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REVIEW

Systematic mapping of monitoring and evaluation in rewilding

Nell J. Pates[1] | **James M. Bullock**[2] | **Johan T. du Toit**[3] | **Sahran Higgins**[4] | **Nathalie Pettorelli**[3] | **William D. Pearse**[1]

[1]Department of Life Sciences, Imperial College London, Silwood Park Campus, Ascot, UK

[2]UK Centre for Ecology & Hydrology, Wallingford, UK

[3]Institute of Zoology, Zoological Society of London, London, UK

[4]Rewilding Britain, Steyning, UK

Correspondence
Nell J. Pates, Department of Life Sciences, Imperial College London, Silwood Park Campus, Buckhurst Road, Ascot, Berkshire SL5 7PY, UK.
Email: nell.pates20@imperial.ac.uk

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Abstract

Rewilding is a landscape recovery approach that seeks to enhance the functioning of degraded ecosystems by reinstating natural processes, and it is increasingly being adopted by organizations and landowners. Despite its popularity, there is no accepted way to assess rewilding's impacts, which is due in part to inconsistent monitoring and evaluation. To address this gap, we developed a systematic map of a unique dataset combining academic and gray literature on monitoring and evaluation in rewilding case studies. We mapped definitions of success, study systems, methods of monitoring, and evaluation metrics for rewilding case studies to compare where the different strands of literature overlap and contrast in focus. We found that researchers and practitioners have been focused on different aspects of rewilding and that the limited recording of case study details and lack of robust experimental design make it difficult to pool and compare data. Researchers and rewilding practitioners face challenges in building a robust evidence base from which to evaluate rewilding outcomes. These challenges include resources as well as spatial and time constraints, which all limit the consistency of data gathering among projects. More comparisons across rewilding projects, better standardization of data collection and data recording methods, and increased collaboration between researchers and practitioners could help remedy these limitations. We developed recommendations for how to monitor and evaluate rewilded landscapes to improve data quality and availability. These include the broad adoption of low-cost and scalable survey designs with greater focus on comparisons across sites and continued effort toward open-source data storage.

KEYWORDS
applied ecology, case studies, ecological monitoring, gray literature, landscape recovery, nature-based solutions, rewilding

INTRODUCTION

Most of the Earth's land surface has been measurably impacted by human activities (Kennedy et al., 2019; Venter et al., 2016), with approximately a third of it estimated to be under intense pressure (Jones et al., 2018). These pressures degrade ecosystems (Williams et al., 2020), leading to increased extinction risk for species (Di Marco et al., 2018) and loss of ecosystem functions and services for humans who rely on them (IPBES, 2019; Isbell et al., 2023). Given the intrinsic value of nature and its importance for securing human well-being, there is an urgent need to not only protect remaining areas of conservation value but also recover damaged ecosystems. This need is reflected in recent roadmaps produced both in policy (UN Decade on Ecosystem Restoration, 2021–2030) and academic research (Dinerstein et al., 2020; Maron et al., 2020; Yang et al., 2020). Within this context, rewilding has emerged as a pragmatic approach to reversing biodiversity loss and ecosystem degradation (Pettorelli & Bullock, 2023).

Much discussion has been focused on establishing a universal definition for rewilding (Corlett, 2016; Pettorelli et al., 2018), and some degree of consensus has emerged in recent years (Carver, Hawkins, et al., 2025). Rewilding can be defined as the process of enhancing the functional properties of degraded ecosystems so that they can become more self-sustaining, requiring minimal long-term management (Perino et al., 2019;

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Pettorelli et al., 2018). Since being developed in the 1990s, rewilding has been credited with injecting a degree of excitement and inspiration into landscape recovery (Wynne-Jones et al., 2020) to the extent that organizations are producing practical guides and handbooks to support the initiation and maintenance of rewilding projects (IUCN Commission on Ecosystem Management: Carver, Convery, et al., 2025; Rewilding Europe: Rewilding Europe, 2025; WWF-UK: Dempsey, 2023).

Despite growing interest, gaps remain in understanding the long-term outcomes of rewilding projects. These gaps are driven in part by rewilding's appeal: there has been rapid adoption of rewilding with an associated surge in research interest (Hart et al., 2023; Lorimer et al., 2015). However, monitoring and evaluation have not kept pace with implementation. Opinion and review pieces about rewilding have emerged (e.g., Egoh et al., 2021), but there have been very few long-term, comparable studies (Hart et al., 2023). To determine if rewilding can deliver more functional, self-sustaining ecosystems, its effectiveness needs to be assessed over time through monitoring and evaluation, and findings must be accessible and relevant to practitioners to allow them to make evidence-based decisions in relation to their sites.

Rewilding projects pose challenges for monitoring and evaluation for two main reasons. First, because rewilding is a relatively young strategy, many projects could not have accrued long-term datasets even if there were effective monitoring efforts in place. Ecosystem recovery can be difficult to measure meaningfully in a short time frame (Corlett, 2019), and practitioners may have decade- or century-long goals for their landscapes. Second, evaluation often requires a goal to compare progress against, but what is meant by success is not necessarily clear-cut in rewilding. Outcomes may not be specified (Law et al., 2017), and where they are, they may be tied to target species, habitat structure, or some level of ecological function or service or may be based on some known remnant, estimate of a past state, or hypothetical prediction (i.e., a projected novel system; Sinclair et al., 2018). Consensus on what rewilding's aims should be has not been reached, meaning that rewilding success is difficult to assess.

Within the context of the challenges outlined above, we used a unique dataset combining peer-reviewed and gray literature (literature from outside of traditional academic publishing) to establish what is being measured, where, and by whom to develop a systematic map of monitoring and evaluation in rewilding case studies. A systematic map collates available information to identify gaps in the current understanding of a field (Arksey & O'Malley, 2005; Haddaway et al., 2020). Systematic maps differ from full systematic literature reviews (Munn et al., 2018), which are most useful when a body of detailed, quantitative literature exists. Systematic mapping is appropriate when the available information is sparse, complex, or heterogeneous (James et al., 2016; Peters et al., 2021), as is the case in rewilding. Because of our systematic approach, this dataset can be updated and reanalyzed in the future to understand changes in the evidence base. This will be critical as the body of information on rewilding case studies grows.

METHODS

We conducted systematic mapping of academic and gray literature with a focus on monitoring and evaluation in rewilding case studies. A narrative synthesis is the principal output of systematic mapping (James et al., 2016), and this paper is the culmination of our review.

Key definitions

Academic literature was defined as academic publications, including postgraduate theses, to cast widely for literature (Haddaway, Woodcock, et al., 2015) and maximize the number of available case studies. Gray literature captures a broad range of materials, including that which is not typically peer reviewed and not produced for commercial publication or wide distribution (Tillett & Newbold, 2006). Gray literature included information provided by or publicly available from organizations belonging to the Global Rewilding Alliance (GRA).

We included both academic and gray literature to capture a range of experiences. For simplicity, we used the term researchers to refer to the scientific community producing academic literature. We used practitioners to refer to employees of or volunteers for organizations that manage projects to deliver rewilding on the ground. These categories are not mutually exclusive. Practitioners publish academic work, and rewilding projects may employ conservation scientists, for example, who work on their organizational (gray) literature. These definitions served to clarify the discussion of the two strands of literature.

Monitoring is the practice of systematically gathering data over time. To be classified as a monitoring study, academic papers had to include repeated measures over time—usually several years. Evaluation is the process of assessing whether an action—in this case, rewilding—has achieved a desired outcome. To be classified as an evaluation study, academic papers had to make clear the aims of the intervention and whether the results of the study were in keeping with those aims. Rewilding organizations were asked about their monitoring and evaluation practices, and organizations' policy documents and websites were searched for information conforming with these definitions.

Research questions

We investigated three research questions: How is success in rewilding defined? How is progress toward success in rewilding projects monitored? How is progress toward success in rewilding projects evaluated?

We did not expect to find consistent definitions across case studies when asking how success in rewilding is defined and did not seek to compare against any benchmark. Rather, we were interested in the content of each description of success and how the two groups—researchers and practitioners—

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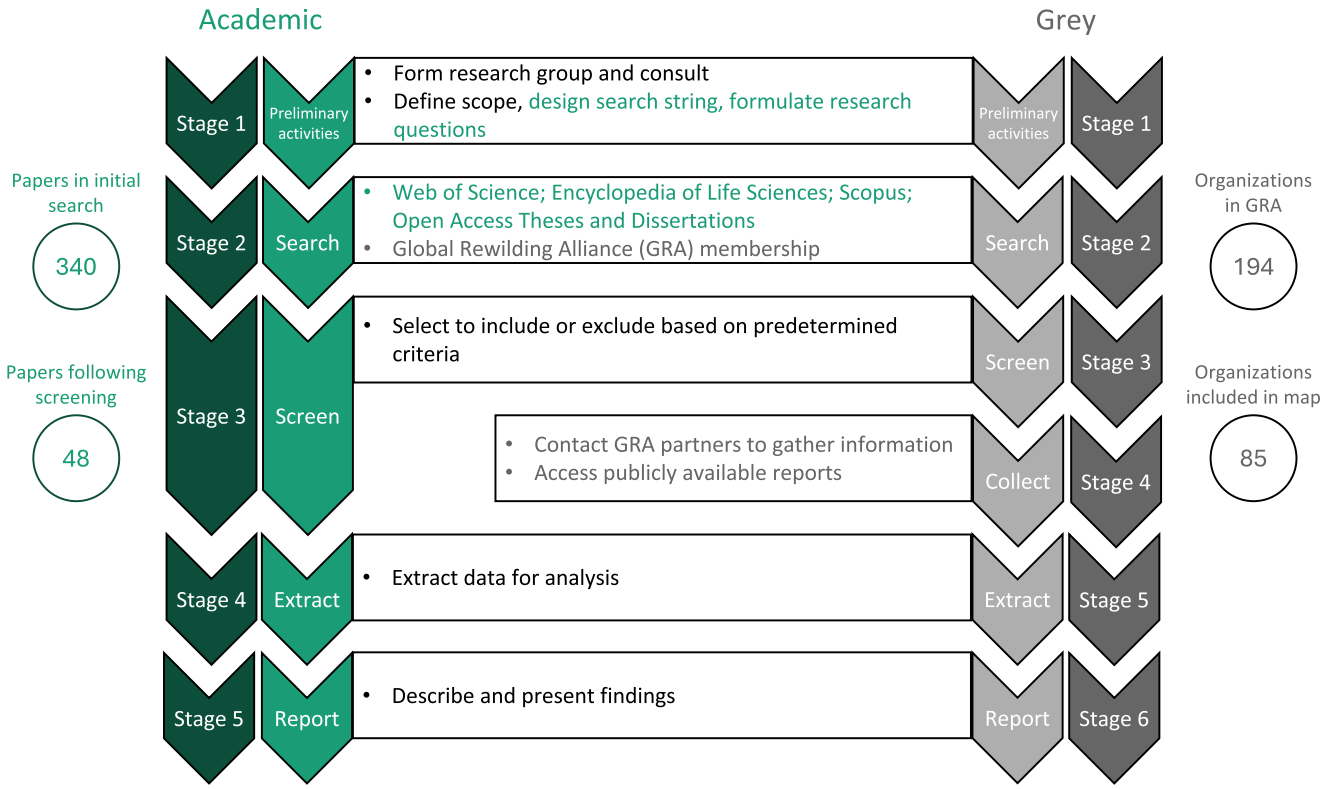


FIGURE 1 Five-stage methodology used for review of academic literature and six-stage methodology used for review of gray literature to produce our systematic map. Black text describes steps for both academic and gray literature. Green text describes actions performed for academic literature only. Gray text describes actions performed for gray literature only.

conceptualized what they aimed to achieve in their own terms.

Academic literature review

We followed a five-stage review process based on systematic mapping tools described in James et al. (2016) and Levac et al. (2010) to analyze the academic literature: preliminary activities, search, screen, extract, and report (Figure 1). This clear, staged methodology ensured the mapping process was consistent and rigorous, allowing for evaluation and refinement at each stage.

In the preliminary activities stage, we determined the scope of this study, research questions, key definitions, and the search string. We also selected criteria for inclusion during the screening stage. Consultation with a research team is a valuable component in the framing of systematic mapping—particularly those using gray literature (Arksey & O'Malley, 2005)—providing a breadth of ideas that might otherwise be overlooked. The authors represented a range of expertise in rewilding, both as academics and practitioners. The academic consultation team (J.M.B., J.T.T, and N.P.) reviewed and provided guidance on the scope, research questions, search string, and criteria, as well as interpretation of results later in the process. The practitioner perspective was provided by S.H. from the results stage onward.

The scope of this review was academic publications, including theses, that describe monitoring or evaluation (or both) of rewilding case studies. The search string was: "rewild* AND (evaluat* OR monitor*)". Our search string was validated to ensure outputs were appropriately sensitive and specific (James et al., 2016). This search string did not capture projects that may have shared the same aims and methods as those that associate themselves explicitly with rewilding but use different terminology, for example, projects involving traditional ecological knowledge (TEK) or non-English-language translations. Similarly, studies whose methods may have met the definitions of monitoring and evaluation outlined above but used the term measure or assess may not have been captured. This degree of specificity was required to limit the need for significant interpretation during screening and to maintain a tight focus on rewilding. The aim of this study was not to impose our own definition on studies or organizations but to investigate how different groups conceive, measure, and evaluate rewilding.

We used our search string across multiple databases (Web of Science, Scopus, PubMed, and Open Access Theses and Dissertations) to conduct the academic literature search on 6 November 2024 (Figure 1).

In the screening stage, we downloaded titles and abstracts of all search results, adding missing abstracts manually. We screened in several stages (see Appendix S1). We pooled all results and removed duplicates. Then we used the R

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package metagear (Lajeunesse, 2016) to screen by title and abstract using predetermined criteria (code available at https://doi.org/10.5281/zenodo.18131010). The final stage was a full paper review, where we compared each paper against further criteria (Appendix S1).

We extracted bibliographic information, case study information, and research question information from each paper. Research question information included the focus study system, the methods used to collect data (monitor), and the metrics used to measure outcomes (evaluate). Definitions of success for case studies were not available within the academic literature as papers are not framed in terms of rewilding projects but with reference to study objectives and hypotheses. To draw comparable data from the academic literature, we extracted the study focus (the taxa or system of interest) of each paper as a proxy for a definition of success. This provided an indication of where most attention was placed, and we could infer from this which groups were considered most important by the research community; however, we acknowledge that this measure of success was somewhat arbitrary and captured only one aspect of each study. For outcomes, we extracted response variables from vertical plot axes, figure and table legends, or subheadings of results sections. Some interpretation of data was necessary to allow coding (assigning extracted data to predetermined categories to allow comparison) (James et al., 2016) (Appendix S1).

Gray literature review

We adapted the academic literature review process to collect and analyze gray literature on rewilding case studies using six stages: preliminary activities, search, screen, collect, extract, and report (Figure 1).

Other reviews including gray literature have relied on professional networks to gather documentation (e.g., Van Klink & WallisDeVries [2018] and Langridge et al. [2021]). We chose to follow a transparent and repeatable methodology that did not rely on existing relationships. We identified the GRA (2024)—a global partnership that allows free, voluntary membership to organizations and individuals involved in rewilding—as a source. The GRA maintains a list of partner organizations, and we used this to search the gray literature. This method will remain available to future reviews as the GRA membership changes over time, for as long as the GRA exists.

The scope of the gray literature review was information and literature provided by, or publicly available from, organizations belonging to the GRA. Direct communication with organizations was an important aspect of this study. Although not a traditional source of gray literature (Haddaway, Collins, et al., 2015), using email and interview responses allowed us to maximize the available information. This approach was valuable because the organizational literature was not generally aligned to our research questions and documents were not comparable in the manner of academic research articles.

The GRA membership list in November 2024 was the starting point for our gray literature search (Global Rewilding Alliance, 2024). We created a subset of GRA partner organizations by removing those that were not directly involved with rewilding case studies (e.g., bookstores, magazines, or rewilding photographers) (Appendix S1).

We collected data from our subset of GRA partners in two stages. First, we directly contacted organizations through email (Appendix S1) to elicit comparable responses about organizations' approaches to defining success in rewilding and monitoring and evaluating progress. Emails were sent on 16 October and 7 November 2024. Then, we collected documents for all organizations that were provided by respondents to the email approach or publicly available through their websites.

We extracted partner organization details, direct communication details, case study information, and research question information for each organization (Appendix S1). We assessed definitions of success as specific, measurable, time-bound, or any combination of the three, in line with the concept of specific, measurable, ambitious, realistic, and time-bound (SMART) goal setting (Maxwell et al., 2015), to compare across the dataset.

Iterative nature of systematic mapping

Methods are described here linearly, but the process of collecting and screening data was iterative (Levac et al., 2010). A first search of the academic literature was conducted in March 2024. We screened and extracted data, checking that our criteria were appropriate. We repeated the search in November 2024 to capture new publications, adding eight papers to the dataset (labeled C–J; see https://doi.org/10.5281/zenodo.18131010). Our academic literature search also revealed two PhD thesis chapters that had been published as papers not found in the initial search (labeled A & B; Appendix S1). During the collection stage of the gray literature review, practitioners shared academic studies with us that were relevant to their projects, and we considered these for inclusion using the same screening process as above, adding three additional articles (labeled K–M).

Language

Although language was not an intended criterion of our scope, all academic case studies returned by our search string were written in English. This is likely a reflection of the use of English search terms. We acknowledge that a single language focus in studies is a known source of bias (Amano et al., 2016; Nuñez & Amano, 2021). We designed our search string to limit the requirement for interpretation, including translation, and although we searched for data globally, this decision may have introduced geographic patterns to our data collection (Appendix S2). Gray literature was found in English, Chinese, Spanish, Portuguese, and Dutch. Where multiple language documents were provided, the English language version was used. For documents in other languages (three Spanish, three Portuguese, one Chinese, and one Dutch), we sought native speakers of these languages, explained the protocol to them, and asked them to extract data. We did not have access to a native Portuguese language speaker, so for these three organizations,

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we used Google Translate. If academic publications in other languages had been returned by our search, then they would have been screened using the same resources described for gray literature.

RESULTS

We performed a full review of 48 academic papers published between 2015 and 2024, which included case studies from 40 countries (see Appendix S2). We categorized papers as monitoring (25%), evaluation (40%), or monitoring and evaluation (35%). The 85 rewilding organizations included in the gray literature review had rewilding projects in 106 countries (Appendix S2). We found documents including information for at least one of our research questions (success, monitoring, and evaluation) for 81 out of 85 organizations. This was supplemented with information from direct contact for the 16 organizations that replied. Most rewilding organizations provided a definition of success (86%). Fewer outlined their monitoring (64%) or evaluation (52%) work. Study areas in academic case studies (academic literature) were typically smaller than the areas managed by rewilding practitioners (gray literature): the median area of academic case studies was 13.7 km^2 (interquartile range [IQR] = 57.2 km^2) compared with the median area in the gray literature of 309 km^2 (IQR = 9,756 km^2). Most academic case studies reported on 1 or 2 years of data (26 out of 48 studies, median duration = 1 year, IQR = 1). In the academic literature, 60% of case studies (n = 29) did not describe controls as part of their design. In the gray literature, two out of 85 rewilding organizations described controls implemented as part of their monitoring strategies.

How is success in rewilding defined?

There was some overlap between the study focus of the academic case studies and definitions of success in the gray literature, but there was a disconnect between the amount of attention given to categories common to both. The academic literature was overwhelmingly focused on species (86%), with most studies on mammals and plants (Figure 2A). Bias in favor mammals was also found in the gray literature (65% of species-centric definitions), although fewer definitions of success centered around species. Throughout, where percentages are used in relation to categories, they refer to proportions of category and subcategory tags. Some case studies were coded with multiple categories and subcategories so that counts summed to >100% across the number of papers/organizations reviewed (Appendix S2). In the gray literature, the greatest number of success definitions was tied to social considerations (23%). The social category for the gray literature was expansive, so subcategories were used to draw out finer-scale detail. Most social category definitions in the gray literature were socioeconomic outcomes (34%) and human–nature connection (related to access to nature—22%; Appendix S1) (Figure 2b). Only 19% of organizations had definitions of success that we classified as specific, measurable, *and* time-bound, and 37 did not meet any of the three criteria, including instances where no definition was provided.

How is progress toward success in rewilding projects monitored?

Fieldwork (direct observations such as surveys and transects) was the most common method used to collect data for monitoring and evaluation (academic literature [41%] and gray literature [45%]). Both included wildlife tracking, remote sensing, experimental, consultation, and DNA methods (Figure 3). One category, review, was present in the academic but not the gray literature.

How is progress toward success in rewilding projects evaluated?

We found three categories common to both strands: diversity, individuals, and social metrics. The individuals category captured responses related to individuals within a declared focal species (e.g., number of individuals introduced). The bias toward mammals found in definitions of success was reflected here (83% of academic species measures and 59% of gray literature measures). Academic studies focused most on species population metrics (abundance, density, etc.; 22%) and ecosystem structure (habitat classification, grass cover, etc.; 22%) and also included measures related to abiotic factors and ecosystem integrity metrics that combine multiple aspects of a system or its function such as networks of seed dispersal (Figure 4a). In the gray literature, the most common evaluation metrics were internal, meaning metrics that were predominantly relevant to the GRA organization, such as number of personnel hired or trained, or size of organization (24%). Other categories unique to the gray literature were external metrics (standards set by external bodies or organizations), measures of area, and academic and financial considerations (Figure 4b).

Additional temporal and spatial analyses of rewilding project evaluation did not reveal significant differences between long- or short-term case studies, older or newer rewilding organizations, and academic or gray literature case studies grouped by continent (Appendix S2). We stress that a lack of identifiable trends at this time was likely due to the patchy and short-term nature of the available data.

DISCUSSION

Our systematic mapping process identified the ways in which researchers and practitioners are framing, monitoring, and evaluating rewilding within case studies. It exposed overlap between researchers and practitioners in terms of the methods used to collect data on rewilding progress (typically involving direct observation and on-the-ground fieldwork including ecological surveys; Figure 3). It also revealed areas of divergence between

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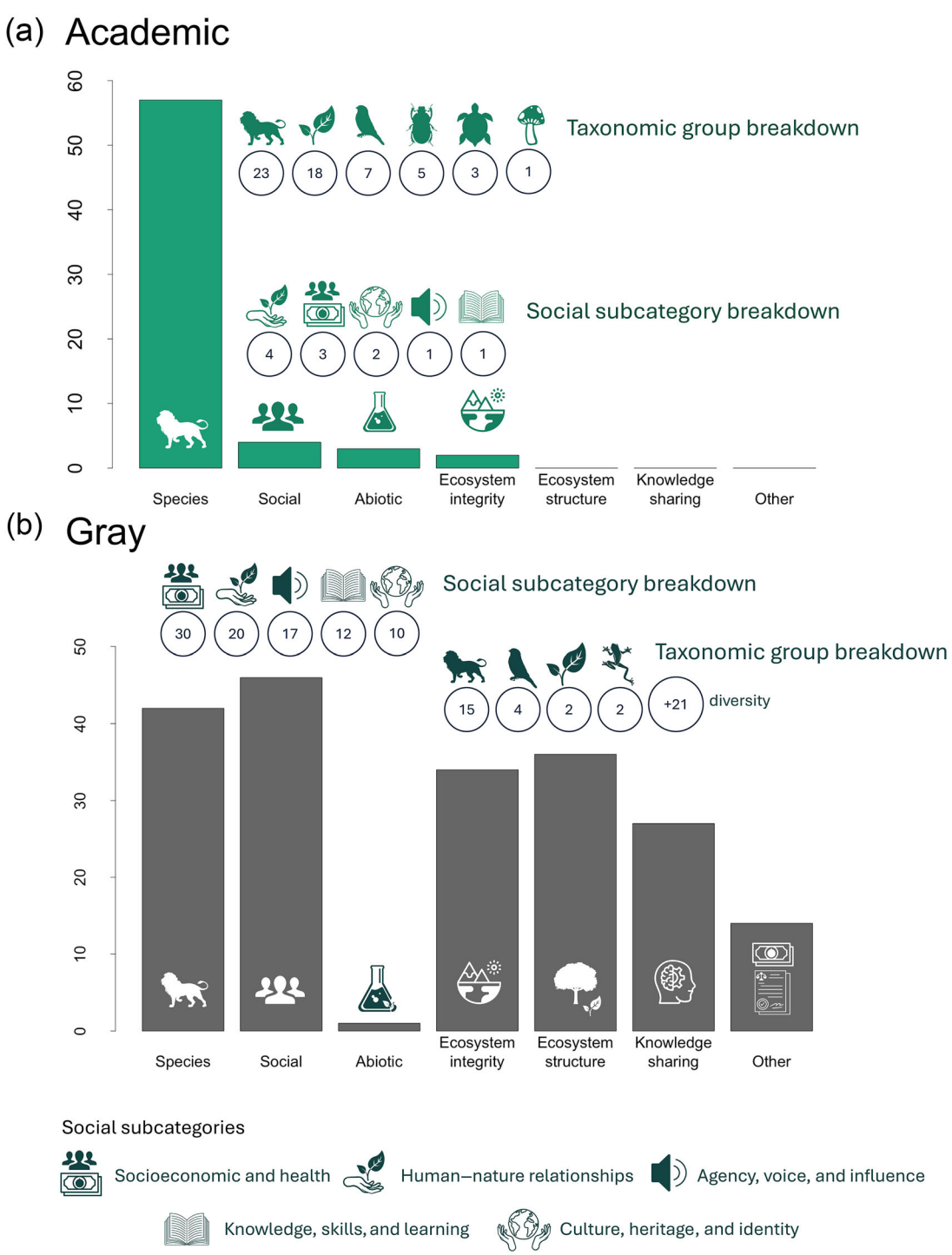


FIGURE 2 Comparison of academic case study focus systems and rewilding organizations' definitions of success. (a) Academic studies were assigned categories to understand which taxa received the most attention. (b) The species category for gray literature includes 21 definitions of success related to diversity without reference to any particular taxonomic group. The other category for gray literature captures legal definitions of success (e.g., securing formal protections), financial ones (e.g., becoming profitable), and those linked to policy targets (e.g., meeting national and international biodiversity goals). Sums of bar plots do not equal the counts of academic papers reviewed or rewilding organizations contacted. Empty category bars are included for ease of comparison across plots (more details on each category and how these were assigned is provided in Appendix S1).

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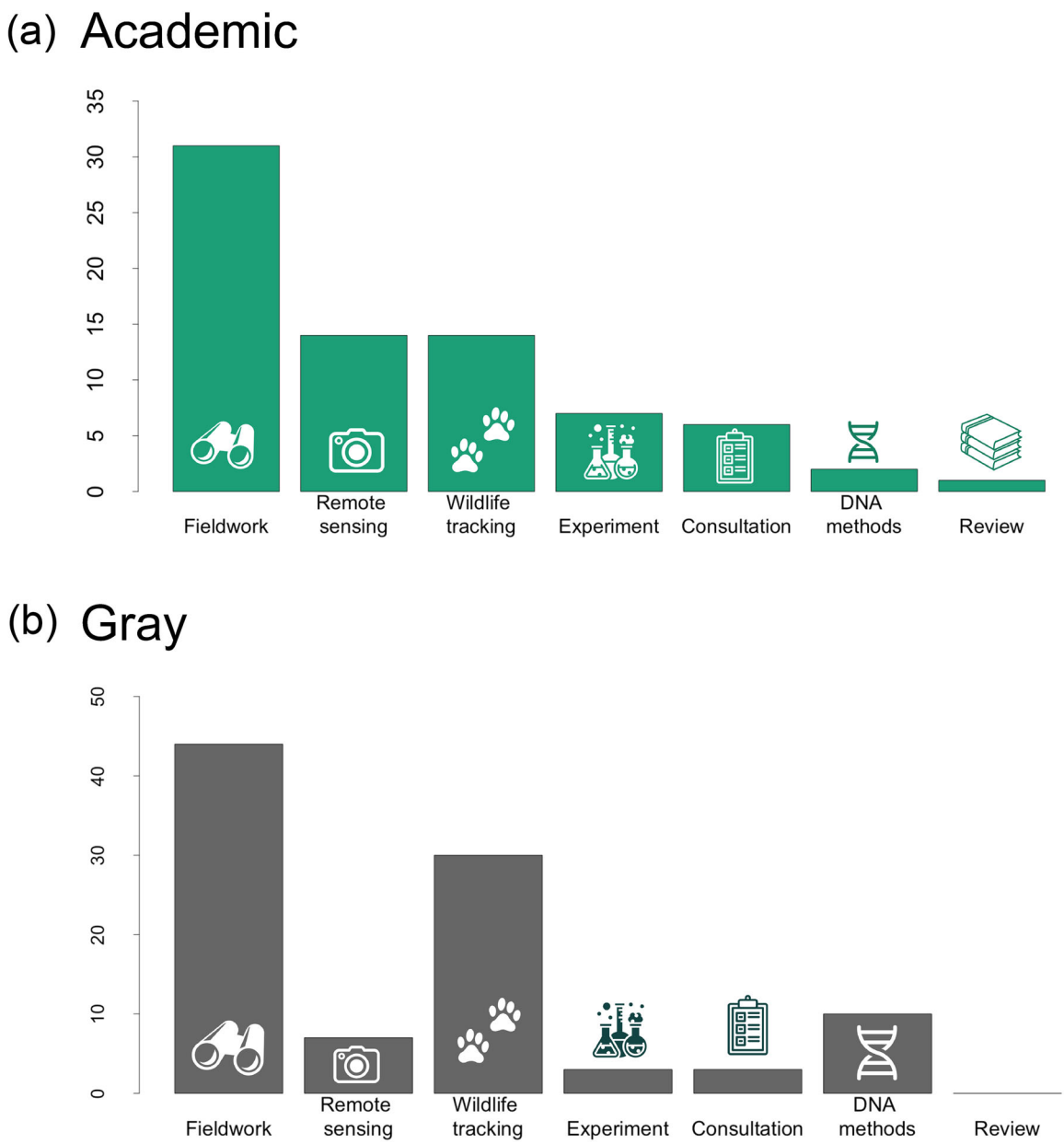


FIGURE 3 Comparison of methods described in both academic and gray literature to investigate rewilding progress. (a) The methods described in each academic paper were coded and categorized. Multiple categories were assigned to studies that used more than one approach. (b) Data were extracted from direct communication or analysis of gray literature, then coded following the same process as used for the academic literature. Empty category bars are included for ease of comparison across plots (additional details on each category and how these were assigned can be found in Appendix S1).

the two strands of literature. We found that framings of rewilding and metrics to measure its progress did not reflect the consensus definitions currently offered in the academic literature (Carver, Hawkins, et al., 2025). Such definitions focus on the aim of rewilding to recover the functional properties of ecosystems; however, we found a taxonomic focus in the academic literature and social focus in the gray literature (Figure 2). The use of metrics to evaluate rewilding's impacts also diverged, from measuring individual species, their population distributions, and ecosystem structure in the academic literature to measuring organizational metrics in the gray literature (Figure 4). The ability to examine these similarities and differences demonstrated a key strength of our approach. We revealed that researchers and practitioners cover a greater range of rewilding's impacts than is captured by each group separately.

Our dataset revealed that most academic case studies were short-term, single-site, and lacking rigorous experimental controls (Appendix S2). Within the gray literature, we found some misalignment between monitoring and evaluation. Methods such as fieldwork surveys and camera trapping were common (Figure 3), but fieldwork data were not tied to the metrics used for evaluation, which tended to emphasize organizational

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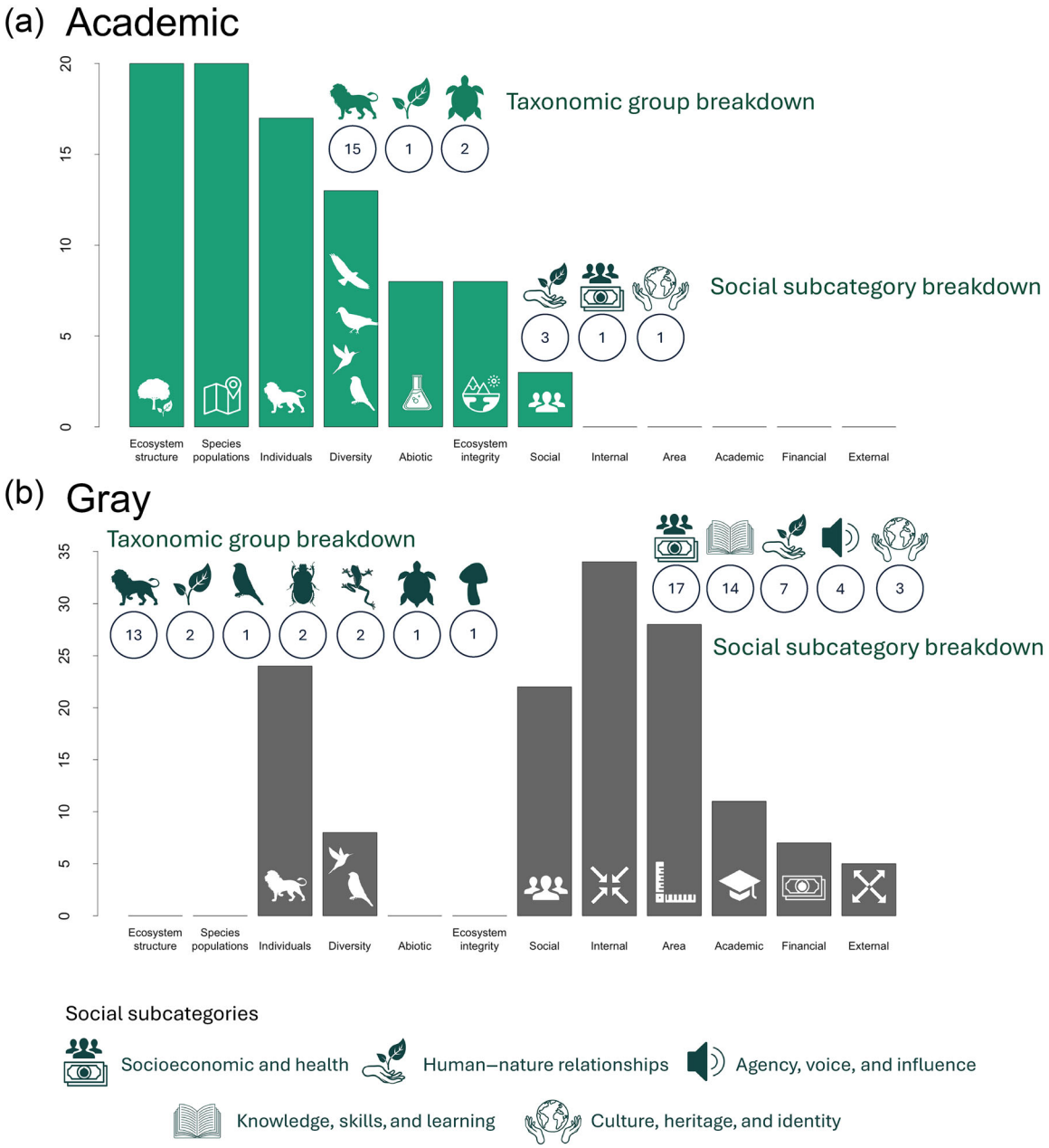


FIGURE 4 Differences between the response variables used to measure impacts of rewilding in academic literature and metrics used by rewilding organizations to evaluate progress. (a) Response variables extracted and categorized from vertical plot axes, figure and table legends, or subheadings of results sections in academic case studies. (b) Evaluation metrics extracted from direct communication or analysis of gray literature. Details on each category and how these were assigned can be found in Appendix S1. Empty category bars are included for ease of comparison across plots. As above, some case studies were tagged with multiple categories, so totals sum to >100% of papers/organizations.

activities rather than ecological status (Figure 4). We also found a lack of metrics that captured ecosystem processes and functions in both the academic and gray literature (Figure 4). We found many examples of species count metrics, a focus on ecosystem structure, and organizational targets, but far fewer measures were identified that captured dynamic processes such as network effects or flood regime change (see Appendix S1).

These findings were likely shaped by multiple practical factors. First, divergence between researchers and practitioners likely occurred because academic research is driven by a requirement for novelty and generalizability, whereas practitioners are more likely to be concerned with individual context, funding, policy, and community factors. The literature associated with these two groups (academic and gray) is therefore difficult to compare. Second, short-term and small-scale case studies in the academic literature were likely the result of limited resource allocation. Study areas available to researchers may be further limited by geography, access restrictions, or the availability of

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suitable habitat. Third, the types of ecological change that rewilding may lead to simply may not yet have had time to occur and be documented (Dombrovski et al., 2022; Isbell et al., 2019). Although monitoring could be accruing research-quality ecological data, in the short term, only preliminary success metrics related to the activities of funding organizations tend to be reported (Hodge & Adams, 2016).

We recognize that some limitations of our approach should be considered. Academic literature and gray literature are written for different audiences and purposes, with porous boundaries between categories (academic, gray, researcher, and practitioner). Our decisions for coding and categorizing the data (Appendix S1) did not preclude the validity of other approaches. We searched for gray literature through the GRA to aid repeatability, but this might have introduced bias because membership of the GRA is voluntary and therefore self-selecting. Finally, because our academic case studies were written in English, our data may have been biased away from linguistic and cultural contexts outside of regions where publishing in English is most common (Appendix S2).

Within the context of these findings and limitations, we identified three ways in which future work might be designed to address current gaps in the literature on monitoring and evaluation in rewilding: develop more comparative study designs; standardize methods of data collection and recording; and work more collaboratively.

Develop more comparative study designs

Research focus should move away from studying rewilding sites in isolation and instead prioritize the comparison of multiple sites or intervention types, ideally covering longer time periods. Although no two sites will ever be identical in all aspects of site history, known differences in context (e.g., age, location, and activity) could be described with the results presented in context, following, for example, principles outlined for the design of natural experiments (McGarigal & Cushman, 2002; Watts et al., 2016). Comparative studies would provide better insight into the generalizability of outcomes, adding greater value to understanding rewilding than simply increasing the number of isolated case studies on a few, well-described locations.

A move toward a greater use of experimental study designs would also allow quantitative evaluation as well as comparison (Ockendon et al., 2021). Studies should aim to include control systems and before-after-control-impact (BACI) experimental design where possible (Caruana et al., 2024). Few rewilding projects are set up to include control landscapes, and practitioners may reasonably resist investing time and money in controls or alternative strategies if they are seeking to maximize the benefit of rewilding across their sites. However, new approaches may offer solutions. For example, remote sensing using synthetic controls (creating a counterfactual by comparing results in a study area of interest with surrounding, untreated landscapes) is a method that has already been applied to ecological contexts (Fick et al., 2021) and could be applied in rewilding by comparing rewilded areas to neighboring, non-rewilded ones.

Standardize methods of data collection and recording

Monitoring and evaluation methods should aim for increased standardization to make findings easier to pool and compare. We emphasize that this is not a call for a single, uniform method of monitoring. There are reasons to be wary of such an approach, particularly in the case of rewilding, which is still such a young discipline (Hart et al., 2023) and where there simply has not yet been time to establish a best way to monitor or evaluate progress. Even where good practice begins to emerge from well-studied areas, there will remain uncertainty across regions and contexts, which may call for different monitoring methods and metrics. This uncertainty reinforces the need for improved data practices. Developing good practice means learning from experience, and without shared, comparable data, each rewilding site will have to learn on its own over and over again (Redford & Taber, 2000).

If researchers and practitioners can develop a common toolkit for data collection, then larger datasets can be built to the benefit of all. A toolkit approach would allow researchers and practitioners to choose the most appropriate methods for the context, while ensuring a degree of consistency. Data collection methods should be simple, accessible, and scalable to allow comparison across broad and local scales (Levin, 1992), and methods will likely achieve best uptake if they are codeveloped among researchers and practitioners and built by consensus. Methods currently in use that have been field-trialed in rewilding systems and published in the academic literature could be a starting point for developing and sharing good practice (e.g., Pates et al., 2025). Another approach may be to push for the widespread adoption of protocols already in use by practitioners such as the British Trust for Ornithology's breeding bird survey methods (BTO, 2025) and Australia's Terrestrial Ecosystem Research Network protocols (TERN, 2025). These methods are publicly available and already contribute to the development of a repository of biodiversity data (e.g., in the United Kingdom, the BTO methodology is shared among the BTO, the Joint Nature Conservation Committee, and the Royal Society for the Protection of Birds).

When assessing case studies, it was difficult to determine the exact location, age, and area for each rewilding effort. Ideally, studies would include such details as standard, as well as information on the type of rewilding intervention taken (timelines, species reintroduced, etc.), and the objectives of the project. In line with the findable, accessible, interoperable, and reuseable (FAIR) principles, the aim should be to develop repositories of good-quality, comparable data on rewilding to allow conclusions to be drawn to inform future directions (Sutherland et al., 2020; Wilkinson et al., 2016). This is necessary because without easy access to developments in research, practitioners are likely to share knowledge only through their own networks, meaning that valuable insights may be lost to both groups (Sabo et al., 2024). Continued progress toward open sourcing of information in both the academic (Mayo et al., 2016) and gray literature (Cadotte et al., 2025) and open access publication of research

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articles will improve the quality and quantity of information available to stakeholders.

Work collaboratively

We found a gap between the amount of monitoring (64% of organizations) and evaluation (52%) in the gray literature, suggesting that more information may be being collected than is being used to inform action. Rewilding practitioners face conflicting demands between their long-term aims for site recovery and the need to demonstrate progress in the short term for funders (Hodge & Adams, 2016). Academic researchers also face challenges: they want long-term and large-scale studies but may not have the resources to invest in them. Improved collaboration could offer a route to address these difficulties. A useful framework for conceptualizing the requirement may be the translational ecology approach, which describes how researchers and practitioners can develop ecological research together that accounts for the social, political, and financial concerns that apply most pressingly to practitioners (Enquist et al., 2017; Lawson et al., 2017).

Collaboration could be supported by alignment between practitioner monitoring and research design. For example, the development of SMART targets by rewilding organizations could support development of metrics to measure progress (Aldridge & Colvin, 2024). It would also provide a scaffold for academic researchers to consider when designing studies of their sites. Academic case studies on rewilding are often based in land owned by rewilding organizations, so when beginning a relationship with an organization to arrange study site access, researchers could request historical data relevant to their study. Such data may be folded into a study or acknowledged as background information, recognizing that data and findings are valuable and it is important that practitioners also benefit from data sharing (e.g., data sovereignty where appropriate). Development of such relationships could serve to incentivize positive practitioner–researcher collaborations such as establishment of long-term ecological plots for study and development of joint proposals to target gaps in the knowledge base. Our results suggest that this may involve more consideration of social factors in research. Social factors currently receive less attention than ecological ones, but the former often drive the work of rewilding organizations (Figure 2). Frameworks for including social factors exist already; for example, human–nature connectedness may be a sensible starting point from which to consider the impacts of rewilding interventions (Barragan-Jason et al., 2022).

There is strong academic and practitioner interest, as well as international political will, to address the damage to ecosystems worldwide (FAO et al., 2021). This is good news for conservation, but funding and other resources will be directed toward strategies that can be proven as effective. Robust data will be needed to reassure financial mechanisms for securing long-term investment in rewilding strategies (Rewilding Britain, 2024), and the development of a strong evidence base for rewilding will allow practitioners to ensure that effort and resources are applied effectively (O'Connell & Prudhomme, 2024). Monitoring and evaluation are key (Hart et al., 2023; Svenning et al., 2016), and there may be a role for global organizations such as the GRA in coordinating such efforts at scale.

Our work illustrates how rewilding clearly still means different things to different stakeholders in different contexts, emphasizing the need for more consensus regarding what rewilding aims to achieve in *measurable* terms. If clearer framings for rewilding and its intended outputs are reached, then it may be possible for future studies to map how different definitions and framings relate to monitoring approaches and metrics of evaluation, which would be a valuable analysis. We do not presume to offer a firm definition for this here, but to meet the scale of the challenge of the environmental crisis, researchers and rewilding practitioners need to determine what works and where. Good practice can only be established and shared responsibly if it is based on evidence (Segan et al., 2011; Sutherland et al., 2020). The challenge now is to establish a sufficient evidence base to direct the development of future action. Many of our findings reflect known problems with monitoring and evaluation not just in rewilding but more broadly in restoration and conservation. There have been calls for improved study design and use of controls in ecological research for many years (Christie et al., 2019; Sutherland, 2022), and similar problems have been raised for practitioners (Legge, 2015).

There has been development of broad guidance on ecological restoration (e.g., FAO et al., 2021; Gann et al., 2026), much of which applies to rewilding, including appeals to involve diverse stakeholders, focus on processes, and monitor progress effectively. As an open-ended, dynamic recovery strategy (Law et al., 2017), rewilding is not tied to an expected end-state in the same way as traditional restoration strategies (du Toit & Pettorelli, 2019; Durant et al., 2019; Pettorelli & Bullock, 2023). Although rewilding shares many attributes with restoration, and it may be argued that the two are coming into greater alignment as practice develops (Mutillod et al., 2024), for now, some rewilding projects still diverge from the broadly accepted standards for restoration (Gann et al., 2026). It may be, therefore, that rewilding requires different metrics and methods for monitoring and evaluation than have been used across traditional restoration. Metrics for rewilding need to describe change (the process of transformation as a landscape recovers) and function rather than taxa. Metrics that explore how communities change across time and space (e.g., Pates et al., 2025; Simpson & Pearse, 2021) and metrics for measuring the recovery of function following rewilding (Selwyn et al., 2025) offer a potential starting point.

The improvements we suggest are not simple to achieve, especially for rewilding given the large spatial and long temporal scales involved. Alongside our call for more comparative studies, improved data collection and recording, and more collaborative relationships between researchers and practitioners, we call for effective levels of funding. There is a need for projects that extend the spatial and temporal reach of monitoring and evaluation and develop metrics for measuring ecosystem function. It was challenging to draw detailed spatial and temporal conclusions in this systematic map because of the patchy and generally short-term nature of the available data (Appendix S2). However, if comparable data are collected and stored accessibly

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while more rewilding projects mature, it should be possible to accrue sufficient information to make such analyses possible in the future, which would provide valuable insights. Similar issues have been addressed in evidence-based conservation (Sutherland et al., 2019); thus, the approaches outlined here can draw on good practice from existing guidance. Ultimately, building a research-quality evidence base is essential for determining whether rewilding truly works.

AUTHOR CONTRIBUTIONS

N.J.P.: Conceptualization; data curation; investigation; methodology; writing—original draft preparation; writing—reviewing and editing. J.M.B.: Conceptualization; methodology; validation; writing—reviewing and editing. J.T.T.: Conceptualization; methodology; validation; writing—reviewing and editing. S.H.: Validation; writing—reviewing and editing. N.P.: Conceptualization; methodology; validation; writing—reviewing and editing. W.D.P.: Conceptualization; methodology; validation; writing—reviewing and editing; supervision.

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DATA AVAILABILITY STATEMENT

All data supporting the findings of this study are available on Zenodo at https://doi.org/10.5281/zenodo.18131010.

ORCID

Nell J. Pates https://orcid.org/0009-0005-7444-651X

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SUPPORTING INFORMATION

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