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Effectiveness of UK Legislation and Management in Producing Nature Conservation Outcomes

Molly Anne Bridger[1]
[1]Loughborough University, UK
[1]m.bridger@lboro.ac.uk

Corresponding author email: m.bridger@lboro.ac.uk

***Abstract*— National Nature Reserves (NNRs) are a form of nature conservation management using protected areas to improve specific site features of wider biodiversity. This study focuses on the Purbeck Heath NNR management aims to restore the natural habitat and increase overall biodiversity through landscape-scale management. This study investigated whether landscape-scale management used within the protected areas will benefit overall biodiversity and fulfil legislation. Sites observations were used to assess public compliance in accordance with the legislation and management measures of the specific site, whilst personal communications were carried out to gain representations of what key ecological measures are currently used on site. Bayesian Belief Networks were used to evaluate how different designated features within NNRs will continue to perform under current management methods. Results showed that protected designated features within the reserve would improve under the landscape-scale management of the Purbeck Heath NNR with ecosystem services, biodiversity, protected target species, and protected target habitat likely to increase despite climate change likely to increase. Discussions showed that the main conservation outcome is to increase landscape connectivity, climate resilience and overall biodiversity by placing nature first. Overall, the Purbeck Heath NNR and other super NNRs have the potential to fulfil the legislation aims set out under the various designations of Special Protected Areas, Special Areas of Conservation, Sites of Special Scientific Interest, and Ramsar sites.**

***Keywords*— National Nature Reserve; Biodiversity; Landscape-scale management; Bayesian Belief Network; Legislation.**

1. Introduction

Protected areas (PAs), including Nature Reserves, play a key role in conservation, covering approximately 15% of the world's land surface [28]. There has been added pressure on Nature Reserves to perform well over the past decade, with their effectiveness being questioned in relation to funding, management, and ecological damage [22]. Although there have been studies exploring the performance of Nature Reserves and their effectiveness at achieving ecological, social, and economic objectives [27] [7] [22], there is limited use of adopting a meta-analysis modelling approach to measure and predict the overall effectiveness of reserves.

In the UK National Nature Reserves (NNRs) were established as a form of PA that aim to conserve specific habitats, species, and genealogy of national importance, whilst also providing opportunities for public engagement with nature [17]. Many of UK Nature Reserves are categorised as Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs), and Ramsar sites. Yet whether site designation and current management is effective at achieving site objectives is not always clear. The effectiveness of a protected site may come down to not only the management practice but who is enforcing such practice. If a site is not performing well, is it because of the management plan or the law and regulations put forward by the management body? Understanding the interactions between scientific and legal fields and highlighting where future weaknesses within nature conservation management may fall need to be addressed.

The importance of NNRs stems from the need for ecological restoration against the backdrop of anthropogenic activities [31]. They provide a haven for ecological biodiversity to flourish and allow for a natural ecological equilibrium to be restored. Yet with the threat of climate change, fragmentation, non-native species, and ultimate decline in ecological biodiversity, it begs the question of how effective NNRs are in aiding the ecological management of nature conservation.

Within NNRs there are different PA designations (SSSI, SPA, SAC, Ramsar) that require different forms of management and allow different forms of activities. Management should focus on land-processes and reducing the impact of disturbances as well as the species present and ecosystem function

[32]. The types of management techniques that may occur on PAs within NNRs include cattle grazing, temporal, and spatial zoning, restricting public access, and management of woodland. SSSIs are a form of designation that protects rare species of flora and fauna, as well as geological and physiological structures that may interest scientific research [10]. Natural England is responsible for the management of this type of PA where it is owned or managed by Natural England. SPAs are managed for the protection of birds. The Joint Nature Conservation Committee (JNCC) can provide advice on site designation and how to classify SPAs within the UK [9]. SACs are PAs that protect specific habitats or habitats of species of ecological importance. A large part of the work carried out by the JNCC on both SACs and SPAs involves continuous monitoring and site assessment. This is to assess the status and trends of protected species within the PA and condition of habitats within the site [9].

In 2020, seven stakeholders came together to form the UK's first 'super' nature reserve spanning 8,231 acres with 11 key wildlife habitats [16]. The Purbeck Heath NNR includes designated areas under SSSIs, SPAs, SACs, and Ramsar sites. The connection of these habitats and PAs falls under the Nature Recovery Program of the government's 25 Year Environment Plan [5]. According to Natural England, it is hoped that this super reserve will benefit both people and the natural environment [20]. The formation of a super reserve connecting landscapes may aid environmental resilience against climate change, biodiversity loss, and other anthropogenic stressors [24].

The aim of this study is to evaluate whether the management methods employed across NNRs (like that of the Purbeck Heaths) will benefit biodiversity and fulfil legislation. The objectives of this study are to (1) Explore what legal designations and protected features exist within NNRs, (2) Identify management measures currently in place on reserves (like that of the Purbeck Heath), (3) Outline how legislation and management can be improved to increase protection of designated features and wider biodiversity.

2. Materials and Methods

This research evaluated whether the proposed management methods employed across NNRs will benefit biodiversity and fulfil legislation aims. To measure the effectiveness of likely future management plans for super NNRs, a Bayesian Belief Network (BBN) is used to predict how different designated PAs within the reserve will continue to perform under future management plans and supporting legislation. Data from site observation and personal communications were used to form prior beliefs for the BBN and determine the probability of various outcomes for designated features within the reserve. Designated PAs include SSSIs, SACs, SPAs, and Ramsar Sites.

2.1. Bayesian Belief Network

BBNs are a form of meta-analysis that places a quantitative or semi-quantitative value on varying nodes. Nodes can represent varied factors such as biodiversity, conservation practices, or recreational activities. The quantitative value of each node can be in two fixed states: increasing or decreasing. The probability ranges between 0 and 1 where 1 represents the probability being 'high' or 'increasing'. Edges connect the nodes to show interactions between different nodes reflecting the degrees of certainty of the interaction occurring, again between 0 and 1. Secondary data in the form of quantitative and qualitative data such as expert opinion and peer reviewed literature is used to determine the value of each edge. In the case of this research, site observations, personal communications, and existing legislation were used to determine the value of each node and the degrees of certainty of each edge. This research was conducted using modified versions of BBNs detailed in [23], which allow for reciprocal interactions between nodes and simplify the combined probability of multiple node interactions, allowing for more complex models of the interactions on nature reserves to be produced.

2.2. Development of BBN on PAs

Information collected from personal communications and site observations informed the probability of each node increasing or decreasing based on changes in management, node interactions, and prior beliefs. In-field site observations were made to explore what protected features exist within the Purbeck Heath NNR and to identify current

management measures in place. Management activities were observed to assess whether operations occurring were in accordance with the intended legislation and management outcomes. Public compliance with the intended management was observed along with public activities within designated public access zones. Representatives from the seven stakeholders involved in managing the Purbeck Heath NNR were contacted for personal communications. Responses from two of the stakeholders were received agreeing to be part of a discussion to gain information to develop the BBN model.

Existing legislation was also used to inform the probability of each node increasing or decreasing. The Birds Directive outlines how SPAs are threatened by natural succession, recreational activities, grazing, and invasive species. The directive also highlights how SPAs benefit from controlled grazing. The Habitats Directive outlines how SACs are threatened by natural succession, recreational activities, grazing, and invasive species. The Habitats Directive also highlights how SACs benefit by controlled grazing. The Wildlife and Countryside Act 1981 outlines the use of SSSIs to conserve and restore flora and fauna. Ramsar sites are listed under the Joint Nature Conservation Committee.

Interactive diagrams were created to reflect the numerous factors (nodes) that are present within each PA designation. Connecting edges within each diagram demonstrates the direct interactions between nodes. Site observations, personal communications, and legislation determined the weight and probability of these interactions. Figure 1.0 provides a simplified diagram to illustrate the operations of the BBN networks used in this study.

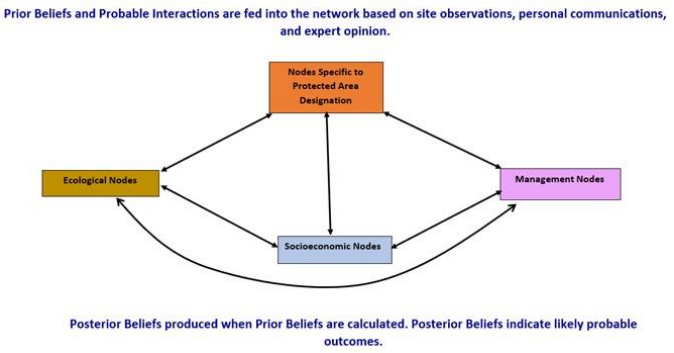

Figure 1.0: Simplified BBN demonstrating how the models operate. Boxes show the different factors known as nodes. Arrows illustrate the different interactions.

3. Results

Observed on-site management techniques included spatial and temporal zoning. Wide paths were used for designated public footpaths and as a buffer between areas of heath to prevent fires from burning through the whole area. Clear signage on gates is used to inform visitors about specific management techniques such as grazing. For specific species of flora and fauna, spatial zoning using fences is practiced. Designated areas for recreational activity included public footpaths for hiking, dog walking, horse riding, and cycling. In some areas of the reserve there were signs explaining high fire risk advising against public BBQs and bonfires.

Discussions with representatives of the Purbeck Heath NNR revealed that landscape-scale management focuses on habitat restoration and increasing biodiversity across the whole reserve. The management plan involves increasing habitat restoration efforts through the reintroduction of species and wild cattle grazing, along with controlled burning of some areas of the reserve as part of fire management and increasing buffer zones. Stakeholders also seek to increase ecotourism activities to engage the public with nature. Landscape-scale management seeks to decrease fragmentation and increase reserve resistance to climate change. Information gathered from site observations and personal communications have been used in the management scenario of the BBN and inform prior beliefs.

To evaluate whether landscape-scale management plans (like those currently employed on the Purbeck Heath NNR) will benefit biodiversity and fulfil

legislation aims, a combined comparison across all four PAs was produced (Figure 2.0). Key findings show that overall, across all four designated PAs within the NNR, there is an increase in ecosystem services, biodiversity, native species, habitat restoration, population of protected target species, and protected target habitat. This is promising as climate change and bush fires are also likely to increase across all four PAs.

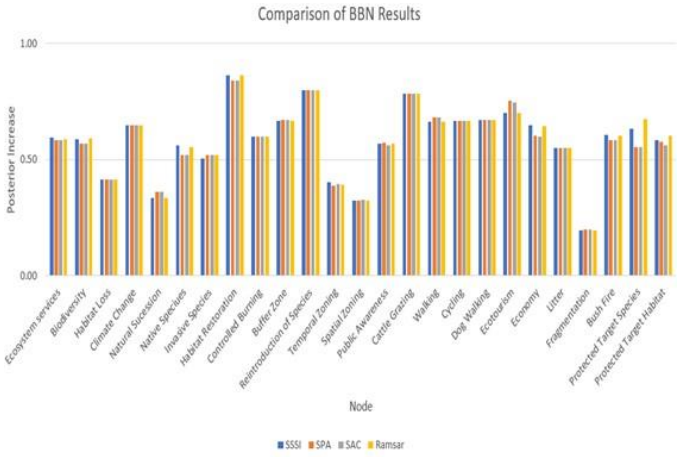

Figure 2.0: The calculated probability of increase in nodes across all protected area designations within super NNRs with the application of Purbeck Heath NNR Management Plan.

SSSIs and Ramsar sites are likely to perform the best under the landscape-scale management. Ecosystem services are likely to increase the most in SSSIs with a posterior increase of 0.60 (Figure 2.0). Whilst protected target species and protected target habitat are likely to increase the most in Ramsar sites with a posterior increase of 0.67 and 0.60, respectively (Figure 2.0). Biodiversity, native species, habitat restoration, and economy are all likely to increase under SSSIs and Ramsar sites with a posterior increase of 0.59, 0.56, 0.87, and 0.65, respectively (Figure 2.0). Invasive species are likely not to increase or decrease in SSSIs, whilst they are expected to increase within Ramsar sites, SPAs, SACs under the landscape-scale management plan to 0.52 across all three PAs (Figure 2.0). Spatial zoning, natural succession and fragmentation are likely to decrease the most in SSSIs and Ramsar sites within the NNR with posterior decreases of 0.68, 0.67 and 0.81, respectively. These are considered decreases as the probability of these nodes increasing is <0.5 (Figure 2.0). Walking is likely to increase the most in SPAs and SACs within the NNR.

Although there are minor differences in the level of increase of nodes across the different PAs, it is important to note that ecosystem services, biodiversity, native species, protected target habitat, and protected target species are all likely to increase in all PAs against the backdrop that climate change is also likely to increase. This suggests that the landscape-scale management of the Purbeck Heath NNR is effective in producing the intended nature conservation outcomes of increasing resilience to climate change, habitat connectivity, and overall biodiversity across the reserve.

4. Discussion

4.1. Effectiveness of Management in Producing Nature Conservation Outcomes

Adopting a landscape-scale management approach to NNRs benefits the biodiversity and ecosystem health of reserves whilst reducing fragmentation of the site. Adjusting prior beliefs in the BBN in relation to future management scenarios predicted increases in ecosystem services, biodiversity, climate change, native species, invasive species, habitat restoration, controlled burning, buffer zones, reintroduction of species, public awareness, cattle grazing, walking, cycling, dog walking, ecotourism, economy, litter, bush fire, specific protected target species, and specific protected target habitat. There was a predicted decrease in habitat loss, natural succession, temporal zoning, spatial zoning, fragmentation. In the case of applying a landscape-scale management approach to SSSIs, there was no change in the level of invasive species despite management efforts to restrict their presence and impact within the reserve. Any changes to predicted outputs were of moderate impact. Overall results show that by adopting a landscape-scale management approach that involves moderate grazing and recreational activities, biodiversity, native species, and protected target species and protected target habitat are still able to increase in an environment where climate change is also set to increase.

In the case of the Purbeck Heath NNR, the main objective agreed upon by stakeholders is to put nature first by increasing landscape connectivity, climate resilience, and increase overall biodiversity.

The reserve consists of various habitats including heathland, woodland, grassland, saltmarsh, reedbeds, and wetland fens. With the formation of the super reserve combing individual PAs, the collaboration and expansion of this reserve allows for stakeholders to move away from tightly prescribed micromanagement and move towards restoring natural processes so that the whole landscape functions ecologically [4]. The formation of large reserves can benefit species suffering from range dispersal resulting from climate change [11]. For species with high dispersal rates, it has been suggested that the quantity of habitat patches available should be priority before increasing the quality of the area, whilst the phenology of species can also benefit from smaller reserves that correspond to the desired conditions for that stage within the species life cycle [11]. Threatened specialist species can benefit from homogeneous environments in the reserve as there is the potential of support from buffer zones provided by landscape-scale management [11]. The development of landscape-scale management has the potential to succeed in achieving the desired conservation outcomes of climate change resilience and connectivity, although it is important to consider the quantity and quality of sites for management efforts to succeed in achieving optimum outcomes, there needs to be the inclusion of both the current suitable habitats (for target species) and surrounding landscapes [11] [12].

The predictions shown in Figure 2.0 indicate that under the landscape-scale management of NNRs biodiversity, protected target species and habitat are set to increase. For these results to be observed, long term monitoring is needed to ensure that there are minimal conflicts when managing specific habitats and species. Losing a species because of landscape-scale management would not aid the outcome of increasing biodiversity, therefore it is important that even if a particular species is lost in designated sites within the NNR, a viable population appears elsewhere within the reserve.

To ensure that landscape-scale management is effective in producing positive outcomes for biodiversity, grazing on the reserve will need to be closely monitored. For the implementation of wild, naturalistic grazing to be effective in producing outcomes that benefit the biodiversity goals of the NNR, a baseline survey assessing the presence of flora and fauna on the reserve needs to be conducted to ensure that no further decline occurs. By providing this buffer zone stakeholders can increase connectivity and reduce fragmentation of biodiversity across the reserve. For management to succeed in achieving a NNR that aids climate change resilience, habitat connectivity, and increase in biodiversity, stakeholders will have to use methods other than reintroduction of species and naturalistic, wild grazing.

Involvement from private stakeholders and non-governmental orgainsations seek to promote positive public interactions by promoting ecotourism. By raising public awareness on threats to wildlife, the public will be more likely to aid in reducing activities that threaten biodiversity and connectivity of the site. With public involvement, stakeholders will be able to build on achieving the intended nature conservation outcomes of climate change resilience, habitat connectivity, and biodiversity goals. Climate resilience needs to be upheld to ensure that landscapes maintain a high-quality matrix that generates income that can be fed back into the management of the reserve [21]. This places an economic need for the intended nature conservation outcomes of super NNRs.

The role of ecosystem services can contribute to the effectiveness of management in producing nature conservation outcomes. Regulating services such as climate regulation, carbon storage, and flood risk management, Cultural services such as recreational activities, and supporting services such as biological diversity are all types of ecosystem services that habitats found within NNRs provide [2]. By incorporating the conservation of ecosystem services into landscape-scale management, stakeholders will be able to effectively increase reserve resilience to climate change and improve climate regulation.

If the management of the reserve is to be true in achieving its intended nature conservation outcomes, then the economy will need to align with the landscape in a way that provides a high-quality environment that generates income rather than trade-offs. There needs to be a shift in the anthropogenic use for nature moving away from an economic value to a landscape focus. If the landscape-scale

management of a reserve is to be for nature using rewilding techniques and natural restoration methods, then nature's needs must come first. The effectiveness of management on producing nature conservation outcomes within NNRs could prove to be successful if natural restorative techniques such as reintroduction of species and naturalist grazing are continuously monitored against a base line survey. Increases in biodiversity can be achieved through low level grazing across the reserve with buffer zones for sensitive areas threatened by grazing. The provision of ecosystem services within landscape-scale management can aid the outcome of climate change resilience by conserving habitats that contribute to regulating services. Overall, expanding and collaborating existing PAs to form super NNRs allows for a balance between all three nature conservation outcomes to be achieved with limited trade-offs. By focusing on increasing biodiversity, habitat connectivity, and climate resilience, all three outcomes interact with each other on an intrinsic level complimenting different restorative methods that benefit each intended outcome as well as providing cultural services.

4.2. Effectiveness of Management in Fulfilling Legislative Outcomes

Results suggest that adopting new landscape-scale management approaches may be effective in achieving nature conservation outcomes, yet management practices carried out by stakeholders will still need to be in line with nature conservation legislation.

Both SACs and SPAs are supported by the Joint Nature Conservation Committee (JNCC) that provide advice on designation and, to a lesser degree, management. These designations came about from the Habitat and Birds Directives established under Natura 2000. Nature 2000 sites often favor site conditions that share characteristics of an area that has been managed under extensive farmland practices [26]. These sites focus on protecting areas that are deemed as Favorable Conservation Status and use management techniques that keep them in this equilibrium. This differs to the intended nature conservation outcome of the Purbeck Heath rewilding plan which focuses on restoring ecological control to nature and enhance biodiversity. This could mean that where a habitat is considered favorable under Natura 2000, removing human involvement, and allowing natural successional processes to occur would remove this favorable status [25]. The new habitat would fit the intended outcomes of rewilding conservation but fail at fulfilling the legislation outcomes assigned under Natura 2000. For both intended outcomes to be fulfilled, it is proposed that the Natura 2000 framework be revised and amended to include rewilding initiatives that benefit biodiversity on a landscape-scale, but also ensure the protection of threatened species [26].

The application of a landscape-scale management plan on SACs and SPAs showed that native species, protected target species, and protected target habitat are likely to increase, suggesting that under the new management plan, SAC and SPA designated areas will continue to fulfill the intended nature conservation outcomes of the supporting legislation. The development of landscape-scale management can be effective in fulfilling the intended nature conservation outcomes for restoration and rewilding, along with keeping in line with legislation. This effect is promising especially given that climate change and invasive species are also set to increase. The fact that the model shows that grazing and recreational activities are also set to increase but SACs and SPAs within the Purbeck Heath will be able to function and support their intended specific target species and habitat outlined in the Habitats and Birds Directives is of importance, as it reaffirms the idea that the proposed management plan put forward by stakeholders will be effective in delivering beneficial nature conservation outcomes and support legislation.

Management activities that occur on SSSIs within NNRs owned by Natural England need to be approved by Natural England. Currently, of the five SSSIs found within the Purbeck Heath NNR reserve, only two have approximately 99% of PA assessed as meeting the condition of favorable or unfavorable recovering [18] [19]. Designed to support species of national importance, SSSI designation and legislation outcomes have the potential to partner with the intended nature conservation outcomes of the landscape-scale management as well as support the favourable characteristics of a SSSI with

ecosystem services, biodiversity, native species, habitat restoration, specific protected target species, and specific protected target habitat all likely to increase.

Ramsar sites are designated under the Ramsar Convention that protects Wetlands of International Importance [29]. The broad aim of the convention is to reduce the rate of habitat loss from Wetlands [30]. The management plan proposed does aid the reduction of habitat loss although it does not focus on protecting target flora and fauna but rather overall biodiversity across the reserve

The government's 25-Year Environment Plan outlines ways to develop a Nature Recovery Network (NRN) that provides 500,000 hectares of additional habitat to increase landscape connectivity [5]. The NRN focuses on producing nature conservation outcomes that focus on habitat connectivity and restoration on a landscape scale [5]. Landscape-scale management and restoration of NNRs compliments the intended outcomes of the government's 25-Year Environment Plan [5]. The effectiveness of the management of the reserve can aid the government in their ability to enforce the NRN that could prove to be effective. The Purbeck Heath NNR serves as a clear example of how government plans can be executed and implemented effectively. This policy change presents an important opportunity for conservation methods to be evaluated and assessed on their effectiveness on implementing a NRN [1].

4.3. How Legislation and Management Can Be Improved to Increase Protection of Designated Feature and Wider Biodiversity

The Convention on Biological Diversity (CBD) determines restoration efforts as a key tool in obtaining ecosystem services along with reducing the rate of biodiversity loss [13] [14]. As a party to this agreement, the UK has installed biodiversity action plans into their legislation framework to work towards reducing biodiversity loss [13]. The Purbeck Heath aims to produce effective conservation outcomes that benefit overall biodiversity highlighting how management used in partnership with legislation to inform decisions can create positive outcomes. The UK is contracted to this conference for the long-term development of conservation strategies. Reaching targets back in 2010, and furthering action plans for the target of 2050 is a promising factor [13]. With post-2020 targets reaching for 30% of the planet being protected through increased landscape connectivity by 2030 [15], there is a global pressure on the UK government to support the continuous improvement in protecting designated features and conservation of wider biodiversity goals. Landscape-scale management projects have a heightened pressure to perform well in achieving the intended nature conservation outcomes as they fall in line with the CBDs post-2020 targets. Conventions such as the CBD and Ramsar can be considered ambitious in their attempt to tackle biodiversity and climate change where they are already under-resourced and therefore their execution in achieving such targets may be lacking [15]. To ensure the long-term sustainability of management outcomes that protect designated features and succeed in achieving nature conservation outcomes, adequate funding needs to be supplied. By placing tools such as ecosystem services in biodiversity frameworks, policymakers and stakeholders can use environmental economic values as a strategic goal in improving nature conservation.

To ensure that the UK remains on track for contributing to the achievement of the CBDs post-2020 targets, the UK government have committed to protect 30% of the UK's land and sea by 2030. The focus of this framework is to assess how existing designated features can be improved to support intended outcomes and wider biodiversity rather than creating new PAs against failing ones [8]. For a designated features to be successful in the long-term, there are four points that legislation and management need to consider; (1) the area delivers for nature in the long term, (2) the area builds ecological resilience and improve biodiversity, (3) conservation outcomes are achieved through effective management and monitoring, and (4) that legislation and management are developed and delivered inclusively [8]. The proposed landscape-scale management plan is effective in securing the achievement of point two by implementing these targets through the intended nature conservation outcomes, but if this is to be a successful long-term project (1), then funds need to be set aside to assist in the continuous and in-depth monitoring of the site

(3), along with allowing management and legislation to be updated alongside each other to allow for continuous future improvements (4).

Non-governmental organisations involved in NNRs rely on membership admissions to help fund the management and monitoring of their sites, for private stakeholders, they rely on private and public funding and tourism to aid the management of their sites. With the UK having left the EU and agri-environmental schemes, funding that was once paid to PAs has been stopped or reduced [4]. With the lack of funding, the long-term success of NNRs is threatened. Moving forward, to ensure that management and supporting legislation is effective in producing nature conservation outcomes, financial schemes need to adopt a different approach that puts nature first. To replace EU agri-environmental schemes, innovation funds, nature recovery area funds, and Countryside Stewardship Facilitation funds have been set aside as part of the government's 25-Year Environment Plan [3]. Securing this financial support is vital to ensure that management is effective in producing the intended nature conservation outcomes within the next decade to ensure that the UK achieves its target of 30x30.

The 25-Year Environment Plan and Environment Act 2021 work together to achieve a NRN. The Environment Act 2021 defines environmental protection as the maintenance, restoration, or enhancement of the natural environment. This definition alone acts as a prompt for the continuous improvements for nature conservation management to be successful. The Act illustrates biodiversity metrics that measure the value of a habitat or habitat enhancement. Using this metric allows for an ecosystem service value to be placed on management tools that contribute to the biodiversity metric. Altering the economy to align with nature and the natural landscapes will improve the protection of designated features and wider biodiversity as it places an economic importance on conserving habitats such as the Purbeck Heath. Although this is a positive prospect of the Environment Act 2021, there is hesitation as to how the legislation may restrict or impact the desired. Landscape-scale management and intended outcomes rely on wild cattle grazing. Cattle are seen as domestic animals and therefore require registration under law. For wild grazing to occur across the whole reserve, locating the herd may be difficult to track, yet legislation is lacking in supporting the development and management of wild herds, something which the management of the Purbeck Heath is keen on. If the UK is aiming towards 30x30 and building a NRN, then supporting legislation will need to improve to aid the use of landscape-scale restoration techniques.

5. Conclusions

Landscape-scale management (like that of the Purbeck Heath NNR) is predicted to be successful in achieving the intended nature conservation outcomes of increasing landscape connectivity, climate resilience and overall biodiversity of NNRs by placing nature first. In doing this, the reserve can fulfil the legislation aims set out under the various PA designation of SPAs, SACs, SSSIs, and Ramsar sites. Super NNRs also contribute to the UK achieving the target of 30x30. Landscape-scale management has the potential to have a positive impact on overall biodiversity as well as designated features. Across all four PA designated features assessed, biodiversity is set to increase despite climate change also increasing. SSSIs and Ramsar sites are predicted to benefit the most under the landscape-scale management.

To reduce conflicts over whether to protect overall biodiversity or specific protected target species and habitat where the proposed management may threaten one of these features, substantial monitoring is needed to ensure that species that are legally protected are not lost to compromise for biodiversity growth. For effective monitoring to occur, it needs to be continuous and therefore suitable funding is needed to maintain the high-quality ecosystem health found within NNRs.

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