METHODOLOGY FOR QUANTIFYING UNITS OF BIODIVERSITY GAIN

Biodiversity quantification approach developed by the **Wallacea Trust**

Version 3 (October 2023)

Updates: Version 3 includes several in-text modifications such as:

- Improvements in the list of definitions;
- Improvements on the guidance for Importance scores calculation;
- Improvements on abundance score calculations
- How to proceed if there is no reference site for uplift projects
- Improvements on how to apply a structural metric
- Improvements on uncertainty adjustments;
- Improvement on the guidance to calculate areas of avoided loss
- Improvements on the guidance on how to deal with leakage
- Improvement on the guidance to calculate awardable biodiversity credits
- Development of external independent academic peer review to verify biodiversity claims

1 Contents

2 Summary

This methodology can be used to quantify expected biodiversity benefits for projects aiming to increase or maintain **biodiversity** via restoration and/or protection interventions that have positive impacts on local livelihoods and ecosystems. There is no geographical restriction on the use of this approach, and its main goal is to measure biodiversity change on **Project sites** and translate those positive changes into awardable **Biodiversity credits**. A **Biodiversity credit** is defined here as a 1% uplift or avoided loss in **biodiversity** per hectare, as measured by the median percentage change in a basket of biodiversity metrics that together reflect the conservation objectives for the **Project site**.

The methodology quantifies the change in **biodiversity** value of an area using a pre-determined project-specific and peer-reviewed basket of biodiversity metrics. These metrics are carefully selected to reflect the management strategies and overall conservation objectives for the region in which the project is located.

This document includes a description on how to measure biodiversity change under different project scenarios and how to calculate the resulting number of **Biodiversity credits**.

To quantify the biodiversity change for a project, there are two options:

1. Measured uplift in biodiversity

Biodiversity is measured using a pre-determined basket of metrics at project initiation on both the **Project site** and a **Reference site**. The main purpose of using reference sites is to be able to estimate the likely biodiversity values at project completion in your **Project site** (and so, have an idea of the predicted uplift to expect during the **Project period**). As the project progresses, biodiversity values are again measured on the **Project site** using the same pre-determined basket of metrics, at agreed interim time-intervals (e.g. every five years) and finally at project completion. Measured change in **biodiversity** on the **Project site** is then calculated at each stated interval during the **Project period** and compared with its baseline at project initiation. Choice of **Reference sites** should identify locations that ideally had a comparable starting point to the **Project site** in terms of habitat structure and have undergone a comparable management system to the one being proposed for the **Project site** for a comparable period of time to the proposed **Project period**. Whenever impossible to find a perfect match between the **Project site** and the **Reference site** in terms of original habitat composition or management system, the likely biodiversity improvement at the **Project site** can be compared with similar habitats in a variety of **Reference sites**. Project developers are required to demonstrate consistency in their basket of metrics and methodologies across measurement periods to ensure comparability.

Please note that for those cases where, for whatever reason, no **Reference site** option is available, it is still possible to quantify uplift. In these cases, it will be however more difficult to quantify the likely **biodiversity gain** and as such the costs per **Biodiversity Credit** for potential investors. There are also implications on how the upper boundaries for **Relative Abundance** are determined for each species, and so this means adopting a more conservative approach than the method employed when **Reference sites** are used (which would affect the total number of credits issued).

As the project progresses, at each subsequent verification period after the baseline assessment (at project initiation) the same survey sites (**Project site** only) are resurveyed using the same methodologies and sampling approach to determine how much the **biodiversity value** of each metric has improved in the **Project site** in relation to the baseline assessment at project initiation. The median value of these percentage changes between periods of time will provide a reflection of the overall biodiversity gain achieved over that time. This value is then multiplied by the **Project site** area to quantify the amount of **biodiversity gain units**.

2. Avoidance of anticipated loss in biodiversity

For **Project sites** under threat of development, avoided biodiversity degradation is approximated using a **Paired development site**. This **Paired development site** must have already undergone the same type of development, degradation or exploitation that is threatening your **Project site**. The **Paired development site** is chosen to give an estimate of the likely **biodiversity** decrease in each of the pre-determined metrics if the **Project site** is developed into the same land use as the **Paired development site**. Projects are required to use the same basket of metrics and methodologies between **Project sites** and **Paired development** sites.

In an avoided loss project, for each metric the percentage difference between the **Project site** and the **Paired development site** is calculated. The median value of the percentage differences of each metric is then multiplied by the amount of area in hectares within the **Project site** expected to be lost over the **Project Period** to estimate the value of the **biodiversity** that will be protected during the **Project Period** (e.g. 25 years). As the project progresses, at each subsequent verification period after the baseline assessment (at project initiation) the same survey sites (**Project site** only) are resurveyed using the same methodologies and sampling approach to determine if the median **biodiversity value** of the **Project site** has remained within 10% of the baseline value or has improved. If for example, a verification event is carried in Year 3 of a 25-year project and the median value of the **Project site** is maintained (defined as within 10% of value obtained at the baseline assessment) or has improved, then 3/25ths of the total number of **biodiversity gain units** can be claimed.

For any uplift or avoided loss project wanting to use this methodology to quantify units of biodiversity gain, it is our recommendation that project developers submit their metric selection, survey methodologies and sampling strategy design to peer-review through a Stage 1 **Biodiversity Futures Initiative** application. This will provide independent academic verification that the quantification of biodiversity is being planned appropriately, and so detect any problems before committing time, effort and funds into collecting the data required for a baseline assessment at project initiation.

After this has been completed, a Biodiversity Measurement Report containing all the information required by the latest version of this methodology should be prepared at the start of the **Project period,** either to quantify the baseline for uplift projects or quantify the difference between the **Project site** and the **Paired development site** for avoided loss projects. This report should peer-review through a Stage 2 **Biodiversity Futures Initiative** application for independent academic verification that the biodiversity baseline for uplift projects or the difference between **Project site** and **Paired development site** for avoided loss projects, has been properly quantified. Once the biodiversity baseline or avoided loss has been peer-reviewed and verified then, as the project progresses, subsequent verification events are to be completed at intervals not exceeding 5 years after the baseline assessment (at project initiation). At each of these events survey sites (**Project site** only) are resurveyed using the same methodologies and sampling approach. Relevant calculations and datasets used to estimate the biodiversity uplift or avoided loss should then be peer-review through a Stage 3 **Biodiversity Futures Initiative** application for independent academic verification for confirmation that the size of the uplift over the baseline (e.g. project A has achieved a 30% increase per hectare in the median value of a basket of metrics that reflect the conservation objectives for the habitats) or that the biodiversity value of the **Project site** has been maintained or improved since project initiation in the case of avoided loss projects.

For organisations quantifying the benefits of their spend for inclusion in ESG reports, to determine value for money for various competing interventions or to provide evidence in supply chains that **biodiversity gains** have been made, then the independently verified claims for biodiversity gain should be sufficient. However, in some cases there will be interest in monetizing the gain as an income stream to support the project. In most cases, 80% of the claim verified by the **Biodiversity Futures Initiative** can be issued and subsequently retired by registries (either digital registries or more traditional registries). Note the other 20% of the claim is retained by the registry as a buffer. Note also that the **Biodiversity Futures Initiative** has the scope to recommend increasing the buffer for projects with higher degrees of uncertainty (see section 6

3 Definitions

Biodiversity
A descriptor representing abundance and species richness of the Kingdoms of plants, animals and fungi within a specific area.

Biodiversity Gain Unit
A 1% gain (uplift or avoided loss) per hectare in the median value of a basket of metrics that reflect the conservation objectives of the habitats within the project site.

Biodiversity Credit
Unit of biodiversity gain issued as a credit by a registry based on a % of the claim verified by the Biodiversity Futures Initiative. Note the percentage issued depends on the size of the buffer required by the Biodiversity Futures Initiative

Biodiversity Futures Initiative
The Biodiversity Futures Initiative is an independent group of academics and field biologists that will provide an independent review of biodiversity claims using this methodology.

Biodiversity Metrics
Group of indicators (usually taxa based) selected to reflect the overall change in biodiversity as the project is implemented.

Project site
An area proposed to be restored or protected through the implementation of **Project interventions** and then monitored over the **Project period**.

Project region
A discrete geographical area within which **Project sites** are or could be located as part of a Project, and that includes any reference areas or leakage buffers

Project period
The period comprehended between the starting and completion phases of the project. By default, the **Project period** should be at least 20 years in duration (preferably 25 – 30 years).

Project intervention
A set of activities designed to restore, protect, monitor and improve the management of the **Project site** and as a result increase or maintain biodiversity and have positive impacts on local livelihoods and ecosystems.

Project scenario
The scenario that involves implementation of the **Project intervention**(**s**) within the area of the project.

Ecoregion
The list of terrestrial, freshwater and marine ecosystems as defined by the World Wildlife Fund.

Habitat
A place where organisms live. There are multiple available classification systems for habitat. The chosen system must be specified.

Median percentage change
Used as an indicator of overall biodiversity change for a given site. Individual biodiversity metric values (change expressed as a percentage compared to the initial project state value), are ordered by ascending magnitude. The median value is defined as representative of the overall biodiversity change at the site over the given time period. In the case of an even number of metrics used, the mid-value of the central two is chosen.

Naturally occurring species

Native species plus any introduced species now regarded as naturalised. As defined by recognised organisations (for example governments or wildlife NGOs).

Paired development sites

A site within the same **Project region** which has been subjected to the same development activity that is threatening the biodiversity at the **Project site.** The **Paired development site** is used as likely predictor for the loss of biodiversity if the proposed development at the **Project site** goes ahead.

Reference sites

A site within the same **Project region** where the proposed management approach for the **Project site** has been applied over a similar period of time as proposed for the **Project period**.

Reference period

The Reference period must be at least 5 years and must not exceed 15 years. The end of the reference period must be within 2 years of the start of the **Project period**

Leakage area

Defined as a buffer around the **Project site** within the area of influence of the involved communities, which is also monitored for habitat structure losses as a result of community actions displaced from the **Project site**.

Local stakeholder

Owners, users and managers of the Project Site divided into primary and secondary stakeholders.

Primary stakeholder

An individual or group affected by the project or that has potential influence on it, i.e. any user of the land or natural resources. This includes **Project participants** and **Project beneficiaries**, all indigenous peoples and local communities with customary user rights or historical access to the land or resources and/or others who are directly affected by and use the biodiversity/land" (see also **Local stakeholders** and **Secondary stakeholders**).

Secondary stakeholder

A stakeholder with an indirect interest in the project, such as national or local government authorities, politicians, religious leaders, civil society organisations and groups with special interests, the academic community, and others who have a more indirect interest in the project.

Project participant(s)

An individual or group that enters into an agreement with the **Project coordinator** to implement **Project interventions** and benefit from the sale of **biodiversity credits**.

4 Applicability

Project developers using one of the approaches outlined in this methodology as the framework for awarding biodiversity credits are required to:

- adopt all definitions as described in the latest version of this methodology document;
- demonstrate that **Project sites** and **Project interventions** meet all the applicability criteria;
- provide auditable evidence of the data and calculations used to demonstrate **biodiversity** change, and that this change has been measured in accordance with the relevant equations defined here;
- provide a detailed, transparent, and auditable description of any data and parameters used, including sufficient evidence to demonstrate a sufficient standard and consistency in their sampling strategies throughout the project period;

This methodology is applicable to a broad range of geophysical and socioeconomic contexts, providing that project meet the following applicability conditions:

- **Project Sites** have not been deliberately negatively altered prior to the start of **Project interventions** with the intent of reducing existing biodiversity and consequently claiming an artificially higher **biodiversity** gain;
- **Project sites** are of an area of land greater than fifty hectares. Non-continuous areas can be considered provided project parcels are all being managed in the same way. There is no minimum area for aquatic based applications;
- **Projects** relate to species naturally occurring in the submitted areas;
- **Project period** are at least 20 years in duration (preferably 25 – 30 years);
- **Project interventions** will not adversely affect other areas locally, resulting in loss of biodiversity;
- **Project interventions** demonstrate to have positive impacts on local livelihoods and ecosystems;
- **Project interventions** guarantee at least 60% of the funds generated from the sale of issued credits will benefit **Local stakeholders**;
- **Project interventions** should avoid land purchase practices that do not follow best practice guidelines and under no circumstances should include non-voluntary displacement of local communities;
- **Projects** can demonstrate additionality, i.e. the biodiversity uplift or avoidance of loss will not happen without **Biodiversity credits** being issued to fund the project. For avoided loss projects, this includes an assessment of the probability of the proposed development occurring at the submitted site;
- **Projects** must describe how their proposed **Project interventions** will result in the **biodiversity** uplift or avoided loss beyond the **Project period** (i.e. permanence);

- **Projects** must describe how incentives and/or livelihood benefits will ensure maintenance of **biodiversity** beyond the **Project period**. This is to avoid a series of short-term gains with no overall **biodiversity** uplift or avoided loss.

A **Reference site** for uplift projects must have the following characteristics:

- allow for the design and implementation of a comparable sampling strategy to the **Project site**;
- allow to have a matching sampling effort and field data collected as near contemporaneously as possible to the **Project site** (to avoid issues such as seasonally variable weather conditions);
- ideally has started from a similar point to the **Project site** in terms of habitat structure and has undergone a comparable management system to the one being proposed for the **Project site** for a comparable period of time to the proposed **Project period**. In certain situations, it may be impossible to find a perfect match between the **Project site** and the **Reference site** in terms of original habitat composition or management system. In these cases, the likely **biodiversity** improvement at the **Project site** can be compared with similar habitats in a variety of **Reference sites**.

Projects where a **Reference site** cannot be identified can still have their uplift quantified, although a more conservative approach has to be taken to **Relative Abundance** measures (see section 5.5).

Avoided loss projects require a **Paired development site** and evidence is needed that demonstrates:

- the **Project site** is under threat by the identified development plans, over-exploitation or drivers of degradation which will go ahead unless the **Biodiversity credits** issued can provide sufficient income to prevent it happening;
- independent operators propose to purchase, lease or rent the **Project site** and develop it in such a way which will result in **biodiversity** degradation;
- identified threat is not unique to the **Project site,** and there is history of similar development in the **Project region;**
- the **Paired development site** has already been subjected to the same type of development that is threatening the **biodiversity** value of the **Project site**;
- design and implementation of sampling strategy is comparable between **Project site** and **Paired development site**;
- sampling effort and field data collected will be identical and as near contemporaneous as possible between **Project site** and **Paired development site** (to avoid issues such as seasonally variable weather conditions).

5 Approach: biodiversity metrics and their values

The following approaches for calculating **Biodiversity gain** may be used by all projects meeting the applicability criteria. Full details of all calculations, data and parameters, as well as any changes or modifications to the described approaches, must be included in a **Biodiversity Measurement Report** (or equivalent project development milestone required by a certification body).

5.1 Defining a basket of metrics

It is assumed for the purposes of this methodology that metrics are indicator taxa chosen specifically to quantify biodiversity. A metric should consist of an entire taxon rather than individual species. This can be a functional taxon (e.g. large herbivores, soil invertebrates, breeding birds etc.) or a zoological taxa (butterflies, bats etc.).

A suitable basket of metrics must be defined (and should be validated through independent academic peer-review using the Biodiversity Futures Initiative) prior to project initiation and then be used consistently throughout the **Project period**.

The selected basket of metrics must:

- reflect the overall conservation objectives for the habitats in which your **Project Site** is included;
- include at least one structural component metric; a structural metric is one which has a major influence on the biodiversity present at the **Project site** and can be a physical component (e.g. rugosity for coral reefs, kelp forest cover in a marine scenario, canopy cover for forests or some of the stream metrics used in the USA for quantifying riverine credits) or an already established scoring system for habitats (e.g. UKHab). Alternatively certain components of fauna and flora can also sometimes be used to determine a structural component (e.g higher plants species richness and abundance for grasslands);
- include metrics covering all ecosystem services likely to be affected by the proposed management plan (such as air quality, water quality, soil quality, pollination value);
- include a minimum of five metrics (including the structural metric) for any project (please note that for some projects more than the minimum will be required to encompass all conservation objectives and the ecosystem services likely to be impacted);
- each non-structural metric should comprise all species in the selected taxa. These taxa can be functional taxa (e.g. soil invertebrates, breeding birds) or zoological taxa (e.g. butterflies) and all species within those taxa should be surveyed and assigned a **Conservation Value** and **Relative Abundance Score** both on a 5-point scale so equal weight is given to both these criteria.
- each metric should be monitored at a minimum frequency of every 5 years.

5.2 Defining the value of the structural metric

Structural metrics should be quantified in relation to a **Reference site** for uplift on a 5-point scale so that it is given equal weighting to the **Conservation Value** and **Relative Abundance Score** weighting used for the taxa based metrics (see section 5.3 below). The difference between the structural metric value at the **Reference site** and at the **Project site** is then divided arithmetically into five equal quintiles. The **Project site** will be allocated a Rank of 1 and will then progress in equal steps to the values observed at the **Reference site**. For a kelp restoration project, the volume occupied by kelp could be used as the structural metric. Assume that the **Project site** has 5% kelp occupancy by volume and the **Reference site** has 40% kelp occupancy by volume. The difference between these values would be divided into five equal steps (I.e. 35 divided by 5). This would result in the following intervals: **Rank 1** = 5% - 12%, **Rank 2** = 13% - 20%, **Rank 3** = 21% - 28%, **Rank 4** = 29% - 36%, and **Rank 5** = 37% or more. At each subsequent verification event after project initiation, the **biodiversity value** (V_m) of the structural metric is calculated by multiplying the rank score value at that time by 100. For example, if at the first verification even the volume of kelp is at 13% the **biodiversity value** (V_m) of the structural metric would be 200.

The units used for structural metrics will vary depending on the metric and in contrast with the non-structural metrics will generally be measured in its entirety. For example, for rugosity of reefs the unit will be a percentage value between 0 which represents a completely flat surface and 100 representing maximal complexity for a given level of pixels, whilst for terrestrial forests some measure of 3D structure would be the best indicator of **biodiversity** value. Measures like canopy cover or total biomass for forests could be confusing since single age/height forests are far less species rich than those with multiple layers. For streams/rivers this could be a composite metric using physical complexity, degree of riparian vegetation etc. Where there is an existing scoring system for habitats (e.g. DEFRA biodiversity metric 4.0) then this is expressed as a value that reflects the total score for habitats and their condition scores. Most countries though don’t have an equivalent system to the DEFRA biodiversity metric 4.0 so in some cases it will be difficult to identify a structural metric. For example, in countries where there is no DEFRA type system, and the objective is to upgrade an arable area into a mix of wetlands and grassland rich meadows then there is unlikely to be a single structural metric that can be identified, and so taxa based metrics should be used as a proxy. For example, the wildflower meadow elements could be species richness and abundance of higher plants, whilst for wetlands the metric could be breeding and/or or wintering birds.

Regardless of the type of units used to represent the structural metric in your project, the rationale to determine its biodiversity value at project initiation and subsequent verification events should follow the rational illustrated in the kelp example. In cases where a **Reference site** cannot be found then the same solution offered for non-structural metrics (see below) cannot be used and the basket of metrics must be comprised entirely of faunal and floral taxa.

5.3 Defining the value of non-structural metrics

For non-structural metrics, the **biodiversity value** (V_m) should in general consider large assemblages of species (such as breeding birds) rather than populations of individual species. This is to ensure all species within a taxonomic group are being measured so the metric is not unduly influenced by random fluctuations in the populations of individual species. Species richness is a poor indicator of biodiversity value unless each species is weighted by their **Conservation Value**. The methodology requires assignment of a **Conservation Value** on a 5-point scale with the most threatened (e.g. Critically Endangered) given a value of 5 and Least Concern a value of 1 (see section 5.4 below).

For uplift projects, as the **Project period** progresses though it is likely that additional species not found at project initiation are detected at subsequent verification periods and so added to the species list for the **Project site.** What is more important given the 70% loss of populations worldwide identified by the Living Planet Report (2022) is that the populations of the species on the **Project site** (particularly those with high **Conservation Value**) increase their abundance. **Relative Abundance** values are assigned on a 5-point scale (see section 5.5 below) to avoid them swamping the **Conservation Value** scores. For non-structural metrics, to determine the overall **biodiversity value** (V_m) for each sampling category within a given taxon/metric, **Relative Abundance** values for each species are multiplied by their **Conservation Value** and the resulting values summed together (there are some expectations to this when metrics use survey methodologies where **a**bundance estimations and or species identification is difficult or not possible; see section 5.5 below). For uplift sites, the scores for each taxon are calculated using this approach for the **Project site** to provide a baseline score against which future uplift will be measured. In the case of avoided loss projects then the overall score for each taxon in both the **Project site** and the **Paired development site** is calculated.

$$V_m = \left[\sum_{s=1}^{S} A_s \times CV_s \right]$$

with

V_m being the total area of habitat the overall **biodiversity value** (this value needs to be calculated separately for each sampling category, i.e. **Project site** and **Reference site** or **Paired development site**);

A_s being the **Relative abundance** scores of each assigned on a 5-point scale (see Section 5.5 below);

CV_s being the **Conservation Value** scores of each species is assigned on a 5-point scale (see section 5.4 below);

The value of each metric within the basket is to be measured directly either from fieldwork or remote sensing techniques. Care must be taken to specify or control the following variables:

- Seasonality and timing. Appropriate assessment of the time of year each of the surveys need to be carried out is very important. For survey methodologies that require replicate sampling, this also includes overall timescale and time between samples;

- weather conditions. To include descriptions of weather conditions that could preclude surveys (such as breeding bird surveys and high winds, butterfly surveys and heavy rain);

- ensure the same sampling effort between the **Project site** and **Reference site** or **Paired development site**. In cases where there are an unequal number of samples between the **Project site** and the **Reference site** or **Paired development site** then this would bias the number of species recorded from the site with the largest number of samples. In these cases, samples from the sample category (i.e. **Project site**, **Reference site**, or **Paired development site**) with the higher number of samples should be randomly selected until the sample numbers match those of the corresponding site.

To be deemed sufficiently rigorous, each metric description must:

- meet the minimum number of sample sites, where the distribution of these sample sites provides a reasonable representation of the strata that are driving the distribution of species within the metric. For each metric selected, the first stage is to determine the main drivers of their distribution and abundance. For example, with soil invertebrates, soil type is often the major determinant, whilst for higher plants it is a mix of soil type and management intervention (e.g. cutting regime, grazing pressure) whilst for breeding birds it is primarily habitat type. All strata should be representatively surveyed with a minimum of ten sample sites per strata except for strata that represent very small percentages of the site but even in these cases, numbers of sample sites can never be less than five. A useful way of quickly evaluating if each stratum has sufficient sample sites and replicates is plotting species accumulation numbers plotted against number of samples (rarefaction curves). Number of sample sites and sampling effort must be the consistent between **Project Sites, Reference Sites** (uplift projects) and **Paired development sites** (avoided loss projects) to allow comparability.

- have a fully described methodology and sampling strategy, including details of how selection of sample sites was decided as well as sample processing and data analysis was carried out;

- employ stratified random sampling for site selection;

- quantify the number of samples to be collected;

- be auditable, and the method for audit must be specified. As such, wherever practicable, data should be collected using digital survey techniques (such as camera traps, sound recordings, 3D mapping of reef structures, drone, or satellite imagery etc.).

5.4 Assigning **Conservation Value** ranking scores

Species conservation importance data are often available at **international**, **national** and **regional** scales, and all three should be consulted in the process to establishing the **Conservation Value** of each species in your project. Please note that for any given taxon only publicly available datasets from relevant and recognized agencies or institutions can be used (literature-based categories may also be accepted if widely accepted by the community of experts for that taxon and enough justification is provided). **Conservation Value** of each species is assigned on a 5-point scale based on the highest threat level identified across the three levels of conservation importance datasets. Often, datasets at the **regional** level will have the highest conservation values, but there are situations where at a **regional** scale a species is not regarded as having high **Conservation Value**, whilst at an **international** level it is in a higher threat category. Each species is assigned a **Conservation Value** from 1 to 5 with the highest values being the most important species from a conservation point of view. In cases of species where the importance value is unknown (e.g. due to data deficiency), the lowest Rank value of 1 will be assigned.

If no **national** or **regional Conservation Value** databases exist then **international** importance values based on the IUCN Red List Categories and Criteria can be assigned as follows: Rank 1 = Least Concern, Data Deficient & Not Evaluated, Rank 2 = Near Threatened, Rank 3 = Vulnerable, Rank 4 = Endangered, Rank 5 = Extinct in the Wild & Critically Endangered. If **national** Lists exists such as Red, Amber and Green lists in the UK for birds (provided by the Royal Society for the Protection of Birds (RSPB) then Red listed species will have Rank 5, Amber species will have Rank 3 and Green species will have Rank 1.

Conservation Values for each species are initially set at project initiation based on the current knowledge at the time. However, these threat categories of species at the start of the project may change over the **Project period**. This is because our overall scientific knowledge will increase and our understanding of threats at an **international** and **national** levels will also, and so reviews of species categories are naturally expected. As such, **Conservation Values** should be revised and updated throughout the **Project period** at each subsequent verification period after the baseline assessment. Whenever the importance score for a given species changes then that value should be updated both in the baseline assessment subsequent verification datasets.

5.5 Assigning Relative Abundance ranking scores

Metrics where abundance estimations and species identification are possible

Relative abundance scores are assigned to each species within the selected taxa on a 1 – 5 ranking system (each rank defined by a quintile interval approach, see below). These ranking scores are derived from the total number of individuals recorded in both the **Project site** and the **Reference site** or **Paired development site** from the same level of survey effort and methods in both sites (e.g assigned breeding territories for breeding birds, species counts of fish using stereo video over a known distance or time period, etc.) or from percentage occurrence in samples (e.g. percentage occurrence of plant species in quadrats, camera trap occurrences over a standard time period etc.).

If for example your **Project site** has a total of 5 sparrowhawks recorded across all the surveyed sites whilst in the **Reference site** a total of 15 sparrowhawks were recorded with the same survey effort and methods, then the value of 15 will establish as the upper boundary of the 5th quintile. The quintiles are then set arithmetically by dividing the maximum number by 5 to produce five equal quintile intervals (**Rank 1** = 1 to 3 individuals; **Rank 2** = 4 to 6 individuals; **Rank 3** = 7 to 9 individuals; **Rank 4** = 10 to 12 individuals and **Rank 5** = 13 or more individuals). In this example, the **Relative abundance** score for sparrowhawks in the **Project site** will be (Rank) 2 whilst for the **Reference site** it will be (Rank) 5. Please note that if the value establishing the upper boundary of the 5th quintile (i.e. highest number of total abundance between the **Project site** and your **Reference site** or **Paired development site**) is not divisible by 5 then the rank boundaries will naturally have decimal places. In the above example if there had been 16 sparrowhawks instead of 15 then the quintile intervals would be as follows: **Rank 1** = 1 to 3.2 individuals; **Rank 2** = 3.2 to 6.4 individuals; **Rank 3** = 6.4 to 9.6 individuals; **Rank 4** = 9.6 to 12.8 individuals and **Rank 5** = 13 or more individuals. In this case, decimal intervals do not affect the assignment of abundance numbers into ranks and the sparrowhawks **Relative abundance** score in the **Project site** would still have been (rank) 2 and in the **Reference site** would still be (rank) 5.

If there is no **Reference site** option available for your **Project site**, it is still possible to quantify the uplift. However, in this case for all the species in the **Project site** Rank of 1 is established as the **Relative abundance** at project initiation with subsequent rankings up to a maximum of 5 allocated with a doubling approach. In the sparrowhawk example above, where 5 individuals were recorded across all the surveyed sites in the **Project site** the **Relative abundance** scoring would be as follows: **Rank 1** = 1 to 5 individuals; **Rank 2** = 6 to 10 individuals; **Rank 3** = 11 to 20 individuals; **Rank 4** = 21 to 40 and **Rank 5** = more than 41 individuals. Please note that this clearly handicaps any uplift project without a **Reference site** because in the measured **Reference site** example above then the population would only need to reach 13 birds to have a Rank 5 score for **Relative abundance**, whilst using the doubling approach this number would only achieve a Rank 3.

An exception needs to be allowed for reintroduction programmes where releases require large numbers in order for the reintroduced species to develop viable populations. In these cases, if the project developer can demonstrate evidence from published studies of likely upper levels for introduced species, then this can potentially be used as the upper quintile limit for that introduced species and as such **Relative abundance** scores calculated in the same way as for when there is a **Reference site**.

As mentioned above, **Relative abundance** ranking score intervals for each species in both uplift and avoided loss projects are initially established at project initiation based on the data collected during the biodiversity baseline. Please note that the ranking score intervals for each species detected at project initiation and are locked for the entire duration of the **Project period**. Whenever a new species is detected at subsequent verification events, that was not detected at project initiation, the doubling must be used to establish their ranking score intervals.

Metrics where abundance estimations is difficult or not possible, but species identification is possible

For survey methodologies making use of digital methods (e.g. acoustic recording of bats and birds, camera-trapping of mammals) to survey for species, a digital unit can be used as proxy for abundance, as long as the project developer can demonstrate a solid literature based with no potential risk of inflated abundance values due to double counting of individuals. An example of a digital unit being used as proxy for abundance in surveys making use of camera-traps would be if multiple photographic sightings of individuals of a given species are demonstrated as separate individuals whenever not seen together in the same photo. Please note that for any given project whatever a digital unit is used as a proxy for abundance its proposed methodology and resulting dataset and calculations require to be independently peer-reviewed and validated during, respectively, a Stage 1 and Stage 2 review application from the **Biodiversity Futures Initiative**.

Metrics where both abundance estimations and species identification are difficult or not possible

There are some taxa where estimation of the abundance of each species is very difficult. For example, captures of arthropods using Malaise traps can produce huge numbers of individuals comprising species that are very difficult to identify from traditional taxonomic approaches. If captured individuals are identified to species level using traditional taxonomic approaches, then individual species' **Relative abundance** data can be used to calculate scores as described above. In the cases where traditional taxonomic approaches are not possible, then wet weight biomass can be used as a proxy for abundance (the same standardized approach as to samples are prepared for weighing must be used both at project initiation and subsequent verification events). Species richness for the taxa either completed using standard taxonomic approaches or metabarcoding can be multiplied by the total captured biomass in the **Project site** and **Reference site** or **Paired development site** instead of using abundance for individual species. Total captured biomass values should also be converted to a 1 – 5 ranking system where each rank is defined by a quintile interval approach. This should follow the same logic outlined above, and if for your **Project site** has 150 grams of total captured biomass of invertebrate species across all the surveyed sites whilst in the **Reference site** a total of 1000 g of biomass were captured with the same survey effort and methods, then the value of 1000 will establish as the upper boundary of the 5^{th} quintile.

Where traditional methods to estimate abundance or morphological or acoustic identification to species level is either not possible (e.g fungi, some more obscure invertebrate groups because of a lack of taxonomic knowledge) or prohibitively expensive or time consuming (e.g. many arthropod or mollusc groups), survey methodologies will likely make use of DNA metabarcoding methods. For taxa with low taxonomic resolution, due to poor reference databases during the metabarcoding pipeline, the number of Amplicon Sequence Variant (ASVs) or the number of Operational taxonomic unit (OTUs) can be used as representative of species richness. For metrics making use of DNA metabarcoding from bulk multi-species samples like the Malaise trap example above, wet weight biomass can be used as a proxy for abundance when determining the biodiversity value (V_m) in the **Project site** and **Reference site** or **Paired development site,** through this formula:

$$V_m = S \times A_{biomass}$$

with

S being the species richness, represented either directly by the number of identified species or via genetic estimates (ASVs or OTUs);

$A_{biomass}$ being the biomass score values as a proxy of abundance, after the conversion of total captured biomass to a 5-point scale (see above),

For metrics making use of DNA metabarcoding from water or sediment samples, the current version of our methodology for quantifying units of biodiversity gain does not yet include a robust approach for significantly and meaningfully differentiating the biodiversity value (V_m) between the **Project site** and **Reference site** or **Paired development site**. However, there is already a framework in mind which we are currently testing and will likely be included in the next version of our methodology for quantifying units of biodiversity gain.

Taking into consideration the rapid development of new DNA sequencing methods, to accommodate future technological developments, project developers are encouraged to collect and preserve additional DNA material from your **Project site** and **Reference site** for uplift projects and from your **Project site** and **Paired development site** for avoided loss projects at project initiation. These can be subsampled from the blended material produced from the sample material sequenced at project initiation. These sub-samples should be preserved in a biobank infrastructure during the **Project Period** in case new sequencing methods emerge or better primers are developed and a new biodiversity baseline for the **Project site** needs be re-calculated. Please note that as our knowledge of species increases it is likely that over the **Project period** more species will have their genetic sequences available for comparison in reference libraries such as Genebank, and so even if no new sequence methods or primers are developed between subsequent verification events, the baseline may still need to be re-calculated to take into account this new information (this however can be done by using the already existing raw sequences obtained at project initiation).

6 Dealing with uncertainty

Uncertainty in terms of numbers of species should be dealt with by ensuring there is good sampling design strategy and useful way of quickly evaluating if each stratum has sufficient sample sites and replicates is plotting species accumulation numbers against number of samples (rarefaction curves). Uncertainty in the abundance values of each species and how this affects the abundance rank scores allocated to each species is what is outlined in this section.

The mean abundance value of each species in the higher of the two areas (i.e. **Project site** and **Reference site** or **Paired development site**) should be calculated with one standard deviation either side of the mean. The rank boundaries should then be calculated for the lower and upper standard deviation limits.

Let's consider an example using the sparrowhawk data example above (**Project site** – 5 sparrowhawks; **Reference site** – 15 sparrowhawks). For the purpose of this example, we will assume the sparrowhawk data originates from 100 samples and so the mean value for the **Reference site** was 0.15 (i.e. 15/100) with a lower standard deviation limit of 0.1 and an upper of 0.2, whilst in the **Project site** (also with 100 samples), the mean was 0.05 with a lower standard deviation limit of 0.02 and an upper standard deviation limit of 0.08. If the lowest standard deviation value is used, then the **Reference site** would have 10 sparrowhawks (i.e. lower standard deviation limit of the **Reference site** mean multiplied by the number of samples; 0.1 x 100 = 10) whilst the **Project site** would have 2 sparrowhawks (i.e. lower standard deviation limit of the **Project site** mean multiplied by the number of samples; 0.02 x 100 = 10). Under this scenario, and by following the same logic for establishing quintile intervals and assigning **Relative abundance** ranking scores outlined in section 5.5, the total number of sparrowhawks in the **Project site** for the mean abundances would be assigned a rank of 2. For the lower standard deviation figures however, the **Reference site** has 10 sparrowhawks which results in ranking based in quintile intervals interval of 2 birds, so the **Project site** which has 2 sparrowhawks now has a rank of 1. For the upper standard deviation, the **Reference site** has 20 sparrowhawks which results in ranking based in quintile intervals interval of 4 birds, so and the **Project site which** has 8 sparrowhawks has a rank of 2.

When determining the levels of uncertainty in every single species within a given taxon/metric, the best thing to do to visualize if uncertainty adjustments are required is to put together a table like the one exemplified below for the taxon/metric with the species identified in the **Project site**.

	CV_s	A_s lower SD limit	A_s	A_s upper SD limit	$A_s \times CV_s$ lower SD limit	$A_s \times CV_s$	$A_s \times CV_s$ upper SD limit
Species 1	1	1	1	2	1	1	2
Species 2	2	1	2	2	2	4	4
Species 3	5	1	1	1	5	5	5
Species 4	2	2	2	3	4	4	6
Species 5	1	1	1	1	1	1	1
Species 6	4	1	1	1	4	4	4
Species 7	3	1	1	2	3	3	6
Species 8	1	2	2	2	2	2	2
Species 9	1	2	3	3	2	3	3
Species 10	1	1	1	1	1	1	1
V_m	---	---	---	---	25	28	34

In the table above, the overall **biodiversity value** (V_m) for this metric/taxon in the Project site is 28, with a standard deviation range from 25 to 34. If the standard deviation range in abundance is more than 50% of the central value for V_m, then uncertainty adjustments must be applied to the final value of anticipated biodiversity loss (avoided loss projects) or biodiversity uplift (restoration projects) for that taxon/metric to deduct a proportion that is equal to or greater than 0.25 × (U - 0.5), where U is the highest uncertainty (i.e. the upper limit V_m minus the lower limit V_m, divided by the central value of V_m) detected amongst the Project site and the Reference or Paired development site. For example, if for a given taxon/metric the highest uncertainty is 70%, then U = 0.7, and therefore the uncertainty adjustment would be 0.25 × (0.7-0.5) = 0.05, which translates in a reduction of 5% in the final the final value of anticipated biodiversity loss or biodiversity uplift (restoration projects) claimed in that biodiversity metric (please note that sections 9 and 10 below outline how the final values for each metric are calculated).

This exercise should be repeated for all the abundance-based metrics so that **biodiversity values** (V_m) for each metric are calculated with one standard deviation either side of the mean. Please note that this does not include some structural data where the whole site is measured (e.g. use of UKHab for the DEFRA biodiversity metric 4.0 or canopy cover measurements).

7 Estimating the potential loss area

In avoided loss projects, to estimate the amount of habitat loss expected to occur in the **Project site** under the baseline scenario it must be assumed that if it is not brought under effective result of your **Project interventions** it will be affected by similar drivers of loss (e.g. deforestation, degradation, etc..) to other areas in a **Reference region** that have the same habitat type and legal status (e.g. private land, state land, etc..). It is also assumed that the average annual amount of habitat loss observed during an historical **Reference period** (expressed as a proportion of the project habitats present at the start of the **Reference period**) in areas within the **Reference region** that have the same habitats types and legal status as the habitats in the **Project area**, will provide a conservative estimate of the annual amount of loss (expressed as a proportion of habitat area present at the start of the **Project period**) that would occur in the **Project area** under the baseline scenario (see definitions table for further criteria on selecting this **Reference region**).

The average annual amount of habitat loss in the **Reference region** during the **Reference period**, as a proportion of the area of habitats present at the start of the **Reference period**, is calculated for each of the habitat type and legal classifications present. For example, for high value nature grasslands to be protected from ploughing and conversion to arable then the rates of conversion over the preceding few years can be used to obtain an annual estimate of at what pace that that is likely to occur over the **Project period**. Likewise for deforestation where rates of conversion to other land use types over preceding years can be used as an estimate, through the following formula:

$$L_{rr(ht,lc,tp)} = \frac{A_{hl(ht,lc,tp)}}{A_{rr(ht,lc,tp)} \times T_{hl(ht,lc,tp)}}$$

with

$L_{rr(ht,lc,tp)}$ representing the average proportion of area at the start of the **Reference period** in the **Reference region** for habitat type ht, legal classification lc and topography class tp that was loss in each year of the **Reference period**:

$A_{hl(ht,lc,tp)}$ being the total area of habitat type ht, legal classification lc and topography class tp that was loss within the **Reference region** during of the **Reference period** (hectares);

$A_{rr(ht,lc,tp)}$ being the area of habitat type ht, legal classification lc and topography class tp present within the **Reference region** at the start of the **Reference period** (hectares);

T_{rp} being the length of the **Reference period** (years)

For avoided loss projects, the area in hectares within the **Project Site** expected to be lost over the **Project period** $\left(A_{p(Avoided\ Loss)}\right)$ is then calculated through the following formula:

$$A_{p(Avoided\ Loss)} = \sum \left[A_{Project\ site(ht,lc,tp)} \times \left(L_{rr(ht,lc,tp)} \times lenght\ of\ the\ \boldsymbol{Project\ period}\right)\right]$$

with

$A_{Project\ site(ht,lc,tp)}$ being the total area in hectares of habitat type ht, legal classification lc and topography class tp within the **Project site** at project initiation;

$L_{rr(ht,lc,tp)}$ represents the average proportion of the habitat area at the start of the **Reference region** for habitat type ht, legal classification lc and topography class tp that was loss in each year of the **Reference period**;

There will be some cases where it is expected that during the **Project period** the whole of the **Project site** area is going to be lost (e.g. the whole **Project site** area is going to be subjected to redevelopment). As long as sufficient justification and data is provided to sustain the argument then the whole area of the **Project site** in hectares can used to calculate the units of biodiversity gain:

$$A_{p(Avoided\ Loss)} = \sum A_{ps(ht,lc,tp)}$$

With

$A_{Project\ site(ht,lc,tp)}$ being the total area in hectares of habitat type ht, legal classification lc and topography class tp within the **Project site** at project initiation;

There will also be some cases where the main threat is not habitat conversion. For example, the removal of invasive species that are damaging other faunal groups (e.g. dwarf mongoose on many Pacific Islands, rats in seabird colonies). In these cases, it may be reasonable to expect that during the **Project period** the whole of the **Project site** area is going to be affected if no **Project interventions** are implemented. As long as sufficient justification and data is provided to sustain the argument then the whole area in hectares of the **Project site** can used to calculate the units of biodiversity gain.

8 Leakage

If during the **Project period** all that **Project interventions** are doing is transferring the habitat and/or biodiversity loss from the **Project site** to another location within the **Project region**, then there is no net gain in biodiversity. So, an important part of project design is to ensure that losses tied to a lack of opportunity in the **Project site** do not occur. These opportunities fall into two categories:

1) biodiversity damage by those participating and benefiting from the project funding;

2) increase in supply by others due to the production loss from the areas included in the **Project site**;

The first is easier to mitigate because all contracts offered during the project for work or credit benefits, should expressly require that the contractor or beneficiary does not directly or indirectly cause damage to the biodiversity in any other areas within the **Project region** in order to provide the services or products lost as a result of upgrading or protecting the **Project site**. At project initiation, a **leakage** area should be defined that includes all the areas that are directly controlled and/or under the influence of all the beneficiaries of the project. Any loss of habitat or damage to biodiversity in the **leakage area** should be deducted from the overall biodiversity gain claimed. Suppose for example the damage to biodiversity was due to threats of forest conversion to agricultural land or meadows to be ploughed. In these cases, the **leakage** areas would include all the land owned, tenanted or traditionally used by the project beneficiaries. If during the **Project period** the beneficiaries targeted by **Project interventions** deforested 10 hectares of their land and ploughed up a further 30 hectares outside the **Project site**, then these 40 hectares would be deducted from the project total biodiversity gains.

The more difficult issue is how do you determine damages caused by the reduction in supply of a product that was previously provided by the **Project site** but is now being delivered by an increased supply from others? Here common sense must be used. If a coral reef is being protected from fishing for example, and this reef supplied 1% of the seafood landings for an area then it will be impossible to determine whether there has been an increase in fishing effort elsewhere to cover this shortfall. However, if an area of forest now being protected through biodiversity claims had before the project supplied 20% of the bush meat to a series of villages and this is not accompanied by a reduction in bush meat consumption in those villages and there is evidence that bush meat hunting has increased in other areas to compensate for the loss of the project site area, then this is an example of where a **leakage** adjustment should be applied. In this example, an estimate needs to be made of the percentage reduction in consumption of bush meat (hopefully alternatives have been found) by the villages that were originally supplied from the **Project site**. If the reduction in consumption has gone from 100 tonnes per year of which 20 tonnes was supplied by the **Project site** but is now at 80 tonnes per year, then no adjustment is needed. However, if the consumption is now 90 tonnes per year, then only a 50% mitigation (i.e. half of the 20 tonnes per year identified to be sourced from the **Project site** before the start of the project) of biodiversity loss through bush meat was achieved by the protection of the **Project site** by the implementation of the **Project interventions**. Please note that in this example, although there is only a direct impact to taxa that directly affected by bush meat hunting (e.g. primates, large herbivores), and other taxa such as higher plants, butterflies, arthropods are not directly affected, this is still an overall biodiversity loss in the **Project region**. In this case we have a 50% leakage rate in the one taxa, and so a 10% leakage deduction should be applied (i.e. 50% divided by the number of project metrics, which in this case is 5) to the overall **biodiversity value** the project developer is using to calculate the units of biodiversity gain from project interventions (i.e the median value across the 5 metrics).

The application to quantify units of biodiversity gain will need to provide evidence of how leakage is going to be monitored and assessed.

9 Calculating units of biodiversity uplift

Biodiversity uplift values (B_u) for each metric need to be calculated at each verification event to determine how much the **biodiversity values** at the **Project site** have changed from the baseline assessment carried at project initiation. Please note that at each subsequent verification event after the baseline assessment, data for each metric will be only collected in the **Project site**. For example, at the first verification event (t_1) this can be done through the following formula:

$$B_{u(t1)} = 100 \times \frac{V_{m(ps,t1)} - V_{m(ps,t0)}}{V_{m(ps,t0)}}$$

with

$B_{u(t1)}$ being the biodiversity uplift value for a given metric at the first verification event (t_1), represented by the percentage difference in **biodiversity values** between the **Project site at** project initiation $\left(V_{m(ps,t0)}\right)$ and the first verification event $\left(V_{m(ps,t1)}\right)$.

The median of the biodiversity uplift values (B_u) for the different metrics after any adjustments have been made for uncertainty (see section 6) is then calculated and will represent the overall biodiversity uplift. This median value is then multiplied by the total area in hectares of the **Project site** to quantify the units of biodiversity gain.

At the next verification event (t_2), the biodiversity uplift values (B_u) for each the metric are recalculated against the baseline to calculate $B_{u(t2)}$. Then, value of $B_{u(t1)}$ for each metric is subtracted from $B_{u(t2)}$ to give the biodiversity improvement that has occurred for that metric between t_1 to t_2. The median of these values is then multiplied by the area in hectares of the **Project site** to calculate the number of credits issued at this second verification event. Please note that this approach is repeated at each verification event until the end of the **Project Period** with a minimum frequency of verification events every 5 years.

At project initiation (t_0), project developers are should also compare **biodiversity values** between the **Project Site** and the **Reference Site** to have an idea of the likely biodiversity uplift expected to occur in your **Project Site** at the end of the **Project period**. This is because unlike the well-established carbon sequestration projects where there is extensive literature and data available on tree growth rates to be able to calculate reasonable estimates of carbon benefits at project initiation (inferred from sequestered carbon through tree biomass over the **Project Period**), the biodiversity uplift projects on the other hand is still relatively new. The use of **Reference Sites** to provide reasonable estimates of what to expect at project initiation over the **Project Period** is very useful in order to evaluate if a project is financially viable.

This can be done through the following formula:

$$P_u = 100 \times \frac{V_{m(rs,t0)} - V_{m(ps,t0)}}{V_{m(ps,t0)}}$$

with

P_u being the predicted biodiversity uplift for any given metric expected to occur in your **Project Site** during the **Project Period**, represented by the percentage difference in **biodiversity values** between the **Project site** $\left(V_{m(ps,t0)}\right)$ and the **Reference site** $\left(V_{m(rs,t0)}\right)$ at project initiation.

10 Calculating overall anticipated loss of biodiversity

Anticipated biodiversity loss (B_l) for each metric need to be calculated from a baseline assessment done at T_0, by comparing **biodiversity values** are compared between the **Project Site** ($V_{m(ps)}$) and **the Paired development site** ($V_{m(pds)}$). Then, at each subsequent verification event after the baseline assessment done at T_0, data for each metric will be only collected in the **Project site**.

For example, for any given metric at the first verification event T_1 this can be done through the following formula:

$$B_l = 100 \text{ X } \frac{V_{m(ps,t0)} - V_{m(pds,t0)}}{V_{m(pds,t0)}}$$

with

B_l being the anticipated biodiversity loss value for a given metric, represented by the percentage difference in **biodiversity values** between the **Project site** $\left(V_{m(ps,t0)}\right)$ and the **Paired development site** $\left(V_{m(rs,t0)}\right)$ at project initiation.

The median of anticipated biodiversity loss values (B_l) for the different metrics after any adjustments have been made for uncertainty (see section 6) is then calculated and will represent the overall anticipated loss of biodiversity in the **Project site**. This median value is then multiplied by the area in hectares of the **Project Site** expected to be lost over the **Project period** (see section 7) to quantify how many units of biodiversity gain can be awarded over the **Project period.** Units of biodiversity gain can be awarded after each verification event if the overall **biodiversity values** of the **Project Site** are maintained (defined as within 15% of the baseline value at project initiation) or improved at the **Project site**. This can be evaluated through the following formula:

$$B_{v(t1)} = 100 \times \frac{V_{m(ps,t1)}}{V_{m(ps,t0)}}$$

with

$B_{v(t1)}$ being the percentage difference in **biodiversity values** between the **Project site** at project initiation $\left(V_{m(ps,t0)}\right)$ and at the fist verification event $\left(V_{m(ps,t1)}\right)$.

If the first verification event is completed 5 years after the start of the project and the biodiversity has been maintained at the **Project Site** then one fifth (5/25) of the total units of gain would be awarded.

11 Calculating issuances of biodiversity credits

A **biodiversity credit** is one unit of biodiversity gain which is defined as a one-percent improvement or avoided loss per hectare in the median value of a basket of metrics that reflect the conservation objectives of the habitats in the **Project site**. The number of claimable **biodiversity credits** issued for a project is determined by overall anticipated biodiversity loss values (avoided loss projects) or overall biodiversity uplift values (uplift projects), the size of the project area being restored (uplift projects) or protected (avoided loss projects) plus any area deductions due to leakage issues (l) and a buffer retained by the registry issuing the credits for their insurance pool (the registry will usually retain 20% of the total of credits issued).

For biodiversity avoided loss projects, the number of claimable biodiversity credits ($BDC_{(avoided\ loss)}$) is defined as:

$$BDC_{(avoided\ loss)} = b \times \left[B_l \times \left(A_{p(avoided\ loss)} - l\right)\right]$$

with

$BDC_{(avoided\ loss)}$ being the number of claimable **biodiversity credits** issued for an avoided loss project;

b being the adjustment to account for the buffer retained by the registry issuing the credits for their insurance pool (this adjustment value is usually set at 0.8);

B_l being the median anticipated biodiversity loss value across the different metrics after any adjustments have been made for uncertainty (see section 6);

$A_{p(avoided\ loss)}$ being the effective area in hectares within the **Project Site** protected over the **Project period** (see section 7);

$A_{p(avoided\ loss)}$ being the area in hectares within the **Project Site** expected to be lost over the **Project period**;

l being the number of hectares lost to leakage issues in the **Project site** or in the identified leakage buffer within the **Project region** (please note that leakage issues not quantifiable in terms of area, e.g. biodiversity loss due to mammal poaching, should have their deductions applied in the value of B_l; see section 8)

For biodiversity uplift projects, the number of claimable biodiversity credits ($BDC_{(uplift)}$), is defined as:

$$BDC_{(uplift)} = b \times \left[B_u \times \left(A_{p(restored)} - l\right)\right]$$

with

$BDC_{(uplift)}$ being the number of claimable **biodiversity credits** issued for an uplift project;

b being the adjustment to account for the buffer retained by the registry issuing the credits for their insurance pool (this adjustment value is usually set at 0.8);

B_u being the median biodiversity uplift value across the different metrics after any adjustments have been made for uncertainty (see section 6);

$A_{p(restored)}$ being the effective area in hectares within the **Project Site** restored over the **Project**;

l being the number of hectares lost to leakage issues in the **Project site** or in the identified leakage buffer within the **Project region** (please note that leakage issues not quantifiable in terms of area, e.g. biodiversity loss due to mammal poaching, should have their deductions applied in the value of B_u; see section 8);

Each **biodiversity credit** issued should be included on a publicly available register and shall have a unique number. **Biodiversity credits** should be retired n a publicly available register.