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Excerpt
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1 · *Moving Species: Reintroductions and Other Conservation Translocations*

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1.1 Background

The increasing threats to our wildlife species have been reported for decades. However, the last few years have seen a dramatic increase in public awareness and concern, with a call for political representatives and decision makers to make 'transformative' changes to improve the prospects for nature. How we respond over the next decade will prove crucial if we wish to maintain and restore our biological diversity and ecosystem services.

In May 2019 the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published its landmark report. It made a sobering read: around one million species are threatened with extinction, the abundance of native species in most land-based habitats has fallen by 20 per cent, mostly since 1900, and at least 680 vertebrate species have become extinct since the sixteenth century (IPBES, 2019). The five main, modern drivers of these impacts were listed as changes in land and sea use, the direct exploitation of organisms, climate change, pollution, and invasive non-native species – all of which carry the fingerprints of human activity. It is not surprising that many scientists now recognise a new geological time interval, the 'Anthropocene', defined by the conditions and processes on Earth profoundly altered by human impact (Crutzen & Stoermer, 2000) and characterised by the developing sixth mass extinction. Furthermore, a headline message of the 'Dasgupta Review' of the economics of biodiversity is that 'our economies, livelihoods and well-being all depend on our most precious asset: Nature' (Dasgupta, 2021). We ignore this at our peril.

We have been increasingly adept at recognising and measuring changes in nature. But the more difficult work involves identifying solutions and applying them. In fact, good tools already exist, and the IPBES report not only describes the scale of the challenge but also proposes ways forward. It lists methods that have '…been successful in preventing the extinction of some species', including the practice of 'translocation'. The report concludes that 'transformative change' is required to ensure a more sustainable future, and that the biodiversity challenge can be addressed effectively if that change starts now.

The specific tool of 'conservation translocation' has become increasingly used in the battle to save species and restore ecosystems. There are multiple formal definitions, but in short they describe people deliberately moving and releasing organisms where the primary goal is a conservation benefit. 'Reintroductions' are the best known type, and specifically refer to the translocations of organisms to places where they have become extinct, or where they could have been reasonably expected to occur, in order to try to re-establish viable populations. The science and practice surrounding conservation translocation have grown massively in recent decades, the result being that there are now many types and sub-types, with an increasingly confusing array of different terms. The International Union for Conservation of Nature (IUCN) (2013) has therefore come up with helpful, standard definitions (see Figure 1.1 and Box 1.1) that are widely accepted and employed, and indeed are used throughout this book.

Even so, conservation translocation is a tool that needs careful consideration before being used. Such projects are often complex, expensive, and time consuming, with a strong element of risk (not only in biological but also socio-economic terms) and some past failures (e.g. Griffith et al., 1989).

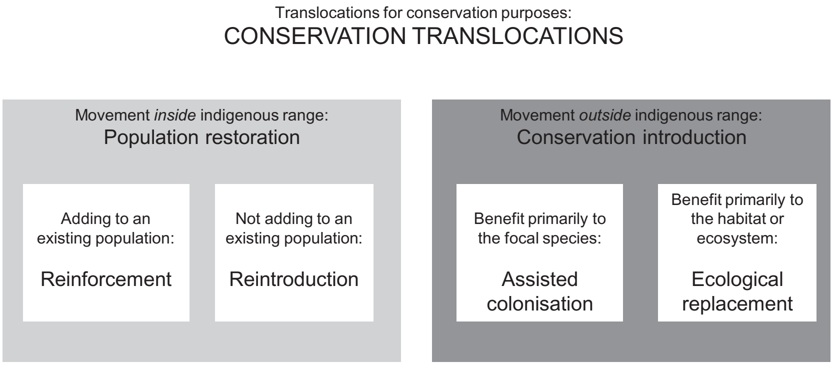

Figure 1.1 Overview of the types of conservation translocations (based on IUCN, 2013, and also applied in National Species Reintroduction Forum, 2014).

Box 1.1 *Definition of terms*

These definitions are based on the 2013 IUCN Guidelines, and are also widely applied in country-based approaches around the world. Also see Figure 1.1.

Conservation translocation – the intentional movement and release of a living organism where the primary objective is a conservation benefit. This usually involves improving the conservation status of the focal species and/or restoring natural habitat or ecosystem functions or processes.

Conservation translocations can entail releases either within or outside the species' indigenous range (the known or inferred distribution generated from historical records or physical evidence of the species' occurrence), and can be subdivided into the following categories:

1. **Population restoration** – a conservation translocation within the indigenous range, including:
   (a) **Reinforcement** – translocation of an organism into an existing population of the same species.
   Reinforcement aims to enhance population viability, for instance by increasing population size, by increasing genetic diversity, or by increasing the representation of specific demographic groups or stages. [Also known as: Augmentation; Supplementation; Re-stocking; Enhancement.]
   (b) **Reintroduction** – translocation of an organism inside its indigenous range from where it has disappeared, to re-establish a viable population of the focal species.
2. **Conservation introduction** – a conservation translocation outside the indigenous range, including:
   (a) **Assisted colonisation** – translocation of an organism outside its indigenous range where the primary purpose is to benefit the focal species.
   This is typically aimed at establishing populations in locations where the current or future conditions are likely to be more suitable than those within the indigenous range. The scale of assisted colonisation can range from local movement to wide-scale international range shifts. [Also known as: Benign introduction; Assisted migration; Managed relocation.]
   (b) **Ecological replacement** – translocation of an organism outside its indigenous range where the primary purpose is

to perform a specific ecological function that has been lost through extirpation or extinction.

Ecological replacement usually involves replacing the extinct taxon with a related subspecies or species that will perform the same or similar ecological function. [Also known as: Taxon substitution; Ecological substitutes/proxies/surrogates; Subspecific substitution, analogue species.]

In all cases, conservation translocations have the primary goal of achieving a conservation benefit, which is defined as an improvement in the status of the focal species, habitat, or ecosystem.

Some of the more controversial and sometimes poorly executed examples, especially where local people were not involved in the decision-making, have resulted in conflict (Glikman et al., this volume), the result being that some people regard all 'reintroductions' as something that should be resisted, which makes organising new projects more difficult. The effect of translocation on the welfare of the individual animals involved has also been questioned (Harrington et al., this volume). And there are alternatives that should always be considered first (IUCN, 2013): area-based solutions such as wider habitat management; species-based solutions such as targeted control of invasive non-native animals and plants; social/indirect solutions such as setting up protected areas or changing legislation; or no action. Therefore, translocation has sometimes been described as a tool of last resort. But it is also an approach that works and has saved species and populations, and restored ecosystems (Novak et al., 2021). The release and return of a long-lost animal or plant can also be an exciting, inspiring, and engaging event for people, and demonstrates that there are still things we can do that make a positive difference. It is no longer just a tool of last resort – the urgency of the biodiversity crisis is such that we need to look at how we can be more creative and proactive with conservation translocation, for example through using certain influential species or combinations of species to help restore and upgrade ecosystem processes, whilst at the same time applying best practice.

Much of this edited volume was written during the 'anthropause' resulting from the COVID-19 pandemic (Rutz et al., 2020), during which people's minds turned even more to the crises in nature we are all grappling with, and the solutions we urgently need. The book brings together authors from across the world who use the IUCN (2013) guidelines as a way of making sure best practice is used in conservation translocations, thereby increasing the chances of success and decreasing the chances of failure. It looks at the key challenges that face practitioners, decision-makers, and other stakeholders who deal with conservation translocation, and provides the latest science-based theory and practice. Specific, fast-developing, and more radical topics are also covered, and attempts are made to look into the crystal ball and predict what will become most important, especially as we try to learn how to deal with a rapidly changing environment. Finally, a series of case studies is presented in the book that provide a taste of the range of species, ecosystems, places, and issues in which conservation translocation is used. This first chapter attempts to summarise some of this and provide a foundation for the details that follow.

1.2 A Very Short History of Translocations

Conservation is not the only reason people have translocated, or moved, species over the centuries. Seddon et al. (2012) recognised at least seven other motivations:

- Non-lethal management of problem animals.
- Commercial and recreational.
- Biological control.
- Aesthetic.
- Religious.
- Animal rights activism and animal liberation.
- *Wildlife rehabilitation.

*(Although increasingly such ‘welfare translocations’ may sometimes be viewed as also having a conservation motivation where there have been short-term, enforced absences of animals from the wild (e.g. for gorillas and orang-utan). See the discussion of temporarily displaced species in Moehrenschlager et al. (this volume).)

Conservation translocation is also not new, although its early practitioners would not have described their actions using this terminology. For example, in Scotland the capercaillie *Tetrao urogallus* became extinct in the eighteenth century and was reintroduced in the 1830s (Stevenson, 2007), and the red squirrel *Sciurus vulgaris* became extinct in parts of the country around the same time, with animals from England and Scandinavia used to reintroduce or reinforce the Scottish population (Tonkin et al., 2016). Kakapo *Strigops habroptilus* in New Zealand and snowy egrets *Egretta thula* in the USA were both subjects of pioneering conservation translocations in the 1890s (Armstrong et al., 2018). The Eurasian beaver *Castor fiber* population was restricted to around 1200 animals scattered across a few isolated populations in Europe and Asia by 1900, but translocation began in 1922 using Norwegian animals to Sweden (Halley & Rosell, 2002), followed by dozens more initiatives across many European countries over the following decades. The motivations for some of the earlier translocations are sometimes unclear, and may not have been purely 'conservation' – for example the capercaillie is a game bird and the beaver has been an important resource for the fur trade.

Reintroduction as a modern conservation tool became progressively more used during the second half of the twentieth century, with high-profile examples including the Arabian oryx *Oryx leucoryx* to Oman (Stanley-Price, 1989) (Figure 1.2) and California condor *Gymnogyps californianus* to the western USA and Mexico (Walters et al., 2010). However, the inherent riskiness of reintroduction meant that, up to thirty years ago, failure rates were relatively high (Griffith et al., 1989). This overall growth in the use of the tool led to the establishment of a dedicated 'Reintroduction Specialist Group' (RSG) by the IUCN

Figure 1.2 Rangers in the Sultanate of Oman protect and monitor the first herd of Arabian oryx released in 1982 (photo: Mark Stanley-Price). (A black and white version of this figure will appear in some formats. For the colour version, please refer to the plate section.)

Species Survival Commission in 1988 to help the development of best practice. Ten years later the RSG published its first 'Guidelines for Reintroductions' (IUCN, 1998), a simple, pragmatic approach that thousands of practitioners around the world have subsequently used to support their decision-making.

1.3 From Reintroductions to All Conservation Translocations: Species Conservation, Ecological Restoration, and Rewilding

The RSG later produced a revised version of their key publication, with the new title 'Guidelines for Reintroductions and Other Conservation Translocations' (IUCN, 2013). In late 2018 the RSG then announced a change in its name to the 'Conservation Translocation Specialist Group' (CTSG). So why has there been this subtle change in scope from just species reintroductions to all forms of conservation translocation? In part it reflects the increasingly complex range of conservation challenges and issues that are being identified, and the fast developing science and practice. Therefore reinforcement, assisted colonisation, and ecological replacement, as well as reintroduction, provide a broad suite of actions that can help address the significant and increasing threats of climate change, disease transmission, habitat loss, and others. At the same time the guidelines continue to provide a simple framework to advise how such work should be done.

The numbers of such projects have also increased dramatically over the last three decades. Seddon et al. (2007) looked at the numbers of papers referring to reintroduction and found very small totals before the early 1990s (no single year reached double figures) but then a rapid increase, with a total of 454 papers for the 15 years up to 2005. The IUCN RSG/CTSG have been publishing case studies in their 'Global Conservation Translocation Perspectives' series since 2008, and by the time of their 2021 volume they had amassed details of 418 projects (Soorae, 2021). This trend is continuing, and it seems likely there have been thousands of projects taking place in recent decades, based on what continues to be published in journals and the grey literature, and the significant proportion that are not formally reported.

In addition, the types of projects are changing and diversifying. The primary goal of any translocation of this type must be a conservation benefit. This has often involved improving the conservation status of a focal species, for example reintroducing a threatened species to part of its indigenous range to help restore the population. There are plenty of examples of this approach, and often habitat restoration (and/or other actions, such as managing invasive non-native species) is required at prospective destination sites to treat the cause of a species' decline before the translocation can take place.

However, there is increasing use of conservation translocation to contribute directly to the restoration of the natural habitat or ecosystem functions and processes, rather than just focussing on the conservation benefits to the translocated focal species. There are a number of imaginative and ambitious examples involving 'keystone species' (those which have a disproportionately large effect on their environment relative to their abundance (Paine, 1995)), including 'ecosystem engineers' (organisms that directly or indirectly control the availability of resources to other organisms by causing physical state changes in biotic or abiotic materials (Jones et al., 1997)). These terms sometimes generate controversy in the scientific community, but they are useful to communicate and highlight the important ecosystem-level role certain individual species can play. Examples include the reintroduction of predators such as wolves *Canis lupus* to Yellowstone National Park in the USA, burrowing and digging species such as black-tailed prairie dog *Cynomys ludovicianus* to North American prairies and eastern bettong *Bettongia gaimardi* to south eastern Australia (Munro et al., 2019), reef-forming species such as corals (Swan et al., 2015), and the wetland-creating Eurasian beaver across many European countries (Figure 1.3).

'Ecological restoration' is a topic that has received considerable and increasing attention in recent years (the science behind it is called 'restoration ecology'). It is defined as '…the process of assisting the recovery of an ecosystem that has been degraded or destroyed' (Society for Ecological Restoration, 2004). However, advocates increasingly recognise that restoration has to be integral to land management in the modern world, and that goals for the future ecosystem should be achievable, rather than based on some arbitrarily selected point in the past (Hobbs & Harris, 2001). The term 'restoration' can therefore be problematic: it can be perceived as too backward looking if the focus is too much on composition, but less so if the focus is the return of ecological processes. The science and practice surrounding species reintroductions have also been developing over the last few decades, and the opportunities for synergy and collaboration between these two fields have started to be more fully recognised and realised. The translocations of key species to degraded systems are now regularly promoted as elements of

Figure 1.3 Beavers are ecosystem engineers and have been used in conservation translocation projects as a means of restoring ecological processes. At this Scottish site a metre-wide stream was dammed by beavers, resulting in an extensive beaver pond and associated wetland habitat (photo: Martin Gaywood). (A black and white version of this figure will appear in some formats. For the colour version, please refer to the plate section.)

wider ecological restoration. For example there are now numerous studies that have shown the importance of apex consumers and their role in 'trophic cascading', and the trophic 'downgrading' that can result when such species are removed by humans (Estes et al., 2011). The process of returning such species, and restoring and upgrading our ecosystems, is conservation translocation.

More recently still the term 'rewilding' has gained prominence and caught the public imagination to such an extent that it is now used to describe all manner of projects at all types of scales. Rewilding projects can also generate controversy and division, as some view them as an attempt to return to previous, natural ecosystems where people's livelihoods are given lower priority. This is a particularly sensitive issue in rural communities with long and complex socio-political histories of land use and ownership. In part, this reflects the range of definitions that different advocates use, although many recognise the complexities of the human dimension and the need to work and engage with those who are best placed to 'steward' the land concerned, including Indigenous Peoples (Moehrenschlager et al., this volume). Some definitions of rewilding include a particular focus on species reintroduction, such as that of Naundrup and Svenning (2015): 'Reintroduction of extirpated species or functional types of high ecological importance to restore self-managing functional, biodiverse systems'. Others have a wider scope, such as that of Carver et al. (2021), who attempted to identify guiding principles for rewilding, noting that '. . .rewilding sits upon a continuum of scale, connectivity, and level of human influence, and aims to restore ecosystem structure and functions to achieve a self-sustaining autonomous nature'. Both of these descriptions of rewilding focus more on restoring or reorganising ecological functions and processes than on trying to return and recreate places to the wild state of some particular historical moment of time.

Clearly there is overlap between the concepts of rewilding and ecological restoration, although the targets of the latter are generally more pre-defined than those of the former. Either way, these are concepts where the restoration process might involve not only 'passive' colonisation and recolonisation of sites by species but active intervention through conservation translocation. Seddon (this volume) provides a comprehensive assessment of how ecological restoration, rewilding, and conservation translocation compare and contrast, and where the commonalities lie.

Such approaches have to recognise that the starting points for such conservation activities are ecosystems that have been transformed by human activity. Indeed the term 'novel ecosystems' has been used to describe this phenomenon, although the term has courted controversy as some suggest it may predispose people to abandon attempts at restoration since it could be perceived as too difficult and costly (Aronson et al., 2014; Hobbs et al., 2014). However, the fact remains that many ecosystems have been or are being modified substantially; a full return to a system as it appeared before human impact will often not be possible, especially in light of continuing climatic change, but restoration can still achieve significant improvements to biodiversity and wider ecosystem functions. A challenge lies in where and how such restoration efforts should be prioritised, noting that the IPBES report concluded that participatory spatial planning on a landscape approach is vital where multiple land uses coexist, to enable the allocation and management of land to achieve social, economic, and environmental objectives in landscape mosaics (IPBES, 2019).