Biodiversity Indicators for Northern Ireland

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Executive summary

Public bodies are obliged to conserve biodiversity and improve the natural environment within Northern Ireland. The Department of Agriculture, Environment and Rural Affairs (DAERA) is currently developing proposals, including policies and targets, to this end. An effective monitoring framework and coherent indicator(s) are necessary to understand whether Northern Ireland is on track to achieving these commitments. The development and use of biodiversity indicators can be challenging. However, they provide a basis for evaluating and communicating progress towards targets, and the policies underpinning conservation measures.

The Office for Environmental Protection (OEP) is responsible for monitoring DAERA's progress towards delivering improvement in the natural environment. In the absence of an existing environmental improvement plan (EIP), the OEP is assessing the drivers and pressures affecting terrestrial and freshwater biodiversity in Northern Ireland. To support this work, the OEP commissioned the UK Centre for Ecology and Hydrology (UKCEH) to evaluate the approaches to assessing and monitoring the status of species, and explore potential metrics to track biodiversity change in Northern Ireland. This report synthesises research and stakeholder engagement undertaken by UKCEH to provide this evidence baseline assessment.

Using an invited written consultation exercise and stakeholder workshop biodiversity metrics, monitoring, and data in Northern Ireland were explored. There is a preference amongst stakeholders to utilise a suite of indicators that reflect the state of biodiversity, the drivers and pressures impacting biodiversity; and highlight the benefits of biodiversity to people. A key set of properties for such indicator(s) emerged. These were for any indicator to be: representative; responsive; meaningful and understandable; multi-sectoral; repeatable and comparable; robust; sufficiently resourced; and flexible. There are many existing monitoring schemes and data sources that could contribute to these biodiversity indicator(s) for Northern Ireland. This includes data sources that already contribute to national indices, and fulfil many of the seven properties identified for indicators.

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There is an urgent need to establish targets, indicator(s) and a monitoring framework for biodiversity in Northern Ireland, accompanied by a resourced delivery plan. The development of which need to be explicitly linked to avoid any disconnect and gaps in evidence. The first step in establishing an indicator and monitoring framework is to explicitly state the objectives and develop achievable targets with an associated timeframe. These should be coherent targets, mirroring national and international obligations, rather than working towards alternative objectives. Following this, a (set of) biodiversity indicator(s) should be developed, peer reviewed, and published. These should be used to track progress towards the targets and should fulfil the properties identified. The monitoring data that underpins any indicators should be woven into the framework, and long-term agreements established with data providers. Efforts should also be made to fill any existing gaps in monitoring. However, a flexible composite approach to monitoring, which starts with what is available and is built on over time as more data becomes available could be adopted, which would remove any barriers to embarking on the process.

The establishment of a monitoring and target setting framework in Northern Ireland could be achieved within 2 years. This is an ambitious timeframe, but there is a growing body of existing data, information and biodiversity indicators upon which to build. The process does therefore not start from scratch, it should build on the existing knowledge. To achieve a target setting framework, establish indicators and an associated monitoring programme within a tight timeframe will require excellent planning and making clear requests of other departments and contractors when necessary. With good planning, strong leadership and communication across all relevant parties, the establishment of a monitoring and target setting framework for biodiversity in Northern Ireland could be achieved in 2 years.

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1. Introduction

There are multiple obligations on public bodies to conserve biodiversity and improve the natural environment in Northern Ireland. This includes, for example, identifying and conserving priority species and habitats, those of principal importance for the purpose of conserving biodiversity.[1] The Department of Agriculture, Environment and Rural Affairs (DAERA) is currently developing proposals, including policies and targets, to this end. These include an Environmental Improvement Plan (EIP) as required under the Environment Act 2021, and a Nature Recovery Strategy, replacing the previous Biodiversity Strategy.[2] The Nature Recovery Strategy will translate global biodiversity targets to a local level,[3] and in doing so set out proposals to conserve biodiversity in Northern Ireland, as required under the Wildlife and Natural Environment (Northern Ireland) Act 2011.

An effective monitoring framework and coherent indicator(s) are necessary to understand whether Northern Ireland is on track to achieving the targets that will be set out in the EIP and Nature Recovery Strategy. Indicators are used to summarise complex data into simple, standardised, and communicable figures that can be used to describe and communicate trends in different aspects of biodiversity.[4] The development and use of biodiversity indicators are challenging, but they can provide a basis for communicating progress towards targets and can also be used to evaluate policies underpinning conservation measures. For example, In England a statutory instrument underpinning biodiversity targets for species' abundance and species' extinction risk came into force in January 2023[5], following the publication of the 25 Year Environment Plan[6] and the Environment Act (2021).[7] Indicators have been chosen to monitor

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[1] Wildlife and Natural Environment (Northern Ireland) Act 2011

[2] DAERA, Biodiversity Strategy for Northern Ireland to 2020

[3] GBF link

[4] POSTnote Effective Biodiversity Indicators

[5] HM Government, *The Environmental Targets (Biodiversity) (England) Regulations 2022*

[6] Defra (2018) A Green Future: Our 25 Year Plan to Improve the Environment

[7] Environment Act (2021)

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progress towards achieving these legally binding targets. These have recently been reviewed and critically appraised in a recent report commissioned by the Office for Environmental Protection (OEP).[8]

The OEP is responsible for monitoring DAERA's progress towards delivering improvement in the natural environment. In the absence of an EIP the OEP has undertaken an assessment of the drivers and pressures affecting biodiversity in Northern Ireland. To support this work, the OEP committed to reviewing approaches to assessing and monitoring the status of species in Northern Ireland.[9] The UK Centre for Ecology and Hydrology (UKCEH) were consequently commissioned to undertake an evidence baseline assessment of approaches to assessing and monitoring the status of species, including priority species, in Northern Ireland and explore potential metrics to track biodiversity change. This report synthesises research and stakeholder engagement undertaken by UKCEH to provide this evidence baseline assessment.

[8] Henly, L. and Henrys, P. (2024) Review of Evidence: Assessing and Monitoring Species Abundance and Extinction Risk for Biodiversity Conservation and Environmental Protection.

[9] OEP, Corporate Plan 2023/24 to 2025/26

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2. Objectives

The UKCEH were commissioned by the OEP to critically appraise approaches to assessing and monitoring the status (abundance, extinction risk, and wider conservation status) of species, including priority species in Northern Ireland. This was achieved through two major components:

A. **Review of existing monitoring programmes and evidence availability**: To understand the current data landscape in Northern Ireland and the information that is currently available to potentially feed into biodiversity indicator(s).

B. **Stakeholder workshop to consider potential for biodiversity indicators in Northern Ireland:** To consider the available data, the practicalities and standards of data, and different methods and approaches to constructing indicators. In light of this consideration and the evidence from the workshop to outline the critical next steps.

The remainder of the report is presented in three sections: First, we set out the methodology used for evidence gathering and analysis to support this work. In this section we summarise the overall approach for evidence gathering and analysis, and then outline any details specific to each element (A & B) of the work. We then summarise the key findings and synthesis from this evidence. Finally, we conclude by translating a high-level summary of the work into the key next steps for Northern Ireland.

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3. Methodology

This section sets out an overview of the evaluation exercise and the methodology used to collect evidence. The evaluation exercise was based on two key elements of stakeholder engagement alongside a review of any existing relevant reports. The first round of stakeholder engagement was an invited consultation, where written feedback was received to a range of questions on data availability, collation and processing. The second phase involved an in-person stakeholder workshop held in Northern Ireland, which discussed the practicalities and standards that should be adopted when using data available to construct a biodiversity indicator(s). The details of each of these elements are outlined below. The activities outlined ran within the following timeline:

- Evidence gathering
    - Identification of stakeholders: September 2023
    - Written consultation: Oct 2023 – Nov 2023
    - In-person workshop 11th Dec 2023
- Analysis of evidence and reporting Jan–March 2024

The structure of the written consultation exercise and stakeholder engagement workshop was used to determine appropriate themes under which the evidence could be assessed for consideration of next steps and key recommendations. The aim of this report is therefore in the synthesis of the evidence collated from each of the activities to make appropriate recommendations for how the development of biodiversity indicators can be taken forward across Northern Ireland.

3.1   Invited consultation

Stakeholders were invited to submit written responses to a series of questions within a set consultation. These stakeholders were identified purposively, and evidence collection was then supported by snowball sampling, where respondents assisted in identifying other potential relevant respondents. This gave the final list of respondents

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outlined in Annex 1, representing 6 distinct organisations, from a total of 19 different organisations that were contacted (also listed in Annex 1). These stakeholders were targeted because they were considered to be either key users of potential biodiversity indicators or suppliers of information critical to any potential indicator. The stakeholders therefore cover the spectrum from those proactively coordinating monitoring activity within Northern Ireland, those collating data from different sources, those involved in setting policy and those delivering policy actions.

The aim of the consultation was to identify and understand what relevant data is available to contribute to potential biodiversity indicator(s), including priority species, and what methodologies and protocols have been adopted in the collation and processing of the data. Concomitantly with this exercise, research has been carried out by the BTO as part of the Terrestrial Surveillance Development and Analysis (TSDA)[10] specifically investigating data availability withing Northern Ireland. Our exercise therefore sought to build on this rather than duplicate, hence a focus on targeted consultation. A full list of questions posed to stakeholders in the written consultation is shown in Box 1.

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[10] Terrestrial Surveillance Development and Analysis

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Box 1: Questions posed to stakeholders via written consultation exercise

- What biodiversity data is available that could contribute to a set of national indicators? *This covers all different types of data from opportunistic records to large, structured schemes. The sub-questions below will help to break this down further.*

  - What protocols have been adopted for data collection? Is abundance data collected or presence/absence?
  - Is the monitoring based on a structured design? Or is it opportunistic, casual records?
  - Is the data openly accessible?
  - Does the data feed into any existing national indices, national statistics or reporting for Northern Ireland?
  - Over what period has the monitoring been in place and is it still active?
  - Does the data represent Northern Ireland or can it be disaggregated to do so?
  - Is there consistency (in design and/or protocols) with similar monitoring elsewhere in the Republic of Ireland and the UK?

- Are there any existing examples of collated biodiversity indices covering Northern Ireland?

- Are there existing protocols for managing, collating or analysing data either across terrestrial, freshwater and marine environments or across different taxonomic groups?

- What are the biggest challenges with producing biodiversity indices for Northern Ireland?

- Who should have the responsibility for operational production of biodiversity indices in Northern Ireland?

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Whilst a thematic analysis of the written responses was planned and a synthesis based on evidence presented across these themes, the relatively small number of responses

to the consultation, and the type of responses received to the questions, meant this was not appropriate. It was determined that an emergent analysis would be more appropriate. Therefore, after receiving the consultation responses, a rapid read-through of each was undertaken alongside the questions. Summaries and key themes emerging from each response were collated and then cross referenced with each other to pull out the critical points.

3.2   Stakeholder workshop

A stakeholder workshop that brought together data providers, experts and policy makers was held in-person at Queen's University Belfast in December 2023. Stakeholders that were invited to contribute to the written consultation were also informed of the workshop and were asked to submit an expression of interest to attend. Other key stakeholders were identified through purposive sampling, supported by snowball sampling, which gave the final list of invited stakeholders presented in Annex 1. The aim of this workshop was to explore the potential data, methods, and approaches available for developing a biodiversity indicator(s) to track biodiversity change across Northern Ireland. Then to use this information to consider the critical next steps needed in developing appropriate indicators for Northern Ireland. Specifically, the workshop focused on understanding the concept of biodiversity indicators and what desirable properties they should have, followed by consideration of the monitoring schemes and data that may feed into any potential indicators.

During the course of the workshop, we discussed the limitations, barriers and technical challenges associated with developing indicator metrics and providing robust, consistent and reliable data with which to compose indices of change in species. We considered what appropriate indices of biological change may be, including what could be learnt from the species abundance and species extinction risk indicators developed for use in England. The workshop explored the questions of whether Northern Ireland should adopt the same approaches or whether there are alternatives that should be considered. The meeting structure and specific questions the workshop aimed to

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address in each session are outlined below and a list of invited organisations are presented in Annex 1.

Breakout Session 1: Desirable properties of a biodiversity indicator(s).

In this session we discussed what key properties robust and useful indicator(s) of biodiversity should possess, focusing on what the essential elements are compared to the "nice-to-haves". This included issues such as representativeness, coverage, timeliness of both data being collected and the indicator(s) themselves. We considered the following questions:

- What are the objectives of monitoring biodiversity?
- How can indicators be used to track progress towards a target?
- What are appropriate properties in terms of:
  - Regularity of reporting.
  - Coverage.
  - Sensitivity.

Breakout Session 2: Exploring potential metrics to track biodiversity change.

This session considered different approaches to producing a biodiversity indicator(s) that achieve the essential properties identified in session 1. We discussed what type of metrics would be appropriate and whether any rules should be followed in constructing indicators. We considered the following questions:

- How could an index be constructed to support progress toward national and international commitments?
- How would we ensure the essential properties identified in Breakout 1 are met?
- Is a single species abundance index, as adopted in England, an appropriate metric to track biodiversity change?
  - Is the production of such a metric in Northern Ireland feasible?
  - What are the main advantages and disadvantages with use the of such indices as adopted in England?

o   What alternative approaches might be considered?

Session 3: Exploring the data to underpin potential indicators.

The final session considered the data that is available to contribute to a biodiversity indicator(s) including the strengths and weaknesses of this and where any gaps may be. We considered the following questions:

- What monitoring is needed to establish indicators considered in sessions 1 and 2?
- What are the gaps based on current availability?

3.3   Synthesis

Following the responses to the written consultation and the stakeholder engagement workshop, the key points were collated. It was decided to focus on the key actions required moving forward, including the critical decisions required and the different elements that need to be put in place for monitoring, indicator(s) and targets to improve biodiversity across Northern Ireland. These elements were captured as next steps and recommendations for Northern Ireland.

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4. Findings

The following sections summarise the findings from the evidence gathering phase of the project. Firstly, we summarise the findings from the three sessions of the stakeholder workshop:

- Desirable properties of biodiversity indicators
- Exploring potential metrics to track biodiversity change in Northern Ireland
- Exploring the data to underpin potential indicators.

The information in these three sections is mostly summarised from the stakeholder views presented during the workshop on biodiversity indicators but has been backed up by evidence from the literature where possible.

We then summarise the information collected in the written consultation responses on the availability of data and indicators in Northern Ireland, and within this we outline what the stakeholders felt were the key challenges faced in Northern Ireland relating to data availability and monitoring.

4.1 Desirable properties of biodiversity indicators

Effectively monitoring biodiversity and accurately tracking changes in species is difficult due to the complexity of biodiversity.[11] There are many options for metrics that could be used to track progress towards targets, each with their own advantages and disadvantages. We asked key stakeholders, experts, and policy makers in Northern Ireland what they felt were the most desirable properties of a species indicator(s) during the in-person workshop.

The key desirable properties of a biodiversity indicator(s) that were identified in the stakeholder workshop were:

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[11] POSTnote Effective Biodiversity Indicators

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Representativeness

One of the properties considered most desirable for a biodiversity indicator was representativeness of ecosystems, habitats, and species. For example, attendees felt that there should be: good representation of marine, terrestrial and freshwater ecosystems; that an indicator should encompass species that are rare and common, generalist and specialist; and include species and habitats that are affected by a variety of pressures.

There were questions surrounding what 'good' representation of ecosystems, habitats and groups of species would look like in terms of proportionate representation. Some attendees felt that there should be equal representation of the different groups, whereas others felt they should be represented in proportion to what is found in nature (see below regarding weighting options). Nevertheless, the majority of attendees felt that an indicator should be able to be disaggregated to different levels of organisation so that the users of the indicator could focus in on different aspects as appropriate. Many also felt there would ideally be a spatial element to this disaggregation, so that resources and policies can be directed to the areas that need them the most. However, the attendees did not come to a conclusion on the most appropriate scale at which this spatial data should be collected (e.g. county-scale, catchment-scale, Northern Ireland-scale, Island of Ireland-scale). The attendees believed that this decision should be made once the overall objective for the indicator(s) had been agreed upon.

A method sometimes used to overcome representation bias is weighting. This is the process of applying a proportionate weight to the contribution of species or species groups according to some value-based set of rules to achieve better representation of biodiversity[12]. An example of weighting species to achieve better representation can be seen in some multi-species indicators such as the Living Planet Index, which includes a weighting system to ensure that each group of vertebrates is represented in proportion to the number of extant species globally, rather than the number with data, as well as a

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[12] Buckland, S.T., Magurran, A.E., Green, R.E. and Fewster, R.M., 2005. Monitoring change in biodiversity through composite indices. Philosophical Transactions of the Royal Society B: Biological Sciences, 360(1454), pp.243-254.

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weighting to correct for the over sampling and under sampling of different regions (Europe and North America being oversampled).[13]

There are a number of options for weighting, many of which were discussed in the stakeholder workshop. For example, it was suggested that if one taxonomic group is represented by far more species than another, the latter could be given a higher weight so that both taxonomic groups contribute equally to the overall indicator. It was also suggested that some species (e.g., rare, or endemic species) should carry greater weight than others, or that the indicator is weighted by the relative sensitivity of the species or according to their ecosystem function. However, attendees did not come to a consensus on what they believed was the most appropriate weighting option.

The difficulty with assigning variable weights to species or taxonomic groups is that any decision of how to weight the data is subjective and value-based.[14] Some weighting options also introduce a set of assumptions. For example, if weighting is based on the proportion of species represented in a taxonomic group, assumptions must be made on how the abundance of species with data are capable of indicating the status of species for which there are no data available. Complicated weighting also risks make the meaning and communication of the indicator less transparent.

Responsiveness to pressures

Biodiversity indicator(s) should be responsive to measurable pressures (e.g. trends in land use, water use, habitat loss, invasive species). Attendees felt that ideally a link would be made between a change in a pressure and the change in the indicator of biodiversity. This would enable assessments of the efficacy of policies and management strategies to be made, and could inform the uptake of future policies. However, there was acknowledgment that this would be difficult to achieve as often the relationships between pressures and changes in biodiversity are non-linear and complex. For example, due to lags in response time, and interactions between

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[13] ZSL, Living Planet Index

[14] Defra (2022) Biodiversity Terrestrial and Freshwater Targets Detailed Evidence Report.

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pressures. Biodiversity is affected by many different natural and human drivers and pressures, such as climate change, invasive species, changes in land use, overexploitation and pollution.[15] The impacts of these pressures on biodiversity may occur over varying time scales, they can be intermittent or permanent, and their magnitude is likely to be location-specific.

Despite the potentially complex relationships between pressures and the state of biodiversity, attendees highlighted the importance of being able to separate natural stochastic or dynamic variations in the status of biodiversity from additional change caused by human-induced drivers and pressures. Many biodiversity indicators, including the England species abundance indicator[16], deal with this by incorporating a smoothing process to reduce the impact of between-year fluctuations, such as those caused by variation in weather, making underlying trends easier to detect. However, this requires decisions to be made regarding the appropriate smoothing parameters to be used, such as the number of knots within a GAM framework[17]. Attendees also suggested that ideally the biodiversity indicator should encompass some measurement of error and uncertainty to account for bias and noise around the data and to enable inferences about the likelihood of the observed trend being true.

Lags between pressures and the response of indicators are also likely to present a challenge when trying to make these links. This is particularly the case if multiple indicators are used as some biodiversity indicators will respond more quickly to changes in pressures than others. An indicator's time lag depends on a number of factors. These include the type of data that feeds into the indicator, the strength and type of pressure, the timescale over which it changes, and the generation times of the species or group of species of interest. For example, indicators measuring the population size of short-lived species will respond more quickly than one measuring

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[15] IPBES, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

[16] Defra (2022) Biodiversity Terrestrial and Freshwater Targets Detailed Evidence Report.

[17] Freeman, S.N., Isaac, N.J., Besbeas, P., Dennis, E.B. and Morgan, B.J., 2021. A generic method for estimating and smoothing multispecies biodiversity indicators using intermittent data. Journal of Agricultural, Biological and Environmental Statistics, 26, pp.71-89.

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that of long-lived species.[18,19] Attendees therefore felt that the chosen indicator(s) should be appropriately sensitive to changes in species across space and time in order to be relevant to decision-making. At the least, the indicator should be able to detect a negative change in the state of biodiversity before it is too late to correct the causes.

Some attendees of the workshop highlighted that choosing only the most responsive species to include in an indicator could lead to an inaccurate picture of the state of species in Northern Ireland. Butterflies or lichens, for example, are highly sensitive to weather / climate and air pollution respectively. Sharp declines or increases of these species caused by short-term variations could affect indicator response, and lead to incorrect interpretation of the state of the natural environment. Conversely, any indicator should also not be dominated by only slowly responding, resilient species that show very little change. In reality, different species will have variable responses (e.g., timescales and magnitude) to different pressures, so caution must be taken when developing and interpreting indicators.

Meaningful and understandable

When considering the objectives of monitoring, a key desirable property was that indicators should measure something meaningful and relevant to the policy problem that needs to be solved, or the targets that have been set. The concept of biodiversity is complex, and is made up of many different aspects, some of which can be hard to understand, define and measure. Some of the broader concepts of biodiversity such as interactions between species, structures of biological networks, and the overall functioning or resilience of ecosystems, are particularly difficult to measure using a simple, single metric, but are often referred to when discussing the desired outcomes for biodiversity policy. This was also the case at the workshop, where many attendees discussed that the desired outcomes of biodiversity policy in Northern Ireland should be

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[18] McQuatters-Gollop, A. et al. (2019). Plankton lifeforms as a biodiversity indicator for regional-scale assessment of pelagic habitats for policy. Ecological Indicators, Vol 101, 913–925.

[19] Härkönen, T. et al. (2013). Core Indicator of Biodiversity: Population Growth Rate, Abundance and Distribution of Marine Mammals. HELCOM.

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related to ecosystem health or functioning. However, when asked how this should be measured, attendees struggled to come to a consensus on a single, simple metric that would represent the concept. Related to this, attendees felt that biodiversity indicators should be easy to understand and interpretable. This will enable non-experts and policy makers to utilise the indicators without risk of confusion and misinterpretation.

Supports multiple sectors

Biodiversity indicator(s) should support decision-making in multiple policy sectors including agriculture, planning, conservation, and natural capital markets. This can be achieved by choosing to monitor groups of species or habitats that are impacted by various pressures across sectors. However, given that it is difficult to disaggregate pressures, there needs to be some idea of which species are specifically impacted by individual pressures.

The successful use of a biodiversity indicator(s) is dependent on obtaining buy-in from a wide range of organisations, stakeholders, people working on the ground, regulators, and Government. One way the attendees of the workshop felt this could be achieved is by understanding how the development and use of an indicator could benefit the different organisations and sectors. If this is understood, there is more likely to be motivation from all parties to ensure any indicator robust and fit-for-purpose.

Repeatable and comparable

Repeatability relates to the data feeding into the indicator. Most workshop attendees agreed that this data should ideally come from long-term data sets, that are collected consistently using the same method at regular (most likely annual) time intervals. This allows for comparisons to be made between years and eventually for trends in a time series to be detected.

Attendees however cautioned that repeatability is likely to be compromised by limitations on the resources available to support monitoring efforts. There was, therefore, a consensus that an indicator(s) should make the most of historical datasets

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if they are reliable. Any additional monitoring that is required should be conducted within the bounds imposed by available resources. This introduces some potential complications for those developing and using the indicator(s) as not all the data that has been collected historically will have been collected for the indicator's intended purpose. For example, if the aim of a survey is to understand whether poor quality habitats are improving, resources may be targeted into sampling in areas where there are specific environmental problems. There may be less impetus to consistently sample locations that have less or no environmental problems.

Quality assured

The indicator and data feeding into it should be quality assured. Attendees felt that the indicator should be independently peer-reviewed to ensure robustness. However, the appropriate peer review group was not identified. Furthermore, the methodology behind the indicator should be transparent, ideally published alongside the indicator to ensure the indicator is not manipulable.

Sufficiently resourced

Current and future data collection programmes that feed into indicator(s) need to be sufficiently resourced. This is to ensure the data can be collected properly and to the appropriate standards for inclusion within an indicator.

Flexible

Indicator(s) should be flexible enough to incorporate new data as it became available. This was especially the case when considering recent developments in technology that could lead to more effective biodiversity monitoring in the future. This kind of flexibility could help to ensure that monitoring and use of the indicator(s) are futureproof. This should reduce the risk of unintentionally 'locking in' monitoring efforts that may not be best suited to addressing the need.

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There exists, however, a tension between the properties of flexibility, and repeatability and comparability previously noted. A solution to achieving repeatability whilst allowing flexibility may be to ensure sufficient overlap between two periods of change, enabling calibration across the two. Examples of this in practice include the change of method in the BTOs survey of common birds from the common bird census to the breeding bird survey[20].

4.2 Exploring potential metrics to track biodiversity change in Northern Ireland

Considering the desirable indicator properties outlined above, workshop attendees then explored potential metric(s) to track biodiversity change in Northern Ireland. The themes considered are outlined below.

Single indicator vs suite of indicators

Workshop attendees considered whether a single indicator or suite of indicators to measure progress towards corresponding target(s) would be most appropriate. There were a number of advantages and concerns raised for both options. However the majority of attendees believed that a single indicator would not be appropriate.

In the first instance, the reasoning for this was that biodiversity is a complex concept that cannot adequately be described by a single indicator. A single indicator would simplify the monitoring and reporting requirements. This would likely be easier to understand for decision makers or end-users. However, many attendees felt that the use of a single indicator creates the potential for interventions to focus only on improving the value of the indicator, rather than focussing on the broader goal of benefitting biodiversity as a whole. Attendees therefore believed that the use of multiple

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[20] Freeman, S.N., Noble, D.G., Newson, S.E. & Baillie, S.R. (2003) Modelling bird population changes using data from the Common Birds Census and the Breeding Bird Survey. Research Report 303. BTO, Thetford.

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indicators measuring progress against multiple targets would be more desirable. This approach would mean it is more difficult to 'game the system'.

Attendees agreed that using a suite of indicators could paint a more accurate picture of biodiversity trends. Multiple indicators could be combined hierarchically to provide a more comprehensive picture of biodiversity health. Attendees suggested that this suite of indicators would help identify whether there has been a genuine success or failure to meet targets, and the overall objective of improving biodiversity.

Indicators within a suite could also be tailored to specific policy objectives, providing key areas of focus as well as a broad overview when considered collectively. However, care must to be taken when choosing the number of indicators to include. Having too many indicators could reduce the focus on the desired outcomes and conservation actions, and could make communication of progress towards targets difficult. No specific number of indicators was mentioned during the workshops. It was recognised that the number required would relate to what each indicator is representative of. Therefore, determining a suitable number of indicators is likely to be linked to the number of key groupings of species or key metrics of species.

Many attendees at the workshop suggested a hierarchy of different indicators – essentially additional information to interpret and understand how biodiversity and nature are changing. There were two main suggestions about how this may work in practice. The first suggestion for a hierarchy was one in which multiple indicators are all collated and then represented by a headline indicator or status that synthesises information from all contributing indicators in some way. It is then this apex indicators, which has synthesised information from other indicators from which targets, trends and progress can be assessed. An example of this made in the workshop was the Water Framework Directive classification[21] whereby multiple individual metrics are derived and synthesised at a site level to provide an overall picture of condition. In this sense of the indicator hierarchy, different metrics are used to inform the apex assessment. The

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[21] https://www.legislation.gov.uk/uksi/2015/1623/pdfs/uksiod_20151623_en_auto.pdf

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alternative view of the indicator hierarchy was one in which different levels are not used to inform others, and in that sense could be considered independent, but are instead used to investigate further details and further aspects that may contribute to enhance understanding biodiversity and nature recovery. In this sense the hierarchy is being used to facilitate interpretation of the apex indicator. For example, one broad indicator can provide the focus for an overall goal and thus be the apex indicators at the top of the hierarchy, and sub-indicators provide a more detailed look at biodiversity across specific categorisations (e.g. regional; marine, freshwater, terrestrial; taxonomic class) and policy areas. The species abundance indicator adopted in England was recognised as an example of a broad, single indicator that may sit atop such a hierarchy, though no further examples were given either of apex indicators or similar hierarchies. This hierarchical view does not overcome all issues that exist with using a single indicator as, ultimately, the apex indicator may still be represented as such. However, presentation as a hierarchy with sub-indicators providing additional context should alleviate some of the concerns regarding aggregation.

The attendees suggested that the suite of indicators should ideally be reported on annually, but the frequency could be reduced depending on the resources available. It was noted that any change to the frequency of reporting should be announced in advance and publicly communicated. There was an assumption amongst attendees that the frequency of reporting should be common across all indicators in a hierarchy. Some suggested that these indicators could be presented in a matrix that shows where any gaps in monitoring lie, and an overview of whether the various indicators are improving or declining. This approach could be useful for focussing future monitoring efforts and policy interventions. Interlinkages between indicators and pressures could also be incorporated into this where the data allows.

Types of indicators to consider

The workshop attendees discussed a variety of potential indicators to track biodiversity change. These included indicators of:

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- the state of biodiversity such as those relating to species, habitats, ecosystems; (referred to as state indicators),
- the drivers and pressures impacting biodiversity; and
- those that highlight the benefits of biodiversity to people.

One of the most discussed state indicators was species abundance, such as the species abundance indicator that will be used to track progress towards the legally binding biodiversity targets in England.[22,23] Attendees discussed a range of advantages and disadvantages of using such an indicator for this purpose. Advantages included that it is generally easily understandable without an in-depth mathematical understanding, and that abundance monitoring data is already fairly accessible and abundant, and in most cases extends back to an historical baseline. Adopting such an indicator may enable comparability between nations. However, this would depend heavily on the data used, the method adopted due to the sensitivity to the species' data included, the smoothing approach, and the baseline year. Further work would therefore be required for any comparability across nations.

The disadvantages of a species abundance indicator included issues of the representativeness of the available data, and whether this would be sufficient to make accurate inferences about the state of biodiversity as a whole. However, there was discussion that this issue should not be a barrier to monitoring biodiversity. As discussed in the 'desirable properties of a biodiversity indicator(s)' section above, a flexible composite approach to monitoring, which starts with what is available and is built on over time as more data becomes available could be adopted.

Some attendees suggested that the representativeness issue of the available data could be resolved in part by weighting the indicator appropriately. However, the complications with choosing an appropriate weighting method, as discussed in the sections above, remain. As well as these complications, weighting an indicator of abundance cannot correct for data that is missing entirely, so if there are key gaps in

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[22] Environment Act (2021)

[23] Defra (2023) Environmental Improvement Plan 2023

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data availability to begin with (e.g., whole groups of species that are missing), then representativeness of an abundance indicator will still be a concern.

Indicators incorporating data on species distribution / occupancy, rarity, and condition were also considered. In some cases, such as for distribution / occupancy, data availability would likely be greater. Species coverage would also be higher for this indicator as the data would mostly be opportunistically collected (e.g., from species observations outside of standardised monitoring schemes). However, the data would likely be less structured than those obtained through official abundance monitoring schemes, and the absence of standardised protocols for collecting this type of data presents challenges for assessing trends in the status of species. Data on rarity of species is also available (e.g., through the IUCN Red Lists), but the majority of rarity assessments are unlikely to have been conducted at the Northern Ireland scale, but rather at the United Kingdom scale. The condition of a species can be measured through an assessment of abundance, distribution and localisation and other components. However, such an indicator is likely to be much harder to assess. This is because it would require a method to incorporate a range of data together, as well as knowledge of what 'ideal condition' looks like, where condition is a relative measure. Whilst current examples of composite indicators that capture such different elements exist[24], there are currently no known examples that include multiple metrics across multiple species whilst standardising across each.

Many attendees of the workshop were interested in incorporating indicators focussing on habitats and ecosystems as well as species-based indicators. These ranged from simple concepts such as habitat diversity and extent, to more complex concepts such as habitat condition and connectivity, ecosystem health and function. The simpler concepts likely already have data available that could be used to help develop indicators (e.g., from land use maps). However, indicators for condition and connectivity of habitats and ecosystem health and function would likely be much more difficult to

[24] Reyers, B., Jaarsveld, A.S.V., McGEOCH, M.A. and James, A.N., 1998. National biodiversity risk assessment: a composite multivariate and index approach. Biodiversity & Conservation, 7, pp.945-965.

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develop. One particularly popular concept was an indicator that could incorporate natural capital assessments and be used to show the benefits that people can obtain from nature, ecosystem goods and services.

Due to the diversity of indicators that were discussed, frameworks for categorising biodiversity indicators were also considered and acknowledge as a potential option to take forward. Biodiversity indicator frameworks can be used to evaluate key knowledge gaps and identify priorities for further indicator development. A number of frameworks are in use across various suites of biodiversity indicators. For example, The UK biodiversity indicator suite uses the Pressure-State-Benefits Response framework.[25] The framework most mentioned during the workshop included the widely used Driver-Pressure-State-Impact-Response (DPSIR) framework.[26,27] The DPSIR framework has been used as a communication tool for suites of indicators as it can help to describe social and environmental interactions using the different categories of indicator.

Setting targets

Attendees at the workshop discussed the principles and approaches that could be applied to developing and setting targets. One of the key principles for setting targets that was considered was that biodiversity targets should be SMART (specific, measurable, ambitious, realistic, and time-bound) as ambiguity and complexity in the wording of targets can make it difficult to develop effective indicators and can complicate assessments of progress.

Attendees were also eager to ensure that any targets set should be in-line with international biodiversity commitments. This should ensure that the ambition of the targets set in Northern Ireland was appropriate. Attendees recognised the need for targets to be appropriately tailored to the regional / national context to ensure they are

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[25] JNCC, UK Biodiversity Indicators 2023

[26] European Environment Agency (1999). Environmental Indicators: Typology and Overview. TNO Centre for Strategy, Technology and Policy.

[27] Elliott, M. et al. (2020). From DPSIR the DAPSI(W)R(M) Emerges… a Butterfly – 'protecting the natural stuff and delivering the human stuff'. in Ecosystem-Based Management, Ecosystem Services and Aquatic Biodiversity : Theory, Tools and Applications.

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suitable for Northern Ireland. There was support from attendees for the targets to be developed in parallel with plans for monitoring to ensure that the monitoring that is developed is effective.

Frequency of monitoring and reporting

Progress towards biodiversity targets should be monitored and reported on frequently. Attendees suggested that this should help ensure that effective and timely action could be taken. Many felt that this should include annual reporting of all biodiversity indicators if more than one indicator is to be used. Others considered the idea of reporting annually on one or a few headline indicator(s) and remaining sub-indicators less frequently (e.g., every 5 years). Either way, there was agreement among attendees that biodiversity monitoring would need to be coordinated with the agreed reporting timescale in mind. Funding agreements would also need to be in place to ensure that monitoring schemes can continue in the long term. While many will have funding agreements in place, these are likely reviewed after relatively short time frames. Ideally DEARA would directly fund these monitoring programmes to ensure they have some control over the overall aim of monitoring and that this is in line with the objectives of the chosen indicator(s).

4.3 Exploring the data to underpin potential indicators

What monitoring is needed?

During the stakeholder workshop, attendees did not talk specifically about data requirements (e.g., what species, where, when, how to monitor biodiversity), but rather about the approach that needs to be taken to understand the monitoring needs. Attendees felt that an essential first step in this approach is to establish what the 'need' is. There needs to be a consensus among stakeholders on the overall aim of the monitoring and the overarching goal for biodiversity. Understanding the intended purpose of any indicator(s) developed including whether they are meant to guide policy actions or provide an overview of the state of biodiversity in Northern Ireland, will be

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important during this process. Attendees felt that looking at the data that was available before establishing what the specific need is risks an ineffective indicator being developed.

Workshop attendees recommended that strategic approach should be taken when considering data needs. Once the overall goals of the indicator(s) have been established, data that is currently available should considered for use before making plans to expand and develop additional monitoring schemes. Some attendees highlighted that there are likely to be a number of cases where data exists, but it is currently not openly available. Use within a biodiversity indicator(s) may therefore require specific data sharing agreements to be put in place. Understanding the scale of this issue and navigating around it will be key to help avoid duplication of effort. This could also help to focus resources to areas that need them the most.

Current and future monitoring efforts need to be sufficiently resourced to ensure the data can be collected properly, and to the appropriate standards. Many of the monitoring programmes and data collection efforts in Northern Ireland are unlikely to be funded directly by DAERA, and often will be collected through well-established volunteer-based recording schemes. Many of these schemes are likely to be run through partnerships between government bodies, non-governmental organisations (NGOs) and research organisations. Although some will have funding agreements in place, these agreements will likely be reviewed after relatively short time frames, which makes them, along with any indicator(s) that rely on their data, vulnerable.

4.4   Availability of data and indicators

Recent research carried out by the BTO as part of the TSDA involved a full review of biological recording schemes and surveys operating in Northern Ireland, or across the UK if not specifically in Northern Ireland. At the time of writing this report, the TSDA work is currently being written up as a report, which will describe the data that are currently being collected for each taxon, along with any data gaps, and the user needs of biological recording data. The report will also cover the main barriers to citizen

science biological recording in Northern Ireland and will provide some recommendations to help reduce these.

Here, we summarise evidence collected from stakeholders in written responses to an invited consultation that builds on the BTO report, we specifically avoid any duplication here. As part of this evidence gathering, we were interested in understanding the spatial extent of any monitoring information, whether this is conducted across the island of Ireland or is specific to Northern Ireland. This included data and monitoring initiatives that have the potential to provide information at the necessary scale and extent, even if they are currently limited in this respect.

From the responses received, it was highlighted that there are a number of monitoring schemes that operate in Northern Ireland already contributing to biodiversity indicators. Many of these are outlined in the metadata for State of Nature 2023 report[28], which gives a breakdown of both the structured monitoring schemes and recording schemes. The monitoring schemes cover terrestrial, freshwater, and marine environments and contribute to various abundance and distribution indicators. Many of the indicators are reported at the Northern Ireland scale such as abundance data for birds, butterflies and some bats, and occupancy data for a range of taxa. Additional indicators mentioned by respondents included those used with NIEA's environmental statistics report[29], such as the wild birds indicator, calculated specifically for Northern Ireland from data collected as part of the UK Breeding Bird Survey. Other data are reported at the island of Ireland scale (e.g., Irish Red List assessments) or contribute only to the UK-level State of Nature results. Following this, it was mentioned by multiple respondents that some of the UK-level monitoring schemes, particularly in the marine area, have potential to be disaggregated to the Northern Ireland scale (e.g., Seasearch, plankton, seals, cetaceans). It was clear from the responses that there is therefore a requirement for

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[28] Burns, F, Mordue, S, al Fulaij, N, Boersch-Supan, PH, Boswell, J, Boyd, RJ, Bradfer-Lawrence, T, de Ornellas, P, de Palma, A, de Zylva, P, Dennis, EB, Foster, S, Gilbert, G, Halliwell, L, Hawkins, K, Haysom, KA, Holland, MM, Hughes, J, Jackson, AC, Mancini, F, Mathews, F, McQuatters-Gollop, A, Noble, DG, O'Brien, D, Pescott, OL, Purvis, A, Simkin, J, Smith, A, Stanbury, AJ, Villemot, J, Walker, KJ, Walton, P, Webb, TJ, Williams, J, Wilson, R, Gregory, RD, 2023. State of Nature 2023, the State of Nature partnership, Available at: www.stateofnature.org.uk

[29] https://www.daera-ni.gov.uk/sites/default/files/publications/daera/ni-environmental-statistics-report-2023.pdf

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further work to explore the potential for disaggregation of UK-level indicators to Northern Ireland.

There were similar calls for further assessment of the potential for data from existing monitoring schemes and datasets that do not contribute data to the State of Nature report, or existing Northern Ireland biodiversity indicators. These include for example the National Plant Monitoring Scheme, and Bumblebee Monitoring Scheme. It was noted that further work would be necessary to determine the utility of the current data for use within indicators for Northern Ireland or to determine when sufficient data may be available to contribute. The National Plant Monitoring Scheme (NPMS) was listed as a clear example of this, whereby the current available data within Northern Ireland is not sufficient to disaggregate UK-level indices on vascular plants. However, much of this is due to the relatively short duration of the NPMS scheme. In the future there will be longer data records and potentially wider adoption of the scheme that will enable disaggregation. This type of assessment is pivotal to understanding the data availability landscape across Northern Ireland and the potential for feeding into any indicator(s).

Additionally, it was highlighted that further ad-hoc recording data is likely to be available. This included a variety of sources including the National Biodiversity Network Atlas, Global Biodiversity Information Facility, Centre for Environmental Data and Recording, and iNaturalist. However, it is likely that substantial investigation of the suitability and availability of data from such sources would be required before consideration within biodiversity indicator(s). CeDAR, for example, have accumulated data from various sources, and an investigation of whether they are useful or can be made more useful for this purpose would be necessary.

4.5   Key data challenges for Northern Ireland

This section summarises some of the key data-related challenges faced related to the development and use of biodiversity indicators in Northern Ireland. These challenges were identified by stakeholders during both the consultation and in-person workshop.

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Monitoring is often project-based

Stakeholders at the in-person workshop highlighted that lots of the monitoring conducted in Northern Ireland is project-based, and therefore associated with short-term funding agreements. A key challenge that needs to be overcome is therefore securing sufficient resources to enable monitoring to occur over a long-term basis. In some cases, it is not the resources for the monitoring surveys themselves that are limiting, but resources to support taxonomic identification of survey samples. This is particularly the case in the marine realm where identification cannot easily be done in-situ.

Collaboration and standardisation

Many stakeholders reported gaps and inconsistencies in monitoring methodologies over time and space as well as an inability to access data. Stakeholders agreed that greater collaboration and standardisation of citizen science methodologies across both the Republic of Ireland and Northern Ireland would be mutually beneficial. This would improve the quality of information generated and available in both jurisdictions. Whilst the same is true across Northern Ireland and Great Britain, it was noted that standardisation is far more common across the UK than across the island of Ireland.

Quantity of data compared to other UK nations

Species time series at the Northern Ireland scale tend to be over a shorter timeframe and cover a smaller proportion of species compared to other UK countries and UK-level data, most likely an artifact of resource limitations. For example, the invertebrate occupancy indicator for Northern Ireland in the State of Nature report included ~500 species covering 1990 to 2015 compared to ~5000 species from 1970 to 2021 for the UK indicator. Data are therefore usually skewed towards the more common, widespread species, due to the relationship between survey effort and detectability. This makes understanding the state of wider species communities more difficult in Northern Ireland.

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5. Next steps for Northern Ireland

Considering the evidence gathered during this project and the priorities identified by the stakeholders during the workshop, a set of recommendations and next steps were distilled. The next steps were identified based on the critical elements, gaps, decisions, and uncertainties that emerged from the consultation and workshop.

The key requirement for Northern Ireland moving forward is to establish a monitoring and target setting framework, supported by a clear delivery plan. Figure 2 presents an overview of the key next steps for Northern Ireland encompassed by the need to develop a monitoring and target setting framework. Each component of this and more specific next steps are described in more detail below. For each component, we have identified key actions resulting from our evidence assessment and considered the success criteria of each alongside who should take ownership moving forward.

The process of establishing a monitoring and target setting framework, which includes establishment of (potentially) legally binding targets and associated indicators should realistically be completed in less than 3 years, ideally in 2. Based on the process in England, which started prior to 2020, published the statutory instrument in January 2023 and further modifications made in Spring 2024, this may seem ambitious. However, strong coordination across government, a clear plan for the development of all components and efficient use of any sub-contractors should make this possible. Fundamentally, DAERA should take ownership of the process and planning, making clear requests of other departments and contractors when necessary. With good planning, strong leadership and communication across all relevant parties, the establishment of a monitoring and target setting framework (as shown in Figure 2) could be achieved in 2 years.
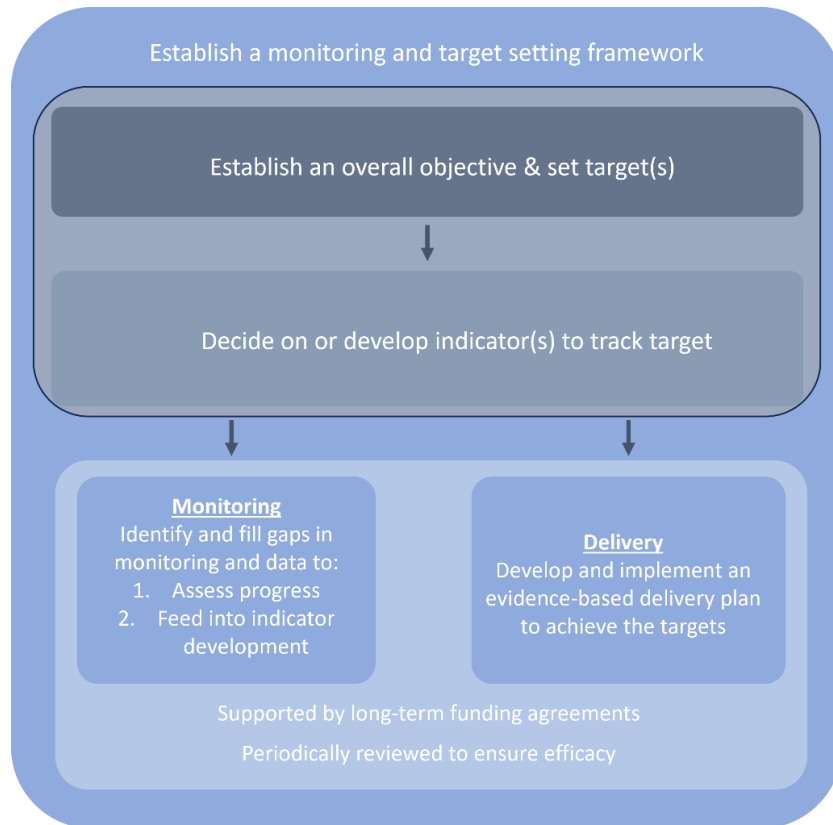
Figure 1: Next steps for Northern Ireland

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5.1   Objectives

Actions

- **Establish the overall objective**

It needs to be clear what the intended use for any biodiversity indicator(s) would be. It is important to consider whether the biodiversity indicator(s) will be used to guide policy, or solely to track progress towards achieving targets. If the intention is for the indicator(s) to guide policy decision-making then it would be beneficial to develop indicators that can be linked to pressures and drivers of biodiversity change. However, indicators that can be linked unambiguously to one or a set of drivers can be unachievable in practice and therefore there will always be some degree of interpretation. Thus, the extreme 'indicator to guide policy' end of the spectrum seems unlikely. Equally, it is hard to imagine a situation in which an indicator was showing deterioration and a policy maker didn't ask what could be done to improve it. Hence, the pure 'indicator as a target' end of the spectrum also seems unlikely. Thus, in reality the objective is likely to fall somewhere on the continuum between these extremes. The question is then to what extent the indicator can be formally linked to specific actions. This demonstrates the importance of understanding, and being clear about, the objectives within any target setting framework.

- **Set target(s)**

These should be tailored to national context to address biodiversity issues in Northern Ireland, but also ensuring ambition is in-line with international biodiversity agreements. The rationale behind the context of national targets is to mirror the scale at which actions and interventions occur. The targets should follow the SMART (Specific, Measurable, Ambitious, Realistic and Timebound) framework as ambiguity and complexity in the wording of targets can make it difficult to develop effective indicators and can complicate assessments of progress.

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Success

Legally binding targets written into law with a published paper on the objectives and aims for biodiversity in Northern Ireland.

Roles

The overall objectives should be determined collaboratively, involving a range of experts and stakeholders, including data collectors, data users including local authorities, and policy developers from each of the departments within the Northern Ireland Executive. This collaborative exercise could be led by NIEA with input from JNCC, whilst DAERA should take the lead in setting out legally binding targets.

5.2   Indicator Development

Actions

- **Decide on and develop indicator(s)**

To measure progress towards target(s). This process may make use of existing indicators or could develop new indicators based on the availability of data and overall objective and targets. The process of developing indicator(s) should happen in parallel with the development of targets. This should ensure that progress towards achieving target(s) are measurable using the indicator(s), and that the indicator(s) will be effective at determining whether the target(s) have been met. The table below shows the desirable properties of biodiversity indicator(s) as described by the attendees of the workshop. Meeting all of these criteria for a complex area such as biodiversity is a challenge. The choice of indicator(s) would therefore need to balance the various properties, so the list should be seen as an overall ambition rather than an essential list. It is possible that by adopting a suite of indicators, as opposed to only one indicator, more of these criteria will be able to be met collectively.

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Desirable property	Justification
Representative	To ensure certain groups of species, ecosystems, or habitats are not overlooked.
Responsive to pressures	To enable assessments of the efficacy of policies and management strategies and inform the uptake of future policies.
Meaningful and understandable	To enable non-experts and policy makers to utilise the indicators without risk of confusion and misinterpretation.
Supports multiple sectors	To encourage buy-in from a wide range of organisations.
Quality assured	To ensure robustness and transparency.
Repeatable and comparable	To allow for comparisons to be made between years/areas and eventually for trends in a time series to be detected.
Flexible	To allow for incorporation of new data as it becomes available and ensure that monitoring and use of the indicator(s) are futureproof.

Success

Publication of a biodiversity indicator(s) for Northern Ireland, updated on a suitable timescale. Clear, transparent, robust methodology underpinning the development of the indicator(s) should also be published and peer reviewed. Any updates to the indicator should also be documented including the reasons for any change and how this may impact consistency in the indicator over time.

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Roles

The responsibility of developing appropriate indicators would lie with DAERA, but the OEP should have clear oversight of this process and to review decisions made against the objectives and targets set out. Each department within the Northern Ireland Executive, and local authorities should also be involved in this process to ensure coherence across policy areas.

5.3 Biodiversity Monitoring

Actions

- **Mapping exercise of existing monitoring activity to criteria**

The existing monitoring data on biodiversity available across Northern Ireland should be evaluated with respect to the criteria outlined in Section 4. This should build on the recent BTO report to consider the data sources identified in a similar review to that conducted for England[30], whereby the appropriateness of each data set for use within an indicator. Where any dataset does not meet appropriate criteria, any potential steps to enable use of the data should be made explicit.

- **Identify and fill gaps in monitoring**

As part of the process of developing biodiversity indicator(s), it is likely that gaps in current monitoring schemes and data will be identified. Existing gaps were discussed by stakeholders during the engagement workshop, including spatial coverage and species representation. However, the type of data required is dependent on the objectives and the indicator chosen and therefore a rigorous exercise needed to be conducted once those decisions have been made. It is important to understand where monitoring gaps lie so the limitations of indicator(s) can be properly developed, understood, and resources can be effectively directed

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[30] https://jncc.gov.uk/our-work/species-indicator-review/

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to address the most important data and monitoring needs. BTO have undertaken a review of biological recording schemes and surveys operating in Northern Ireland. Whilst the final report has not yet been published, those consulted as part of this project expected that this work could be used as a resource to help guide decisions about the appropriate indicator(s) to be used and what extra monitoring will be needed once indicator(s) have been chosen.

- **Establish a monitoring framework for Northern Ireland**

Individual monitoring activity is led by different organisations who should maintain control and management of their activity. However, greater top-down coordination is needed to ensure that data being collected is fit-for-purpose within biodiversity indicators. This framework should clearly set out appropriate governance around biodiversity monitoring across Northern Ireland working closely with key data providers to build a collaborative agreement on use of data for the long term.

Success

The success of these actions will be determined by the existence of a monitoring framework that matches the requirements of the objectives, targets and indicator(s). This framework should have appropriate agreements in place with data providers, including funding commitments, that span to at least the time-frame of the set targets. A successful monitoring framework should strive for continuous improvement and encourage continued engagement in data collection efforts, and therefore regular appraisal of monitoring activity and gap analysis should be conducted.

Roles

Establishment of a monitoring framework should involve all those contributing data and those using data. It is essential to have buy in from all parties to ensure successful implementation. This includes data provides, data curators, data users

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and decision makers from each of the departments in Northern Ireland and local authorities. In terms of leadership, DAERA should provide the top-down overview and the long-term commitments with data providers, but coordination should be undertaken collaboratively, with JNCC providing a pivotal role.

5.4 Delivery

Actions

- **Develop an evidence-based delivery plan**

In order to meet the targets that have been set, an evidence-based delivery plan needs to be developed. The delivery plan should be developed alongside the development of the targets. For the targets to be realistic and achievable, the evidence to understand pathways should have been considered. That same evidence should be used within a delivery plan focussed on actions at the rights scale within the right timescale. This development of this plan should be a collaborative process, involving a wide range of experts that can advise on the most effective policies to address biodiversity decline, alongside the stakeholders that will be responsible for implementing the aspects of the delivery plan. The delivery plan should be detailed and prescriptive. It should lay out exactly how the actions chosen will help to achieve the target(s), within what timescale, and how species will respond to them based on the evidence available. It should also be explicit about who is responsible for implementing the actions.

- **Implement policies and take actions to deliver outcomes**

Once a delivery plan has been developed, it needs to be implemented effectively and ideally revisited after a set time period once progress has been evaluated, to ensure the planned policies and actions remain appropriate.

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Success

The success of an effective delivery plan is measure exactly by the proposed indicator(s) and progress towards achieving the stated targets and wider ambitions set out.

Roles

DAERA should lead, with input from other departments, to develop a delivery plan. All public authorities have a role in implementing actions and monitoring progress. The OEP has a role in holding DAERA and other public authorities accountable for delivery and progress towards environmental targets. Regular assessment of policies and actions should be undertaken, such as is required for the EIP, the outcomes of which should be published.

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Annexes

5.5 Annex 1 – Organisations involved in stakeholder engagement

Table 1 shows the organisations that responded to the written consultation about biodiversity data and Table 2 shows the organisations that were invited to the in-person stakeholder workshop and highlights those that attended.

Table 1: Organisations that submitted written responses to the invited consultation on data availability in Northern Ireland

Organisation
AFBI (Agri-Food and Biosciences Institute)- Fisheries and Aquatic Ecosystems Branch
BSBI (Botanical Society of Britain & Ireland)
National Biodiversity Data Centre
National Trust
RSPB (Royal Society for the Protection of Birds)
Ulster Wildlife Trust

Table 2: Organisations approached for written responses to consultation and invited to the in-person stakeholder workshop on biodiversity indicators.

Organisation	Attended Workshop
AFBI (Agri-Food and Biosciences Institute)	Yes
Birdwatch Ireland	No
BSBI (Botanical Society of Britain & Ireland)	Yes
BTO (British Trust for Ornithology)	Yes

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Buglife	Yes
CeDAR (Centre for Environmental Data & Recording)	Yes
DAERA (Department of Agriculture, Environment and Rural Affairs)	Yes
Irish Ecological Association	Yes
Irish rare breeding bird panel	No
JNCC (Joint Nature Conservation Committee)	Yes
National Biodiversity Data Centre	No
National Trust	Yes
NIEA (Northern Ireland Environment Agency)	Yes
Northern Ireland Environment Link	Yes
NPWS (National Parks & Wildlife Service	No
OEP (Office for Environmental Protection)	Yes
RSPB (Royal Society for the Protection of Birds)	No
Ulster Wildlife Trust	Yes
Woodland Trust	No

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