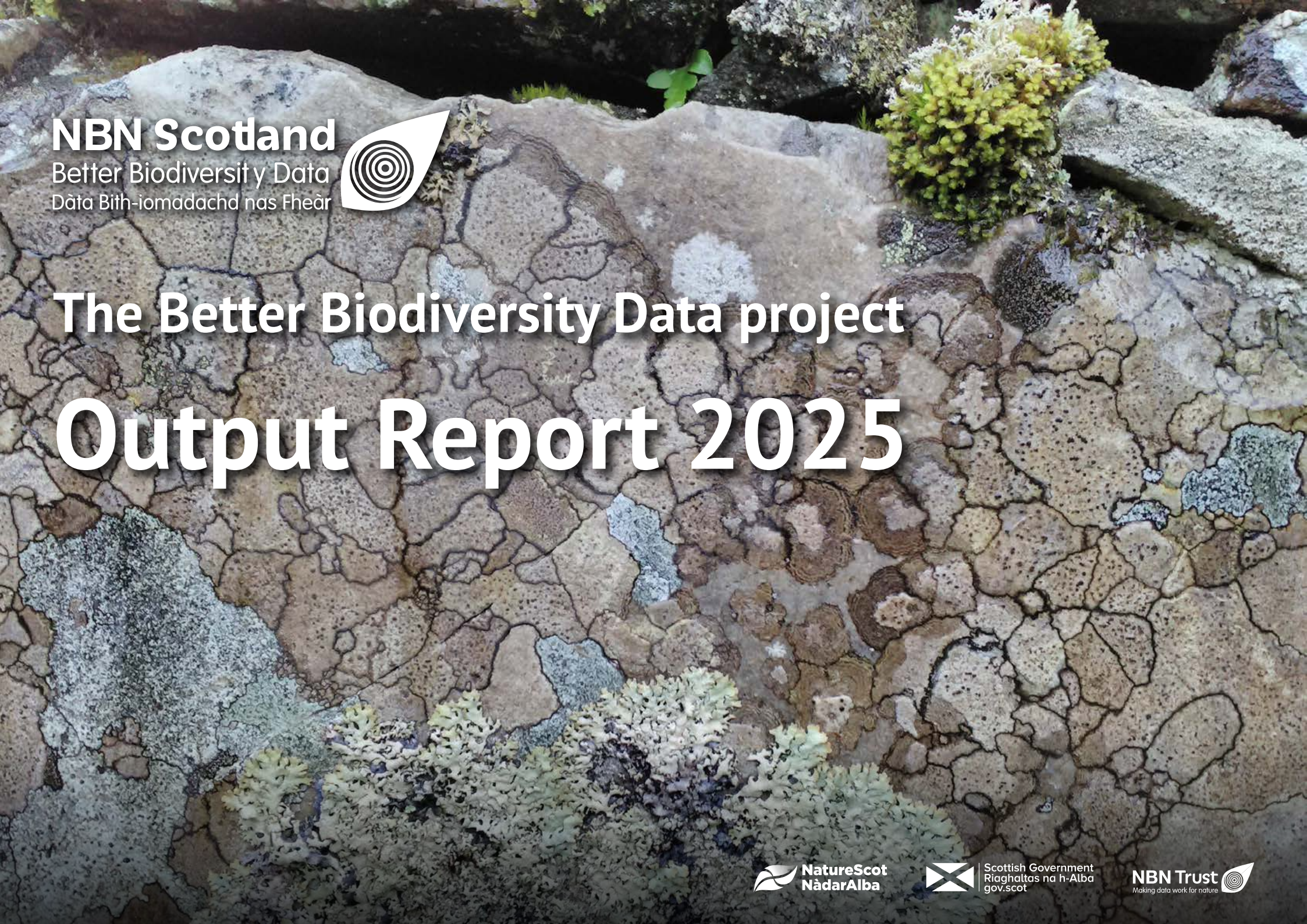

NBN Scotland
Better Biodiversity Data
Dàta Bith-iomadachd nas Fheàr
The Better Biodiversity Data project
Output Report 2025
NatureScot
NàdarAlba
Scottish Government
Riaghaltas na h-Alba
gov.scot
NBN Trust
Making data work for nature

Executive Summary

The 2-year Better Biodiversity Data (BBD) project was delivered between 2023-2025. Supported by NatureScot and the Scottish Government, BBD addressed three objectives for, i) A nationwide partnership providing biodiversity data services on behalf of Scotland, ii) A fit-for-purpose Data Management and Digital Services System, providing financially sustainable value-added services to users, and, iii) A well-connected and functional biodiversity data community and infrastructure in Scotland, following FAIR and Open Data principles, across all sectors. The BBD project has laid the foundations for a Scottish Biodiversity Services Consortium (SBSC) and commenced development and established a roadmap for a new Data Management and Digital Services System. The BBD team has worked with the wider biodiversity data community to explore biodiversity data flows in Scotland, advocated for ongoing support of the biodiversity data infrastructure to policymakers and facilitated the work of the Scottish Biodiversity Information Forum (SBIF). The BBD project concluded by outlining recommendations for the next phase of work required to embed the SBSC and deliver an operational Data Management and Digital Services System.

Contents:

Background

The SBIF Review and Recommendations

The Scottish Biodiversity Information Forum (SBIF) recommendations, published in 2018[1], are designed as a visionary guide to enhance the management, accessibility, and integration of biodiversity data across various sectors and stakeholders in Scotland. These recommendations lay the groundwork for a cohesive approach to biodiversity information, aiming to support conservation efforts, sustainable development, and policymaking with comprehensive, timely, and precise data. The recommendations address critical challenges faced by the biodiversity data infrastructure, including shortcomings in data flows, service provision, funding and governance and culture. The subsequent Scottish Marine Biodiversity Data Review (SMBDR) was published by NatureScot in 2022[2], focusing on marine biodiversity data. In 2024, the twenty-four recommendations made in the 2018 SBIF Review were updated[3] in light of changes in the biodiversity-related policy frameworks and legislation since its original publication.

Initial work to address key SBIF recommendations commenced in 2023, with the start of Better Biodiversity Data (BBD) project delivery. The BBD project is led by the National Biodiversity Network Trust's Scottish team, known as NBN Scotland, in partnership with NatureScot, the Scottish Government and SBIF.

BBD project objectives

1. A nationwide partnership providing biodiversity data services on behalf of Scotland.
2. A fit-for-purpose Data Management and Digital Services System, providing financially sustainable value-added services to users.
3. A well-connected and functional biodiversity data community and infrastructure in Scotland, following FAIR and Open Data principles, across all sectors.

In addressing the above objectives, the BBD project has directly tackled SBIF recommendations associated with national support in Scotland for biodiversity service providers, building on the existing network and creating the foundation for national-level service provision. The outcomes of the BBD project will help establish the technical systems and business models required for delivering financially sustainable services into the future.

BBD Project Partners

The BBD project has worked with a wide community of partners to deliver on the SBIF recommendations and project objectives. The BBD Project Group includes:

Managing Partners

- National Biodiversity Network (NBN) Trust
- Scottish Biodiversity Information Forum (SBIF)
- NatureScot
- Scottish Government
- Scottish Wildlife Trust

Core Partners

- Scottish Local Environmental Records Centres (LERCs)
  - Fife Nature Records Centre
  - Glasgow Museums Biological Records Centre (GMBRC)
  - North East Scotland Biological Records Centre (NESBReC)
  - Shetland Biological Records Centre (SBRC)
  - South West Scotland Environmental Information Centre (SWSEIC)
  - The Wildlife Information Centre (TWIC)
- Local Biological Recording Groups
  - Argyll Biological Records Centre (ABReC)
  - Highland Biological Recording Group (HBRG)
  - Orkney Wildlife Recording Group (OWRG)
  - Outer Hebrides Biological Recording (OHBR)

Supporting Partners

- Association of Local Environmental Records Centres (ALERC)
- Biological Recording in Scotland (BRISC)
- Conservation and Biodiversity NGOs
- Biological Records Centre (BRC) / UK Centre for Ecology & Hydrology (UKCEH)
- Museum and Herbaria Collections in Scotland
- Scottish National Parks

BBD Governance Structure and Funding

A total of £578,948 was awarded to the BBD project by NatureScot and the Scottish Government, each contributing 50% of the funding. Additional small grants from BRISC, the RSPB and Scottish Wildlife Trust enabled the BBD Partnership Officer to act as SBIF Coordinator and to facilitate the activities of the SBIF Advisory Group.

The overall governance and advisory structures for the BBD project are outlined in Figure 1, where solid arrows show governance/decision-making pathways and hollow arrows show advisory and information sharing pathways. Throughout the project, BBD sought to make significant project decisions based on the consensus of project partners. The NBN Trust retained authority to make decisions where consensus was not achieved.

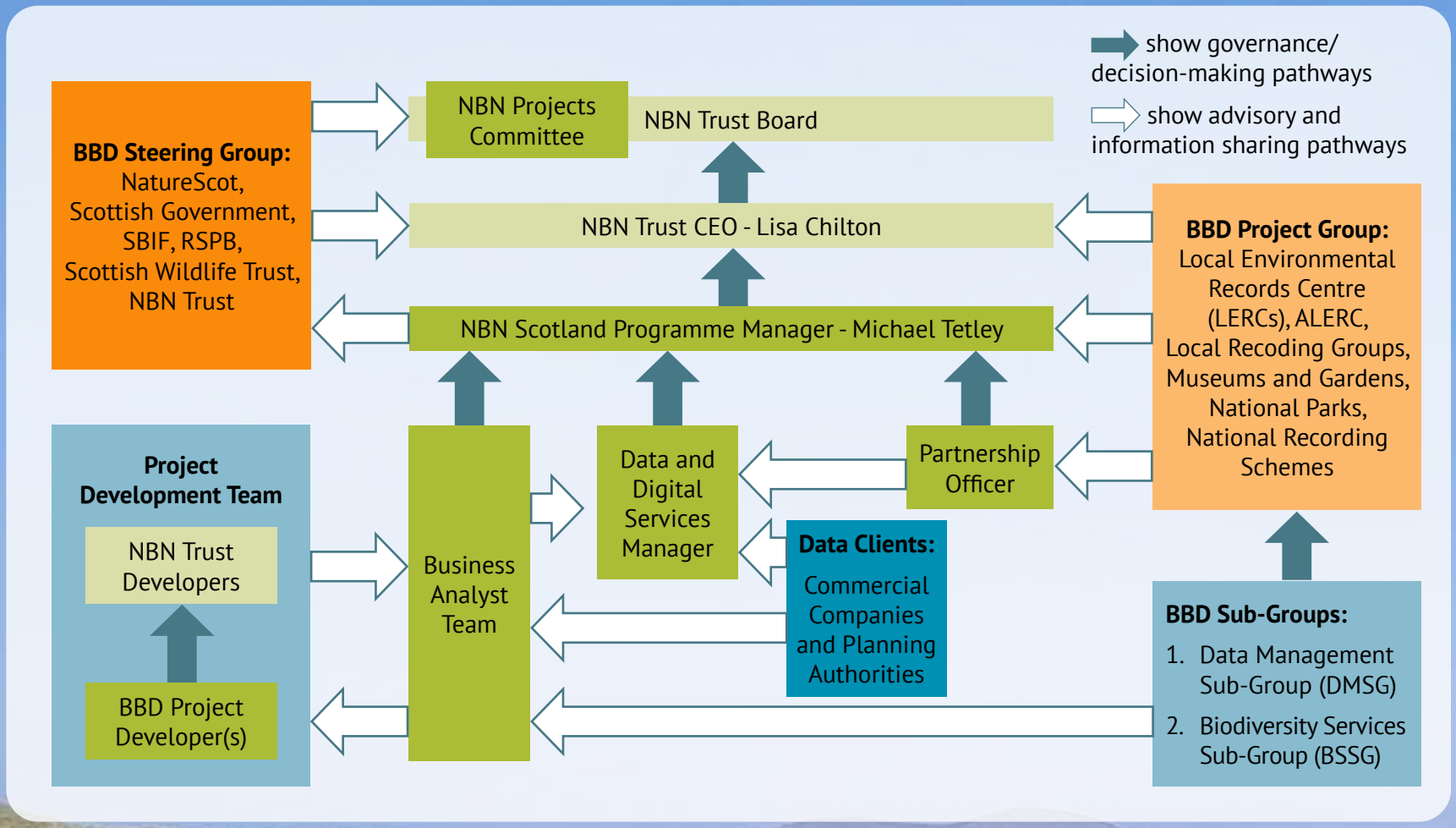


Figure 1: BBD project governance and advisory structures

Alongside the BBD project structure, the SBIF Advisory Group has continued to provide an important external forum for sharing information about the project and enabled BBD to keep up to date with developments and relationships across the wider biodiversity data community in Scotland. The relationship with the SBIF Advisory Group has ensured BBD project team engagement in reviewing progress against the SBIF recommendations and awareness of other initiatives to take forward recommendations from the SBIF Review that lie outwith the remit of the BBD project.

BBD Project Delivery and Outputs

Objective 1. A nationwide partnership providing biodiversity data services on behalf of Scotland

The SBIF Review (2018) recommended that the NBN Trust should act as the lead coordinating body for Scotland's biodiversity data infrastructure, integrating regional biodiversity data services into a cohesive framework of National and Regional Hubs. This vision aligns with NatureScot's objective of a coordinated system and National Hub for Biodiversity Data to improve and maintain data flows for locally recorded biodiversity data and aid in the delivery of biodiversity data services across Scotland. To achieve this, a new nationwide partnership was required - one that formalises collaboration between LERCs and Recording Groups and Schemes, ensuring effective service provision, governance, and financial sustainability.

Stakeholder Engagement and Consultation

The development of this new collaborative infrastructure followed a highly consultative and iterative approach. Between 2023 and 2025, extensive stakeholder engagement shaped the design of a new consortium arrangement and model:

- Four BBD Project Group Meetings (2023-2025) – Defined core requirements for a local-to-national biodiversity data system, refining the role of the National coordinating body and members within the proposed consortium.
- Three ad hoc BBD Biodiversity Services Sub-Group (BSSG) Meetings – Focused on the operational framework for biodiversity service delivery, clarifying data flows, governance structures, and financial arrangements.
- Consortium Models Consultation (Round 1, 2023) – Evaluated different governance models, leading to the selection of a 'hosted' consortium coordinated by a new subsidiary Community Interest Company (CIC) under the NBN Trust.
- Consortium Agreements Consultations (Rounds 2, 3, and 4, 2024-2025) – Developed the Consortium Agreement, Individual Service Level Agreements, and a Memorandum of Understanding (MoU) between NBN Trust and the new NBN Scotland CIC, ensuring clarity on financial oversight, governance, and service provision.

Throughout these consultations, expert advisory support was provided to ensure the governance, financial planning, and operational models aligned with best practices:

- Scottish Enterprise and Cooperative Development Scotland (CDS) – Advised on consortium governance structures, ensuring statutory and community-driven compliance.
- Just Enterprise and Community Enterprise in Scotland (CEIS) – Guided the development of NBN Scotland CIC's financial sustainability model.
- Freeths LLP (Legal Firm) – Provided legal oversight on service agreements and NBN Scotland CIC's establishment.
- ALERC – Advised on the necessary requirements of LERCs for being supported/represented in any local-to-national governance model.

Selection of the Hosted Consortium Model

The consultation process confirmed that a hosted consortium model, coordinated by an independent subsidiary CIC, was the most effective approach to achieving a structured, sustainable biodiversity data infrastructure in Scotland. This approach was partly advised by CDS, considering the variation in the organisational structure and incorporation status of LERCs and local Recording Groups and Schemes, which currently provide key services for collecting, managing, and distributing biodiversity information locally.

The Scottish Biodiversity Services Consortium (SBSC) will provide a local-to-national framework of biodiversity data services, ensuring that Local biodiversity information service providers (LSPs), initially comprising Scottish LERCs, remain independent while operating within a coordinated national framework. The NBN Scotland CIC will serve as the national coordinating body, facilitating financial sustainability, governance oversight, and service standardisation.

New Legal and Governance Framework

The creation of the SBSC and NBN Scotland CIC represents a major milestone in implementing the SBIF recommendations on governance, regional hub service focus, and financial sustainability. Figure 2 shows the relationship between NBN Scotland CIC and other key stakeholders. The key governance structures established include:

- **NBN Scotland CIC as the Coordinating Body**

  Legally incorporated as a subsidiary of the NBN Trust, ensuring accountability while maintaining operational independence, whilst facilitating the central coordination of local-to-national biodiversity services, including financial management, service agreements, and technical support. As a Scottish arm of the NBN Trust it provides the national platform for data management via the NBN Atlas Scotland and new Data Management System for Scotland created by the BBD project.

- **Community Advisory Panel (CAP)**

  Making use of the existing SBIF Advisory Group, the CAP will ensure representation from the wider biodiversity data community (including recorders, NGOs, statutory bodies, academic institutions), providing strategic oversight and ensuring that NBN Scotland CIC delivers its community commitments related to biodiversity data service coordination, aligning with user needs and national priorities.

- **SBSC Steering Group**

  Comprising LSPs and overseeing operational aspects of service delivery. This will ensure consistent, high-quality biodiversity data services across Scotland by utilising the local knowledge and expertise of LSPs.

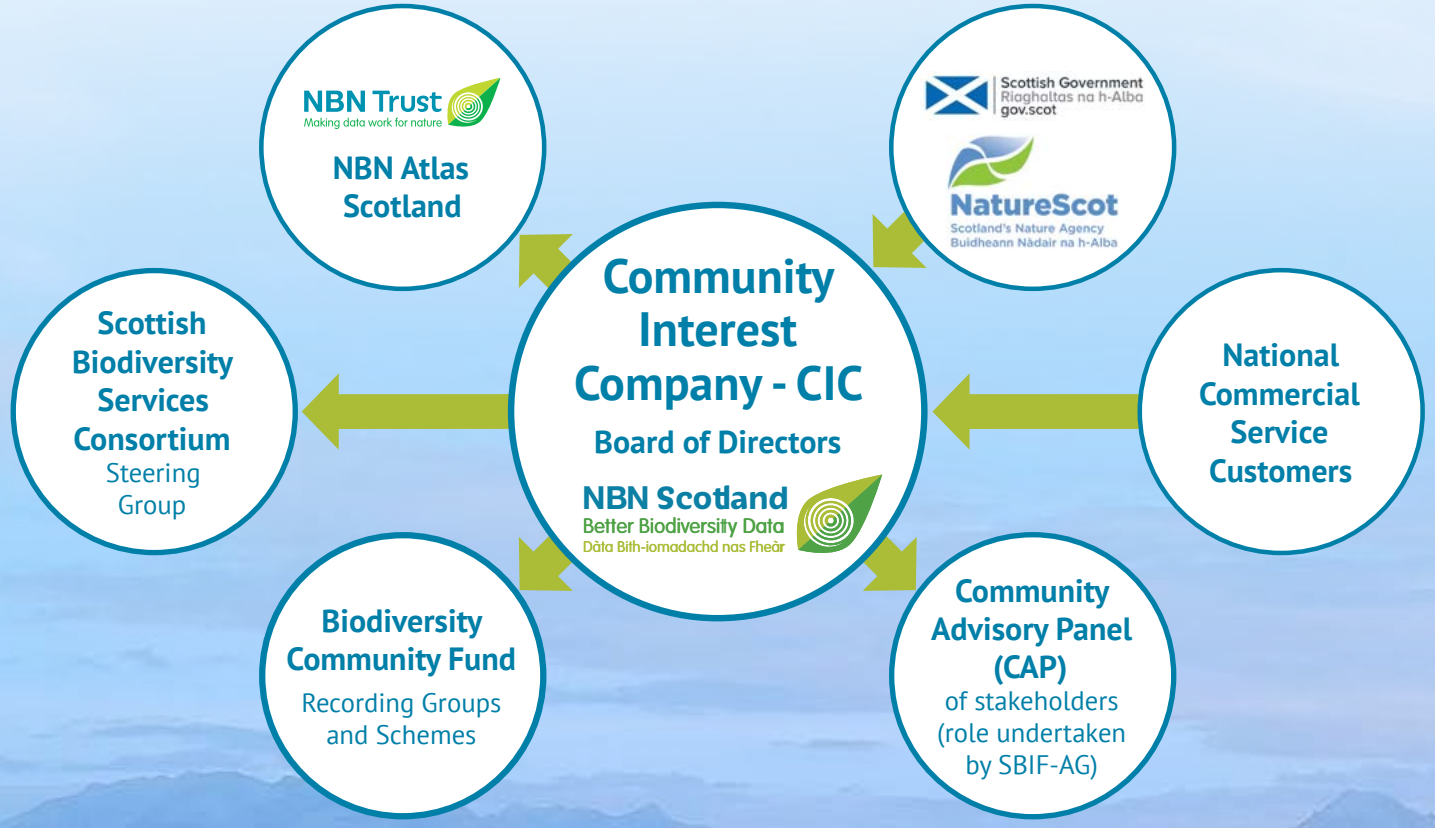


Figure 2: The NBN Scotland CIC and its relationship with key stakeholders.

National-Level Data Services and the Biodiversity Community Fund

Beyond its role in coordinating local biodiversity data services, NBN Scotland CIC has been structured to provide national-level biodiversity data services to key infrastructure sectors, including energy, utilities, and transport.

The BBD team engaged with SSEN-Transmission to pilot a potential national biodiversity data service based on a searchable data dashboard concept model. Through consultation with SSEN-Transmission and the wider SSE Group, a product specification and demonstratable pilot was built based on reporting requirements and user needs. This highlighted the pilot client's need for improved access to biodiversity data, species and habitat status information, and analytics on licences and age of species records. A proof-of-concept dashboard was created using ESRI GIS products, in association with the ESRI UK non-profit scheme, that integrated NBN Atlas Scotland data with SSEN-Transmission's species occurrence data within a single platform. A demonstration highlighted the value and utility to potential clients, showcasing a range of habitat and spatial datasets with analytics, insights and customisable map views.

Building on the BBD project pilot with SSEN-Transmission, a national biodiversity data dashboard service will:

- Facilitate improved access to biodiversity data from the NBN Atlas Scotland to national infrastructure and utility providers and their environmental consultancies.
- Signpost national clients to LSPs, ensuring that regional expertise is utilised in development and planning projects.
- Generate sustainable income, supporting ongoing SBSC operations and service expansion.

A portion of the revenue from national biodiversity services will be reinvested into a Biodiversity Community Fund, designed to address a key bottleneck in biodiversity data services: data collection, verification, and mobilisation.

The Biodiversity Community Fund will:

- Provide direct financial support to local Recording Groups and Schemes for biodiversity data collection and management.
- Enhance local capacity, ensuring the long-term sustainability of Scotland's biodiversity data infrastructure and its data to be findable, accessible, interoperable, and reusable (FAIR).

A National Hub for Scotland's Biodiversity Data

The creation of NBN Scotland CIC will ensure that Scotland's biodiversity data services align with national and international biodiversity commitments. By implementing a hosted consortium model, the SBSC will enable LSPs to operate within a coordinated framework while retaining local independence.

This structure directly supports the implementation of SBIF Recommendation 17, which called for a National Hub model that integrates:

- Local biodiversity data services into a national framework.
- Governance mechanisms to ensure long-term sustainability.

To ensure that the SBSC and NBN Scotland CIC can provide a robust, scalable, and financially sustainable solution to biodiversity data management in Scotland, alignment is needed with the Scottish Biodiversity Strategy's 2024-2030 Delivery Plan[4]. In particular, with the identified aim to create a National Hub for Biodiversity Data in Scotland that delivers services across national and local scale. This will ensure long-term benefits for policy, conservation, and environmental decision-making at both local and national levels, aligning with Scotland's statutory biodiversity targets and the Scottish Biodiversity Strategy.

Objective 2. A fit-for-purpose Data Management and Digital Services System, providing financially sustainable value-added services to users

The Scottish biodiversity data landscape is inconsistent and fragmented, with most records being stored locally. Subsequently, biodiversity data services are variable in their quality and content across the country. Access to data can be difficult and there is a lack of funding to support data curation.

A new Data Management System is a key objective of the BBD project and a necessary component to fixing this problem; by creating a centrally managed platform which will provide management and storage of biodiversity data.

Definition of Requirements

A user-driven approach was adopted for the definition of requirements for the Data Management System to ensure that it would meet the needs of LSPs in Scotland, initially comprising the LERCs and Recording Groups who will be the first users of the new system. The BBD team gathered requirements from all existing LSPs through a series of individual and group meetings. This process involved regular meetings with the BBD Data Management Sub-Group (DMSG) and user surveys to clarify the required functionality. This approach ensured continuous refinement and improvement of the Data Management System, and can be extended as the technical development progresses beyond the BBD project.

Development Approach

The BBD project has taken an agile approach to development. This means that the Data Management System is being built through a series of small iterations, throughout its lifetime. The advantages of agile development are:

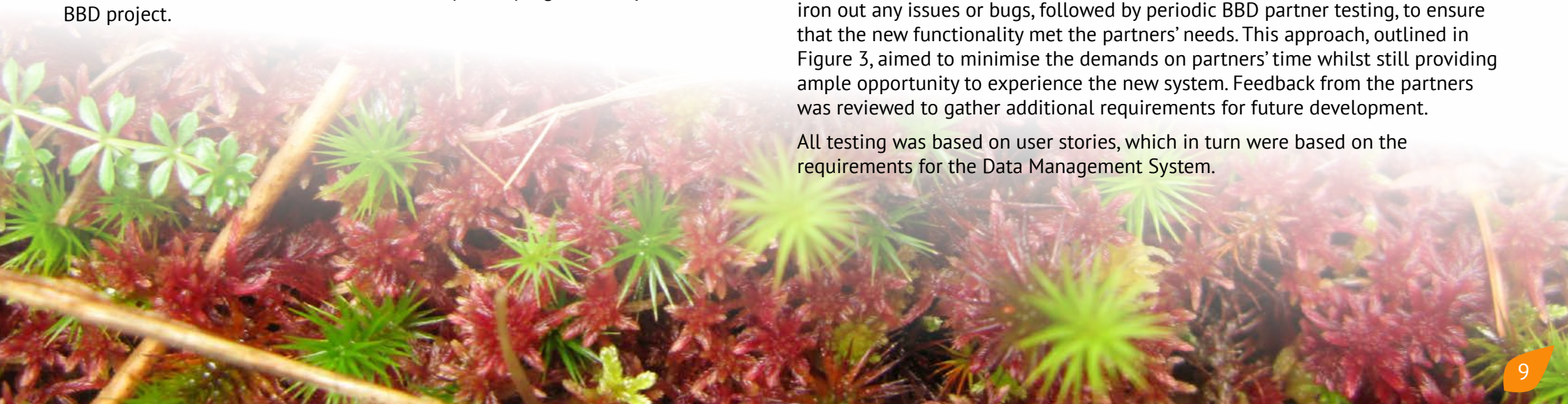
- LSPs are able to experience the Data Management System (or subsections of it) much earlier in the project lifecycle.
- Feedback from early iterations is easily incorporated into subsequent iterations, allowing a much more flexible and adaptable development process.

Development began in 2024, with the first iteration of the Data Management System completed in November 2024. Each iteration includes the steps of planning and refinement, build/development, testing and review.

Testing Approach

For the initial phase of development to establish a cloud-based multi-tenanted database, testing of the basic functionality was done wholly within the BBD team. As functionality became more complex, internal testing was completed to iron out any issues or bugs, followed by periodic BBD partner testing, to ensure that the new functionality met the partners' needs. This approach, outlined in Figure 3, aimed to minimise the demands on partners' time whilst still providing ample opportunity to experience the new system. Feedback from the partners was reviewed to gather additional requirements for future development.

All testing was based on user stories, which in turn were based on the requirements for the Data Management System.



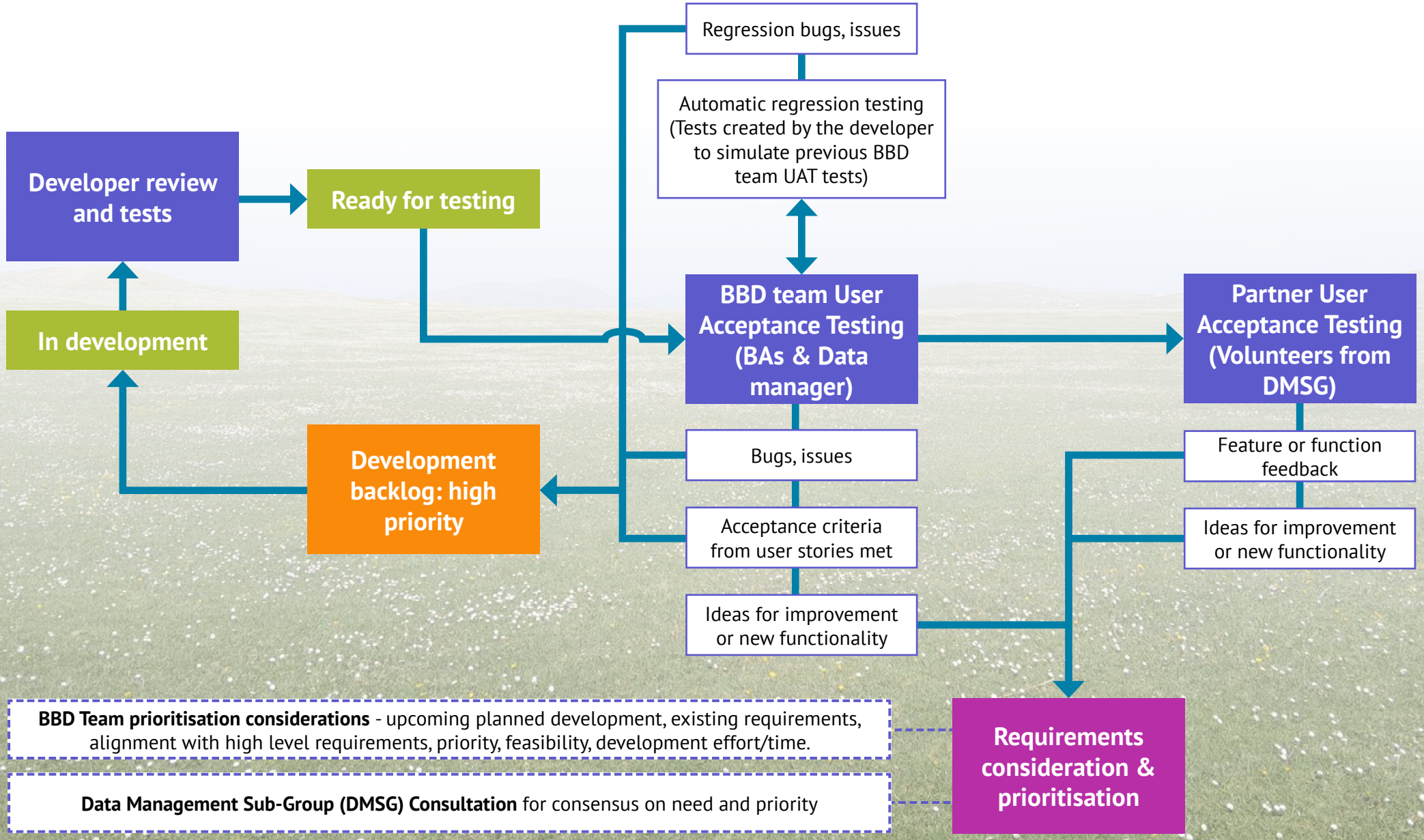


Figure 3: The testing process undertaken during development of a new Data Management System through the BBD project.

Key Documentation

Business Case Options Report

Development of a new Data Management System is a significant undertaking for the NBN Trust. As such, the Board of the NBN Trust asked that a thorough risk assessment was performed against the delivery options for this system. Four options were assessed against:

- Their alignment with the SBIF requirements
- Delivery costs
- Feedback from BBD project partners
- In-depth risk analysis

The BBD team's recommendation to the Board was that the most suitable option was to redevelop the existing Recorder 6 system and create a new system based on the Recorder data model, solely for Scotland. When considering delivery, developing the Data Management System in-house at the NBN Trust was identified as having the least risk. This approach was approved by NatureScot.

Vision Document

The BBD team created and regularly updated a vision document to capture the key features of the Data Management System, the business objectives, requested scope and benefits. The document was used to engage key BBD partners and to facilitate handover to the in-house development team.

Over time, the vision document evolved into a Business Analysis report, in order to summarise the progress of the system development.

Requirements and User Stories

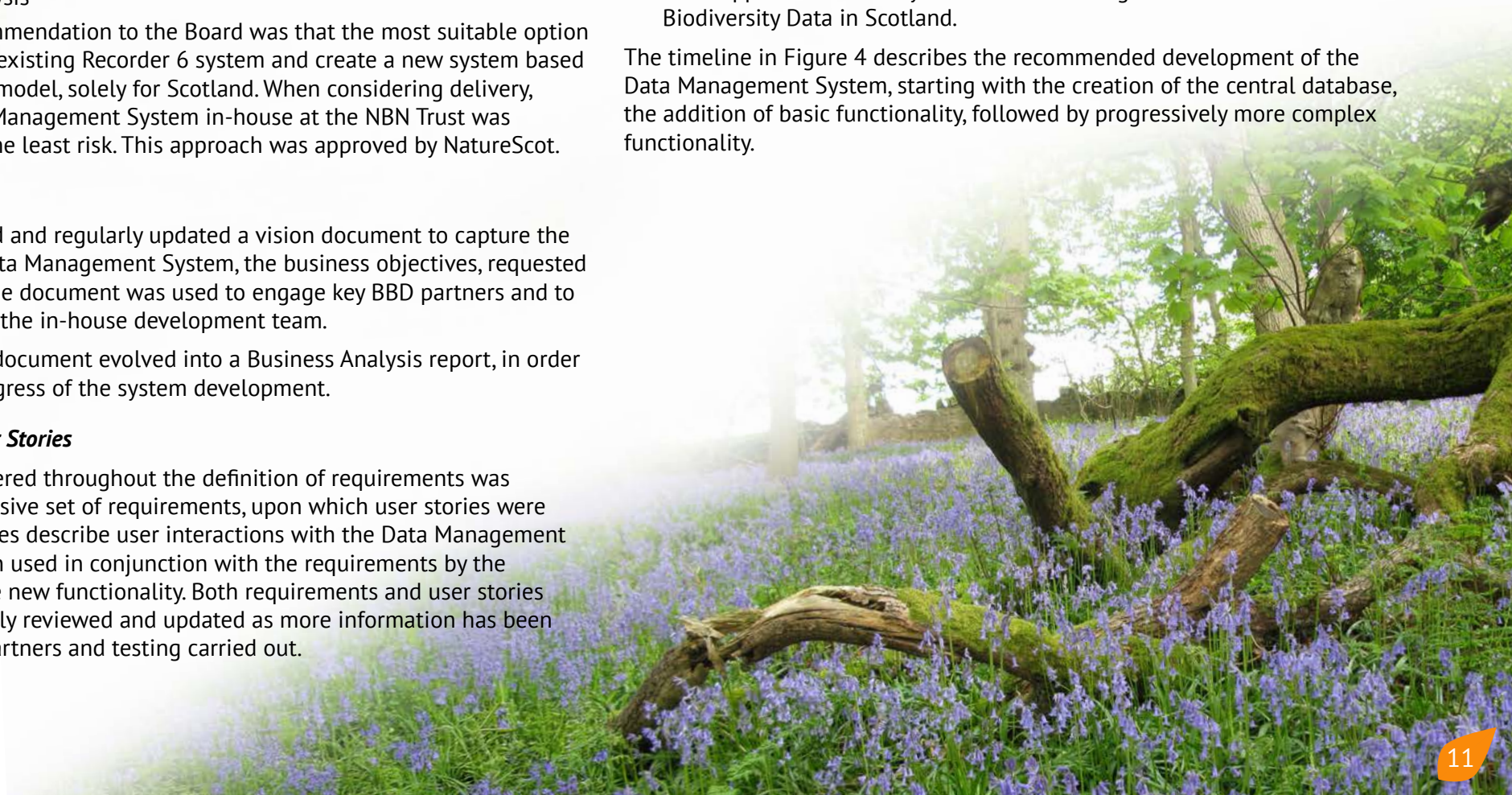
The information gathered throughout the definition of requirements was distilled into an extensive set of requirements, upon which user stories were written. The user stories describe user interactions with the Data Management System and have been used in conjunction with the requirements by the developer to build the new functionality. Both requirements and user stories have been continuously reviewed and updated as more information has been gathered from BBD partners and testing carried out.

Timeline for System Development

Development of the Data Management System has been split into 3 recommended stages:

1. Up to March 2025 (BBD project) – delivery of a tested central database, with basic tooling to allow users to import and view data and create simple reports.
2. Up to March 2026 (BBD+1) – delivery of an end-to-end system for use by LSPs to centrally manage their biodiversity data records.
3. Up to 2030 – transition to the centralised Data Management System that supports biodiversity data services through a new National Hub for Biodiversity Data in Scotland.

The timeline in Figure 4 describes the recommended development of the Data Management System, starting with the creation of the central database, the addition of basic functionality, followed by progressively more complex functionality.



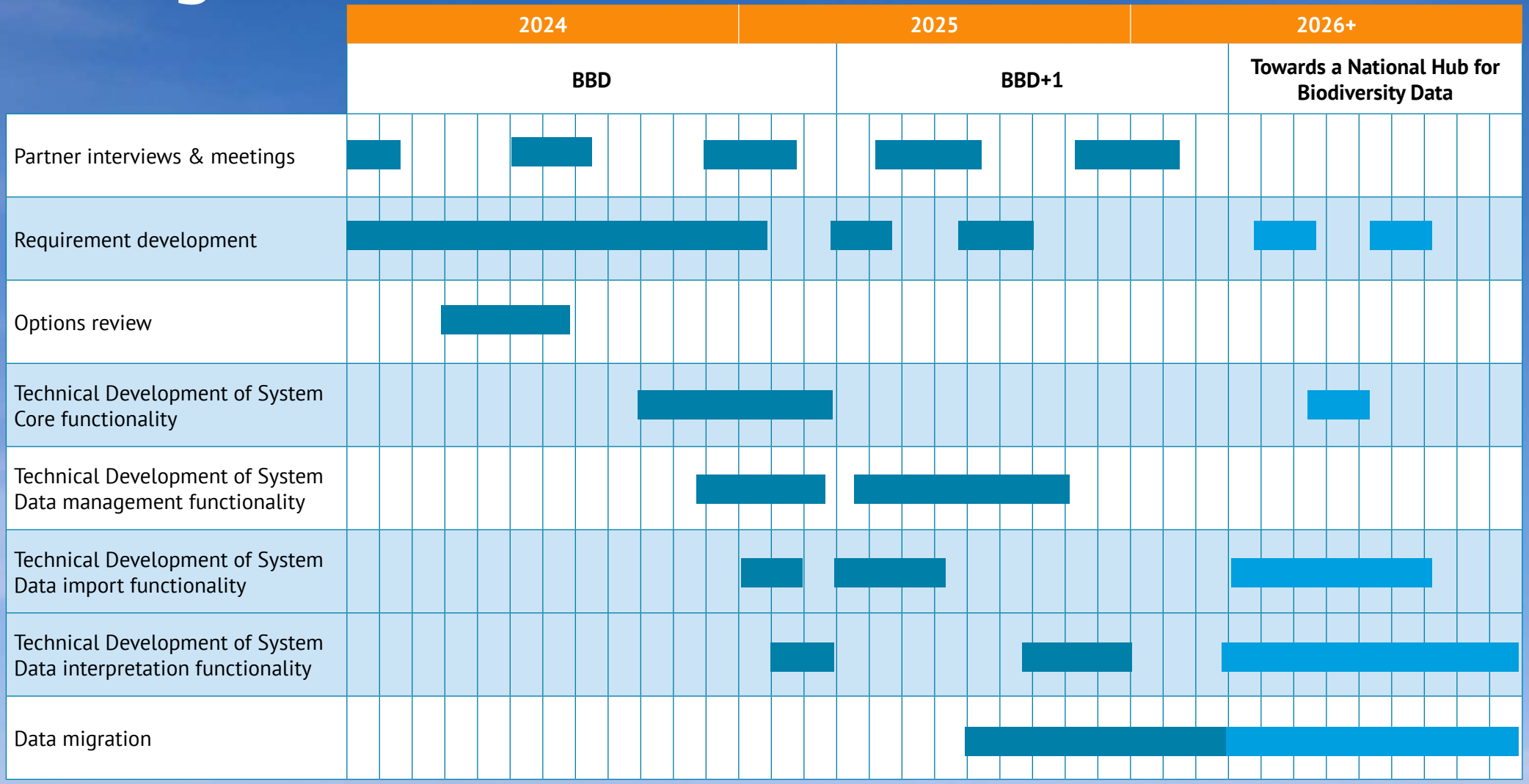


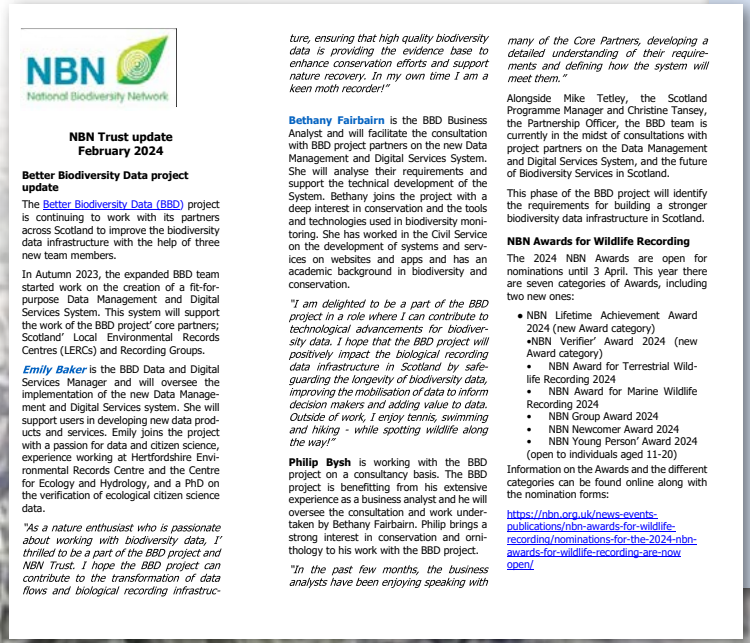
Figure 4: The BBD Data Management System development timeline.

Objective 3. A well-connected and functional biodiversity data community and infrastructure in Scotland, following FAIR and Open Data principles, across all sectors

The BBD project sought to engage with partners across the biodiversity data community in Scotland to i) deliver BBD project objectives, and, ii) align with SBIF recommendations for the enhancement of the biodiversity data infrastructure across all sectors.

To enable the delivery of BBD project objectives, the BBD team undertook a series of meetings with core and supporting partners across Scotland. Engaging with the LERCs and Recording Groups that make up existing LSPs in Scotland provided an up-to-date picture of the challenges they face and a foundation for subsequent BBD consultation processes.

To ensure communication with the wider biological recording community, the BBD team contributed talks and information stands at ten recorder-focused conferences and events over the project period (2023-2025). In addition, BBD contributed to webinars and other events, including for the Species on the Edge Partnership, the Scottish Government, the Scottish Biodiversity Officers Network, ALERC and Planning Democracy. Sixteen updates on the progress of the BBD project were shared via newsletters, articles and blog-posts for the NBN Trust, BRISC, Tayside Biodiversity Partnership, The Scottish Ornithologists Club (SOC) and CIEEM among others.



NBN National Biodiversity Network

NBN Trust update
February 2024

Better Biodiversity Data project update

The Better Biodiversity Data (BBD) project is continuing to work with its partners across Scotland to improve the biodiversity data infrastructure with the help of three new team members.

In Autumn 2023, the expanded BBD team started work on the creation of a fit-for-purpose Data Management and Digital Services System. This system will support the work of the BBD project' core partners; Scotland' Local Environmental Records Centres (LERCs) and Recording Groups.

Emily Baker is the BBD Data and Digital Services Manager and will oversee the implementation of the new Data Management and Digital Services system. She will support users in developing new data products and services. Emily joins the project with a passion for data and citizen science, experience working at Hertfordshire Environmental Records Centre and the Centre for Ecology and Hydrology, and a PhD on the verification of ecological citizen science data.

"As a nature enthusiast who is passionate about working with biodiversity data, I' thrilled to be a part of the BBD project and NBN Trust. I hope the BBD project can contribute to the transformation of data flows and biological recording infrastructure, ensuring that high quality biodiversity data is providing the evidence base to enhance conservation efforts and support nature recovery. In my own time I am a keen moth recorder!"

Bethany Fairbairn is the BBD Business Analyst and will facilitate the consultation with BBD project partners on the new Data Management and Digital Services System. She will analyse their requirements and support the technical development of the System. Bethany joins the project with a deep interest in conservation and the tools and technologies used in biodiversity monitoring. She has worked in the Civil Service on the development of systems and services on websites and apps and has an academic background in biodiversity and conservation.

"I am delighted to be a part of the BBD project in a role where I can contribute to technological advancements for biodiversity data. I hope that the BBD project will positively impact the biological recording data infrastructure in Scotland by safeguarding the longevity of biodiversity data, improving the mobilisation of data to inform decision makers and adding value to data. Outside of work, I enjoy tennis, swimming and hiking - while spotting wildlife along the way!"

Philip Bysh is working with the BBD project on a consultancy basis. The BBD project is benefitting from his extensive experience as a business analyst and he will oversee the consultation and work undertaken by Bethany Fairbairn. Philip brings a strong interest in conservation and ornithology to his work with the BBD project.

"In the past few months, the business analysts have been enjoying speaking with many of the Core Partners, developing a detailed understanding of their requirements and defining how the system will meet them."

Alongside Mike Tetley, the Scotland Programme Manager and Christine Tansey, the Partnership Officer, the BBD team is currently in the midst of consultations with project partners on the Data Management and Digital Services System, and the future of Biodiversity Services in Scotland.

This phase of the BBD project will identify the requirements for building a stronger biodiversity data infrastructure in Scotland.

NBN Awards for Wildlife Recording

The 2024 NBN Awards are open for nominations until 3 April. This year there are seven categories of Awards, including two new ones:

- NBN Lifetime Achievement Award 2024 (new Award category)
- •NBN Verifier' Award 2024 (new Award category)
- NBN Award for Terrestrial Wildlife Recording 2024
- NBN Award for Marine Wildlife Recording 2024
- NBN Group Award 2024
- NBN Newcomer Award 2024
- NBN Young Person' Award 2024 (open to individuals aged 11-20)

Information on the Awards and the different categories can be found online along with the nomination forms:

https://nbn.org.uk/news-events-publications/nbn-awards-for-wildlife-recording/nominations-for-the-2024-nbn-awards-for-wildlife-recording-are-now-open/

SOC at the Biodiversity exhibition in the Scottish Parliament

NBN Trust
Making data work for nature

An exhibition held at the Scottish Parliament in September featured a number of biodiversity projects in Scotland in order to raise the importance of biological recording, volunteer recorders, and biodiversity data to politicians and policy makers.

The exhibition was run by the National Biodiversity Network (NBN) Trust, and was coordinated by the Better Biodiversity Data (BBD) project. The BBD project is working to develop a fit-for-purpose infrastructure facilitating biodiversity data access and services across Scotland. The exhibition aimed to tell the stories of those involved in the collection, collation and use of biodiversity data, showcasing the importance of supporting a good biodiversity data infrastructure in Scotland.

The SOC's Lothian branch was invited to feature some of the projects coordinated by the branch Discussion Group. This group was established in the 1960s, and during this time has been responsible for organising a raft of different ornithological fieldwork in the Lothians. The group meets monthly from September to April at Waterston House, the Club's headquarters at Aberlady, east Lothian. Members include both very experienced field birders and relative newcomers to the hobby keen to become more involved in field study. They recognise the huge importance of robust data collected locally in supporting the conservation of the birds and their habitats, as well as the personal benefits that being outdoors with a purpose can bring.

The display featured two key projects coordinated by the group over the last 20 years. Firstly, there was the local bird atlas mapping the distribution of all birds in Lothian and Borders at the tetrad (2x2 km square) level. This was the second such atlas in the area, following another 20 years earlier, so we were also able to map changes in distribution. Data from these local projects contributed directly to the wider data collection for and publication of two bird atlases of Britain and Ireland led by the British Trust for Ornithology (e.g. *Bird Atlas 2007–13*). See: https://www.bto.org/ourscience/projects/birdatlas/results/mapstore

In Lothian and Borders, over 850 volunteers took part in this mammoth project, recording their observations directly into a website set up for the purpose, and 11 organisers and authors analysed the data and published the results in a book (Murray *et al*. 2019. *Birds in South-east Scotland 2007–2013*).

The exhibition also showcased some comments from volunteers. Allan Finlayson of west Lothian took up fieldwork for the Atlas as a retirement project, having never done this type of work before. Although a long-term resident of the county, he discovered new areas for the first time, many of which were not only good for birds but also lovely places to walk in. He also met numerous helpful people: "Many people took a great interest in what I was doing. Some wanted to know what the survey was all about; others were very keen to tell me of the local birds they had seen themselves". Despite initial reservations about the work becoming a chore or his competence in taking part, Allan says "within a few weeks I was completely hooked and enjoyed the whole project immensely".

Following the success of the Atlas across the whole of Lothian and Borders - in particular how it brought new people into the hobby and how much it was enjoyed - we organised a short follow-up study just in east Lothian, and only in the winter months. We also used that project to invite new birders to team up with a mentor to help them learn the techniques and some bird identification skills. One of those mentored said: "I took a great deal of benefit from the scheme, I encountered new species,

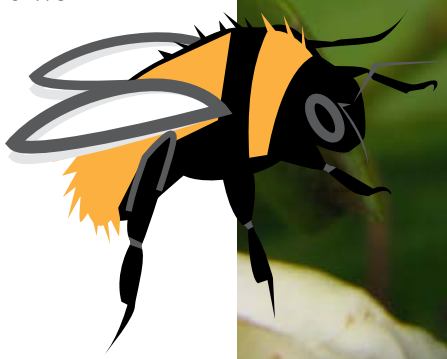
Highlighting Data Flows in Scotland

In order to better understand active biodiversity data pathways in Scotland, the BBD team undertook a simple data flow mapping exercise. This aimed to elucidate the existing relationships between the NBN Atlas and Scottish data partners, to support the development of the new Data Management System and to highlight areas where data flows could be improved to meet FAIR and Open Data principles.

The NBN Atlas currently holds around 36.7 million records for Scotland. Figure 5 shows the top 20 data partners for Scotland who account for 96% of the data currently shared to the NBN Atlas, detailing the number of records that they share (as of Feb 2025).

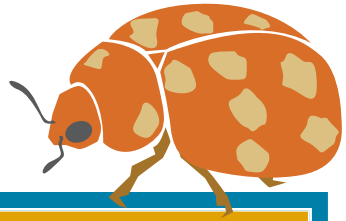
To gain a better understanding of the extent and scale of data flows within the current infrastructure, the BBD team reached out to the project's core partners and the NBN Atlas' top 20 data partners for Scotland. They shared information on their total data holdings, including data not shared with the NBN Atlas, their data sources and whether their data is shared anywhere else. The NBN Atlas was identified as a data source for some organisations, with Scottish LERCs for example, accessing 1.8 million records this way. Figure 6 summarises the information gathered on total data holdings during this exercise. Not all data providers were able to respond to the request for information, and others were unable to provide figures for their total data holdings. The numbers in Figure 6 are therefore likely to be underestimates of the total data holdings.

This exercise did not include universities and businesses as they currently represent less than 4% of the data on the NBN Atlas. Further investigation is required to understand the data holdings outside the categories in Figure 6. Detailed information from each contributor will inform work beyond the BBD project and help ongoing conversations to streamline data flows and work towards FAIR and Open Data principles.



Total NBN Atlas Scotland records (Feb 2025) – 36,711,926

Top 20 data providers provide 96% of the data.



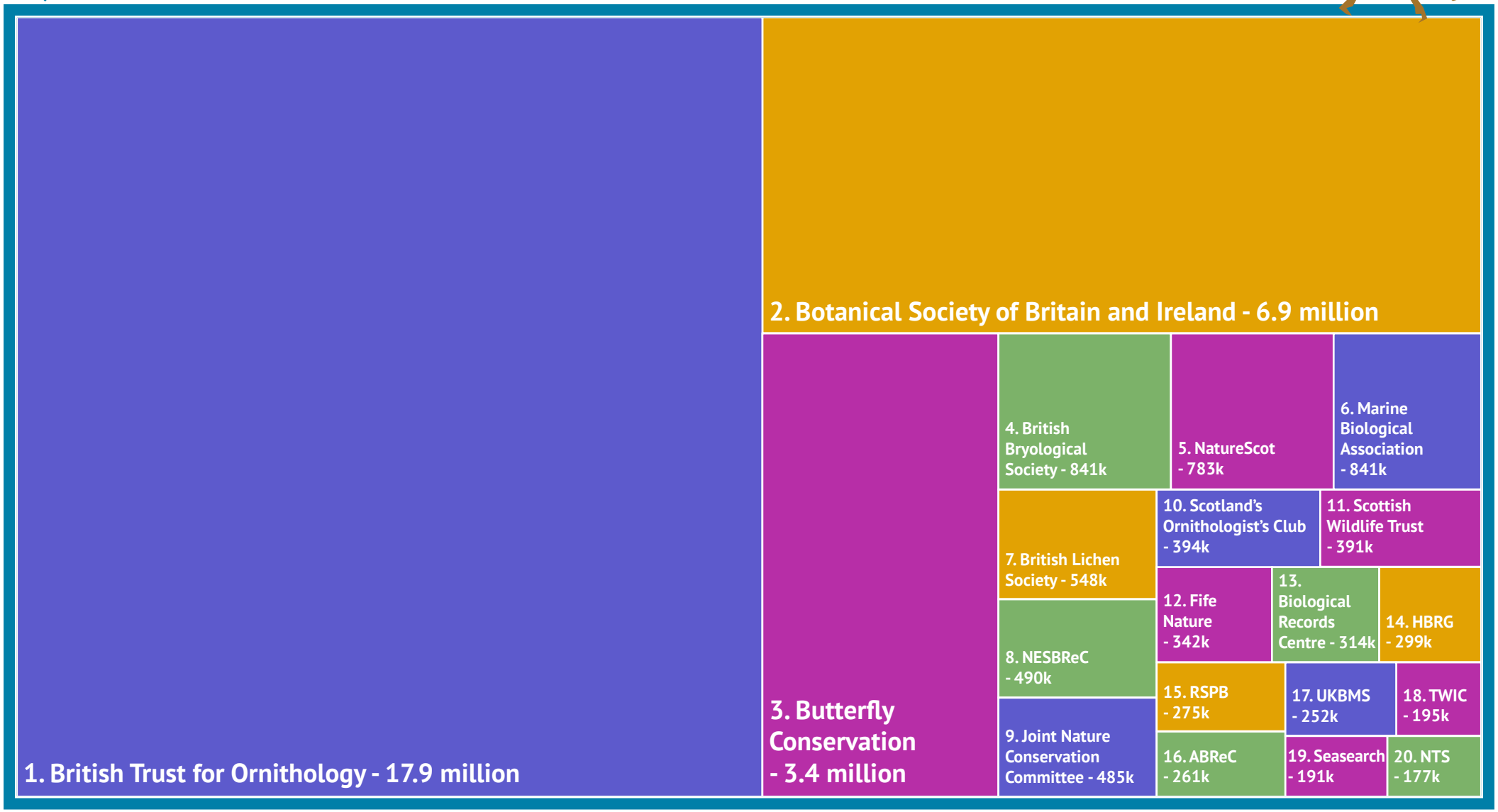


Figure 5: Contributions made to the NBN Atlas Scotland by its top 20 data partners.

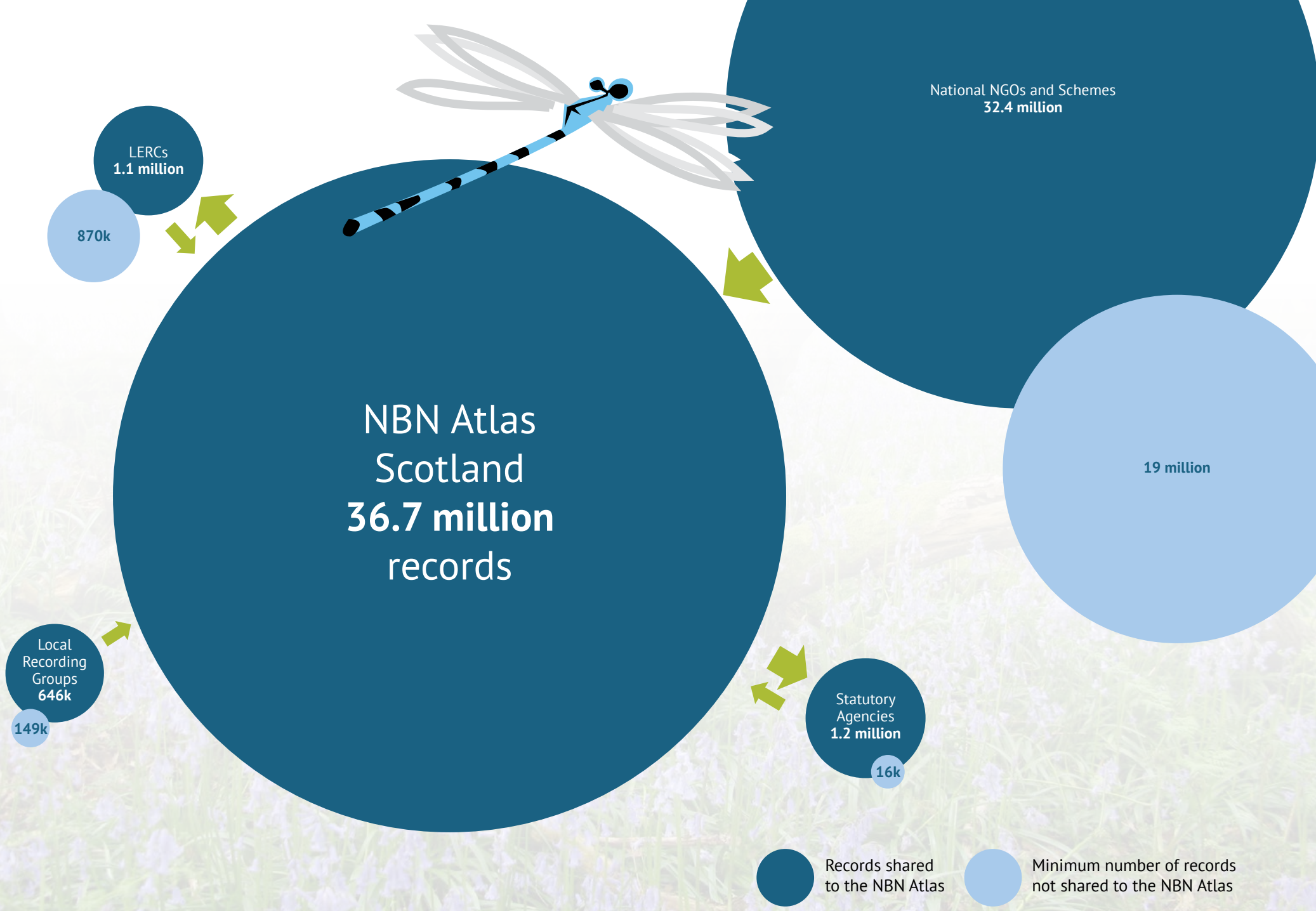


Figure 6: Data flows between the NBN Atlas Scotland and key parts of the current Scottish biodiversity data infrastructure.
N.B. Visual scales are indicative and do not accurately represent the difference in size of datasets.

Advocating for the Biodiversity Data Community

Throughout the project period, the BBD team represented the importance of the biodiversity data community and that of the infrastructure underpinning biodiversity data to policymakers. The BBD project provided a response to the 2023 Consultation on Scotland's Strategic Framework for Biodiversity on behalf of Scottish LERCs and the wider biodiversity data community. The subsequent publication of the Scottish Biodiversity Delivery Plan 2024–2030[4] acknowledged a new National Hub for Biodiversity Data in Scotland providing services across local and national scale.

In September 2024 a Better Biodiversity Data exhibition was held at the Scottish Parliament to showcase biodiversity data stories from across Scotland, highlighting the diverse ways in which biodiversity data is collected, collated and used across many organisations and sectors. The exhibition provided an opportunity to demonstrate the critical importance of biodiversity data for delivery of the Scottish Biodiversity Strategy and to advocate for the SBIF vision of a transformed biodiversity data infrastructure by 2030.

NBN Scotland
Better Biodiversity Data
Dàta Bith-iomadachd nas Fheàrr

SBIF Recommendations 2024:
Progress towards a better biodiversity data infrastructure

Introduction

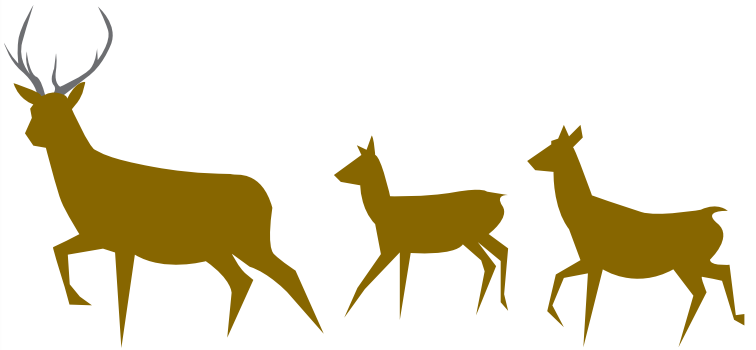
The Scottish Biodiversity Information Forum (SBIF) recommendations, published in 2018[1], are designed as a visionary guide to enhance the management, accessibility, and integration of biodiversity data across various sectors and stakeholders in Scotland. These recommendations lay the groundwork for a cohesive approach to biodiversity information, aiming to support conservation efforts, sustainable development, and policymaking with comprehensive, timely, and precise data. The recommendations address critical challenges faced by the biodiversity data infrastructure, including shortcomings in data flows, service provision, funding and governance and culture.

The purpose of updating the SBIF recommendations is to refine them in response to the evolving policy frameworks and legislation that have emerged since 2018. In recent years, global and national policy landscapes have increasingly recognised the importance of biodiversity, leading to enhanced legislative measures. This shift necessitates a reassessment to ensure the SBIF recommendations remain effective and relevant in this dynamic policy environment. This process strengthens the recommendations' capability to support the goals set by new environmental policies and international biodiversity targets, such as those detailed in 2022 within the UN Convention on Biological Diversity (CBD) Kunming-Montreal Global Biodiversity Framework[2].

In addition, the Scottish Marine Biodiversity Data Review (SMBDR)[3] was undertaken in 2022 and carried out with marine stakeholders to establish a set of recommendations parallel to those in the SBIF Review for Scottish marine biodiversity data. The SMBDR recommendations reflect the marine data landscape through the Marine Environmental Data and Information Network (MEDIN). The Scottish Biodiversity Strategy (SBS)[4], a pivotal element of Scotland's domestic policy, underscores the nation's commitment to preserving its unique natural heritage and biodiversity. This strategy is intrinsically linked to the broader UK and international goals, aligning with directives such as the EU Biodiversity Strategy[5] and the UN Post-2020 Global Biodiversity Framework. The importance of the SBS lies not only in its goal to halt biodiversity loss within Scotland by 2045, but also in its broader socio-economic benefits, including enhancing ecosystem services that contribute to national health, wealth, and disaster resilience.

The upcoming implementation of the first 5-year delivery framework for the SBS marks a significant phase in Scotland's environmental policy. It will focus on several key areas, including restoring degraded ecosystems, expanding native woodland, and improving ecological connectivity across various landscapes. The framework aims to create a more cohes
biodiversity while encouraging public, priva
participate actively in conservation efforts.
that the milestones set in the SBS are not o
that is transparent and accountable. By doi
the forefront of biodiversity conservation, s
sustainable biodiversity management that c
globally. The success of this delivery framew
the trajectory of Scotland's biodiversity poli
influencing everything from local conservat
collaborations on environmental sustainabi

Progressing the SBIF recommendations will
2030 SBS delivery framework. This reassess
SBIF recommendations based on their align
through the SBS.



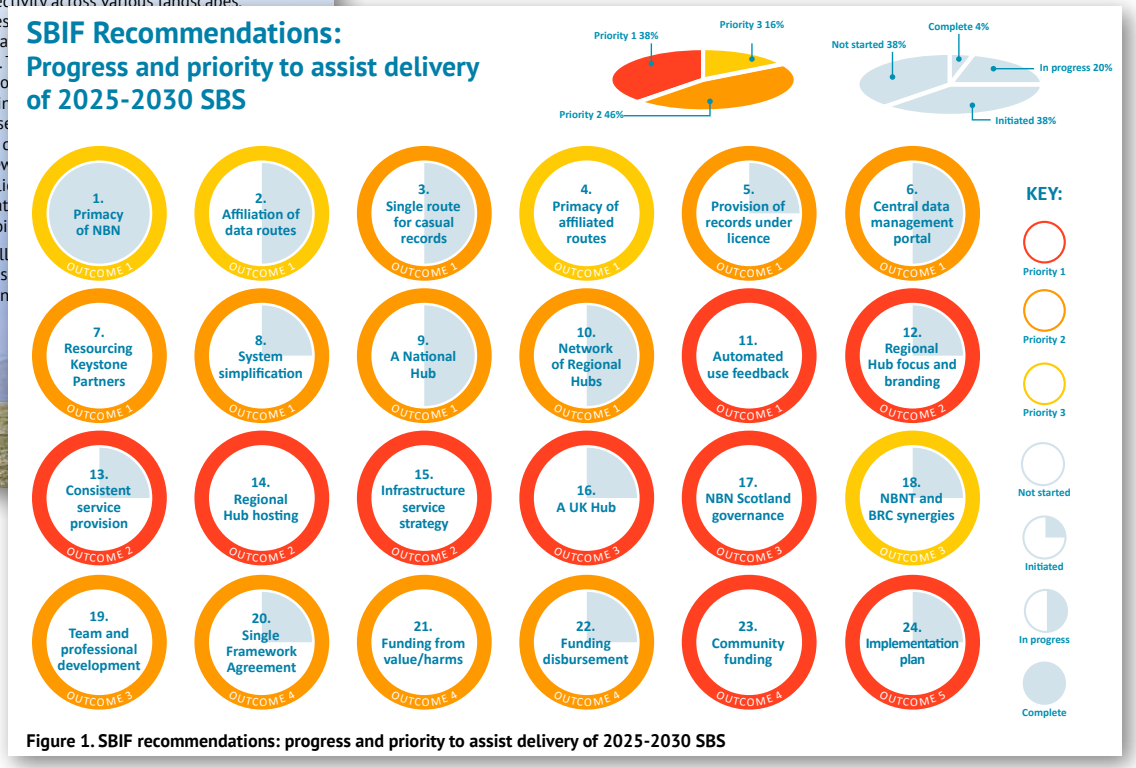


Figure 1. SBIF recommendations: progress and priority to assist delivery of 2025-2030 SBS

Supporting the Work of SBIF

The BBD project worked alongside SBIF and provided support to the SBIF Advisory Group through the BBD Partnership Officer acting as SBIF Coordinator. This enabled the SBIF Co-Chairs and Advisory Group to progress plans for the continuing implementation of the SBIF recommendations.

In 2024 the BBD team and SBIF Co-Chairs conducted a review of progress made towards implementing the SBIF recommendations since their 2018 publication. In addition, the recommendations were updated to reflect changes in the policy landscape and an assessment of their alignment with the Scottish Biodiversity Strategy and the associated draft 5-year Scottish Biodiversity Delivery Plan was undertaken. *The SBIF Recommendations 2024: Progress towards a better biodiversity data infrastructure*[3] report has been made available as a tool for engaging with policymakers and representatives of sectors across the biodiversity data community in Scotland.

Beyond the BBD project

BBD+1: Completing Scotland's Shared Biodiversity Data Management System

BBD+1 is a 12-month extension designed to finalise Scotland's biodiversity Data Management System, ensuring it is fully operational and ready for national-scale service delivery. This phase will strengthen biodiversity monitoring, conservation efforts, and decision-making by standardising data flows, enhancing system integration, and supporting statutory reporting needs.

Key priorities include finalising the multi-tenanted system to facilitate secure data migration for LERCs and Recording Groups, aligning biodiversity data with Darwin Core Archive and NBN Atlas standards, and providing training and onboarding to ensure a seamless transition into full operation. Additionally, BBD+1 will support statutory biodiversity reporting, aiding NPF4 Planning, Protected Areas Monitoring, and Local Authority Nature Networks.

3-Year Framework Agreement: Delivering Biodiversity Services at Scale

NBN Scotland CIC will operationalise biodiversity data services through the SBSC, ensuring the development of a sustainable biodiversity data service model that is financially viable and integrated into the government's Scottish Biodiversity Strategy Delivery and Biodiversity Investment Plans.

To achieve the aim of "Delivering Biodiversity Services at Scale" a new Diversified Income Strategy is needed to align with the government's policy plans, as well as a recommended statutory funding framework of at least 3 years to implement this.

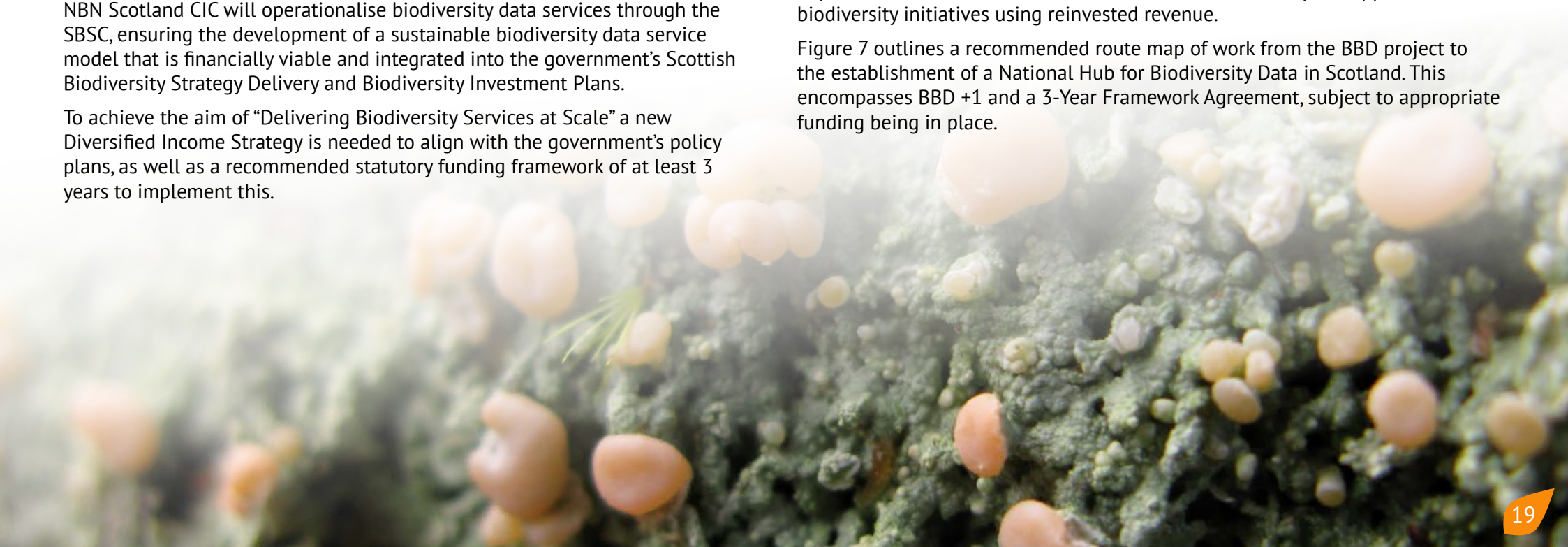
Key deliverables of a recommended 3-Year Framework Agreement:

Year 1: Implementation and development to establish NBN Scotland CIC governance, legal structures and financial model. Finalise SBSC Service Level Agreements with LSPs, with the further development of a services catalogue and reporting framework in conjunction with a Diversified Income Strategy.

Year 2: Service expansion and commercialisation of the SBSC's activities, with direct support of LSPs through updated SBSC Service Level Agreements. Launch biodiversity data dashboard subscription services for an initial client, and the establishment of a Biodiversity Community Fund for supporting local biodiversity projects.

Year 3: Full implementation and revenue growth of the SBSC and NBN Scotland CIC's local-to-national services catalogue, with a review of the initial impact of the SBSC reporting framework in conjunction with a Diversified Income Strategy. Expansion of dashboard services to more clients nationally, to support local biodiversity initiatives using reinvested revenue.

Figure 7 outlines a recommended route map of work from the BBD project to the establishment of a National Hub for Biodiversity Data in Scotland. This encompasses BBD +1 and a 3-Year Framework Agreement, subject to appropriate funding being in place.



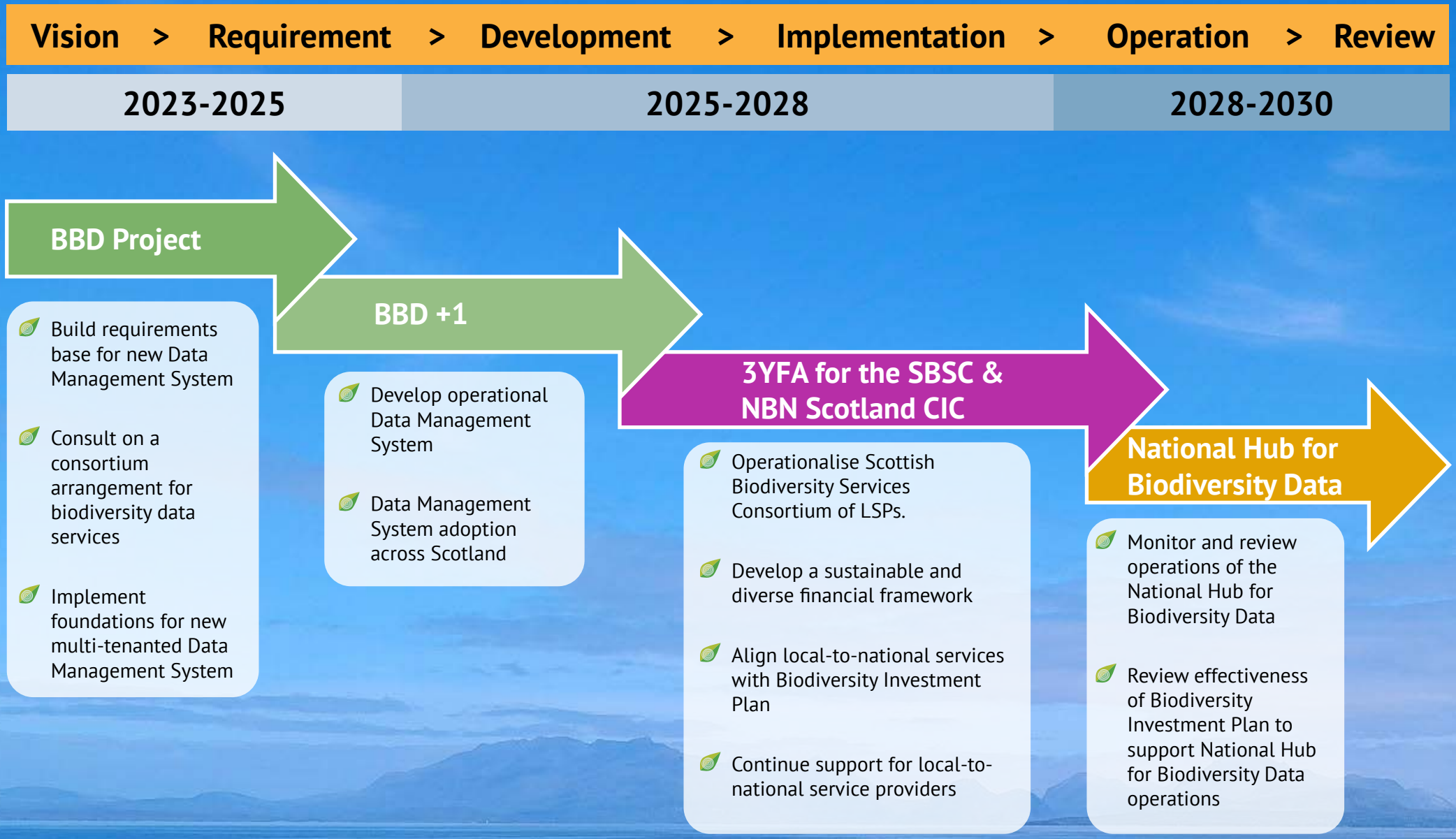


Figure 7: A route map for the creation of a National Hub for Biodiversity Data in Scotland.

Change management

The BBD project has reviewed and considered change management principles for the continuation of work commenced throughout its project period. Kotter's 8 Step Change Model[5] was used to evaluate the stages covered by the SBIF Review and BBD project and establish how BBD+1 and planned 3-Year Framework Agreement would progress the changes required for a successful transition to an updated biodiversity data infrastructure in Scotland.

These projects and frameworks have been mapped across this change management model in Figure 8. The implementation of BBD+1 and the 3-Year Framework Agreement represents a critical step in developing a long-term, sustainable biodiversity data infrastructure in Scotland. By applying structured change management principles, these initiatives ensure a scalable, operational, and financially sustainable approach to biodiversity data services, culminating in the establishment of the National Hub for Biodiversity Data by 2030.

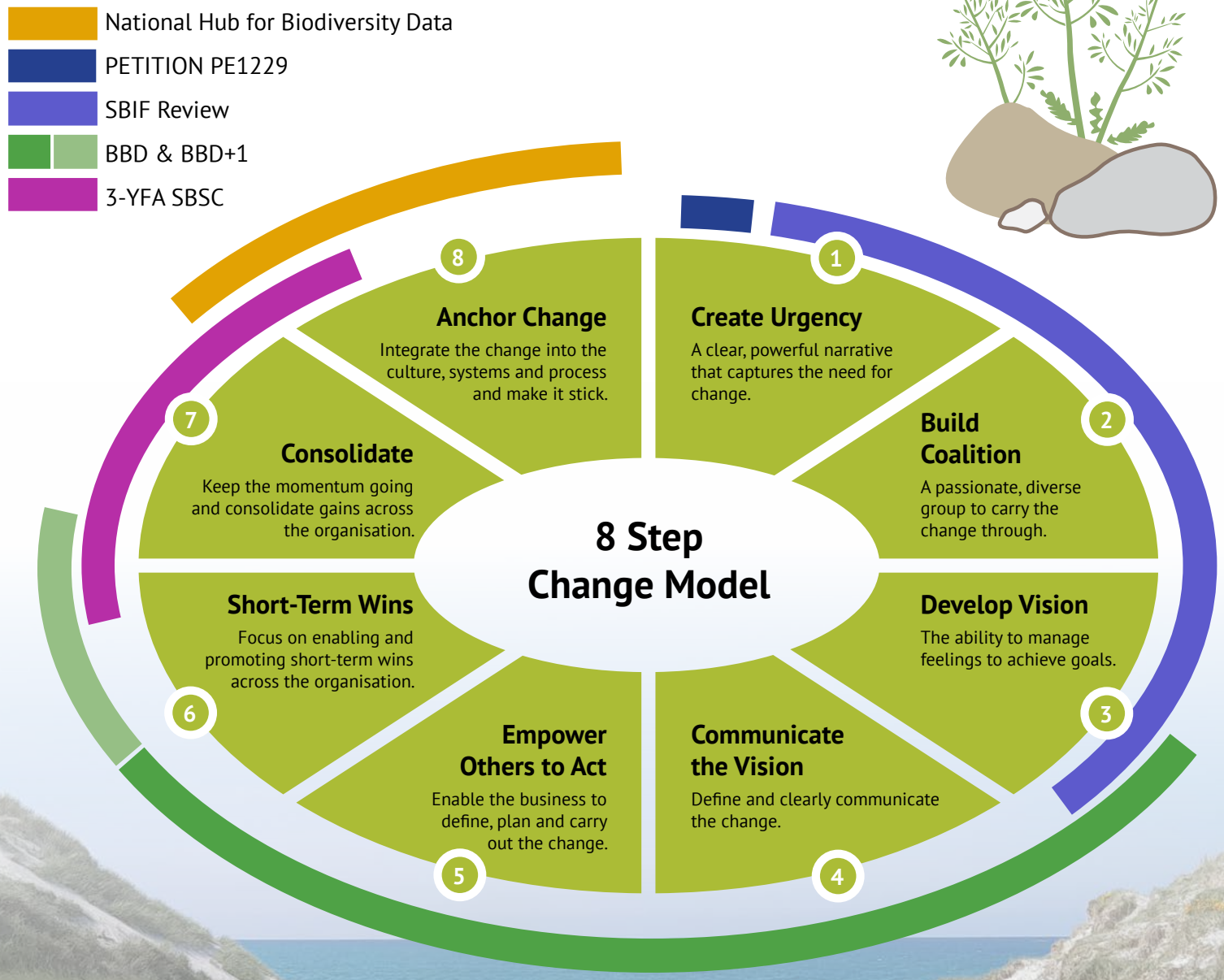


Figure 8: Phases of work towards transforming Scotland's biodiversity data infrastructure mapped across Kotter's 8 Step Change Model

The steps outlined in Kotter's model provide a useful structure to understand the phases of work seen in Figure 8. However, in practice these steps may not always follow a linear sequence[6] and onward work will allow for multiple steps to be undertaken concurrently, as change is implemented at different scales within the biodiversity data infrastructure in Scotland.

The BBD project has produced a detailed draft change management plan that will require review at the commencement of BBD+1 and the planned 3-Year Framework Agreement. A revised plan should build on the change management requirements outlined by the BBD project and include a timeline for implementation and KPIs to measure progress. Critical to achieving effective change management, a change communication plan should also be developed to maintain relationships with all partners and the wider biodiversity data community.

SBIF Implementation Strategy

The SBIF Advisory Group will continue to promote the implementation of the SBIF recommendations alongside work to progress BBD +1 and the planned 3-Year Framework Agreement. Acting as the CAP for NBN Scotland CIC, and maintaining its reach across different sectors, the SBIF Advisory Group will build on its role as a key facilitator within Scotland's biodiversity data community. This will better enable members of the community to take actions that help meet the ambitions of the Scottish Biodiversity Strategy.

Conclusion

Between 2023-2025 the BBD project has:

1. ***Created a model for the Scottish Biodiversity Services Consortium (SBSC) to provide local-to-national biodiversity services, hosted by a new coordinating body, NBN Scotland CIC.***

   This structure directly supports the BBD project's vision for *"A nationwide partnership providing biodiversity data services on behalf of Scotland"*. The establishment of NBN Scotland CIC also aligns with NatureScot's goal of a coordinated biodiversity data infrastructure and the SBIF vision of a lead coordinating body to manage national and regional biodiversity data services known as NBN Scotland.

2. ***Initiated and delivered the first phase of development for a new Data Management System for use by LSPs in Scotland.***

   This work has progressed the BBD project's objective of *"A fit-for-purpose Data Management and Digital Services System, providing financially sustainable value-added services to users"*. The requirements for making this Data Management System operational have been identified by the BBD team, and delivering the next phase of work will align with the SBIF vision for a central data management portal for Scotland.

3. ***Engaged with BBD project partners and the wider biodiversity data community in Scotland to better understand existing data flow pathways, advocate for the importance of biodiversity data and support the work of SBIF.***

   These activities have supported the BBD project's vision for a *"A well-connected and functional biodiversity data community and infrastructure in Scotland, following FAIR and Open Data principles, across all sectors"*. Through working with the BBD Project Group and SBIF Advisory Group, the BBD project has laid the foundations for further engagement across sectors as work progresses.

Work undertaken to deliver the BBD project objectives during 2023-2025 has also identified the onward direction required to embed a new National Hub for Biodiversity Data in Scotland, further the development of the Data Management System and establish new mechanisms to better support the wider Scottish biodiversity data and biological recording community.

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[5] Kotter, J. P. (1996) Leading Change. Boston: Harvard Business School Press.

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Acknowledgements

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