



BISON BENEFITS



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The Role of European Bison (*Bison bonasus*) as an Ecosystem Engineer and Their Value in Nature Recovery: A Review for Application in the UK

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This document should be read alongside the companion document, 'Introducing European bison (*Bison bonasus*) in the UK: Key Considerations, Challenges, and Best Practice Guidelines' (Rewilding Britain, 2025). Together, these reports present an evidence-based framework demonstrating how European bison can contribute to nature recovery, biodiversity enhancement, and climate resilience in the UK through carefully planned and collaboratively managed rewilding initiatives.

Executive summary

The European bison (*Bison bonasus*) is Europe's largest terrestrial mammal and a powerful symbol of nature recovery. Introducing bison through well-designed UK conservation grazing and rewilding projects can help restore ecological processes that have been absent for centuries. This offers a practical, nature-based contribution to addressing biodiversity loss, habitat degradation, and the growing need for climate resilience.

This report provides a comprehensive, evidence-based assessment of the ecological, cultural, and strategic value of rewilding with European bison in the UK. Drawing on published research, European case studies, and early outcomes from the Blean Bison Project in Kent (a partnership between Wildwood Trust and Kent Wildlife Trust), it examines bison as a keystone species and ecosystem engineer, and sets out the mechanisms through which they deliver measurable ecosystem services.

The report focuses on the benefits bison can provide across key ecosystem services, including:

- Enhancing biodiversity and biological abundance
- Improving habitat structure and dynamism
- Strengthening soil function and nutrient cycling
- Supporting carbon storage
- Reducing wildfire risk through fuel-load reduction
- Increasing ecosystem resilience to climate extremes
- Generating social value through education, engagement, and nature-based tourism

Bison drive these outcomes through natural behaviours such as browsing, debarking, trampling, and dustbathing. Together, these behaviours create shifting, heterogeneous habitat mosaics. They open vegetation structure, create microhabitats, and increase variation in soils, light conditions, and vegetation composition. In turn, this mosaic supports a wider range of species and ecological niches, enhances ecosystem functioning, and can improve resilience and recovery following disturbance. Each ecosystem service is considered in detail, drawing on the scientific literature alongside the author's first-hand field observations in the UK.

Key findings

- European bison create structurally diverse, heterogeneous habitat mosaics through their natural behaviours, enhancing biodiversity, increasing ecosystem dynamism, and stimulating nutrient cycling.
- Bison can support resilience to climate change by improving soil condition and carbon storage, reducing wildfire fuel loads, creating local refugia during extreme weather, and aiding post-disturbance recovery.

- By reducing uniform vegetation structure and encouraging heterogeneity, bison may help lower habitat susceptibility to the spread and impact of some invasive pests, pathogens, and diseases.
- Bison rewilding in the UK can generate cultural and economic benefits through public engagement, educational outreach, and nature-based tourism.
- Compared with domesticated livestock, bison provide distinct ecological functions and catalyse natural processes that are not readily replicated by domesticated proxies such as cattle or horses.
- UK landscapes, particularly lowland wood-pasture, open-canopy woodland, dunes, and heathland/grassland mosaics, can be well suited to bison rewilding where implemented under appropriate regulatory frameworks with robust monitoring and management.

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Introduction

The European bison (*Bison bonasus*) is a powerful flagship for species recovery and ecological restoration across Europe. As the continent's largest extant terrestrial mammal, it occupies a critical functional niche as a keystone species and ecosystem engineer (Cromsigt et al., 2017; Nickell et al., 2018; Trepel et al., 2024; The Global Rewilding Alliance, 2024). Historically widespread across temperate woodlands, wood-pastures, and mixed landscapes following the last glacial period, European bison experienced a dramatic contraction in range and population size due to habitat loss, overhunting, and anthropogenic landscape fragmentation (Kraśnińska and Kraśniński, 2013; Olech et al., 2022). By the early 20th century, the species was extinct in the wild, surviving only in captivity. A century of concerted conservation action has since led to a remarkable recovery, with reintroduction projects now re-establishing free-ranging herds across Europe (Kraśnińska and Kraśniński, 2013; Olech et al., 2022). The current population is estimated at over 9,500 free-roaming bison and more than 12,000 worldwide.

Interest in rewilding with European bison in the United Kingdom has grown significantly, driven by the species' demonstrated ability to initiate and sustain ecological processes that enhance biodiversity, promote habitat heterogeneity, and build ecosystem resilience (Gottlieb et al., 2024; Trepel et al., 2024; Rewilding Europe, 2023). Unlike domesticated grazers often used as proxies (for example, cattle, horses, pigs), bison exhibit complex behaviours such as debarking, extensive browsing and grazing, dustbathing, and trail creation that contribute uniquely to habitat dynamics (Cromsigt et al., 2017).

Natural England and other stakeholders have highlighted the need to understand what ecological value bison add beyond domestic species, and how they might contribute, alongside other large grazers and browsers, to restoring a diverse herbivore guild in Britain. This review synthesises current evidence from Europe, the UK, and North America (where relevant) to evaluate the ecological functions of European bison and support strategic planning for the wider use of large wild herbivores in UK nature recovery programmes.

1. Ecological benefits of rewilding with European bison

1.1 Keystone functions and ecosystem engineering

European bison are recognised as a keystone species due to their disproportionate influence on ecosystem structure and function relative to their biomass (Nickell et al., 2018; Trepel et al., 2024). Through selective grazing and browsing, trampling, debarking, and dustbathing, bison act as ecosystem engineers, maintaining a dynamic mosaic of habitats across the landscape (Cromsigt et al., 2017; Nieszala et al., 2022).

Their foraging behaviour promotes continuous vegetation heterogeneity by reducing the dominance of both herbaceous and woody species. This slows and periodically resets successional trajectories, helping to maintain open habitats that may shift location over time, as well as transitional ecotones between grassland, scrub, and woodland (Cromsigt et al., 2017). Mechanical impacts such as trampling and debarking further suppress undergrowth and increase light penetration. This facilitates the emergence of floristically rich understoreys supported by dormant seedbanks and seeds dispersed by large herbivores. Unlike domestic cattle or horses, bison actively debark trees year-round, creating standing deadwood that supports saproxylic invertebrates, fungi, and cavity-nesting birds (Valdés-Correcher et al., 2018; Cromsigt et al., 2017; Nieszala et al., 2022).

Dustbathing creates areas of bare soil and shallow depressions that may accumulate water to form ephemeral ponds. These temporary wetlands support amphibians, aquatic invertebrates, and early successional plants (Nickell et al., 2018; Thor et al., 2023). Even when dry, these patches provide valuable foraging areas for birds such as turtle doves (*Streptopelia turtur*) and offer microhabitats for thermophilic species, including sand lizards (*Lacerta agilis*) and psammophilous invertebrates. Together, these effects increase fine-scale heterogeneity and dynamism across the landscape (Nickell et al., 2018; Schwerk et al., 2021; Rewilding Europe, 2023).

Seasonal shedding of bison fur provides high-value nesting material for birds, improving hatching success, particularly in cooler climates (Rewilding Europe, 2023; Wisentproject Kraansvlak, 2019). By stripping bark, bison can initiate decay processes that lead to the formation of elongated, slit-like cavities. These non-excavated cavities provide important nesting habitats for species such as tits and nuthatches, thereby enhancing woodland biodiversity (Broughton et al., 2022).

Bison may, in certain settings, help reduce invasive plant dominance, for example by breaking up dense thickets of *Rhododendron ponticum* and trampling regrowth. This can provide a complementary, process-led alternative to chemical or mechanical vegetation management within rewilding projects (Cromsigt et al., 2017; Free Nature, 2025).

1.2 Enhanced biodiversity and trophic interactions

The introduction of European bison plays a pivotal role in enhancing biodiversity, increasing species abundance, and restoring complex trophic interactions within ecosystems (Svenning et al., 2024; Cromsigt et al., 2017; Thor et al., 2023). As large-bodied generalist herbivores, bison exert strong bottom-up effects on ecological communities through selective grazing, browsing, physical disturbance, seed dispersal, and nutrient redistribution (Gottlieb et al., 2024; Dănilă et al., 2022).

By altering vegetation structure bison create dynamic mosaics of habitat patches, characterised by varying vegetation heights, successional stages, and levels of disturbance (Trepel et al., 2024). This

spatial and temporal heterogeneity promotes the coexistence of species with diverse ecological requirements, leading to increased plant and faunal diversity (Gottlieb et al., 2024; Hobbs et al., 1996). A study in Bornholm, Denmark, demonstrated that European bison grazing increased understory plant species richness, particularly favouring grasses and early successional species (Schäfer, 2018).

Bison influence plant community dynamics not only by suppressing dominant competitive species through grazing and browsing, but also by promoting dispersal and colonisation processes (Jaroszewicz et al., 2009). They act as vectors for both endozoochory (internal seed dispersal via ingestion and defecation) and epizoochory (external dispersal through fur adhesion) (Thor et al., 2023; Schulze et al., 2014; Jaroszewicz et al., 2013). Collectively, these mechanisms can support connectivity across fragmented landscapes and promote vegetation resilience to drought, pests, and disease under changing conditions (Fricke et al., 2025).

Changes in vegetation structure initiated by bison can cascade through food webs, rebuilding the foundations of degraded trophic networks and supporting wider ecological recovery (Svenning et al., 2024; Cromsigt et al., 2018). Research from Poland has shown that sites with bison support greater species richness and altered functional traits in ground beetle (*Carabidae*) assemblages, reflecting increased microhabitat diversity and resource heterogeneity (Schwerk et al., 2021). These invertebrate responses can drive wider trophic cascades by increasing prey availability for insectivorous birds, bats, and other predators (Thor et al., 2023; Barber et al., 2019).

Wild European bison often show greater parasite resilience than captive-bred counterparts, reducing the need for veterinary anthelmintics, including avermectins. Reduced anthelmintic use limits environmental contamination and helps protect dung fauna, soil invertebrates, and overall soil health (Kołodziej-Sobocińska et al., 2018; Gałązka et al., 2023; Vokřál et al., 2023).

In addition to their direct trophic impacts, bison contribute substantially to ecosystem nutrient cycling (Schmitz et al., 2023). Their dung and urine inputs act as localised nutrient hotspots, stimulating microbial activity, enhancing soil fertility, and promoting primary productivity, particularly in nutrient-poor systems (Hobbs, 1996). Where carcasses occur naturally, they provide pulsed nutrient subsidies and support scavenger and decomposer communities, including foxes, raptors, and invertebrate decomposers (Melis et al., 2007; Risch et al., 2020; Van Klink et al., 2020).

The presence of bison dung in the landscape has been shown to support increased bryophyte diversity. Studies from the Białowieża Forest indicate that dung-enriched microsites create favourable conditions for many bryophyte species, likely due to elevated nutrient availability and moisture retention (Jaroszewicz et al., 2011). This highlights the role of bison not only in driving nutrient flows, but also in enhancing microhabitat diversity for sensitive and functionally important plant groups.

1.3 Habitat structure and soil ecological functions

European bison significantly influence habitat structure and soil processes through their foraging, trampling, and dustbathing behaviours, thereby enhancing ecological heterogeneity and supporting key ecosystem functions (Cromsigt et al., 2018; Ivanova et al., 2018).

Through selective browsing, debarking, and sapling trampling, bison regulate natural successional processes in open habitats and promote an ever-shifting mosaic of open grassland, regenerating scrub, and woodland patches (Gottlieb et al., 2024; Cromsigt et al., 2018). Long-term studies from rewilded reserves, such as Białowieża Forest in Poland, demonstrate that bison activity maintains trail networks, glades, and canopy openings, fostering diverse light regimes and microhabitats within otherwise closed-canopy systems (Kowalczyk et al., 2021; Putman et al., 2011).

Soil disturbance associated with bison activity plays a vital ecological role. Their trampling behaviour aerates and compacts the soil in a spatially heterogeneous manner, influencing water infiltration, seed germination, microsite formation, and nutrient cycling processes (Thor et al., 2023; Nickell et al., 2018). These dynamic disturbance regimes are largely absent in conventionally managed UK habitats, where their absence has contributed to the decline of disturbance-dependent species.

Of particular significance are dustbathing sites (shallow depressions created by bison) which can accumulate rainwater and function as ephemeral ponds. These temporary features offer critical refugia for invertebrates, reptiles, pioneering plants (Nickell et al., 2018), and potentially amphibians (Gerlanc et al., 2003), enhancing microhabitat diversity and moisture retention across the landscape.

The nutrient dynamics associated with bison contribute significantly to habitat complexity. Dung and urine create nutrient-rich patches that stimulate localised plant productivity, enhance soil microbial activity, and increase nutrient heterogeneity across the landscape (Vlasakker et al., 2014; Hobbs, 1996; Hawkins et al., 2022). Studies of American bison (*Bison bison*) in prairie ecosystems, which provide useful functional parallels for temperate systems, have shown that dustbathing sites can remain hotspots of plant diversity and soil nutrient availability for decades after formation. These findings suggest the potential for similarly long-lasting ecological benefits in European bison landscapes (Nickell et al., 2018; Ratajczak et al., 2022).

By influencing vegetation dynamics, soil structure, and hydrological processes, bison serve as foundational drivers of ecosystem resilience. Their engineering behaviours enhance spatial and temporal heterogeneity (Trepel et al., 2024), strengthen resilience to climatic extremes, and promote the self-organisation of dynamic, semi-natural habitats (Cromsigt et al., 2017).

Observations from the Blean Bison Project

On the hottest day of 2022, the matriarch of the Blean Bison herd stepped calmly from the corral into the woodland, becoming the first free-roaming bison in modern Britain. While the release received extensive international media coverage, she remained focused and instinct-driven, scanning her surroundings before calling the rest of the herd to follow. Within minutes, they disappeared into the silver birch thickets, quietly beginning the transformation of the woodland ecosystem.

The herd quickly demonstrated their capacity to reshape the landscape. Rangers observed newly formed trails through dense undergrowth, trees debarked and used as rubbing posts, extensive bracken trampled and the dense litter layer mulched, creating a more open, structurally diverse woodland mosaic.

Unexpected behaviours soon emerged. Rangers observed the bison sampling and debarking *Taxus baccata* (yew), a highly toxic plant, raising intriguing questions around self-medication, particularly as a drop in parasite load was observed in faecal samples. The bison were also seen thrashing and trampling *Rhododendron ponticum*, a highly invasive non-native species (INNS), which may also offer benefits as a natural insect repellent.

Wildlife interactions revealed complex ecological interactions not observed in domesticated herbivores. Bison carefully avoided active wood ant nests, while the trails they created were used by foxes, rabbits, and sun-basking slow worms. Jackdaws and robins followed the herd to catch disturbed invertebrates, while pied wagtails took advantage of resting animals to snatch flies from the airspace close to their faces as the herd ruminated. These interactions suggest that the bison's keystone role extends well beyond vegetation structure, influencing multiple trophic levels and species guilds.

Socially, the herd demonstrated cohesive group dynamics. The matriarch acted as a behavioural anchor, providing calm leadership and social stability. The bull, initially withdrawn and anxious, gained confidence through the protection and support of the herd. Seven healthy calves have now been born and raised in the woodland, each a genetically valuable individual contributing to the long-term restoration of the species in the UK and beyond.

Subtle yet powerful signs of ecosystem recovery continue to emerge after four years, including seeds and fungi germinating from dung, birds lining nests with bison fur, and seedlings sprouting in disturbed bracken mulch. Coppicing effects are visible where trees have been debarked. These observations reinforce that rewilding is not simply about species reintroduction, but about restoring

natural processes, complexity, and ecological self-regulation. The bison are active agents in this recovery, catalysing dynamic change through their behaviour and interactions.

Bison Impact



Bison debark trees through feeding and rubbing. This natural behaviour creates standing deadwood and cavity habitats, benefiting bats, fungi, invertebrates, and cavity-nesting birds.



Bison open up dense vegetation, creating natural trails and glades that provide valuable edge habitat, increase structural diversity, improve light penetration, and support a wide range of species.



Bison rubbing behaviour often leads to ringbarking, initiating tree death and decay processes that contribute to structural heterogeneity and biodiversity within woodlands.



Bison dust bathing exposes bare soil, promoting pioneer species and offering important basking habitat for reptiles and invertebrates.



Bison contribute to seed dispersal through their dung, fur, and hooves, helping native plants colonise new areas and enhancing plant diversity.



As large herbivores, bison play a role in ecological restoration by physically damaging invasive plant stands, reducing their spread and fostering more balanced plant communities.



Bison influence vegetation-soil-microbe dynamics in ways that enhance ecosystem carbon sequestration, particularly through increased soil carbon retention and structural diversity.



The seasonal shedding of bison fur offers soft, insulating material that birds incorporate into their nests, improving hatching success.



The introduction of European bison plays a pivotal role in enhancing biodiversity, increasing species abundance, and restoring complex trophic interactions within ecosystems.



Bison carcasses act as nutrient hotspots enriching the soil and sustaining scavenger and decomposer communities such as foxes, birds of prey, and saproxylic invertebrates.



Bison promote habitat diversity, which in turn strengthens ecosystem resilience to climate-related stresses such as drought, flooding, and temperature extremes.



Bison act as powerful ambassadors for nature recovery. Their presence in rewilding landscapes encourages public visitation, well-being, outdoor learning, and support for conservation.

2. Climate change mitigation and adaptation

The introduction of European bison can play a significant role in supporting climate change mitigation and adaptation strategies by enhancing carbon sequestration, reducing wildfire risk and potential intensity, and promoting ecosystem resilience (Schmitz et al., 2023; Rouet-Leduc et al., 2021).

2.1 Carbon sequestration and storage

Large herbivores can influence carbon sequestration by altering how carbon moves through vegetation into soils (The Global Rewilding Alliance, 2024). By maintaining shifting mosaics of open canopy, regeneration patches, scrub and herb-rich ground layers, bison can promote repeated phases of active plant growth and increase below-ground carbon inputs in parts of the landscape. These inputs arise not only from greater root biomass, but from fine-root turnover and root exudates, which are key pathways by which recently fixed carbon enters soil microbial pathways and can become stabilised as longer-lived soil organic matter (Pringle et al., 2023).

Grazing, browsing, and trampling redistribute carbon and nutrients through dung and urine deposition, creating localised hotspots of productivity and microbial activity. Over time, these patchy inputs and disturbances can enhance soil structure (for example, aggregation) and support mechanisms that retain carbon within soils. A further mechanism may operate via soil fauna. Evidence from North American tallgrass prairie shows that earthworm communities respond strongly to bison dung pats, concentrating biological activity and organic inputs into the soil profile (James, 1992; Ivanova et al., 2018). As with other grazing-driven processes, the direction and magnitude of these effects depend on grazing intensity, habitat type, and baseline vegetation structure. Outcomes are therefore most likely to be positive where bison densities and management objectives maintain habitat heterogeneity without chronically suppressing vegetation recovery.

A modelling study in the Southern Carpathians estimated that a population of approximately 170 bison across 300 km² could increase carbon sequestration by around 54,000 tonnes of CO₂ per year compared to ungrazed systems (Rizzuto et al., 2024). This supports the broader principle that large herbivores can influence ecosystem carbon cycling by altering vegetation-soil-microbe interactions and shifting carbon into more persistent soil pools.

Where bison reduce the need for repeated mechanical interventions, such as scrub cutting or clearance, there may be associated reductions in emissions and carbon losses linked to those activities. Carbon accounting guidance for habitat management notes that clearance can carry measurable carbon costs, strengthening the case for maintaining open structure through ecological processes where appropriate (Anderson, 2024).

2.2 Wildfire risk reduction

Increasing frequency and intensity of wildfires pose major threats under climate change scenarios. European bison contribute to natural wildfire mitigation by reducing fuel loads through grazing, trampling, and suppressing shrub encroachment (Rouet-Leduc et al., 2021).

A systematic review under the GrazeLIFE project concluded that large herbivore grazing is an effective nature-based solution to managing wildfire risks across Europe (Rouet-Leduc et al., 2021; GrazeLife, 2021). Bison create natural firebreaks through trail formation and patch disturbance, reducing fire continuity and aiding fire suppression efforts (Cromsigt et al., 2017).

2.3 Enhancing ecosystem resilience

By maintaining habitat heterogeneity, European bison can support landscape-scale resilience to climate extremes and climate change impacts. Through grazing, browsing, trampling and other disturbance behaviours, bison create a shifting mosaic of microhabitats and successional stages that provides refugia and recolonisation opportunities following drought, heat and other disturbances. For example, dustbathing sites create patches of bare or sparsely vegetated ground that support pioneer plants and provide warm, open microhabitats used by reptiles and burrowing invertebrates (Nickell et al., 2018; Thor et al., 2023). In addition, bison-mediated seed dispersal can facilitate plant migration and recolonisation after disturbance, supporting natural recovery processes (Thor et al., 2023; Jaroszewicz et al., 2013; Fricke et al., 2025).

At broader scales, mosaics shaped by bison and reduced monoculture structure may lower vulnerability to climate-driven stressors, such as pest outbreaks, invasive dominance, and extreme-weather impacts, by increasing structural and functional diversity across the landscape. In this way, bison can act as ecosystem stabilisers, buffering environmental variability and supporting long-term ecological resilience.

Observations from the Blean Bison Project

In the Blean, bison have enhanced woodland structure by creating natural, dynamic rides and glades, increasing light penetration to the forest floor and stimulating diverse ground flora. These structural changes are consistent with mechanisms that can increase below-ground carbon inputs and support soil carbon storage.

Bison dung supports nutrient cycling and below-ground biodiversity, with dung beetle activity accelerating decomposition and enhancing microbial function. Their dustbathing behaviour creates

bare patches that serve as microhabitats for reptiles, invertebrates, and regenerating plants, contributing to overall landscape heterogeneity.

Collectively, these behaviours illustrate how bison support both carbon cycling and climate resilience through ecological disturbance, structural diversification, and the restoration of dynamic, self-regulating habitats.



3. Social, cultural, and economic benefits of rewilding with European bison

The release of European bison offers not only ecological advantages but also measurable social, cultural, and economic benefits, particularly in regions undergoing land-use change or seeking nature-based economic regeneration (Tusznio et al., 2024; Zélie et al., 2025).

3.1 Social and educational value

As a charismatic megafaunal species, the European bison serves as a powerful focal point for public engagement with nature recovery. Their presence in rewilding landscapes fosters increased visitation, well-being, nature-based learning, and positive attitudes toward conservation (Klich et al., 2018; Hertel et al., 2023; Vasile et al., 2021). In the UK, the Blean Bison Project in Kent has demonstrated increased community interest, media attention, and opportunities for volunteer involvement, enhancing local ownership of rewilding initiatives (Kent Wildlife Trust, 2023).

Bison releases provide opportunities for educational outreach at multiple levels, from school curricula to university-level research partnerships. Their visible ecological impacts serve as accessible case studies in ecosystem engineering, trophic interactions, and landscape restoration. Interpretive infrastructure (e.g., hides, trails, signage) can be designed to support both biodiversity objectives and public engagement.

Beyond their ecological role, the story of the European bison offers a compelling narrative of recovery and resilience that resonates with communities witnessing ongoing environmental challenges. It underscores the importance of ex situ conservation, demonstrating how functional breeding populations maintained in zoological collections have played a pivotal role in the species' survival (Krasińska and Krasiński, 2013). Today, the bison is widely regarded as a symbol of hope, ecological renewal, and a reconnection with a wilder, more natural past. In the UK, this renewed interest is exemplified by projects like the Blean Bison Project, which not only aim to restore biodiverse ecosystems but also to cultivate a strong sense of community pride and participation in nature recovery.

3.2 Cultural significance

The bison holds cultural resonance across Europe as a symbol of wilderness and resilience. Their return represents a reconnection with broader European ecological heritage (Krasińska and Krasiński, 2013; Rewilding Europe, 2023). Indigenous large herbivores played a formative role in shaping pre-modern British landscapes (Søndergaard et al., 2025) and the introduction of bison can be viewed as part of a deeper cultural restoration of landscape processes lost since the Holocene.

Narratives of ecological renewal centred on bison can be powerful tools for building public support for rewilding. Storytelling that links ecological functions to cultural identity has been effective in other rewilding contexts and can strengthen the social licence for future projects (Kraśńska and Kraśński, 2013).

3.3 Economic opportunities

Rewilding with bison has the potential to generate significant economic returns through ecotourism, nature-based enterprise, and reduced land management costs (Rewilding Romania, 2024). Sites hosting bison reintroductions in the Netherlands and Poland have reported increases in tourism, including guided wildlife watching, photography, and associated hospitality revenue (Rewilding Europe, 2023; Wisentproject Kraansvlak, 2017). These gains often extend to peripheral businesses, contributing to rural economic diversification.

Evidence from UK rewilding projects suggests that nature recovery can create and diversify employment, rather than diminish it. Rewilding Britain's analysis of 33 rewilding projects in England found that full-time equivalent jobs increased by 54%, rising from 173 to 267 since rewilding began. Over the same period, volunteering opportunities rose thirteenfold (from 61 to 810), with roles spanning education, nature-based tourism, ecology and monitoring, events, and land management (Rewilding Britain and Conservation Capital, 2021). A complementary survey across 23 rewilding sites similarly reported a 47% increase in full-time equivalent jobs (from 151 to 222) over an average of ten years, with many new posts linked to restoration activity, visitor engagement, and livestock management within more nature-led systems (Rewilding Britain and Conservation Capital, 2021).

By replacing some mechanical or chemical vegetation management with natural processes, bison can reduce long-term management expenditure in certain habitat types (e.g., lowland wood-pasture, heathlands). This aligns with nature-based solutions frameworks, where ecosystem services provide both ecological and financial returns. Moreover, it reduces dependence on fossil fuels and agrochemicals (e.g., glyphosate used in stump treatment) thereby contributing to more sustainable land management practices.

Observations from the Blean Bison Project

Since their release, the bison in the Blean have become a powerful stimulus for public engagement, education, and local pride. The project has attracted widespread national and international media attention and sparked significant community interest drawing thousands of visitors and generating opportunities for guided walks, volunteering, school visits, and academic

research. The herd's visible impact on the woodland has made complex ecological processes accessible and engaging for a wide range of audiences.

Their story of extinction in the wild, recovery, and return has resonated deeply with the public, positioning the bison not only as a keystone species but also as a symbol of ecological hope and resilience. The presence of these iconic animals just a few miles from Canterbury has challenged perceptions of what is possible in UK conservation and brought nature recovery into everyday conversation.

Most importantly, the project has fostered a strong sense of local ownership. Community members, from schoolchildren to landowners, have actively participated in the rewilding journey, demonstrating that successful bison introductions are not only ecologically transformative, but also socially inclusive and culturally meaningful.

4. Genealogy, pedigree management, and the role of wild animals vs. domestic proxies

The European bison is a conservation-dependent species with a complex genealogical history. All extant individuals are descended from a small founder population of just 12 animals, creating a genetic bottleneck that necessitates pedigree management to maintain genetic diversity and minimise inbreeding (Massilani et al., 2016; Krasieńska and Krasieński, 2013).

4.1 Historical context and relevance to the UK

Although there is no definitive evidence that European bison inhabited the British Isles during the Holocene, their deep evolutionary lineage makes them highly relevant to the UK's natural history and ecological restoration ambitions.

Paleogenomic research reveals that *Bison bonasus* originated through hybridisation between the steppe bison (*Bison priscus*) and the aurochs (*Bos primigenius*) over 120,000 years ago (Soubrier et al., 2016). Steppe bison were widespread across Eurasia, including Pleistocene Britain, while aurochs remained present in Britain until at least the Bronze Age. The emergence of European bison from these ancestral species highlights a shared evolutionary and ecological heritage.

Pleistocene megafauna such as steppe bison and aurochs played a foundational role in shaping prehistoric British ecosystems. Through browsing, trampling, and nutrient redistribution, they maintained dynamic, structurally diverse wood-pasture mosaics. Their extinction left a long-standing gap in trophic interactions and natural disturbance regimes across the landscape.

The extinct woodland bison (*Bison schoetensacki*), a close relative and possible sister species to *Bison bonasus*, further strengthens the case for functional relevance. Genetic analyses suggest this forest-adapted bison inhabited temperate woodlands across Western Europe, including parts of Britain (Palacio et al., 2017; Sorbelli et al., 2021), indicating a precedent for bison-like herbivores in these ecosystems.

Britain's fossil record is fragmentary and often lacks the taxonomic resolution provided by modern genetic tools. Fossil evidence historically attributed to aurochs or steppe bison may obscure the presence of *Bison bonasus* or its close relatives, particularly during periods of ecological transition.

In this context, the introduction of European bison to Britain should not be viewed as the return of a precisely native species, but as a scientifically grounded case of functional 'ecological replacement' (Defra, 2021). Their introduction revives essential processes that have been missing for millennia, and supports broader ambitions to restore biodiversity, ecosystem resilience, and dynamic, self-regulating landscapes.

4.2 Genealogical structure and conservation breeding

Two genetically distinct lines exist: the Lowland line (Białowieża), derived primarily from the nominate subspecies (*B. b. bonasus*), and the Lowland-Caucasian line, which includes contributions from the extinct Caucasian bison (*B. b. caucasicus*) (Machová et al., 2022; Olech et al., 2022). These lines are maintained separately within ex situ and in situ populations through the International European Bison Studbook (IEBS), first established in 1947 and now maintained by the European Bison Friends Society (EBFS) under the patronage of the IUCN SSC Bison Specialist Group (Raczyński et al., 2024; IUCN, 2020).

All bison translocations within Europe are managed under the European Association of Zoos and Aquaria Ex-situ Programme (EEP) and the European Bison Conservation Centre (EBCC), which ensures genetically informed breeding and release strategies. Best practice dictates that only bison with known and verified lineage, and free from deleterious hybridisation, be used in introductions (IUCN SSC Bison Specialist Group; Vlasakker et al., 2014).

4.3 Ecological distinctiveness and functional role

Despite their limited genetic base, European bison have retained a broad ecological niche as mixed feeders, displaying behavioural and foraging traits distinct from domesticated proxies such as cattle or horses. Unlike domestic breeds, bison exhibit year-round debarking, extensive grazing and browsing,

and dustbathing behaviours that drive habitat heterogeneity and ecological feedback loops (Cromsigt et al., 2017; Kowalczyk et al., 2021).

Comparative studies suggest that domestic proxies, while useful in targeted conservation grazing, do not fully replicate the ecosystem engineering functions of wild bison (Gordon et al., 2021; Monk et al., 2024). Key differences include their ecological impacts, predator awareness, breeding independence, natural social structures and reduced need for intensive management. The argument for wild herbivore introductions is thus grounded in their role in restoring ecological functionality (Jepson, 2025; Vera and Hitchmough, 2002).

4.4 Relevance to UK rewilding contexts

The UK lacks any surviving native mega-herbivores capable of delivering the ecological processes once provided by steppe bison, aurochs or elk (*Alces alces*). While semi-feral breeds of domesticated species have great value in conservation management (Monk et al., 2024), the additional release of truly wild species such as bison offers a restoration of missing trophic functions and ecosystem dynamics. Models of diverse large herbivore communities show that mixed grazing assemblages generate richer structural heterogeneity and more resilient ecosystems.

Incorporating bison into UK rewilding projects requires robust genetic screening, compliance with EEP and IUCN translocation protocols, and close collaboration with breeding institutions. Such measures ensure that wild individuals contribute to both species conservation and ecological restoration.

Observations from the Blean Bison Project

The Blean herd was selected from EEP-registered populations to ensure known lineage, genetic integrity, and suitability for free-ranging conditions. All individuals underwent robust health screening, quarantine, and behavioural assessment prior to release. Their successful adaptation to a semi-natural UK landscape underlines the value of sourcing animals that are both genetically appropriate and behaviourally suited to the setting.

Within hours of release, the bison expressed key wild behaviours, including trail creation, tree debarking, browsing, and dustbathing, initiating immediate changes to vegetation structure and habitat complexity. These behaviours are rarely seen in domesticated proxies and highlight the distinct ecological functions bison can provide.

Socially, the herd showed strong cohesion and minimal reliance on human intervention. The matriarch acted as a stabilising presence, reinforcing the importance of intact social structures in large wild ungulates.

Overall, the project demonstrates that European bison are functionally and behaviourally distinct from domestic grazers and can thrive in well-managed UK rewilding contexts. The Blean experience shows that the strongest ecological outcomes are achieved when conservation genetics, animal welfare, and the expression of natural behaviour are embedded in project design.

5. UK application and habitat suitability

This chapter considers where European bison could be most effective in UK landscapes and which habitat types are most likely to benefit. Building on the historical context set out in Chapter 4, it focuses on habitat suitability and the practical application of bison as a functional ecological replacement, particularly within lowland wood-pasture and other structurally diverse systems.

5.1 Current UK initiatives

The Blean Bison Project in Kent represents the first release of European bison in the UK into a conservation grazing or rewilding project. A partnership between Wildwood Trust and Kent Wildlife Trust, the project introduced a small herd of Lowland-Caucasian line bison into a fenced semi-natural woodland to assess their ecological impacts and welfare under UK conditions (Wildwood Trust, 2025; Kent Wildlife Trust, 2023). Initial results indicate positive effects on vegetation structure, habitat diversity, and public engagement.

The project follows international best practice, including compliance with EEP pedigree standards, veterinary health protocols, stakeholder consultation, long-term ecological monitoring and IUCN guidelines. The Blean Project serves as a pilot model for future rewilding initiatives and demonstrates the feasibility of introducing bison in carefully selected managed landscapes.

5.2 Habitat suitability in the UK

Many UK habitats, particularly in the lowlands, offer ecological conditions suitable for European bison. These include:

- Ancient and secondary wood-pasture systems
- Lowland heathlands and open-canopy oak-birch woodlands
- Grassland mosaics with scrub encroachment
- Dune systems

Bison are adaptable and demonstrate seasonal shifts in habitat preference, using wooded areas for cover in winter and open habitats for foraging during spring and summer (Łopucki et al., 2023;

Pedersen et al., 2019). Their presence can help manage scrub dynamics, reduce the need for mechanical intervention, and maintain complex edge habitats (Van Klink et al., 2016; Crooms et al., 2017). Their foraging is characterised by relatively low selectivity, enabling them to exploit a wide variety of plant species and contribute to structural and botanical diversity within ecosystems (Filella et al., 2024; Zielke et al., 2019).

5.3 Complementarity with other herbivores

Rewilding with large herbivores is most effective when it is framed as restoring a guild of complementary ecological functions, rather than selecting a single “best” grazer. Where conditions allow, bison alongside cattle, equids (for example ponies), wild boar, and native deer can collectively deliver a broader and more resilient set of processes than any one species alone.

Bison are likely to be most effective as part of a multi-species assemblage because different herbivores contribute distinct foraging behaviours, dietary preferences, and disturbance patterns. When present at appropriate densities and guided by site objectives, these interactions can amplify habitat heterogeneity and ecological complexity. In general:

- Cattle can reduce grass dominance, promote a richer forb component, and maintain structurally varied swards that support diverse invertebrate communities and associated taxa, particularly at appropriate stocking levels.
- Equids often graze selectively and can help maintain open structure, particularly within heathland and semi-natural grassland mosaics, for example through the creation of short-grazed lawns and patchiness.
- Wild boar disturb soils through rooting and foraging, influencing nutrient cycling, seedbed creation, and regeneration dynamics, with outcomes strongly dependent on-site conditions and sensitivity.
- Native deer contribute browsing and grazing pressure across woodland and open habitats, shaping woodland structure and scrub dynamics and influencing landscape-scale heterogeneity, particularly where densities are balanced with regeneration objectives.

Within such guilds, bison add distinctive functions, including debarking, rubbing and tree damage, trail formation, and dustbathing or wallow creation, which are not readily replicated by domestic livestock or other wild herbivores. Mixed-herbivore systems can therefore restore a fuller spectrum of complementary disturbance and foraging processes, more closely approximating the functional diversity of historic grazing guilds (Vermeulen et al., 2015; Bergfeld et al., 2024). Where mixed-herbivore assemblages are not feasible, bison may still deliver significant benefits, but outcomes are likely to be narrower and more management-dependent.

6. Conclusion

European bison (*Bison bonasus*) offer a compelling, evidence-based tool for restoring ecological processes that underpin biodiversity, habitat quality, and resilience in the UK. As a keystone species and ecosystem engineer, bison deliver a distinctive suite of impacts that are difficult to replicate with domesticated livestock alone. Through grazing and browsing, trampling, trail formation, debarking, and dustbathing, they generate the repeated disturbance and heterogeneity that many depleted landscapes now lack.

Evidence from rewilding projects across Europe, alongside early outcomes from the Blean Bison Project in Kent, indicates that bison can restore lost ecosystem functions and help shift habitats towards more dynamic, structurally complex states. These changes support richer communities of plants and invertebrates, strengthen nutrient cycling and soil function, and can reduce reliance on intensive, ongoing mechanical interventions in some settings. In parallel, bison can contribute to climate adaptation through the creation of habitat mosaics and refugia, potential reductions in wildfire fuel loads, and influences on carbon cycling that depend on habitat context and management objectives.

Beyond ecology, bison can act as catalysts for wider nature recovery by engaging people. Their presence can increase public interest and learning, support research and monitoring partnerships, and generate economic opportunities through nature-based tourism and local enterprise, strengthening the social licence for long-term restoration. In doing so, bison rewilding aligns strongly with the UK's direction of travel on nature recovery by helping deliver measurable improvements in ecosystem condition and resilience.

Overall, the evidence reviewed in this report supports European bison as a high-impact addition to the UK nature recovery toolkit, particularly in landscapes capable of supporting shifting mosaics such as lowland wood-pasture and open-canopy woodland systems. Where introduced through well-designed projects with robust welfare, monitoring, and adaptive management, bison can help restore the processes that create biodiversity, complexity, and resilience, bringing recovering landscapes to life through nature's own engineering.



7. Reference list

Anderson, P. (2024). Carbon in ecosystems - management, restoration and creation for carbon capture. *The Chartered Institute of Ecology and Environmental Management*. Available at: <https://cieem.net/wp-content/uploads/2024/05/CIEEM-Carbon-and-Habitats-May-2024-1.pdf> (Accessed January 2026).

Barber, N.A., Hosler, S.C., Whiston, P. and Jones, H.P. (2019). Initial responses of dung beetle communities to bison reintroduction in restored and remnant tallgrass prairie. *Natural Areas Journal*, 39(4), pp. 420-428. Available at: <https://doi.org/10.3375/043.039.0405> (Accessed January 2026).

Bergfeld, A. and De Maat, S. (2024). European bison and Scottish highlander: the differences and their shared task in the dunes. *Nature Today*. Available at: <https://www.naturetoday.com/intl/nl/nature-reports/message/?msg=32762> (Accessed January 2026).

Broughton, R.K., Karpińska, O., Kamionka-Kanclerska, K. and Maziarz, M. (2022). Do large herbivores have an important role in initiating tree cavities used by hole-nesting birds in European forests? *Acta Ornithologica*, 57(1), pp. 107-121. Available at: <https://doi.org/10.3161/00016454AO2022.57.1.007> (Accessed January 2026).

Cromsigt, J.P.G.M., Kemp, Y.J.M., Rodriguez, E. and Kivit, H. (2017). Rewilding Europe's large grazer community: how functionally diverse are the diets of European bison, cattle, and horses? *Restoration Ecology*, 26(5), pp. 890-900. Available at: <https://doi.org/10.1111/rec.12661> (Accessed January 2026).

Cromsigt, J.P.G.M., te Beest, M., Kerley, G.I.H., Landman, M. et al. (2018). Trophic rewilding as a climate change mitigation strategy? *Philosophical Transactions of the Royal Society B*, 373(1761), 20170440. Available at: <https://doi.org/10.1098/rstb.2017.0440> (Accessed January 2026).

Dănilă, G., Cătănoiu, S., Simioniuc, V. and Roșca, S. (2022). The reintroduction analysis of European bison in the north of Romania and the identification of the most favourable locations. *Forests*, 13(6), 920. Available at: <https://doi.org/10.3390/f13060920> (Accessed January 2026).

Defra (2021). Reintroductions and other conservation translocations: code and guidance for England. Available at: https://assets.publishing.service.gov.uk/media/66fd6a1430536cb927482b2d/Reintroductions_and_other_conservation_translocations_code_and_guidance_for_England_v1.2.pdf (Accessed January 2026).

Filella, J.B., Morán, F., Kemp, Y.J.M. et al. (2024). Diet comparison between sympatric European bison, red deer and fallow deer in a Mediterranean landscape. *Biodiversity and Conservation*, 33, pp. 1775-1791. Available at: <https://doi.org/10.1007/s10531-024-02832-x> (Accessed January 2026).

Free Nature (2025). European bison. Available at: <https://www.freenature.nl/en/about-free/natural-grazing/soorten-grazers/european-bison> (Accessed January 2026).

Fricke, E.C., Bello, C., Chaplin-Kramer, R. et al. (2025). Drivers and impacts of global seed disperser decline. *Nature Reviews Biodiversity*. Available at: <https://doi.org/10.1038/s44358-025-00053-w> (Accessed January 2026).

Gałązka, M., Klich, D., Filip-Hutsch, K., Olech, W., Anusz, K. and Pyziel, A.M. (2023). Endoparasite loads and the efficacy of conventional anthelmintics against gastrointestinal nematodes in captive European bison. *International Journal for Parasitology: Parasites and Wildlife*, 21, pp. 224-231. Available at: <https://doi.org/10.1016/j.ijppaw.2023.06.005> (Accessed January 2026).

Gerlanc, N. and Kaufman, G. (2003). Use of bison wallows by anurans on Konza Prairie. *The American Midland Naturalist*, 150(1), pp. 158-168. Available at: <https://www.semanticscholar.org/paper/Use-of-Bison-Wallows-by-Anurans-on-Konza-Prairie-Gerlanc-Kaufman/2a774ed0496ee8c5bc2b56ccdf832049a3b8d75b> (Accessed January 2026).

Gordon, I.J., Manning, A.D., Navarro, M.L. and Rouet-Leduc, J. (2021). Domestic livestock and rewilding: are they mutually exclusive? *Frontiers in Sustainable Food Systems*, 5, 550410. Available at: <https://doi.org/10.3389/fsufs.2021.550410> (Accessed January 2026).

Gottlieb, L., Schäfer, B.A. and Buttenschön, R.M. (2024). European bison (*Bison bonasus*) increase plant species richness in forest habitats. *Forest Ecology and Management*, 561, 121891. Available at: <https://doi.org/10.1016/j.foreco.2024.121891> (Accessed January 2026).

GrazeLife (2021). New study finds large herbivores can reduce wildfire risk. Available at: <https://grazelife.com/news/new-study-finds-large-herbivores-can-reduce-wildfire-risk/> (Accessed January 2026).

Hawkins, J.H. and Zeglin, L.H. (2022). Microbial dispersal, including bison dung-vectored dispersal, increases soil microbial diversity in a grassland ecosystem. *Frontiers in Microbiology*, 13, 825193. Available at: <https://doi.org/10.3389/fmicb.2022.825193> (Accessed January 2026).

Hertel, S.W. and Luther, D. (2023). The role of social and political factors in the success of rewilding projects. *Frontiers in Conservation Science*, 4, 1205380. Available at: <https://doi.org/10.3389/fcsc.2023.1205380> (Accessed January 2026).

Hobbs, N.T. (1996). Modification of ecosystems by ungulates. *Journal of Wildlife Management*, 60, pp. 695-713. Available at: <http://www.jstor.org/stable/3802368> (Accessed January 2026).

IUCN (2020). European bison recovering, 31 species declared extinct - IUCN Red List. Available at: <https://iucn.org/news/species/202012/european-bison-recovering-31-species-declared-extinct-iucn-red-list> (Accessed January 2026).

IUCN SSC Bison Specialist Group. Available at: <https://iucn.org/our-union/commissions/group/iucn-ssc-bison-specialist-group> (Accessed January 2026).

IUCN SSC (2013). Guidelines for reintroductions and other conservation translocations. Available at: <https://portals.iucn.org/library/sites/library/files/documents/2013-009.pdf> (Accessed January 2026).

Ivanova, N., Smirnov, V., Khanina, L. and Bobrovsky, M. (2018). Changes in vegetation and earthworm populations under free-grazing European bison in broad-leaved forests of the Kaluzhskie Zaseki State Nature Reserve. *Biology Bulletin*, 45(1). Available at: <https://doi.org/10.1134/S1062359018010053> (Accessed January 2026).

James, S.W. (1992). Localized dynamics of earthworm populations in relation to bison dung in north American tallgrass prairie. *Soil Biology and Biochemistry*, 24(12), pp. 1471-1476. Available at: [https://doi.org/10.1016/0038-0717\(92\)90135-K](https://doi.org/10.1016/0038-0717(92)90135-K) (Accessed January 2026).

Jaroszewicz, B., Pirożnikow, E. and Sagehorn, R. (2009). Endozoochory by European bison (*Bison bonasus*) in Białowieża Primeval Forest across a management gradient. *Forest Ecology and Management*, 258(1), pp. 11-17. Available at: <https://doi.org/10.1016/j.foreco.2009.03.040> (Accessed January 2026).

Jaroszewicz, B., Sondej, I., Stebel, A., Pirożnikow, E. and Kwiatkowska-Falińska, A.J. (2011). Biodiversity of bryophytes growing on the faeces of ungulates: a case study from north-eastern Poland. *Cryptogamie, Bryologie*, 32(3), pp. 221-231. Available at: <https://doi.org/10.7872/cryb.v32.iss3.2011.221> (Accessed January 2026).

Jaroszewicz, B. (2013). Endozoochory by European bison influences the build-up of the soil seed bank in subcontinental coniferous forest. *European Journal of Forest Research*, 132(3). Available at: <https://doi.org/10.1007/s10342-013-0683-4> (Accessed January 2026).

Jaroszewicz, B., Pirożnikow, E. and Sondej, I. (2013). Endozoochory by the guild of ungulates in Europe's primeval forest. *Forest Ecology and Management*, 305, pp. 21-28. Available at: <https://doi.org/10.1016/j.foreco.2013.05.004> (Accessed January 2026).

Jepson, P.R. (2025). De-extinction beyond species: restoring ecosystem functionality through large herbivore rewilding. *Cambridge Prisms: Extinction*, 3, e3. Available at: <https://doi.org/10.1017/ext.2024.27> (Accessed January 2026).

Kent Wildlife Trust (2023). Wilder Blean project updates. Available at: <https://www.kentwildlifetrust.org.uk/news/after-year-bison-freely-roaming-canterbury-woodland-monitoring-programme-releases-first-year> (Accessed January 2026).

Klich, D., Olech, W., Łopucki, R. et al. (2018). Community attitudes to the European bison (*Bison bonasus*) in areas where its reintroduction is planned and in areas with existing populations in north-eastern Poland. *European Journal of Wildlife Research*, 64, 61. Available at: <https://doi.org/10.1007/s10344-018-1219-5> (Accessed January 2026).

Kołodziej-Sobocińska, M., Demiaszkiewicz, A.W., Pyziel, A.M. and Kowalczyk, R. (2018). Increased parasitic load in captive-released European bison (*Bison bonasus*) has important implications for reintroduction programs. *EcoHealth*, 15(2). Available at: <https://doi.org/10.1007/s10393-018-1327-4> (Accessed January 2026).

Kowalczyk, R., Kamiński, T. and Borowik, T. (2021). Do large herbivores maintain open habitats in temperate forests? *Forest Ecology and Management*, 494, 119310. Available at: <https://doi.org/10.1016/j.foreco.2021.119310> (Accessed January 2026).

Kraśńska, M. and Kraśński, Z. (2013). European bison: the nature monograph. Available at: <https://doi.org/10.1007/978-3-642-36555-3> (Accessed January 2026).

Łopucki, R., Klich, D., Perzanowski, K. et al. (2023). Individual differentiation of habitat preferences indicates high flexibility in habitat use by European bison. *Global Ecology and Conservation*, 44, e02494. Available at: <https://doi.org/10.1016/j.gecco.2023.e02494> (Accessed January 2026).

Machová, K., Struncova, P., Caltá, J., Tichý, L. and Vostry, L. (2022). Genealogical analysis of European bison population revealed a growing population despite very low genetic diversity. *PLOS ONE*, 17(11), e0277456. Available at: <https://doi.org/10.1371/journal.pone.0277456> (Accessed January 2026).

Massilani, D., Guimaraes, S., Brugal, J.P. et al. (2016). Past climate changes, population dynamics and the origin of bison in Europe. *BMC Biology*, 14, 93. Available at: <https://doi.org/10.1186/s12915-016-0317-7> (Accessed January 2026).

Melis, C., Selva, N., Teurlings, I. and Skarpe, C. (2007). Soil and vegetation nutrient response to bison carcasses in Białowieża Primeval Forest, Poland. *Ecological Research*, 22, pp. 807-813. Available at: <https://doi.org/10.1007/s11284-006-0321-4> (Accessed January 2026).

Monk, J., Barker, K., Maher, S., Serota, W.M. et al. (2024). Wild vs. domestic ungulate ecosystem impacts: understanding functional differences requires greater focus on mechanisms. *Preprint*. Available at: <https://doi.org/10.32942/X2HK85> (Accessed January 2026).

Nickell, Z., Varriano, S., Plemmons, E. and Moran, M. (2018). Ecosystem engineering by bison (*Bison bison*) wallowing increases arthropod community heterogeneity in space and time. *Ecosphere*, 9(9), e02436. Available at: <https://doi.org/10.1002/ecs2.2436> (Accessed January 2026).

Nieszała, A., Klich, D., Perzanowski, K., Januszczak, M., Wołoszyn-Gałęza, A. and Olech, W. (2022). Debarking intensity of European bison in the Bieszczady Mountains in relation to forest habitat features. *Forest Ecology and Management*, 508, 120057. Available at: <https://doi.org/10.1016/j.foreco.2022.120057> (Accessed January 2026).

Olech, W. et al. (2022). European bison (*Bison bonasus*) strategic species status review 2020. IUCN SSC Bison Specialist Group and European Bison Conservation Centre, Warsaw, pp. 1-138. Available at: <https://ebcc.wisent.org/science-papers/> (Accessed January 2026).

Palacio, P., Berthoud, V., Guérin, C. et al. (2017). Genome data on the extinct *Bison schoetensacki* establish it as a sister species of the extant European bison (*Bison bonasus*). *BMC Evolutionary Biology*, 17, 48. Available at: <https://doi.org/10.1186/s12862-017-0894-2> (Accessed January 2026).

Pedersen, P.B.M., Olsen, J.B., Sandel, B. and Svenning, J. (2019). Wild steps in a semi-wild setting? Habitat selection and behavior of European bison reintroduced to an enclosure in an anthropogenic landscape. *PLOS ONE*. Available at: <https://doi.org/10.1371/journal.pone.0198308> (Accessed January 2026).

Pringle, R.M., Abraham, J.O., Anderson, T.M. et al. (2023). Impacts of large herbivores on terrestrial ecosystems. *Current Biology*, 33 (11), pp. 584-610. Available at: <https://doi.org/10.1016/j.cub.2023.04.024> (Accessed January 2026).

Putman, R. and Smit, C. (2011). Large herbivores as environmental engineers. *Environmental Science*. Available at: <https://doi.org/10.1017/CBO9780511974137.010> (Accessed January 2026).

Raczyński, J. and Bolbot, M. (2024). The European Bison Pedigree Book 2023. Białowieża National Park. Available at: <https://bpn.gov.pl/pliki-do-pobrania/otworz/7cc95262-0985-45df-9b39-493b293e87da.pdf> (Accessed January 2026).

Ratajczak, Z., Collins, S., Blair, J.M. and Nippert, J.B. (2022). Reintroducing bison results in long-running and resilient increases in grassland diversity. *Proceedings of the National Academy of Sciences of the USA*, 119(36), e2210433119. Available at: <https://doi.org/10.1073/pnas.2210433119> (Accessed January 2026).

Rewilding Britain and Conservation Capital (2021). Rewilding and the rural economy: How Nature-Based Economies can help boost and sustain local communities. Rewilding Britain. Available at: <https://assets.rewildingbritain.org.uk/documents/nature-based-economies-rewilding-britain.pdf> (Accessed January 2026).

Rewilding Britain (2025). Introducing European bison (*Bison bonasus*) in the UK: key considerations, challenges, and best practice guidelines. (Report)

Rewilding Europe (2023). Impact stories: European bison. Available at: <https://rewildingeurope.com/impact-stories/european-bison/> (Accessed January 2026).

Rewilding Romania (2024). Boosting local economy. Available at: <https://rewilding-romania.com> (Accessed January 2026).

Risch, A.C., Frossard, A., Schütz, M., Frey, B., Morris, A.W. and Bump, J.K. (2020). Effects of elk and bison carcasses on soil microbial communities and ecosystem functions in Yellowstone, USA. *Functional Ecology*, 34(9), pp. 1933-1944. Available at: <https://doi.org/10.1111/1365-2435.13611> (Accessed January 2026).

Rizzuto, M., Leroux, S.J. and Schmitz, O.J. (2024). Rewiring the carbon cycle: a theoretical framework for animal-driven ecosystem carbon sequestration. *JGR Biogeosciences*, 129(4), e2024JG008026. Available at: <https://doi.org/10.1029/2024JG008026> (Accessed January 2026).

Rouet-Leduc, J., Pe'er, G., Moreira, F. et al. (2021). Effects of large herbivores on fire regimes and wildfire mitigation. *Journal of Applied Ecology*, 58(12). Available at: <https://doi.org/10.1111/1365-2664.13972> (Accessed January 2026).

Schäfer, B.A. (2018). Reintroduction of the European bison in Almindingen on Bornholm: impact on biodiversity of vascular plants over a 5-year period from 2012-2017. Master's thesis. Available at: <https://naturstyrelsen.dk/media/05zh0tl5/bjarke-schaefer-speciale.pdf> (Accessed January 2026).

Schmitz, O.J., Sylvén, M., Atwood, T.B. et al. (2023). Trophic rewilding can expand natural climate solutions. *Nature Climate Change*, 13, pp. 324-333. Available at: <https://doi.org/10.1038/s41558-023-01631-6> (Accessed January 2026).

Schulze, K.A., Buchwald, R. and Heinken, T. (2014). Epizoochory via the hooves: the European bison (*Bison bonasus*) as a dispersal agent of seeds in an open-forest mosaic. *Tuexenia*, 34(1), pp. 131-144. Available at: https://www.zobodat.at/pdf/Tuexenia_NS_34_0131-0144.pdf (Accessed January 2026).

Schwerk, A., Klich, D., Wójtowicz, E. and Olech, W. (2021). Impact of European bison grazing on species and functional traits of carabid beetle assemblages in selected habitats in Poland. *Biology*, 10(2), 123. Available at: <https://doi.org/10.3390/biology10020123> (Accessed January 2026).

Søndergaard, S.A., Ejrnæs, R., Svenning, J.-C. and Fløjgaard, C. (2025). From grasslands to forblands: year-round grazing as a driver of plant diversity. *Journal of Applied Ecology*, 62, pp. 1104-1113. Available at: <https://doi.org/10.1111/1365-2664.70047> (Accessed January 2026).

Sorbelli, L., Alba, D.M., Cherin, M., Moullé, P., Brugal, J. and Madurell-Malapeira, J. (2021). A review on *Bison schoetensacki* and its closest relatives through the early-Middle Pleistocene transition: insights from the Vallparadís Section (NE Iberian Peninsula) and other European localities. *Quaternary Science Reviews*, 261, 106933. Available at: <https://doi.org/10.1016/j.quascirev.2021.106933> (Accessed January 2026).

Soubrier, J., Gower, G., Chen, K. et al. (2016). Early cave art and ancient DNA record the origin of European bison. *Nature Communications*, 7, 13158. Available at: <https://doi.org/10.1038/ncomms13158> (Accessed January 2026).

Svenning, J., Buitenwerf, R. and le Roux, E. (2024). Trophic rewilding as a restoration approach under emerging novel biosphere conditions. *Current Biology*, 34(9), pp. R435-R451. Available at: <https://doi.org/10.1016/j.cub.2024.02.044> (Accessed January 2026).

The Global Rewilding Alliance (2024). Rewilded bison are climate heroes. Available at: <https://globalrewilding.earth/rewilded-bison-are-climate-heroes/> (Accessed January 2026).

Thor, K.A., Oldak, K.A., Klich, D., Gajewska, K., Popczyk, B., Klimaszewski, K. and Olech, W. (2023). Artificial waterholes for European bison as biodiversity hotspots in forest ecosystems: ecological effects of species reintroduction activities. *Diversity*, 15(3), 446. Available at: <https://doi.org/10.3390/d15030446> (Accessed January 2026).

Trepel, J., le Roux, E., Abraham, A.J., Buitenwerf, R., Kamp, J., Kristensen, J.A., Tietje, M., Lundgren, E.J. and Svenning, J.-C. (2024). Meta-analysis shows that wild large herbivores shape ecosystem properties and promote spatial heterogeneity. *Nature Ecology and Evolution*, 8(4), pp. 705-716. Available at: <https://doi.org/10.1038/s41559-024-02327-6> (Accessed January 2026).

Tusznio, J., Gutierrez, L.S., Strzelecka, M., Niedziałkowski, K. and Grodzińska-Jurczak, M. (2024). Traditional and emerging visions of European bison (*Bison bonasus*) conservation and management: implications for the IUCN conservation planning. *Environmental Science and Policy*, 158, 103783. Available at: <https://doi.org/10.1016/j.envsci.2024.103783> (Accessed January 2026).

Valdés-Correcher, E., Rodriguez, E., Kemp, Y.J.M. et al. (2018). Comparing the impact of a grazing regime with European bison versus one with free-ranging cattle on coastal dune vegetation in the Netherlands. *Mammal Research*, 63, pp. 455-466. Available at: <https://doi.org/10.1007/s13364-018-0373-1> (Accessed January 2026).

van Klink, R., Ruifrok, J.L. and Smit, C. (2016). Rewilding with large herbivores: direct effects and edge effects of grazing refuges on plant and invertebrate communities. *Agriculture, Ecosystems and Environment*, 234, pp. 81-97. Available at: <https://doi.org/10.1016/j.agee.2016.01.050> (Accessed January 2026).

van Klink, R., van Laar-Wiersma, J., Vorst, O. and Smit, C. (2020). Rewilding with large herbivores: positive direct and delayed effects of carrion on plant and arthropod communities. *PLOS ONE*, 15(1), e0226946. Available at: <https://doi.org/10.1371/journal.pone.0226946> (Accessed January 2026).

Vasile, M. and Opincaru, I. (2021). Sociological report: urgent actions for the recovery of the European bison populations in Romania. *Life Bison*. Available at: <https://life-bison.com/wp-content/uploads/2021/07/LIFE-Bison-Socio-Study-Summary.pdf> (Accessed January 2026).

Vera, F. and Hitchmough, J. (2002). Grazing ecology and forest history. Available at: <https://doi.org/10.2307/1587257> (Accessed January 2026).

Vermeulen, R. et al. (2015). Natural grazing - practices in the rewilding of cattle and horses. *Free Nature*. Available at: <https://www.rewildingeurope.com/wp-content/uploads/2015/07/Natural-grazing---Practices-in-the-rewilding-of-cattle-and-horses.pdf> (Accessed January 2026).

Vlasakker, J. (2014). Bison Rewilding Plan 2014-2024. Rewilding Europe, Nijmegen, The Netherlands. Available at: <https://www.rewildingeurope.com/wp-content/uploads/2014/10/Bison-Rewilding-Plan-2014.pdf> (Accessed January 2026).

Vokřál, I., Podlipná, R., Matoušková, P. and Skálová, L. (2023). Anthelmintics in the environment: their occurrence, fate, and toxicity to non-target organisms. *Chemosphere*, 345, 140446. Available at: <https://doi.org/10.1016/j.chemosphere.2023.140446> (Accessed January 2026).

Wildwood Trust (2025). Blean Bison Project. Available at: <https://wildwoodtrust.org/conservation-and-rewilding/conservation-projects/blean-bison-project/> (Accessed January 2026).

Wisentproject Kraansvlak (2019). European bison help songbirds during breeding season. Available at: <https://www.wisenten.nl/en/nieuws/2019/european-bison-help-song-birds-during-breeding-season> (Accessed January 2026).

Wisentproject Kraansvlak (2017). Milestone: 10 years of bison in Dutch nature. Available at: <https://www.wisenten.nl/en/nieuws/2017/milestone-10-years-bison-dutch-nature> (Accessed January 2026).

Zélie, S. and Hunziker, M. (2025). Social acceptance of human-wildlife coexistence: a case study about the reintroduction of the large herbivore European bison (*Bison bonasus*) in Switzerland. *Restoration Ecology*, 33(3), e14373. Available at: <https://doi.org/10.1111/rec.14373> (Accessed January 2026).

Zielke, L., Wrage-Mönnig, N., Müller, J. and Neumann, C. (2019). Implications of spatial habitat diversity on diet selection of European bison and Przewalski's horses in a rewilding area. *Diversity*, 11(4), 63. Available at: <https://doi.org/10.3390/d11040063> (Accessed January 2026).