservation priority does not align with the priorities of other external observers who place their focus on other issues. Frequently in the reports reviewed during this study the inclusion of ecological outcomes was not related to a detrimental effect on other elements but in some cases they were. Success in conservation can be defined not just in terms of absolute increases in populations or in additional areas of protection, but by effectively addressing the conflicts and pressures that create the conservation need in the first place, including conflicts between stakeholders (Gruber et al., 2018; Hill, 2015; Madden and McQuinn, 2014). If alternative impacts are not considered, even when a non-conservation outcome is positive, then the omission of any discussion of these alternative impacts serves to undermine the position of the organisation. External observers can take the position that their own interests have been neglected or are subordinate to the ecological priorities. While conservationists must make difficult choices, and “drive action which is contrary to some interests” (Black, Groombridge and Jones, 2013), emerging approaches to stakeholder analysis and engagement have, in recent years, started to address this issue (Brooks, Waylen and Mulder, 2013; Reed, 2008). However as this assessment showed many organisations are very small and for this group at least it is likely that stakeholder analysis is either too difficult to achieve with limited resources or simply not deemed a requirement.

A better process would be to include all impacts at a planning stage providing both the opportunity for mitigation and/or avoidance at an early stage, or at minimum providing an impartial assessment of the cumulative impacts of the proposal which can be shared with wider stakeholders, thus enhancing transparency and avoiding these conflicts with stakeholders with differing priorities. Such an approach would complement stakeholder analysis processes already recommended in management approaches.

9.2.3. Funding requirements and public perception

The competitive funding environment for non-profit organisations partially explains the reluctance to publish negative (less positive) outcomes. Organisations are under great pressure to demonstrate success across all aspects of their activities and in many cases funding streams are linked to this success. Conservation organisations exist within a constrained funding landscape, whether for small and local or large and international organisations. For all organisations the availability of funding is the key to both the delivery of their project aims, and to their continued existence as an organisation. Without access to project and core funding, organisations cannot exist.

Moves by institutional funders to ensure that money is spent efficiently (demonstrating value for money) and transparency in pursuit of clearly defined goals are undoubtedly well-intentioned and generally improve the overall practice of conservation. Could it be however, that funders' expectations have shifted to an unrealistic perspective whereby they are only interested in positive outcomes? If this is the case then it is likely that organisations are dis-incentivised to publish any project information or outcome that is contrary to this or even outcomes that do not align exactly with the aims set out in project proposals. In the case of direct reporting of project outcomes it may be that this does not accurately reflect all organisations' activities and that private reports detail more negative outcomes than are included in published reports. However in an age of instant access to information it seems unlikely that a funder would provide project funding simply on the basis of an application without reviewing information on the wider applicant through their website. This places an even greater requirement on non-profit organisations to control the narrative they present as it represents not only a responsibility to maintain existing funding streams but also a route to future income.

For individuals providing funding directly to conservation organisations (with the exception of very large donors) published information is likely to be the initial source of information

on projects and outcomes that can be used to make investment decisions. While the amount of funding from these sources varies, it can make up a substantial part of an organisation's total income. For example, WWF UK received 73.6% of its annual total funding from individuals in 2016/17 (in the form of memberships, individual donations and legacies) equating to around £52 million (WWF-UK, 2017). Although there has been minimal research on conservation fundraising (Veríssimo et al., 2018), Karlan and Wood (2014) showed that in another NFP context (funding for micro-finance initiatives) inclusion of impacts from an organisation's activities resulted in an increase in the likelihood that recent large donors will donate (while small donors become less likely to donate). It is clear therefore that for continued contributions from these donors then messages must be targeted, and it is even more important that positive outcomes are shown to those who appreciate this. Therefore, conversely the risk of including negative outcomes must become highly sensitive. Many of these donors will make their decisions on the basis of brief reviews of websites or promotional materials and are unlikely to be interested in the minutiae of project outcomes. Without the capacity to provide advisory guidance on the causes or institutional learning gained from any negative impacts or outcomes to such funders then the risk of "turning off" both existing and potential individual donors is heightened.

9.2.4. Shared learning

The publication of any output from a conservation project represents not only an opportunity for the organisation delivering the project to provide details of their own activities, but also an opportunity for other organisations working in similar fields to learn from that project. Publishing reports on projects and outcomes represents an opportunity for collaboration and developing improved evidence based practice. This case has been made strongly by groups such as Conservation Evidence (Conservation Evidence, 2018). These attempts focus on developing enhanced ecological responses to conservation. However there is also an argument that all elements of project delivery, from project management, to the transition to "business-as-usual" can also provide opportunities for shared learning. This includes the wider assessments of impacts. Providing more comprehensive details of project activities, including the positive and negative impacts in a wider range of impact categories would also provide a resource upon which other conservation practitioners could base successful projects. This would also avoid the issues associated with negative impacts.

The complication with this approach is that conservation organisations, as all non-profit organisations are essentially in competition with each other (Bennett, 2003). This raises an important question. Does publicly providing information on successful and unsuccessful approaches to delivering projects give “competitors” an advantage which results in them being more able to secure funds? In an ideal world providing an organisation with the same aims as your own with the tools needed to address a shared problem or concern would be logical. However when funding sources are increasingly limited it must be questioned whether many non-profit organisations would choose to provide information that helps their competitors.

9.2.5. Omission of positive impacts

There are a high percentage of positive impacts across the impact categories which are not being presented in reports, and cumulatively the majority of projects achieve a ‘net positive’ impact. Again this represents a missed opportunity for conservation organisations. By what appears, in many cases, to be the unconsidered omissions of most impacts (aside from the ecological), the chance for conservation focussed organisations to demonstrate a positive effect on wider issues is frequently missed. Demonstrating that conservation projects can contribute to positive outcomes in other areas would be a useful tool in eliciting wider support from stakeholders without an interest in the conservation priorities. Instead however, the general approach to avoiding the full disclosure of impacts actually serves to hide positive impacts in many cases.

9.2.6. Voluntary or regulated impact assessment

Currently any responsibility for impact assessment as part of non-profit conservation projects (within the countries included in this study at least) lies with the practitioners. There is no legal basis requiring impact assessment and no evidence of alliances or representative groups that are furthering this agenda (see Sections 3 and 4).

For those organisations that are exemplary in their impact assessment activities there are no consistent characteristics that either compel or predict the standard of assessment. Conceivably the projects where a comprehensive approach to impact assessment was demonstrated are driven by the staff within the organisations, where the value of the approach is understood and appreciated by managers and senior staff and so is applied. Equally it could be that comprehensive impact assessment is a response to previous

issues, or even failed projects. Understanding the drivers of current best practice is outside the scope of this study but is likely to form a central part of any future work around this topic.

In an ideal scenario the positive implications of impact assessment (the ability to identify problems before they occur, to refine and improve positive outcomes, to impartially quantify impacts) would inspire the majority of conservation practitioners to take such steps voluntarily. However, given the other issues discussed, in particular the challenging funding landscape and the competitive nature of the non-profit world, for many organisations there is likely to be resistance to a process that potentially highlights negative aspects to what are generally perceived as positive activities.

The alternative is that such a process should become mandatory and form part of reporting for national charity regulators in the same way that annual accounts are provided. While this approach would doubtlessly increase the quantity of impact assessments undertaken, the level to which it would improve the quality of such assessments is debateable. By making reporting mandatory there is the risk of making it a “tick box” exercise that would apply to all charitable organisations. In doing so this would create additional resource drain, without supporting an increased understanding of the value of assessing and mitigating negative impacts from positive activities.

Perhaps the best opportunity would be for such a process to become part of the project management approaches discussed in Section 3. Such a shift would provide practitioners with the confidence to undertake such activities and provide a semi-formalised process by which they to achieve this.

9.2.7. Impact assessment as part of project design

If impact assessment is to provide a useful contribution to improving the outcomes of conservation activities, then it is important to consider the stage of project management at which this would occur. For many projects there is evidence of monitoring and evaluation, and reflection on successes post-project. However if impact assessment is to become a part of conservation it needs to be applied during project design stages. By undertaking robust assessments of the likely effects of planned activities across a range of potential receptors at the point of project design then alterations and amendments can be made that allow negative impacts to be avoided or reduced, and even for positive impacts to be

enhanced. Undertaking impact assessment at this stage also provides benefits for later stages of project management. By creating a set of pre-assessed impacts at the outset of a project, monitoring efforts can be based on informed criteria and deviations from this can be easily identified (and where necessary remedied) in simple process. Similarly at the point of project reporting, an early stage impact assessment provides a detailed framework against which achievements and failures can be measured. This in turn would facilitate the iterative process that should feed into future projects, enabling the identification of impacts that had not been previously considered and highlighting successful amendments and mitigation efforts that had been put in place at the start of projects.

9.3. Recommendations and Tool Development

The overriding recommendation from this study is for non-profit organisations to increase the level of impact assessment included within project reports. Currently there is little evidence that guidance or systems are in place within the major conservation project management approaches that would support such a course of action. Therefore included within this thesis is a prototype version of a simple tool designed to allow organisations to record and assess the impacts from their proposed projects. This section outlines the caveats and requirements for the development of the tool, based on the findings of this study. A full worked demonstration of the tool is included in Appendix 1 and Appendix 2.

9.3.1. Impact Recording / Assessment Tool

Across this study the consistent finding is that impacts of most types, positive and negative, are frequently omitted from project reports. In order to address this gap, this project concludes with the provision of a tool to quickly capture details of impacts and provide an assessment of the significance of such impacts, both individually and cumulatively, allowing practitioners to record and report on such impacts, and encourage mitigation of negative impacts. The considerations and steps required for the development of such a tool are described in this section. A working prototype of a tool is included as an electronic appendix to this thesis, and complete instructions for the tool are included in Appendix 1 and a worked example of a project is included in Appendix 2.

The limited number of significant findings across all organisational and project characteristic comparisons for the inclusion of impacts, the omission of impacts and the overall “*significance*” scores for impacts all suggest that, while there are still a notable number of impacts that are not correctly recorded and/or reported, this process is infrequently linked to any identifiable characteristic. In the development of a recording and assessment tool, this provides a useful starting point, in that it is clear that the impacts generated through non-profit conservation organisations’ activities are universal. This allows the creation of a tool that can be used by any organisation, regardless of the characteristics of that organisation, or of its projects.

A central aim of the tool is to act as an *aide-memoire*, a methodology by which practitioners can be encouraged to consider the effects of their proposed projects. This

forms part of wider project management, by supporting a systematic approach to project planning. In order to identify project impacts, users are compelled to consider the processes and stages of their own projects from beginning to end. Although the tool could be used at later stages of projects, ideally usage of the tool needs to be at an early stage of project design, allowing issues to be addressed before commitments have been made. A central element of the usage of such an approach is to avoid risks that threaten to undermine the positive impacts of projects, or ultimately disrupt the project in its entirety.

9.3.2. Criteria for tool

This study and the methodologies developed within it provide a number of key criteria which can be implemented within the creation of an impact recording / assessment tool.

Simple to access / low cost

The range of sizes of organisation and the varying activities that they undertake suggests that any systematic approach to assessing impacts from conservation actions needs to be low cost and accessible. For this study any organisation spending under 100 currency units was removed from analysis as their overall impact was considered to be so low that assessment was impossible. However, even within the remaining case studies there are many organisations with low levels of spending, likely equating to limited staff availability and capacity for tasks that are considered “additional” to the main organisational activities.

This low level of declared expenditure for so many organisations combined with the difficult funding situation suggests that any approach needs to be easily accessible, and ideally at low- or no-cost. This therefore supports the idea that a tool needs to be provided on a platform that is accessible to all. While paper based tools (provided for example in PDF format) would answer the majority of this requirement, the need to include some comparative element of scoring means that in terms of providing a robust approach to assessing the overall impact level some form of interactivity and calculation is required. These caveats therefore led to the decision to provide the tool within a commonly accessible spreadsheet format (Microsoft Excel, with the capacity for use in Open Source programs such as Open Office or with cloud-based systems such as Google Sheets). The tool can therefore be accessed by a wide range of users, and downloaded for use offline in situations where a reliable internet connection is not available. By creating the tool in a simple to access and low cost format this also allows easier sharing of the outcomes, either across teams within the same organisation, or potentially with other organisations to

facilitate shared learning (see 9.2.4), and improve outcomes in the wider field of conservation.

Simple to use

Due to the range of users and the associated time and resource limitations for non-profit organisations, any approach to recording and assessing impacts needs to be intuitive and simple to use. This was supported with the provision of a simple to use interface, with clear guidance (both within the tool itself) and included within accompanying materials. The focus on simplicity of use also allows practitioners to spend more time considering the impacts and implications of their projects, rather than spending time on recording.

Prescriptive impacts

One approach to simplifying the use of a tool is to provide a limited set of impact types, which in turn would allow a series of predefined potential advisory information to be given to the user by means of mitigation approaches. However the study suggests a very wide range of impacts are possible even from the comparatively small number of projects reviewed. The risk of providing a predefined set of impacts and responses is that it would make the approach too prescriptive. Capturing every eventuality is likely to be impossible and trying to do so would make the approach unusable for many scenarios. In reality it is the practitioners themselves who have the best understanding of local contexts and of avenues for mitigation. The aim of the tool should be to facilitate decision making, by capturing data and providing it in a standardised format (a score) which can be set against other impacts which appear incongruous. The aim is not to replace the need for practitioners to make their own decisions regarding mitigation but rather to highlight where mitigation is likely to be necessary. The inclusion of a worked example of the usage of the tool provides a useful starting point for the processes and considerations that a project might encounter, but the blank format allows usage as required.

Based on the impact criteria identified in the methodology used here

The criteria for assessment used within this study included recording details of:

- Positive or negative status
- Likelihood
- Duration
- Spatial extent
- Severity.

All these criteria are likely to be required to provide an accurate approach to quantifying impact “significance” and form the main criteria within this tool. These criteria would allow users to adopt a similar methodology and require no prior knowledge of impact assessment methods.

Allow multiple assessments within a single document

Across the project reviews it is clear that projects can have multiple impacts, both across impact categories and within individual impact categories (for example a project may affect multiple species in different ways). This provides the need for a tool to include multiple activities within a single impact category, and be able to provide a cumulative score for all impacts within that impact category.

Highlight both negatives AND positives

As highlighted, many of the impacts of conservation focussed projects are positive even for impact categories that are considered secondary, yet these are often omitted (see section 9.2.5). However, there is also evidence of a positive bias in publication, which this tool aims to address (see section 9.2.1). This represents an opportunity for organisations to highlight positive non-core activities which appear to be frequently omitted. The tool therefore is designed to flag both positive elements and negative elements. This allows the positive impact information to be shared with staff, colleagues or stakeholders who have not been involved in the initial review or assessment to communicate the positives. Similarly negative impacts are also flagged allowing the identification of specialist help to provide input to mitigation / improvement in areas which can be altered.

Baseline comparison for improvements / mitigation to projects

The aim of any impact assessment is to identify and where possible mitigate (in the case of negative impacts) or improve (in the case of positive impacts) the likely outcomes of proposed activities. To identify accurately approaches to amending impacts there is a clear need to provide a “before” and “after” summary of impacts allowing the user to record the evolution of the project approach. The tool therefore provides a dual approach. The initial assessment provides a baseline of the project impacts at the point of project conception with no consideration of impacts. The secondary assessment shows the situation at the point of review / delivery which allows recording and, where appropriate, communication of the altered project plan highlighting project activities where mitigation and improvement activities have altered the impact “scores”. These are set against the

original impacts and their scores to highlight areas of improvement (and potentially of deterioration or consistency).

Provide a combined score for all “cumulative” impact assessment

To provide an overall assessment of the validity of a project, the impact assessments for all categories need to be combined. This allows users to gain an overview of whether the project provides a cumulative “net” positive or negative impact. This tool therefore provides a cumulative assessment of all identified impacts (shown as a cumulative percentage of the total possible score for impacts) as a proxy for this “net” impact. While this approach cannot replace the requirement to assess whether a negative impact in one area is considered to be more or less important than a positive impact in another area, this approach allows the user to compare all impacts for the complete project, by comparing the standardised scores. This also allows the user to make a final decision on the appropriateness of methods used. If the cumulative impact of a project cannot be made positive through amendments and alterations then a decision might be made not to go ahead.

Weighting

As during the assessment undertaken within this study, the assessment should be undertaken with all elements of assessment equally weighted, meaning that no element of the project or its impacts are more or less important than any other element. It is clear that for any organisation undertaking conservation work their key aims and objectives are likely, at least in the perception of their own staff and supporters, to be considered as more important than secondary or indirect outcomes, and it is likely that potential users of a tool would expect it to weight their own priorities to reflect this.

However, at least part of the role of impact assessment is to put the delivery organisation (in this case non-profit conservation organisations) in a position where they are able to demonstrate an impartial assessment of the activities proposed. This plays a dual function. Firstly, it allows a truer reflection of the impacts on one area compared to another area, allowing the balancing of project impacts (and a more appropriate response to any alterations required to achieve such a balance). A weighted system runs the risk that conservation organisations add too much weight to their ecological / conservation positives which in turn removes the need to mitigate any negatives in other areas of impact. Secondly, and perhaps more importantly, it allows the delivery organisation to respond to criticism from third-parties who hold differing priorities. By ensuring that

impacts are considered consistently, using identical assessment criteria and the same weighting this ensures that any use of the tool maintains impartiality and avoids the risk of overly prioritising their own objectives to the detriment of other areas, which in turn leads to potential criticism and/or opposition to planned activities from those with differing priorities.

9.4. Study limitations

9.4.1. Study size

The initial scope of the study was to include 250 case study reports from individual organisations, drawn from five countries and five size categories. In practice however the final number of available organisations was 208. Including a higher number of case studies might have provided more significant results. However the labour intensive process of the review processes and modelling activities mean that such an undertaking would not have been possible within the constraints of this study.

9.4.2. Language of reports

The limited availability of time and the likely additional costs / capability requirements also meant that this study was limited to comparison of projects taken from Anglophone countries. Ideally a wider study would include organisations and their projects taken from a range of languages. Again however, the time / labour intensive processes used meant that attempting to translate and review projects in other languages was not possible. The risk of mistranslations and mistakes using translation software could have altered the findings dramatically, and the limitations of such packages would still have resulted in only a small proportion of languages being included.

9.4.3. Economic status of countries included

The countries from which the organisations included within the study were drawn are all similar in terms of development and GDP (GDP PPP). A more comprehensive picture of current practice could be drawn through the inclusion of organisations drawn from different economic strata. However in many cases this would also encounter issues of language so would require additional specialist language skills. Similarly an initial exploration of conservation organisations in India and South Africa undertaken at the proposal stage of this study revealed a lack of viable central information repository from which to build a selection process for case studies (as seen in the USA).

9.4.4. Omission of the USA

When considering Anglophone countries the omission of the USA is notable. However without provision of a viable, reliable database collection of a comprehensive list of conservation organisations is difficult and any study based on simple searches could not

be considered reliable. An independent survey on a state-by-state basis could provide a more reliable source of information but again was not a viable option within a study of this size.

9.4.5. Methodological limitations

This study is based on published information. By definition this includes only the information an organisation chooses to make public. It could be argued that many organisations undertake far more rigorous impact assessment within their own project planning activities (although the review of conservation management approaches suggests this area is not central to most methodologies). A review of only internal documentation may have yielded very different results. However the use of published documentation in this study relates to important factors regarding process within conservation organisations, including issues of funding, shared learning and best practice discussed in Section 9.2 so the decision to focus on only published information is justified. The use of published information, rather than requesting access directly from organisations either through surveys or interviews facilitated the international element of the study. It also allowed the inclusion of a range of sizes of organisations. Requests for information from small (“Micro”) organisations would have added an unnecessary time burden to resource limited organisations, and the likely result would have been that such organisations would have been unrepresented in responses to requests for information. Using published information allowed a larger and arguably more representative study to be undertaken than other approaches would have achieved.

Bespoke “likelihood” and “significance” modelling methods were developed specifically for this study. Both methods are based on existing practice and information as available. However, this is the first attempt to undertake such a comparative study so future studies could refine the methods used to model, including additional or alternative factors to provide more detailed comparisons and scores.

Of particular note is the method of assessment of “likelihood”. The method of assessment of which impacts were likely is by nature based on the information included within published documents. While there is no evidence that the information in any of the case studies included was incorrect, deficient or incomplete, cases where such problems did exist would skew any assessment of impacts based on this. A future project might take a different approach to establishing details of a project (for example through site visits or

direct discussions with organisations). Again this approach was not used here due to the limited timescales.

Similarly the review and assessment of impacts was based on the project information provided. While efforts were made to ensure that this was consistent, reviewing multiple projects is problematic and discrepancies are not completely avoidable. A potential approach to clarify this issue would have been to implement sensitivity testing within the statistical analyses. By artificially altering results in randomly selected case studies (for example moving them from one point within a measure of impact to another (for example moving a project from “Possible” to “Probable” in terms of likelihood) would have enabled the identification of instances where differences in review would have resulted in alternative statistically significant (or insignificant) results. The format of data collection and subsequent analysis meant that this was not possible, but a repetition of the study would aim to include this.

The EIA approach to assessment provides a logical starting point, and a defined set of criteria for assessment of current practice. The existence of conservation projects in the real world with direct and indirect impacts makes the use of such a systematic and defined approach appropriate. However, alternative approaches relating more specifically to a conservation context could theoretically be defined. It should however be noted that while the system of review used here was based on EIA, the methodology for review was deliberately not prescriptive. If an impact was included in reporting which related to EIA themes then it was included within the review, rather than being omitted for such technical reasons.

9.4.6. Replicating reviews of projects

While efforts were made during the study to ensure that consistency of review was achieved (through for example the clear protocol and criteria for assessment that were developed in Chapters 7 and 8), a more objective assessment could possibly have been achieved through use of a wider college of assessors to deliver a multi-reporter assessment of projects. While this was not possible given the time and financial constraints of this study, there are several potential benefits that this theoretical approach would provide. In particular this could have allowed both a greater consistency of assessment through collection of multiple assessments of the same activity. This would have allowed an average score from multiple reviewers to be established, potentially

providing a more impartial assessment. Ideally this would be through a minimum of three reviews for each project. Re-examination of the reports in this way would increase the reliability of the relationships identified in the results of Chapters 6, 7 and 8.

While positive in terms of outcomes, this would be restrictive in terms of delivery. In order to fully replicate the study undertaken here, more than 600 reviews would need to be undertaken. While a representative sample of repeat assessments could be undertaken in order to establish the level of consistency and replicability, this would not permit the average scoring process. Extending the number of reviews would also add additional factors to the study, including the requirement for additional time and collection of 'reports' from reviewers, and the requirement to collate scores. Additionally the need to develop a wider college of assessors for review and to provide a training and instruction process for reviewers may have resulted in further delays. Using the standard methodology developed for the tool (see section 9.3) such an assessment would require minimal additional training, although reviewers would need to have a broad understanding of conservation activities in order to identify relevant aspects. This would also equate to a process that many smaller organisations would not be able to replicate due to limited staff availability and time.

9.5. Directions for further research

This study provides a starting point on the inclusion and omission of impacts from project reporting. However, it can only highlight notable differences between the inclusion and omission of positive and negative impacts, but not evaluate the longer term implications on project success of the differing approaches.

Developing a secondary longitudinal study would be highly beneficial and could develop a wider understanding of the value of impact assessment in conservation management. This would involve examining and classifying projects at their start, followed by an evaluation of the levels and types of impacts assessed and omitted from internal project planning and from published project reports. Finally, a review of subsequent outcomes and successes / failures would establish links between impact assessment and successful project delivery. Utilising a multiple-reviewer approach as discussed in 9.4.6 would further enhance a future review, potentially increasing the reliability of any significant relationships identified.

The difficulty of such an approach is that it is likely to be subject to the same limitations seen within this project; that information that is in the public domain may be incomplete or unrepresentative and that access to sensitive internal documentation is considered impossible or alternatively adds a resource burden to small organisations.

Impact assessment represents a major opportunity for those organisations that support conservation. The review here showed minimal application of project impact assessment within management systems, but equally there was little evidence of impact assessment as part of wider management of programmes, which bring together projects to deliver wider strategic objectives. This broader approach to impact assessment represents a further opportunity for conservation and could build on methodology developed in SEA (Strategic Environmental Assessment). By taking an overview of potential changes arising from a complete programme of activities then the assessment of the specific impacts from each individual project could be contextualised. Decisions could be made based on the levels of acceptable impacts set for programmes, and the combination of projects would be subject to the cumulative impact agreed. This would in turn inform the activities that may be undertaken as part of individual projects.

Again assessing the value of this would be complex, and would involve a longitudinal study with input to projects across a range of activities. Any researcher undertaking this activity would need to be embedded for an extended period, within a conservation organisation undertaking a significant programme of activities and would make replication of the assessment with further organisations demanding in terms of resource requirements.

10. References

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Appendix 1: Conservation Project Impact Assessment Tool

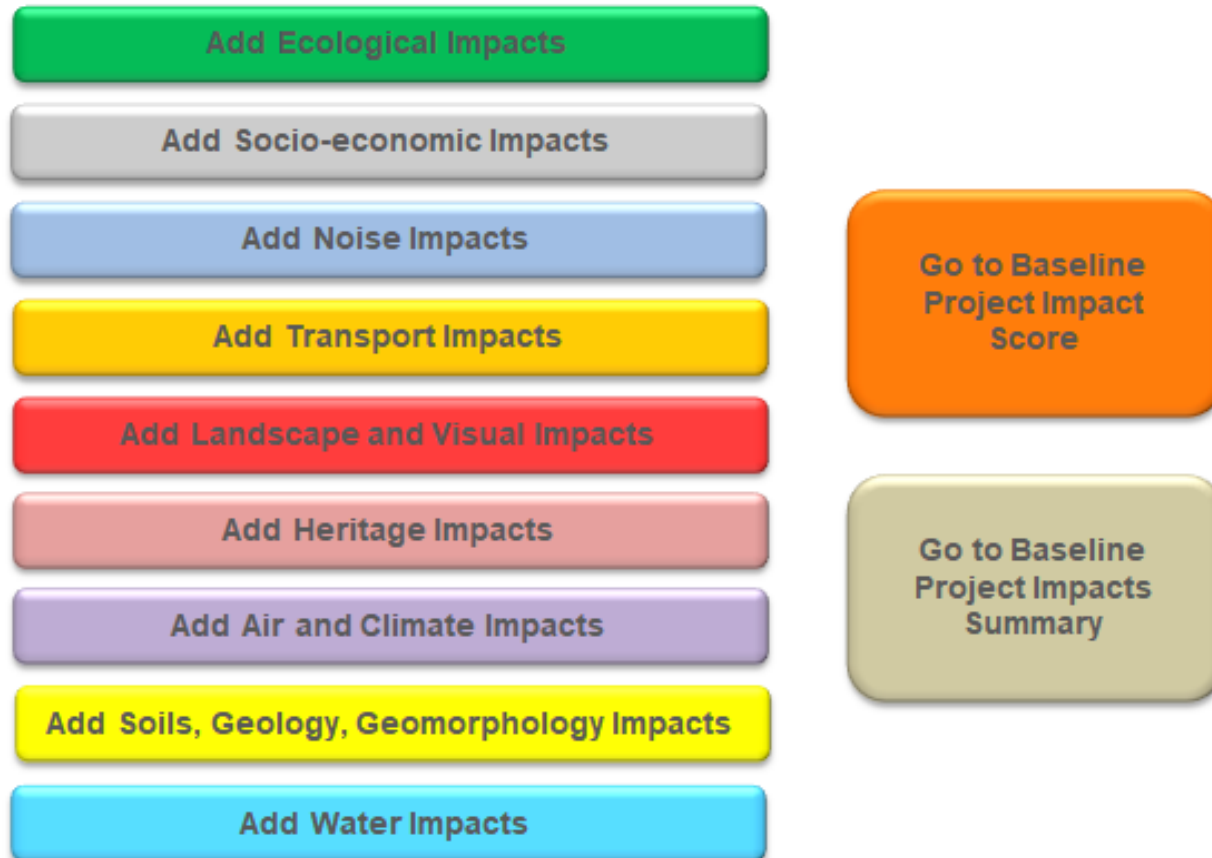
Instructions for users

This tool is designed to allow the rapid assessment of the impacts of proposed conservation projects. The tool provides a score for each area of impact and a combined score for the overall project. By entering details of a proposed project it is possible to compare options for projects, to highlight areas for improvement or mitigation. The process requires you to consider each aspect of your project. For complex projects it is likely that you will be required to enter details of multiple impacts within each impact category, while for simple projects there may be comparatively few impacts in only one or two impact categories.

Starting

Open the Excel Workbook *Project Impact Assessment Tool - Combined Baseline and Update Final.xls* The Workbook will open at the Start tab.

Project Planning / Baseline



Start Tab

At this point you can save the file as a new document with details of our own project.

From this page, you can add details of each area of impact; view a summary of your baseline project impacts; and update impacts to reflect changes or mitigation.

Navigation

The Tool can be navigated as a normal Excel sheet, by clicking on the appropriate tab at the bottom of the screen.



Standard Excel tabs

However each tab also includes quick link buttons allowing you to navigate from page to page without the need to return to the home page. Simply click on the button to go to that page.



Quick link buttons

Baseline Project Impact Score Tab

When you start, this tab will be blank. As you add impacts this tab will automatically calculate a combined impact score for your project, providing details of the combined impacts in each impact category. Navigate to the individual impacts using the buttons adjacent to each impact area.

The bottom section of the tab provides an overall score for your project, taking into account all the impact categories and the individual impacts within those categories. Combined project scores are coloured green, negative impact scores are coloured red and neutral impact scores are coloured yellow.

Return to Start Page
Go to Baseline Project Impacts Summary

Cumulative Ecological Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Socio-economic Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Noise Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Transport Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Landscape and Visual Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Heritage Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Air and Climate Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Soils, Geology, Geomorphology Impact Percentage Score	No impact recorded	Go to Impacts
Cumulative Water Impact Percentage Score	No impact recorded	Go to Impacts

Combined Project Impact Cumulative Percentage Score **No impacts added**

START
Comparison
Baseline Project Impact Score
Baseline Project Impact Summary
Ecological
SocioEconomic
Noise
Transport
Landscape and visual
Heritage

The Project Impact Score Tab

Baseline Project Impact Summary Tab

This tab summarises each of the impacts, by category, that you have entered into the impacts tabs. The sections are colour coded to match the impacts tab. Each is provided with an impact score and a percentage score. Positive impact scores are coloured green, negative impact scores are coloured red and neutral impact scores are coloured yellow.

You will also see a cumulative score for that impact at the bottom of each section. Again combined positive scores are coloured green, negative impact scores are coloured red and neutral impact scores are coloured yellow.

Return to Start Page

Go to Baseline Project Impact Score

Baseline Ecological Impacts	Impact score	Percentage Score
Cumulative Ecological Impact Score	0	0

Go to Impacts

START

Comparison

Baseline Project Impact Score

Baseline Project Impact Summary

Ecological

SocioEconomic

Noise

Transport

Landscape and visual

Heritage

Baseline Impacts Summary Tab

Impact Tabs

There are nine baseline impact tabs reflecting the nine categories of impact you can add to the project summary. These are *Ecological; Socio-economic; Noise; Transport; Heritage; Air quality and climate; Soils, geology, geomorphology; Water.*

Entering your impacts

For each impact it is advisable to enter brief details of the impact for your own reference. This will be displayed in the Baseline Impacts Summary Tab. For each impact you will be required to consider five aspects of the impact: The options that you can select for each aspect are shown below.

Once you have entered details of an impact you can either add another impact in that category by clicking on the option or move to a new impact by selecting that tab or clicking the “Add next impact” at the top right of the screen.

Return to Start Page
Go to Baseline Project Impact Score
Go to Baseline Project Impacts Summary
Add Next Impact

Ecological Impacts
View Updated Ecological Impact

Ecological Impacts	Activity - Provide details of the proposed activity	Add text:	
	Receptor - Who / what is being affected?	Add text:	
	Impact - What change is happening to the receptor?	Add text:	
	Positive or negative - Is the change positive or negative?	Select an option	
	Likelihood - How likely is the change to happen?	Select an option	
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	
	Scale of the impact - How severe is the impact?	Select an option	
Longevity of the impact - How long will the impact last?	Select an option		

START
Comparison
Baseline Project Impact Score
Baseline Project Impact Summary
Ecological
SocioEconomic
Noise
Transport
Landscape and visual
Herita

Impact Tab

Impact Aspects

Aspect	Options	Details
Details of impact and receptor(s)	Text fields	Information contributing to other criteria.
Status of impact	Positive	A positive impact on the receptor(s).
	Negative	A negative impact on the receptor(s).
Likelihood of impact	Possible	An impact that may result from described activities.
	Probable	An impact that is the likely result of described activities without mitigation or avoidance methods.
	Definite	An impact that is unavoidable or that has already happened due to described activities.
Spatial extent of impact	Vicinity	An impact with no effect beyond the immediate project activities.
	Local	An implication with local implications
	Regional	An impact with regional implications
	National	An impact with national implications
Severity of impact	International	An impact with international implications
	Minimal	An impact creating a minimal change.
	Moderate	An impact creating a moderate change.
	Severe	An impact creating a severe change.
Longevity of the impact	Short term	Impacts during project set up phases / one-off impacts associated with a single activity/event.
	Medium term	Impacts during project operational phases or impacts likely to be repeated / recurring.
	Long term	Impacts continuing after project related activities finish but that may cease (at any timescale).
	Permanent	Impacts that create a permanent change.

Finishing

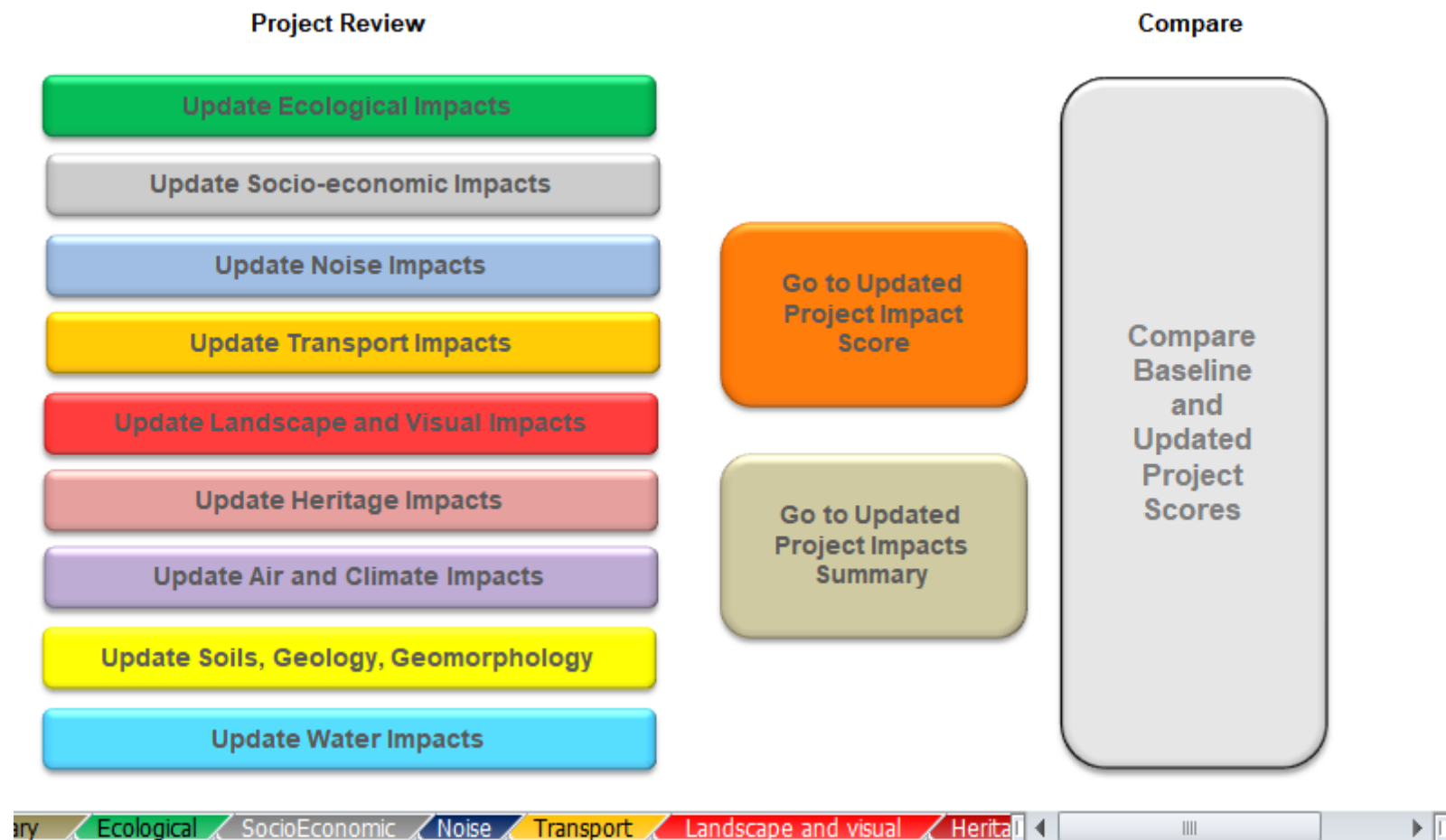
Once you have added all impacts for your project SAVE the workbook. You will be able to see a summary of all impacts and can decide whether negative impacts should be mitigate against and whether there are options to further enhance positive impacts.

If there are no further changes to your project then the workbook provides a simple record of your impact assessments.

Comparing revised projects

If however you choose to make changes to your project; mitigating / improving or removing / adding impacts after your initial review, you can use the second part of the Tool to evaluate these changes. Once you have agreed changes to your project, return to the Start Tab.

From here you can add updated details of your project impacts.



Adding updated impacts

Follow the instructions for adding details to each Updated Impact Tab as shown above to enter the revised impacts of your project.

You can quickly switch between the Updated and Baseline Impact Tabs for each category by clicking the button.

Updated Ecological Impacts

View **Baseline** Ecological Impacts

Switch Between Updated / Baseline Impact Tabs

Updated Project Impact Summary and Update Project Impact Score Tabs

The Updated Project Impact Summary tab now provides a record of updated impacts and scores and the Update Project Impact Score tab provides an updated combined score for your impacts and project.

Return to Start Page
Go to Updated Project Impact Score

UPDATED Ecological Impacts	Impact score	Percentage Score
Additional habitat for invertebrates	10	67
Ecological Impact Updated Cumulative Score	10	67

Go to Impacts

Heritage
Air and climate
Soils, geology, geomorphology
Water
Updated Project Impact Score
Updated Project Impacts Summary
Updated Ecological
Update

Updated Project Impacts Summary Tab

Return to Start Page		Go to Updated Project Impacts Summary	
		Updated Project Review Score	
Cumulative Updated Ecological Impact Percentage Score		67	Go to Impacts
Cumulative Updated Socio-economic Impact Percentage Score		No impact recorded	Go to Impacts
Cumulative Updated Noise Impact Percentage Score		No impact recorded	Go to Impacts
Cumulative Updated Transport Impact Percentage Score		No impact recorded	Go to Impacts
Cumulative Updated Landscape and Visual Impact Percentage Score		No impact recorded	Go to Impacts
Cumulative Updated Heritage Impact Percentage Score		No impact recorded	Go to Impacts
Cumulative Updated Air and Climate Impact Percentage Score		No impact recorded	Go to Impacts
Cumulative Updated Soils, Geology, Geomorphology Impact Percentage Score		No impact recorded	Go to Impacts
Cumulative Updated Water Impact Percentage Score		No impact recorded	Go to Impacts
Combined Project Impact Cumulative Percentage Score		66.67	

Updated Project Impacts Score Tab

Comparison Tab

Once you have updated all details, return to the Start Tab and click the Compare Baseline and Updated Project Scores Button. This new table automatically compares your initial project with your updated project impacts to identify areas of improvement (and worsening) and indicates whether each area of impact has improved, worsened or remains unchanged.

[Return to Start Page](#)

	<u>Baseline Project Impact Score</u>	<u>Improved?</u>	<u>Updated Project Impact Score</u>
Cumulative Ecological Impact Percentage Score	-60	Improved	67
Cumulative Socio-economic Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Cumulative Noise Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Cumulative Transport Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Cumulative Landscape and Visual Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Cumulative Heritage Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Cumulative Air and Climate Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Cumulative Soils, Geology, Geomorphology Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Cumulative Water Impact Percentage Score	No impact recorded	Unchanged	No impact recorded
Combined Project Impact Cumulative Percentage Score	-60.00		66.67

Comparison Tab

Appendix 2: Worked Example of Toolkit Usage

The following exemplar describes a multidimensional conservation project in Australia which trains and subsequently employs members of Aboriginal communities to deliver enhanced landscape management in order to protect endemic flora, and dependent species. While the example given here is illustrative, it borrows from genuine examples identified from case studies used within this project. This example includes an illustration in all categories of impact while in many real cases projects may involve just a few impacts. This exemplar is designed to demonstrate the process of describing impacts from a baseline project plan, scoring those impacts, identifying areas of impact where alterations may be made to reduce impacts, and how those changes can be recorded and the eventual cumulative impact value for the project.

Baseline Review

Ecological Impacts

The overall project aims for positive ecological impacts which will benefit wildflower species and dependent species. The methodology is new so the likelihood of impacts is considered “possible”, this is an initial project and change will only be “local” to the project area, and only a small level of change. If successful there should be a long term change. In addition to the positive change for the targets, there will also be some additional ecological alterations. These are potentially negative, and are a direct result of planned actions so are considered “probable”, and will result in change the will last for the medium term until native species can recover. Again changes are in the local area.

Ecological Impacts		View <u>Updated</u> Ecological Impact
Ecological Impacts	Activity - Provide details of the proposed activity	Add text: Training for improved landscape level management
	Receptor - Who / what is being affected?	Add text: Wildflower species Dependent species
	Impact - What change is happening to the receptor?	Add text: Protection from overgrazing Protection from environmental change (soil erosion, flooding) Preservation of species
	Positive or negative - Is the change positive or negative?	Select an option Positive
	Likelihood - How likely is the change to happen?	Select an option Possible
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Local
	Scale of the impact - How severe is the impact?	Select an option Minimal
	Longevity of the impact - How long will the impact last?	Select an option Long term

Ecological Impacts	
Activity - Provide details of the proposed activity	Add text: Removal of non-native species
Receptor - Who / what is being affected?	Add text: Native species using non-native species for habitat, food sources etc.
Impact - What change is happening to the receptor?	Add text: Removal of potential habitat
Positive or negative - Is the change positive or negative?	Select an option Negative
Likelihood - How likely is the change to happen?	Select an option Probable
Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Local
Scale of the impact - How severe is the impact?	Select an option Moderate
Longevity of the impact - How long will the impact last?	Select an option Medium term

Socio-economic Impacts

A central element of the project is to provide training and subsequent employment to people from the local community. This will result in roles for the duration of the project, and skills which last beyond that. The positive impact is categorised as “probable”, “local”, “moderate” and “long term”.

Socio-Economic Impacts		View Updated Socio-Economic Impacts
Socio-Economic Impacts	Activity - Provide details of the proposed activity	Add text: Training and employment of local staff for project delivery
	Receptor - Who / what is being affected?	Add text: Local community members
	Impact - What change is happening to the receptor?	Add text: Enhanced skills Enhanced future employability
	Positive or negative - Is the change positive or negative?	Select an option Positive
	Likelihood - How likely is the change to happen?	Select an option Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Local
	Scale of the impact - How severe is the impact?	Select an option Moderate
	Longevity of the impact - How long will the impact last?	Select an option Long term

Noise Impacts

The project identifies three areas of noise impact; during the training phase where trainees will visit potentially sensitive sites, during the surveying phase where the same sites will be visited and during remediation works where landscape contractors will undertake activities at the same sites. These affect both species at the sites (in the case of training and survey visits) and human users and neighbours of the site (during remediation works). For the first two these impacts will be “minimal”, but the use of heavy equipment makes the impact of remediation “moderate”. Impacts for all will be “local” and “short term”. As these are all key elements of the project likelihoods are considered “probable”.

Noise Impacts		View <u>Updated</u> Noise Impacts
Noise Impacts	Activity - Provide details of the proposed activity	Add text: Field based training sessions will involve transporting small groups of surveyors to sites for training on species identification, survey methods and landscape management techniques.
	Receptor - Who / what is being affected?	Add text: Native species (in particular birds, mammals and reptiles)
	Impact - What change is happening to the receptor?	Add text: Site visits have the potential to disturb native species
	Positive or negative - Is the change positive or negative?	Select an option Negative
	Likelihood - How likely is the change to happen?	Select an option Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Vicinity
	Scale of the impact - How severe is the impact?	Select an option Minimal
	Longevity of the impact - How long will the impact last?	Select an option Short term

Noise Impacts	Activity - Provide details of the proposed activity	Add text:	Establishing baselines during the operational phases of the project will involve site surveys by individuals, or small groups of surveyors.
	Receptor - Who / what is being affected?	Add text:	Native species (in particular birds, mammals and reptiles)
	Impact - What change is happening to the receptor?	Add text:	Site visits have the potential to disturb native species
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Vicinity
	Scale of the impact - How severe is the impact?	Select an option	Minimal
	Longevity of the impact - How long will the impact last?	Select an option	Short term
Noise Impacts	Activity - Provide details of the proposed activity	Add text:	Use of heavy machinery for remediation of landscape areas
	Receptor - Who / what is being affected?	Add text:	Native species (in particular birds, mammals and reptiles) Human users / neighbours of sites
	Impact - What change is happening to the receptor?	Add text:	Unspecified landscape alterations will be based on results from monitoring activities, but may involve clearance of non-native vegetation, alterations to fencing, restoration of watercourses
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Local
	Scale of the impact - How severe is the impact?	Select an option	Moderate
	Longevity of the impact - How long will the impact last?	Select an option	Short term

Transport Impacts

The project identifies three specific areas of transport impact; during the training phase, the surveying phase and during changes made by landscape contractors. These affect both on road networks and off-road. Impacts for all will be local of minimal severity, and short term. However the only confirmed impact will be during the training phase, as subsequent phases are not confirmed. Therefore the likelihood differs between impacts.

Transport Impacts		View <u>Updated</u> Transport Impacts
Transport Impacts	Activity - Provide details of the proposed activity	Add text: Transport of small groups of trainees to sites for training sessions during start up phases
	Receptor - Who / what is being affected?	Add text: Local transport networks Offroad areas
	Impact - What change is happening to the receptor?	Add text: Local transport networks - additional vehicle movements Offroad transport with potential for increased degradation of sites
	Positive or negative - Is the change positive or negative?	Select an option Negative
	Likelihood - How likely is the change to happen?	Select an option Definite
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Local
	Scale of the impact - How severe is the impact?	Select an option Minimal
	Longevity of the impact - How long will the impact last?	Select an option Short term

Transport Impacts			
Transport Impacts	Activity - Provide details of the proposed activity	Add text:	Transport of individual or pairs of surveyors to sites for site surveys
	Receptor - Who / what is being affected?	Add text:	Local transport networks Offroad areas
	Impact - What change is happening to the receptor?	Add text:	Local transport networks - additional vehicle movements Offroad transport with potential for increased degradation of sites
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Local
	Scale of the impact - How severe is the impact?	Select an option	Minimal
	Longevity of the impact - How long will the impact last?	Select an option	Short term
Transport Impacts	Activity - Provide details of the proposed activity	Add text:	Transport of site workers to sites for management / remediation works
	Receptor - Who / what is being affected?	Add text:	Local transport networks Offroad areas
	Impact - What change is happening to the receptor?	Add text:	Local transport networks - additional vehicle movements Offroad transport with potential for increased degradation of sites
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Local
	Scale of the impact - How severe is the impact?	Select an option	Minimal
	Longevity of the impact - How long will the impact last?	Select an option	Short term

Landscape and Visual Impacts

The project will have both positive and negative impacts. Short term changes will result in removal of non-native species changing visual aspects for neighbours. Long term however, the positive result is the restoration of native landscape views. In both cases changes are permanent and moderate. For the restoration the project aims to contribute to a wider landscape restoration so is considered “regional”.

Landscape and Visual Impacts		View <u>Updated</u> Landscape and Visual Impacts	
Landscape and Visual Impacts	Activity - Provide details of the proposed activity	Add text:	Alterations to landscape may include removal of non-native vegetation, removal of fencing, alterations to water courses
	Receptor - Who / what is being affected?	Add text:	Local landscapes (and neighbours of those landscapes)
	Impact - What change is happening to the receptor?	Add text:	Changes will be informed by the results of surveys but will only be confirmed during later parts of the project.
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Local
	Scale of the impact - How severe is the impact?	Select an option	Moderate
	Longevity of the impact - How long will the impact last?	Select an option	Permanent

Heritage Impacts

A key aim of the project is to reaffirm the value of native species through education, resulting in long-term change. But this will rely on the engagement strategy communicating this to the wider population so this is considered “possible”.

Heritage Impacts		View <u>Updated</u> Heritage Impacts
Heritage Impacts	Activity - Provide details of the proposed activity	Add text: Training / education elements of the project aim to (re-)establish the cultural heritage values of native wildflower species within the local and wider communities
	Receptor - Who / what is being affected?	Add text: Local people, wider community
	Impact - What change is happening to the receptor?	Add text: Increased relevance and interest in the role of native species in cultural heritage
	Positive or negative - Is the change positive or negative?	Select an option Positive
	Likelihood - How likely is the change to happen?	Select an option Possible
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Regional
	Scale of the impact - How severe is the impact?	Select an option Moderate
Longevity of the impact - How long will the impact last?	Select an option Long term	

Air and Climate Change Impacts

The project plan proposes using aerial spraying of herbicides to remove large areas of non-native vegetation. This risks release of toxins to the air. While areas for spraying will be clearly defined and local the potential effects are severe with herbicides remaining in the environment for the medium term. The use of the aerial sprayer also has a high carbon footprint associated with the use of aviation fuel, potentially contributing to regional carbon emission levels.

Air and Climate Impacts		View <u>Updated</u> Air and Climate Impacts
Air and Climate Impacts	Activity - Provide details of the proposed activity	Add text: Aerial herbicide spraying for removal of non-native plant species
	Receptor - Who / what is being affected?	Add text: Local air quality through aerosol effects of herbicide use
	Impact - What change is happening to the receptor?	Add text: Toxins in the air through spraying
	Positive or negative - Is the change positive or negative?	Select an option Negative
	Likelihood - How likely is the change to happen?	Select an option Definite
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Local
	Scale of the impact - How severe is the impact?	Select an option Severe
	Longevity of the impact - How long will the impact last?	Select an option Medium term

Air and Climate Impacts	
Activity - Provide details of the proposed activity	Add text: Carbon emissions associated with aerial spraying
Receptor - Who / what is being affected?	Add text: Carbon emission levels
Impact - What change is happening to the receptor?	Add text: Additional fossil fuel use (aviation fuel)
Positive or negative - Is the change positive or negative?	Select an option Negative
Likelihood - How likely is the change to happen?	Select an option Probable
Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Regional
Scale of the impact - How severe is the impact?	Select an option Minimal
Longevity of the impact - How long will the impact last?	Select an option Short term

Soils, Geology, Geomorphology Impacts

The removal of any vegetation risks exposing soils to erosion. While this negative risk is very specific to the area of removal, the impact is moderate and likely permanent where this happens.

However, remediation works also have positive potential to restore soils where they have previously been degraded. Again this benefit is very specific to the area of restoration, the impact is moderate and likely permanent where this happens.

Soils, Geology, Geomorphology Impacts		View <u>Updated</u> Soils, geology, geomor-phology Impacts
Soils, Geology, Geomorphology Impacts	Activity - Provide details of the proposed activity	Add text: Removal of non-native vegetation
	Receptor - Who / what is being affected?	Add text: Local soils
	Impact - What change is happening to the receptor?	Add text: Potential for increase erosion with less vegetation cover during the period required for native species to recover
	Positive or negative - Is the change positive or negative?	Select an option Negative
	Likelihood - How likely is the change to happen?	Select an option Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Vicinity
	Scale of the impact - How severe is the impact?	Select an option Moderate
	Longevity of the impact - How long will the impact last?	Select an option Permanent

Soils, Geology, Geomorphology Impacts

Activity

- Provide details of the proposed activity

Add text:

Restoration of already degraded soils through management works

Receptor

- Who / what is being affected?

Add text:

Local soils

Impact

- What change is happening to the receptor?

Add text:

Additional protection, restoration

Positive or negative

- Is the change positive or negative?

Select an option

Positive

Likelihood

- How likely is the change to happen?

Select an option

Probable

Spatial extent of the impact

- What is the spatial extent of the impact?

Select an option

Vicinity

Scale of the impact

- How severe is the impact?

Select an option

Moderate

Longevity of the impact

- How long will the impact last?

Select an option

Permanent

Water Impacts

Remediation work to sites is likely to include restoration of degraded water courses. Additionally removal of non-native species with high water demand will reduce overall demand on water in the local areas. Both positive impacts are likely to make a moderate difference for the long-term.

[View **Updated** Water Impacts](#)

Water Impacts		
Water Impacts	Activity - Provide details of the proposed activity	Add text: Restoration of altered / damaged water courses
	Receptor - Who / what is being affected?	Add text: Local water courses
	Impact - What change is happening to the receptor?	Add text: Improved flow, removed silting, improved water quality
	Positive or negative - Is the change positive or negative?	Select an option Positive
	Likelihood - How likely is the change to happen?	Select an option Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option Local
	Scale of the impact - How severe is the impact?	Select an option Moderate
	Longevity of the impact - How long will the impact last?	Select an option Long term

Water Impacts

Activity

- Provide details of the proposed activity

Add text:

Removal of high water demand non-native species

Receptor

- Who / what is being affected?

Add text:

Local water availability

Impact

- What change is happening to the receptor?

Add text:

Reduced demand for water by non-native species

Positive or negative

- Is the change positive or negative?

Select an option

Positive

Likelihood

- How likely is the change to happen?

Select an option

Probable

Spatial extent of the impact

- What is the spatial extent of the impact?

Select an option

Local

Scale of the impact

- How severe is the impact?

Select an option

Moderate

Longevity of the impact

- How long will the impact last?

Select an option

Long term

Baseline summary

Once all impacts have been identified and added to the spreadsheet, the summary shows a slight negative cumulative score for the project. While several areas provide a positive cumulative effect on that impact (socio-economic, heritage and water) for most areas the overall effect is actually negative.

Cumulative Ecological Impact Percentage Score	0	Go to Impacts
Cumulative Socio-economic Impact Percentage Score	60	Go to Impacts
Cumulative Noise Impact Percentage Score	-38	Go to Impacts
Cumulative Transport Impact Percentage Score	-42	Go to Impacts
Cumulative Landscape and Visual Impact Percentage Score	-67	Go to Impacts
Cumulative Heritage Impact Percentage Score	60	Go to Impacts
Cumulative Air and Climate Impact Percentage Score	-57	Go to Impacts
Cumulative Soils, Geology, Geomorphology Impact Percentage Score	0	Go to Impacts
Cumulative Water Impact Percentage Score	60	Go to Impacts
Combined Project Impact Cumulative Percentage Score	-1.37	

For some areas, such as “Ecology”, this shows a combination of positive and negative impacts that have been identified:

Baseline Ecological Impacts		
	Impact score	Percentage Score
Training for improved landscape level management	8	53
Removal of non-native species	-8	-53
Cumulative Ecological Impact Score		
	0	0

Go to Impacts

While for other areas, such as “Noise”, all impacts are negative:

Baseline Noise Impacts		
	Impact score	Percentage Score
Field based training sessions will involve transporting small groups of surveyors to sites for training on species identification,	-5	-33
Establishing baselines during the operational phases of the project will involve site surveys by individuals, or small groups of	-5	-33
Use of heavy machinery for remediation of landscape areas	-7	-47
Noise Impact Cumulative Percentage Score		
	-17	-38

Go to Impacts

This allows the project manager to review the individual impacts listed, and where possible identify alternative approaches where negative impacts can either be reduced, or ideally turned into positives.

Project Review

Revised Ecological Impacts

The project is amended so that removal of non-native species will take place outside key breeding times for species, and they will ensure that sufficient native vegetation is present when removal happens. Sites will also be checked for key priority species before removal happens. This reduces the severity and duration of the negative impact.

Updated Ecological Impacts	Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Removal of non-native species outside key periods (breeding etc.)
	Receptor - Who / what is being affected?	Add text:	Native species using non-native species for habitat, food sources etc.
	Impact - What change is happening to the receptor?	Add text:	Removal of potential habitat
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Local
	Scale of the impact - How severe is the impact?	Select an option	Minimal
	Longevity of the impact - How long will the impact last?	Select an option	Short term

Revised Socio-economic Impacts

As the Socio-economic impacts are positive from the outset, no changes are made.

Revised Noise Impacts

To address the negative noise impacts during training and surveying phases of the project, additional training will be undertaken to minimise the level of impact from disturbance. This training will take place away from sites initially so that subsequent visits are less disturbing. While the use of heavy machinery in later phases is unavoidable, steps will be taken to ensure that activities take place outside key periods such as breeding seasons to reduce the disturbance caused to species on sites. To minimise disturbance to human users and neighbours then the project will also consult with stakeholders to identify periods where heavy machinery cannot be used, further minimising the impacts.

Updated Noise Impacts		View <u>Baseline</u> Noise Impacts	
Updated Noise Impacts	Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Undertake classroom sessions to limit disturbance during field sessions. Field based training sessions will still involve transporting small groups of surveyors to sites for training on species identification, survey methods and landscape management techniques, but training will minimise disturbance.
	Receptor - Who / what is being affected?	Add text:	Native species (in particular birds, mammals and reptiles)
	Impact - What change is happening to the receptor?	Add text:	Site visits have the potential to disturb native species
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Possible
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Vicinity
	Scale of the impact - How severe is the impact?	Select an option	Minimal
	Longevity of the impact - How long will the impact last?	Select an option	Short term

Updated Noise Impacts

Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Include specific guidance in training sessions on how to minimise disturbance. Establishing baselines during the operational phases of the project will still involve site surveys by individuals, or small groups of surveyors.
Receptor - Who / what is being affected?	Add text:	Native species (in particular birds, mammals and reptiles)
Impact - What change is happening to the receptor?	Add text:	Site visits have the potential to disturb native species
Positive or negative - Is the change positive or negative?	Select an option	Negative
Likelihood - How likely is the change to happen?	Select an option	Possible
Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Vicinity
Scale of the impact - How severe is the impact?	Select an option	Minimal
Longevity of the impact - How long will the impact last?	Select an option	Short term

Updated Noise Impacts

Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Ensure that use of heavy machinery for remediation of landscape areas only takes place at times when minimal disturbance will take place (i.e. outside key breeding, rearing times for species). Notify human users about disturbance and allow feedback on times when disturbance is / is not acceptable.
Receptor - Who / what is being affected?	Add text:	Native species (in particular birds, mammals and reptiles) Human users / neighbours of sites
Impact - What change is happening to the receptor?	Add text:	Unspecified landscape alterations will be based on results from monitoring activities, but may involve clearance of non-native vegetation, alterations to fencing, restoration of watercourses
Positive or negative - Is the change positive or negative?	Select an option	Negative
Likelihood - How likely is the change to happen?	Select an option	Probable
Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Local
Scale of the impact - How severe is the impact?	Select an option	Minimal
Longevity of the impact - How long will the impact last?	Select an option	Short term

Revised Transport Impacts

It is concluded that all transport movements are likely to be necessary, so no changes can be made. However, as a negative has been identified, an additional caveat will be added to the plan to ensure that off-road vehicle movements stick to specific agreed routes where negative impacts are minimised. This does not alter the overall level of impacts but highlights an area of potential concern.

Revised Landscape and Visual Impacts

While landscape and visual alterations are an inevitable part of the project, it is decided to ensure that all changes are discussed with those affected. Where removal and alteration does happen, the aim is to ensure that an acceptable change is made, for example restoration of view with native plants providing equivalent land cover. This allows the entire change to be viewed as a positive rather than negative.

Updated Landscape and Visual Impacts

View [Baseline](#) Landscape and Visual Impacts

Updated Landscape and Visual Impacts

Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Alterations to landscape may include removal of non-native vegetation, removal of fencing, alterations to water courses. discussed with those affected. Where removal, alteration does happen, the aim is to ensure that an acceptable change is made – for example restoration of view with native plants providing equivalent land cover
Receptor - Who / what is being affected?	Add text:	Local landscapes (and neighbours of those landscapes)
Impact - What change is happening to the receptor?	Add text:	Changes will be informed by the results of surveys but will only be confirmed during later parts of the project.
Positive or negative - Is the change positive or negative?	Select an option	Positive
Likelihood - How likely is the change to happen?	Select an option	Probable
Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Local
Scale of the impact - How severe is the impact?	Select an option	Moderate
Longevity of the impact - How long will the impact last?	Select an option	Permanent

Revised Heritage Impacts

In order to increase the positive heritage impacts, the training and education on native species will be made a key measure of success and the engagement strategy will be foregrounded. The change therefore becomes probable rather than possible.

Updated Heritage Impacts

View **Baseline** Heritage Impacts

Updated Heritage Impacts	Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Training / education elements of the project aim to (re-)establish the cultural heritage values of native wildflower species within the local and wider communities
	Receptor - Who / what is being affected?	Add text:	Local people, wider community
	Impact - What change is happening to the receptor?	Add text:	Increased relevance and interest in the role of native species in cultural heritage
	Positive or negative - Is the change positive or negative?	Select an option	Positive
	Likelihood - How likely is the change to happen?	Select an option	Probable
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Regional
	Scale of the impact - How severe is the impact?	Select an option	Moderate
	Longevity of the impact - How long will the impact last?	Select an option	Long term

Revised Air and Climate Change Impacts

Due to the negative impacts the decision is made to remove all aerial spraying from the project. Where herbicides do need to be used, and alternative methods such as manual removal are not possible, they will be directly applied to limit the wider dispersal of toxic element and will use only herbicides that are specific to the species in question. There is still some negative effect but the likelihood and severity and spatial scale are all reduced.

By removing spraying the negative carbon emissions associated with the use of aviation fuel can be completely removed.

Updated Air and Climate Impacts

View [Baseline](#) Air and Climate Impacts

Updated Air and Climate Impacts

Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Direct application use of herbicides ONLY when alternative removal methods are not possible. Use only herbicides that are specific to the species in question.
Receptor - Who / what is being affected?	Add text:	Local air quality through aerosol effects of herbicide use
Impact - What change is happening to the receptor?	Add text:	Toxins in the air through spraying
Positive or negative - Is the change positive or negative?	Select an option	Negative
Likelihood - How likely is the change to happen?	Select an option	Possible
Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Vicinity
Scale of the impact - How severe is the impact?	Select an option	Minimal
Longevity of the impact - How long will the impact last?	Select an option	Medium term

Revised Soil, Geology, Geomorphology Impacts

In review the decision is made to reduce the possibility and severity of soil erosion caused by vegetation removal by planning activities to avoid environmental conditions that would exacerbate loss.

Updated Soils, Geology, Geomorphology Impacts		View Baseline Soils, geology, geomorphology Impacts	
Updated Soils, Geology, Geomorphology Impacts	Activity - Provide details of the proposed activity and any changes made to improve / reduce the impact	Add text:	Removal of non-native vegetation ONLY when likelihood of significant soil damage can be minimised (avoiding wet and dry periods)
	Receptor - Who / what is being affected?	Add text:	Local soils
	Impact - What change is happening to the receptor?	Add text:	Potential for increase erosion with less vegetation cover during the period required for native species to recover
	Positive or negative - Is the change positive or negative?	Select an option	Negative
	Likelihood - How likely is the change to happen?	Select an option	Possible
	Spatial extent of the impact - What is the spatial extent of the impact?	Select an option	Vicinity
	Scale of the impact - How severe is the impact?	Select an option	Minimal
	Longevity of the impact - How long will the impact last?	Select an option	Permanent

Revised Water Impacts

Water impacts were already considered to be positive so no changes were made to alter water impacts.

Reviewed Project Cumulative Impact

After the project review, this results in a project which moves from a cumulative negative impact at baseline, to a cumulative positive impact after review. In most areas impacts are also now positive. Some areas of negative impact cannot be avoided (for example in transport and noise) but steps have been taken to minimise these. In other areas negative impacts have been removed, or reduced.

	<u>Updated Project Review Score</u>	
Cumulative Updated Ecological Impact Percentage Score	7	Go to Impacts
Cumulative Updated Socio-economic Impact Percentage Score	60	Go to Impacts
Cumulative Updated Noise Impact Percentage Score	-31	Go to Impacts
Cumulative Updated Transport Impact Percentage Score	-42	Go to Impacts
Cumulative Updated Landscape and Visual Impact Percentage Score	67	Go to Impacts
Cumulative Updated Heritage Impact Percentage Score	67	Go to Impacts
Cumulative Updated Air and Climate Impact Percentage Score	-33	Go to Impacts
Cumulative Updated Soils, Geology, Geomorphology Impact Percentage Score	7	Go to Impacts
Cumulative Updated Water Impact Percentage Score	60	Go to Impacts
Combined Project Impact Cumulative Percentage Score	10.00	