Background and Guidelines for the IUCN Green Status of Species

Version 2.0 (August 2024)

Prepared by the Green Status of Species Working Group of the IUCN Red List Scientific Committee

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1. Introduction

The IUCN Red List of Threatened Species plays a fundamental role in documenting and monitoring the state of biodiversity and is the respected "go-to" global repository of scientifically accurate information on species. The Red List measures the extinction risk of species and documents the change (both deterioration and improvement) in extinction risk over time. However, while a genuine reduction in extinction risk should be celebrated as a conservation success, it may only be a first step towards achievement of broader conservation goals beyond that of avoiding extinctions. Therefore, the Green Status of Species is envisioned to fulfill the need to document all dimensions of species conservation success, and to incentivize conservation action towards a species' recovery and prevent future declines.

The main concept underpinning the Green Status of Species, of conservation that goes beyond extinction avoidance, has been around in different contexts for a while (e.g., Soulé et al. 2003). Sanderson (2006) expressed this concept as "having animals acting like animals, not just persisting", and stated that demographic sustainability (i.e., long-term viability) "should be seen only as a threshold requirement, a necessary but not sufficient level". Similarly, Redford et al. (2011) argued that species conservation should not just be about avoiding extinction ("conservation at the emergency room door"), but have an optimistic vision where species are only considered fully conserved when they are found in replicate populations within each ecological setting, and resilient across the range.

Within IUCN, this concept was promoted during the 2012 World Conservation Congress through resolution WCC-2012-RES-41 "Development of objective criteria for a Green List of Species, Ecosystems and Protected Areas" that "Requests that the Species Survival Commission (SSC)… conduct international scientific consultations to develop objective, transparent and repeatable criteria for Green Lists that systematically assess successful conservation of species", and "Requests SSC… to report to the next IUCN World Conservation Congress on progress achieved".

To this aim, the SSC completed a series of consultations and workshops between 2014 and 2020. In 2016, a Task Force was formed under the auspices of the Red List Committee to move forward on developing a Green List of Species. In 2018, the Task Force published a framework for measuring species recovery and assessing conservation impact (Akçakaya et al. 2018), which proposed a definition of a fully recovered species based on viability, functionality, and representation; and defined four conservation impact metrics to quantify the importance of conservation for a species.

The proposed framework was then tested by 200+ assessors who applied it to 181 species. In March-May 2020, an IUCN-wide online consultation was conducted. Based on the results of the testing and the comments received from the online consultation, the framework was further refined, and the name was changed to IUCN Green Status of Species, in order to prevent the common misunderstanding that the protocol only lists successfully recovered species.

This document accompanies the *IUCN Green Status of Species: a global standard for measuring species recovery and assessing conservation impact v. 2.0* ("the Standard"). Akçakaya et al. (2018) is considered to be version 1.0 of the Standard; version 2.0, which was approved by IUCN Council, reflects the changes made in response to the testing and consultations that took place between 2018 and 2020.

This document aims to provide guidance for using the Standard and to give a more detailed explanation of the scientific and technical basis of the conservation impact metrics. While the Standard is a fixed document (barring major methodological changes) in order to ensure an appropriate level of consistency between assessments, this document will be updated regularly. This is necessary because the Green Status of Species method will undoubtedly undergo improvements as it is widely applied and new questions arise; indeed, since the publication of Standard v. 1.0, several topics have become the focus of active research and publication in the academic community. Any updates will be captured in new versions of this *Background and Guidelines* document.

In addition to this document and the Standard, assessors should consult the latest versions of the following documents:

(i) *IUCN Red List Categories and Criteria* (IUCN 2012a);
(ii) *Guidelines for Using the IUCN Red List Categories and Criteria* (IUCN Standards and Petitions Committee 2024);
(iii) *Guidelines for Application of IUCN Red List Criteria at Regional and National Levels* (IUCN 2012b);
(iv) Mapping Standards and Data Quality for the IUCN Red List Spatial Data (IUCN SSC Red List Technical Working Group 2024)

2. Purpose and Scope of the IUCN Green Status of Species

The IUCN Green Status of Species has five main objectives:

(i) To provide a standardised framework for measuring species recovery;
(ii) To recognize conservation achievements;
(iii) To highlight species whose current conservation status is dependent on continued conservation actions;
(iv) To forecast the expected conservation impact of planned conservation action; and
(v) To elevate levels of ambition for long-term species recovery.

These objectives are represented by a Species Recovery Score, and by four conservation impact metrics (see Figure 1). The Species Recovery Score measures the degree of recovery of a species based on the concepts of viability, functionality, and representation. The four conservation impact metrics are quantified as differences between the degree of the recovery of the species (measured as the Green Score, defined in section 4.3) in different time steps or under different scenarios:

- **Conservation Legacy** measures the impact of conservation actions that have been conducted to date. It is the difference between the Current Green Score and what the value of the Current Green Score would have been if there were no conservation actions (i.e., a counterfactual scenario of a past without conservation).

- **Conservation Dependence** measures the impact of ongoing conservation in the short-term future (10 years), focusing on the expected deterioration in the status of the species if all conservation actions were to cease. It is the difference between the Current Baseline Green Score and the Green Score in a Future-without-conservation scenario.
- **Conservation Gain** measures the impact of ongoing and planned conservation in the short-term future (10 years), focusing on the expected improvement in the status of the species as a result of current and planned conservation actions. It is the difference between the Current Baseline Green Score and the Green Score in a Future-with-conservation scenario.
- **Recovery Potential** quantifies conservation aspiration or ambition, measuring the maximum plausible improvement in the status of the species with sustained conservation efforts and conservation innovation over the long-term. It is the difference between the Current Green Score and the Long-term potential Green Score.

These metrics are discussed in more detail in later sections of this document.

The scope of the IUCN Green Status of Species is the same as that of the IUCN Red List of Threatened Species; the definitions and metrics of the Green Status of Species can be applied to any species except microorganisms. Species can be assessed under this protocol regardless of their Red List category, and regardless of whether they have been subject to conservation measures.

However, for practical reasons, Green Status of a species should be assessed after, or concurrently with, the Red List assessment of that species. In addition, if the Red List category of a species is Data Deficient (DD), then before undertaking a Green Status assessment the species should first be reassessed for the Red List so that it is moved from DD to a data-sufficient category.

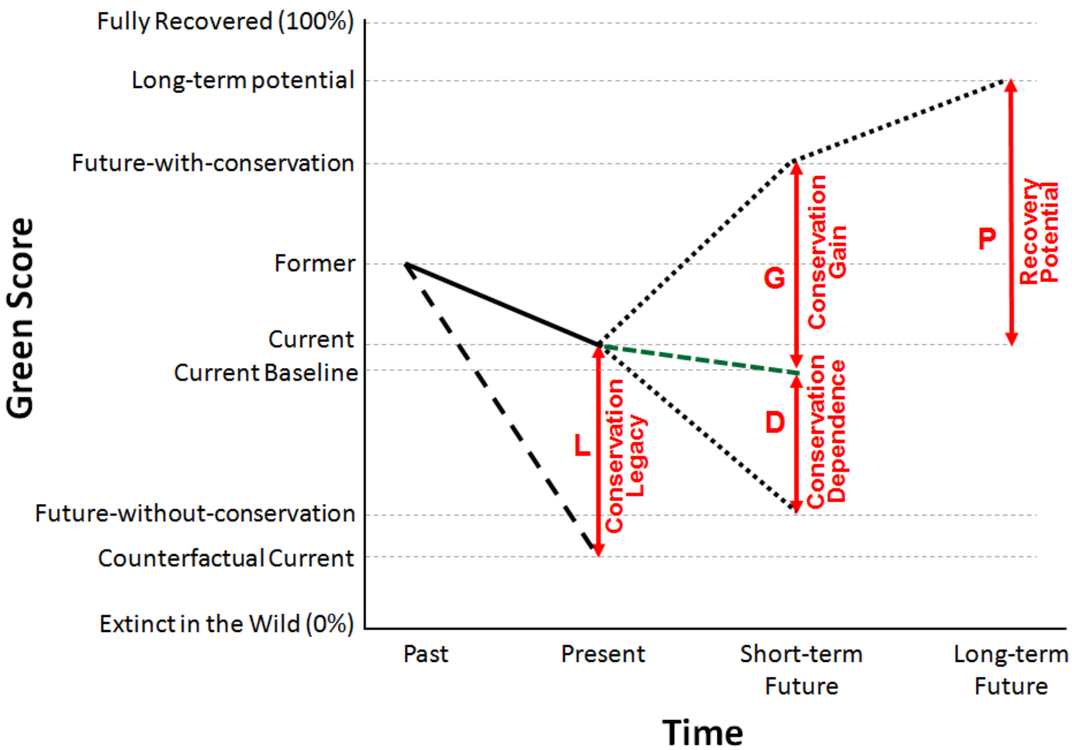


Figure 1. Graphical representation of the conservation impact metrics as differences in the degree of recovery the species (percent of Fully Recovered, measured as Green Score; equation 1).

Solid-black line: observed change in the Green score of the species.

Dashed-black line: (counterfactual) past change expected in the absence of past conservation efforts.

Dashed-green line: (dynamic baseline) future scenario of change expected under current conditions and conservation actions.

Dotted-black lines: future scenarios of change expected with and without current and future conservation efforts.

Vertical arrows represent the conservation impact metrics:

Conservation Legacy: Benefits of current and past conservation (Current – Counterfactual Current);

Conservation Dependence: Expected change in the short-term future in the absence of ongoing conservation (Current Baseline – Future-without-conservation);

Conservation Gain: Expected improvement in the short-term future with ongoing and planned conservation (Future-with-conservation – Current Baseline);

Recovery Potential: Possible improvement with long-term conservation (Long-term potential – Current).

3. Defining Recovery

The four conservation impact metrics discussed in the previous section (and represented by the red arrows in Figure 1) are central to the Green Status of Species, and are calculated as differences in the degree of recovery of the species under different scenarios and assumptions. The degree of recovery is measured with the Green Score (the vertical axis of Figure 1), and defined in reference to (i.e., as a percentage of) the Fully Recovered state. The value of the Green Score calculated based on information about the *actual* condition of the species (i.e., based on observed, estimated, inferred or suspected species condition) at the time of the assessment is called the Species Recovery Score. The Species Recovery Score, calculated at different points in time, can be used to track species' recovery trends.

Reviewing previous efforts to define recovery and the conditions for a fully recovered and conserved state of a species (e.g., Sanderson 2006; Goble 2009; Redford et al. 2011; Hutchings et al. 2012; Westwood et al. 2014), Akçakaya et al. (2018) identified three dimensions of recovery: viability, functionality, and representation. Viability (or the related concepts of persistence, resilience, and low extinction risk) is the first requirement that is essential but not sufficient for recognizing a species as recovered. The second requirement for a fully recovered species is that it exhibits the full range of its ecological interactions, functions, and other roles in the ecosystem. The third requirement is that it occurs in a representative set of ecosystems and communities throughout its native range. Based on these requirements, a species is considered "fully recovered" if it is viable and ecologically functional in each part of its range. The underlined terms are defined in the next section.

It is important to note that this definition of "fully recovered" applies not only to species that have previously declined, but also to species that have not declined, because it defines the conditions which must be met for a species to achieve the maximum Green Score (100%). However, species that have not benefitted from conservation (but fit the definition of fully recovered) are categorized as "Non-Depleted" rather than as "Fully Recovered.". Although "fully recovered" represents a standard conservation goal for all species, for many species, full functionality across the species' indigenous range may not be possible, e.g., if part of their former range is irreversibly lost to human uses.

It is also important to note that the definition of "fully recovered" does not necessarily correspond to a "pristine" or "optimal" state (however these may be defined), or to any particular state that the species was in prior to human impact. Full recovery (i.e., score of 100%) can be achieved if and only if all parts of the range (spatial units; see section 4.2) are assessed as Functional, based on the definitions and guidance provided here.

4. Components of Recovery

4.1. *Range*

For the purposes of a Green Status assessment, the range of the species is the total extent (i.e., union or overlay) of the ***indigenous range*** and any ***expected additional range***. However, Current and Counterfactual Current Green Scores are based only on information from the indigenous range (historical and current range; defined below), while the future scores can be based on the information from both the indigenous range and expected additional range (anticipated future range; defined below).

Note that, as defined here, range is conceptually slightly different to the way range is defined in IUCN (2016) or in the way it is used to support the Red List assessment process. "Indigenous range" is broadly equivalent to "range" as defined in IUCN (2016) and its use for Red Listing purposes (see also Brooks et al. 2019), except that it includes also all parts of the range from which the species has been lost back to a stated benchmark date (see 4.1.1). Meanwhile, "expected additional range" is a novel component in the Green Status assessment process. Note further that range, and indeed indigenous range, are conceptually different from Area of Occupancy (AOO) and Extent of Occurrence (EOO), which are the spatial metrics used for extinction risk assessment (IUCN 2013b, Brooks et al. 2019).

The level of ambition represented by the "fully recovered state" is determined by two aspects of range: (1) how far into the past to look when assessing a species' indigenous range, and (2) how far into the future to look when assessing expected additional range. The chosen dates of assessment determine the extent and size of the range against which full recovery is measured. To incentivize ambitious conservation action, while at the same time recognizing the constraints of uncertainty and feasibility, the following guidance on selection of these dates is provided.

4.1.1. *Indigenous range*

Indigenous range comprises both lost (historical) range and current range. Therefore, indigenous range should be assessed at a date far enough back to avoid shifting baselines and recognize range contractions due to human impacts. The spirit of this is captured in Sanderson's (2019) suggestion that the date should be "a time before human beings were the most important element limiting species' distributions". However, the earlier the chosen date, the less information about species distribution there is likely to be. With this in mind, the recommended default date for determining indigenous range is 1750 CE. This date is considered to be the approximate start of the industrial era, a period when human impacts intensified overall. If not explicitly stated otherwise, it will be assumed that indigenous range was evaluated at 1750 CE.

However, for many regions and species there may be a date before or after 1750 CE that best represents an anthropogenic tipping point for biodiversity (Sanderson 2019; Stephenson et al. 2019). The default date can therefore be modified, but must fall between 1500 CE and 1950 CE. 1500 CE is used as the cut-off date for listing Extinct (EX) species in the Red List (i.e., species that went extinct before this date are not assessed using the Red List), and the Green Status assessment mirrors this for consistency. 1950 CE is used in Green Status assessments as the point at which to consider past conservation actions, and is approximately the start of modern biodiversity conservation. Using dates outside of this range is disallowed because although historical data on human impacts and species distributions prior to 1500 CE exist (see Klein Goldewijk et al., 2017; Grace et al., 2019), they are very sparse; conversely by 1950 a large proportion of the world had already been impacted by human activities.

It is important to note that the choice of 1500 as the earliest possible benchmark year is not meant to disregard human impacts that occurred before 1500; rather it is a pragmatic cutoff. Assessors are encouraged to document human impacts that occurred prior to 1500 in their narrative description of the indigenous range if that information is available.

If it is suspected that the default date of 1750 CE is not the most appropriate, then choice of an alternative date between 1500 CE and 1950 CE should be guided by the following principles:

i) Though exceptions are possible, as a general rule species in the same geographic region and experiencing similar threats should have similar benchmark dates for determining indigenous range. This enables comparability of assessments of different species within the same geographical region. Therefore assessors should consider the dates used in previous Green Status assessments, and as far as possible use the same date for all species that are assessed within a given region (unless there is a strong argument that another date is appropriate- see below).

ii) Changes in human population density may indicate appropriate region-wide dates. These changes could be inferred—for example, 1500 CE is considered the approximate start of European expansion across the globe (MacPhee & Flemming 1999), an activity that changed and/or intensified human impacts in many regions worldwide—or data-based. Using modelled data from Klein Goldewijk et al. (2011), significant changes in population density, which suggest non-default dates may need to be used, were identified for the following regions:

- 1500 CE is recommended for western and central Europe, Mexico, Turkey, South Asia, China, Japan, and Korea, based on their high population densities relative to other regions pre-1500.
- Dates after 1800 CE may be more relevant for some parts of Africa and South-east Asia, as large increases in population density were not observed in the modelled data until then.

iii) Though region-wide dates inferred using the above process or similar are entirely acceptable, assessors are encouraged to use local and/or species-specific evidence (from historians as well as biologists) to justify modification of the default date.

iv) For species found on islands, historical knowledge of the local human population and its impact on species, as well as any data on invasive species and their impacts, should be sought proactively to help inform the choice of a suitable local benchmark date.

v) For species found across regions, in cases where the different regions have different benchmark dates, the earliest benchmark date should be used.

Some areas of the species' current distribution may include subpopulations formed by conservation introductions and translocations (IUCN 2013a). These areas are included in the indigenous range if certain conditions are met (see the current version of the Red List Guidelines [IUCN Standards and Petitions Committee 2024], section 2.1.3).

Some areas of the indigenous range, as defined above, may be expected to become unsuitable (and potentially unoccupied) because of climate change or land-cover change. Such areas are not excluded from the indigenous range. Inclusion of these areas is necessary to avoid shifting baselines; progressive erosion of range targets which masks the shortfall of a species from a fully recovered status.

Box 1. Delineating indigenous range.

The species' distribution at the chosen benchmark date is the indigenous range. In IUCN Red List assessments, assessors largely focus on mapping current known limits of range. While they are also encouraged to map historical range where this is relevant (e.g., to illustrate or provide context to local extirpations or range loss), in practice, mapping of historical range is usually completed only for a limited group of (often charismatic) species. With the exception of globally Extinct and Extinct in the Wild species, mapping historical range is also not required or recommended supporting information in Red List assessments.

However, for an IUCN Green Status assessment, mapping historical range is essential, in order to delineate indigenous range. Assessors must use the best available information to construct a map that accurately reflects the historical range at the chosen benchmark year. For species with few historical (or contemporary) records, delineating this range may seem a challenging task. Here, we provide a number of resources that may be helpful. If, even after consulting these resources, delineating indigenous range poses a challenge, we recommend reading section 4.2 (*Parts of the range*) and then 'assembling' the indigenous range from parts of the range; i.e., start with the species' current documented range and add parts of the range which have been described as occupied (or are highly likely to have been occupied) in the past but which are no longer occupied.

Examples of datasets that can be used to infer species' indigenous range. The featured datasets and more can be explored at Conservation Archive (Grace et al. 2019)

Resource type	Use case	Examples
Species occurrence data	Locating historical records of species to inform indigenous range	• Global Biodiversity Information Facility (GBIF.org, 2024), including International Living Atlases Project (https://living-atlases.gbif.org/) • Biodiversity Heritage Library (https://www.biodiversitylibrary.org/) • History of Marine Animal Populations Project (HMAP, https://oceanspast.org/hmap_db.php)
Historical or non-impact landcover	Inferring indigenous range for species known to be associated with particular land cover characteristics	• HYDE database of human induced land use change over the past 12,000 years (Klein Goldewijk et al. 2017) • Potential Natural Vegetation in the absence of human impacts (e.g., Tomislav et al. 2020) • Anthromes dataset of change in coverage of human-dominated landscapes (Ellis et al. 2021)
Historical climate data	Inferring indigenous range for species known to have specific climate tolerances	• NOAA Paleoclimatology Datasets, https://www.ncdc.noaa.gov/data-access/paleoclimatology-data/datasets

It is a requirement to submit a GIS map of indigenous range with a Green Status assessment (Table 5). Guidance on mapping indigenous range is provided in IUCN SSC Red List Technical Working Group (2024).

4.1.2. *Expected additional range*

Ranges of many species are shifting, or are expected to shift, in response to environmental changes (particularly climate change). These shifts may result in expansion of the species into areas that may have to be considered in future conservation efforts; therefore, to predict future status, Green Status assessments need to consider these potentially suitable areas. Species may also be moved into locations outside of the indigenous range for conservation purposes (e.g., translocations and introductions). Expected additional range consists of areas that are not part of the species' indigenous range, but are strongly expected to become suitable for, and strongly likely to be occupied by, the species in the future.

Because of the time horizons commonly used to project range changes due to climate change, expected additional range would normally be used only for the long-term future (i.e., for calculating the Recovery Potential). Unless some spatial units within the expected additional range can become occupied, or become focus of conservation efforts, in the next 10 years, short-term future scenarios (for calculating Conservation Dependence and Conservation Gain) do not have to consider expected additional range.

Methods for estimating expected additional range of a species due to climate change should follow Red List Guidelines for incorporating climate change into assessments (IUCN Standards and Petitions Committee 2024, section 13). For suitable future range to be included in expected additional range, there must be a high probability (>80%) that it will become occupied by the species. For example, there must be evidence that the species is likely to disperse to the newly suitable areas at the time scales considered for the conservation impact metrics. In most cases, this will mean only including areas that are "geographically close" (according to the Red List Guidelines, section 2.1.3(b)) to the indigenous range. However, if a conservation translocation (as defined above) into a suitable area is planned or likely, even if the area is not geographically close to the indigenous range, this area is considered part of the expected additional range.

In rare cases, the species may be expected to move or be translocated to an area outside of the indigenous range, but which was occupied by the species at a point in history before the benchmark year. This situation could arise if there are ancient records (e.g., fossils) of the species in the area, but the species went locally extinct there prior to the benchmark year. Due to the specific way that indigenous range is defined in the Green Status assessment, any such areas would be considered Expected Additional Range.

4.2. ***Parts of the range***

A fully recovered species occurs in a representative set of ecosystems and communities across its range. A practical way of assessing this is to determine the status of the species in each of several subdivisions or spatial units, making their definition and delineation a key part of a Green Status assessment.

4.2.1. *General Principles for Delineating Spatial Units*

When choosing how (and if) to subdivide a species' range into spatial units, the assessor should consider the fundamental reasons for using spatial units in the Green Status assessment process: to capture variation and to incentivize recovery across all parts of the range, with representation across the different systems in which the species has historically occurred. With these reasons in mind, the following guiding principles were developed:

(1) Spatial units should define areas of similar importance to the species' conservation, regardless of their relative size. An area may be small compared with the range of the species or compared with other spatial units, but it may be identified as a separate spatial unit if, for example, it represents a unique ecological setting, supports a genetically distinct population, or represents a special conservation opportunity. A species' distribution within a spatial unit does not have to be contiguous.

(2) Assessors should consider the indigenous range of the species when delineating spatial units. For example, it is not recommended to identify each fragment of the species' current distribution as a separate spatial unit. It may make more sense to place a set of current fragments, which represented a single population prior to major human impacts, within the boundaries of a single spatial unit. This is relevant especially (but not only) if increasing the connectivity among these fragments is a conservation goal. However, it is not necessary for all spatial units to accurately reflect the distribution of the species in the past. Because a Green Status assessment is a forward-thinking exercise meant to incentivize future recovery, spatial units can be delineated to represent useful or practical divisions for the current and future conservation of the species.

(3) Because spatial units are meant to capture and account for variation, it is not always necessary to divide the species range into multiple spatial units for a Green Status assessment. For species with naturally small or restricted ranges, species that have always existed in a single very specific type of ecosystem, species whose functions are similar in the different ecological settings they exist in, or other conceptually similar cases, the Green Status assessment may be performed using only one spatial unit (i.e., the species' global range). In some cases, it is appropriate to define only two spatial units (e.g., one for the extant range and one for the extirpated range). Nonetheless, for most species, three or more spatial units will be necessary to represent the variety of ecological conditions and contexts that the species occurs or has occurred in.

(4) The maximum recommended number of spatial units is 15, in order to avoid delineating spatial units that are too small to be meaningful and to facilitate completion and comprehension of assessments (Grace et al. 2021a), although for some species with an extremely large indigenous range spanning many regions and ecological settings, this could be increased. Nonetheless, spatial units should be delineated such that they could potentially hold a Viable and Functional population (Grace et al. 2022).

4.2.2. *Methods for Delineating Spatial Units*

The following categories represent different methods of dividing the range into spatial units. The methods are presented from most to least recommended so as assessors move down the list, they should use the first method that is appropriate for their species:

- **Subpopulations, and other species-specific biological subdivisions:** For the purposes of Green Status, the most relevant approaches are species-specific subdivisions based on the biology of the species. These include subpopulations (as defined in the Red List Guidelines [IUCN Standards and Petitions Committee 2024]), as well as subspecies, stocks, genetic units, flyways, evolutionarily significant units, and discrete population segments. These are all conceptually similar to subpopulation, in the sense that they are based on the biology of the particular species. Stocks may be appropriate units of assessment for fish and other mobile aquatic species. For some taxa, identification of genetic population units is already a component of species management (e.g. cetaceans). Flyways may be appropriate units for volant species which migrate along distinct and known routes, e.g., many waterbirds and migratory seabirds, but are not appropriate for species whose migrations are along broad fronts or with other patterns, e.g., many passerines and other land birds. Evidence of animal culture (e.g., Vachon et al. 2022) can also provide a biological basis for delineating spatial units.
- **Ecological features:** Although not species-specific, divisions based on ecoregions, habitat types, or ecosystems can be used to define spatial units because they capture the different "ecological settings" in which a species exists (or has existed). Existing divisions of terrestrial and aquatic regions using ecological features, which can be used as spatial units, include:
    - Habitat types, as documented through the IUCN Red List Habitats Classification Scheme;
    - Terrestrial ecoregions of the world (TEOW), based on Olson et al. 2001 or Dinerstein et al. 2017;
    - Marine ecoregions of the world (MEOW), based on Spalding et al. 2007;
    - Freshwater ecoregions of the world (FEOW), based on Abell et al. 2008.

  If the number of ecologically based units within the species range is too high for a feasible assessment, similar ecoregions/habitat types/ecosystems may be combined to reduce the number of spatial units.
- **Geographical features:** Watersheds, mountain ranges, islands, lakes, and other geological or geomorphological features can be considered proxies for subpopulations, and hence can be used to delineate spatial units.
- **Administrative units:** In cases where there are no apparent biological, ecological, or geological/geographical divisions (e.g., there are no subspecies, no phylogeographic structure, and few significant biogeographic barriers), administrative units such as countries, states, or provinces may be used to delineate spatial units. However, assessors must be mindful of the relative proportion of the species' range within different administrative units. Because spatial units' contribution to the recovery

calculation (see section 4.3) are weighted equally, treating countries that have historically only held a small proportion of the range (e.g., they are a small country relative to other range states, or only the edge of species' distribution falls within the country) as independent spatial units can produce confusing assessment results (Grace et al. 2022). In most cases, such areas should be joined with an adjacent administrative unit to produce a spatial unit.

- **Locations:** Areas of similar threatening processes (defined as "Location" in the Red List Guidelines) can be used to define spatial units. In some cases, countries, states, provinces, and other political/administrative units (or groups of them) might be suitable proxies for delineating locations, based on specific and pervasive threatening processes within their boundaries.
- **Grid cells:** While grid cells are not the preferred option (because they are not a biologically derived unit), this method may be useful in certain cases, for example for species which have been extirpated from the vast majority of their indigenous range. In such cases, use of grid cells will realistically represent the extent of range loss which has occurred since the benchmark date for indigenous range, while other methods that generate fewer spatial units, such as ecoregions or locations, could mask this loss. While this method has the potential to generate a large number of spatial units, in practice there might be very few units where species reestablishment is likely or possible, so negligible extra work is needed to assess all spatial units.

Spatial units can also be delineated based on a combination of two of these proposed methods acting as "levels"; for example, identifying subspecies and then dividing these again by the different ecoregions occupied by each subspecies to create the final set of spatial units. In some cases, this finer-grain division will make assessments more meaningful, so assessors should be aware that they do not have to choose just one method from the above list.

In practice, no single definition of spatial units will be applicable to all species, given their vastly different range sizes (from narrowly endemic to circumglobal) and ecologies. Spatial units must be appropriate for the particular species being assessed, and feasible to assess. Finer-scale subdivisions (thus larger numbers of spatial units) will mean that a larger number of spatial unit populations need to be functional for a species to be considered fully recovered. Practically, the assessment becomes more complex and time-demanding the more spatial units there are, which might be a limiting factor. However, identifying too few spatial units also causes problems; for example, if the area of a spatial unit is too large relative to the range of the species, or combines unique and important parts of the range into one unit, the resulting assessment will not reflect the intent to assess recovery potential throughout the species range and could present a misleadingly optimistic assessment of recovery status. Therefore, whenever possible, delineation of spatial units should be undertaken by a group of experts and stakeholders, especially for wide-ranging species. Once a Green Status assessment has been completed for a species, if it is decided in future reassessments that it is necessary to delineate spatial units in a different way, all previously published assessments will have to be retrospectively re-assessed using the new units.

As a general rule, it is recommended that the same method is used to subdivide the ranges of closely related species with similar distribution types and life histories, but this may not be possible in all cases.

4.2.3. *Spatial Units in the Expected Additional Range*

In rare cases, the expected additional range of a species will introduce a new spatial unit, which will be included in the denominator of Equation 1 when calculating Green Scores for future scenarios. However, this is not the default; for example, if spatial units are defined based on subpopulations, and these subpopulations are simply predicted to shift their range, then no new spatial units are created, their boundaries will just be expanded. Also, even if new areas become suitable for the species, new SUs would not be defined in those areas, unless they are very likely to be occupied. Even if those areas are expected to be occupied by naturally dispersing individuals, it may be more appropriate, from a conservation perspective, to consider these as part of a (growing) population that already exists in a current SU in the indigenous range. New expected additional spatial units are more likely to occur in cases of conservation introductions.

However, even when no new spatial units are created, expected additional range should be mapped to illustrate the expected expansion of spatial units.

If new spatial units are expected in the future, the current state in those units will be Absent. However, in this case, Absent does not mean extirpated; it means not yet occupied. Thus, these spatial units should not be included in the calculation of the Species Recovery Score and should not contribute to Conservation Legacy. They may be included in the denominator of Equation 1 when calculating Green Scores for future scenarios. Calculating the future conservation impact metrics (Conservation Dependence, Conservation Gain, and Recovery Potential) in this case requires careful consideration of how to include these spatial units, and may also require calculating the current Green Score in two different ways. This process is explained in section 9.

4.2.4. *Spatial Units for Migratory Species*

In the case of migratory species, delineation of spatial units becomes more complex. However, a key principle is that if the same individuals use different areas in different times of the year (e.g., breeding and non-breeding areas), these areas should not be considered separate spatial units; doing so would lead to double-counting of individuals. Rather, spatial units can be based on discrete “population units” that travel together (a biological division). In some cases, these population units may overlap in space during certain times of the year; in that case, the spatial units would also partially overlap. This is not necessarily a problem; spatial units in this case are based on population sub-divisions, not necessarily on geographical space. In this case, assessors can either (1) use the overlapping spatial units, or (2) consider whether combining two or more population units into one spatial unit to reduce the amount of overlap would be appropriate, *if* the resulting delineation is still relevant for conservation.

4.3. *State in each spatial unit*

The population in each spatial unit must be assessed as one of four ordinal states: Absent, Present, Viable, and Functional. These states are defined and discussed in the Standard.

Weights associated with each state are used to calculate the Green Score. There are two sets of weights (Table 1). The default weights are recommended for most assessments. Nonetheless, assessors may choose to use the optional fine-resolution weights, which require more detailed assessment of the state in each spatial unit, e.g., identifying the Red List category that would be assigned to the spatial unit population. The fine-resolution weights allow a more precise calculation of the conservation impact metrics, and thus may be preferable for species with one or few spatial units, or for species with large spatial units encompassing areas of widely differing human impacts and more than one current population of the species (see Functional weights, Table 1). For such species, using the default weights may result in an uninformative assessment. Consider, for instance, a species with a single spatial unit, where the current Red List category is CR, and the Future-with-conservation Red List category is VU. With default weights, both of these would be scored as Present (weight=3); as a result, Conservation Gain would be 0%, even though future conservation is expected to make an important difference to the status of the species. Using the optional fine-resolution weights, Conservation Gain would be 20%.

Table 1. Default and (optional) fine-resolution weights for each state in a spatial unit.

State *(default)*	**Default weight**	**Fine-resolution State (*optional, e.g., if one or few spatial units*)**	**Fine-resolution weight *(optional)***
Absent	0	Absent	0
Present	3	Present-CR	1.5
		Present-EN	2.5
		Present-VU	3.5
		Present-NT with cont. decline	4.5
Viable	6	Viable-NT without cont. decline	5.5
		Viable-LC	6.5
Functional	9	Functional in <40% of SU	8
		Functional in 40-70% of SU	9
		Functional in >70% of SU	10

The weights are set such that the average of fine-resolution weights in each state equals the default weight, so that, on average, the Green Score will be the same with either default or optional weights. Although assessors can choose either the default or the optional weights, for a given species the same set of weights must be used for all spatial units and all Green Scores (past, current, short-term future, long-term future).

The Green Score (G) for the species is obtained, based on the states in all spatial units, with the equation (Equation 1):

$$G = \frac{\sum_s W_S}{W_F \times N} \times 100$$

where s is each spatial unit, W_S the weight of the state in the spatial unit (from Table 1), W_F is the maximum possible weight (i.e., 9 with default weights and 10 with fine-resolution weights), and N is the number of spatial units. The denominator is the maximum possible score attained when all spatial units are assessed as Functional. Thus, a Green Score is calculated as a percentage of Fully Recovered. For Current and Counterfactual Current scores, the denominator is based on the number of spatial units in the indigenous range only (not including any resulting from any expected additional range).

Conceptually, the four possible states are considered to be mutually exclusive: each spatial unit is classified as only one state. However, because of uncertainty, each spatial unit could have multiple plausible states. In some cases, there may be substantial uncertainty about the state of the species in each spatial unit. It is important that this uncertainty is transparently and fully captured in the assessment process. Detailed guidelines on incorporating uncertainty are given in section 10.

Some states are also considered to be nested, as in the Red List, where a species that qualifies for EN also qualifies for VU by definition, but is only listed as EN. A spatial unit that is assessed as Viable is also Present by definition (but not classified as such). A spatial unit that is assessed as Functional is by definition also Viable and Present (but not classified as such). However, assessors may encounter a spatial unit that fits the definition of Functional but not the definition of Viable. For guidance on this situation, see sections 4.4 and 4.6.

4.4. *Viability*

Viability of the population in a spatial unit is defined based on the Red List category of the population in that spatial unit. Thus, the Green Status definition of "viable" operationalizes the generic concept of viability (having a low probability of extinction) in terms of the Red List criteria: if a spatial unit population is Least Concern OR Near Threatened and not declining, it is Viable.

In cases where the species has only one spatial unit, the Red List category of the global assessment should be used to help determine the current state of the spatial unit (e.g., if the global Red List category is NT with ongoing decline, VU, EN, CR, EW, or EX, the spatial unit cannot be assessed as Viable). If assessors believe that the most recent Red List assessment no longer reflects the species' condition, or that the assessment is unrealistically precautionary, the Red List assessment should be revised before assessing the Green Status.

If the species' range is divided into two or more spatial units, Regional Guidelines (IUCN 2012b) are used. Tools such as sRedList (sredlist.eu) can help assessors determine the Red List category that applies to a spatial unit. The regional application guidelines for the IUCN Red List consider the possibility of rescue effect, which is the process by which immigrating propagules result in a lower extinction risk for the target population (in this case, for the population in the spatial unit that is being assessed). In other words, immigration from other spatial units will tend to decrease extinction risk within the spatial unit being assessed. This effect is accounted for by modifying the Red List category of the spatial unit. Thus, if the data from the spatial unit under consideration would result in an assessment of Present based on the Red List criteria, consideration of rescue effect can change this assessment to Viable, in cases where rescue effect allows the spatial unit to be downlisted to LC or 'NT and not declining'. If the rescue effect results in a downlisting to CR, EN, VU, or NT with decline, the spatial unit would remain Present.

In rare cases, projected changes in immigration from other SUs may result in the state being modified from Viable to Present. In a sink population, reproduction is lower than mortality, and the population would be extirpated without immigration. According to the Red List Regional Guidelines (IUCN 2012b), if the population in the spatial unit being assessed is a sink population, and immigration from other spatial units is expected to decrease, then the extirpation risk may increase, which is reflected by modifying the state from Viable to Present.

Following the Regional Guidelines (IUCN 2012b), this type of adjustment is based only on immigration from wild populations. Contributions from other (e.g., intensively managed or ex-situ) populations can be in the form of population supplementations, reintroductions, and benign introductions; such contributions are considered conservation actions, and their effects are taken into account in counter-factual and future scenarios. If the Red List category, after such adjustment, is LC, or it is NT and the population is not declining, the state is Viable. If the Red List category is NT and the population is declining, or if the Red List category is VU, EN, or CR (but not CR(PE) or CR(PEW), the state is Present. If the Red List category is EX, EW, CR(PE) or CR(PEW), the state is Absent.

The definition of viability is based on the Red List categories to maximize synergy between the two methods; however, because the aims of a Green Status assessment are different than those of a Red List assessment, there is a minority of cases where this definition is counterproductive. If spatial units are very small or the population density is naturally low, they may never meet the criteria for viability as defined in the Standard. This may happen even if the spatial unit population is considered Functional, as defined in the next section. Assessing such spatial units as non-viable may be counterproductive, if failure to meet the criteria for Viable reflects the natural densities and distribution of the species, rather than the legacy or current effect of threatening processes. In such cases, the assessors should consider the following steps in sequence from a-c: (a) Read the discussion in a section 4.6 regarding the relationship between functionality and viability. (b) Re-consider the definition of spatial units, checking if each spatial unit includes at least one whole subpopulation (as defined in the Red List Guidelines [IUCN Standards and Petitions Committee 2024]); if not, consider increasing the size of the spatial units. (c) Re-consider how the regional guidelines have been applied to the spatial unit. In particular, consider if the probability of immigration from other spatial units ('rescue effect') justifies downlisting one or more Red List categories to achieve a Viable state.

The Red List criteria use data qualifiers (Observed, Estimated, Projected, Inferred, and Suspected) to specify the nature of evidence for each parameter. For the Current state in a GSS assessment, the assessors should follow the Red List guidelines (IUCN Standards and Petitions Committee 2024) for the proper application of these data qualifiers. However, the Red List criteria were not designed to be applied to hypothetical (counterfactual and future) scenarios. Therefore, when assessing future, former or current counterfactual states, assessors should use the same data qualifier as for the current state. In other words, if a value used in assessing the current state is Estimated, assume that this value would have been Estimated even if there had been no conservation, and it will also be Estimated 10 or 100 years from now, whether or not there is conservation.

4.5. ***Functionality***

An ecologically functional population has the abundance or density, and the appropriate demographic structure, that allow all its ecological interactions, roles, and functions to take place. The concept of ecological functionality is closely related to the concept of ecological extinction or functional extinction. A population is considered not to be functional if its abundance is too low, or its demographic structure is not suitable, for it to fulfill its ecological role(s) in the community or ecosystem (Akçakaya et al. 2020). Nonetheless, even when a population is at high density, its demographic structure may be unsuitable for the function(s) considered. For instance, if harvest or other human-caused mortality is removing all the older or larger individuals, and if the ecological function in question is carried out primarily by the older or larger individuals (such as trees providing cavities for nesting by animals), the population would not be functional.

Consideration of functionality in the context of species recovery should not be misinterpreted as prioritizing conservation of species based on their functional importance. Functionality is considered in Green Status assessments in order to restore a species to levels higher than what is required only for its own viability. Thus, assessing functionality is a way of expecting more from our conservation efforts, not from the species (Akçakaya et al. 2020); and it is not for comparing species to each other. Being unable to identify a species' functions does not preclude the establishment of ambitious recovery targets, which can be based on proxies of functionality or symptoms of reduced functionality (discussed below).

Although ecological functionality of a population is fundamentally a continuous measure, for the purposes of a Green Status assessment, the functionality of a spatial unit population is assessed either as a binary measure (functional vs. not functional, with the default weights) or as a categorical variable with four ordinal categories (not functional, functional in <40% of the spatial unit, functional in 40-70% of the spatial unit, and functional in >70% of the spatial unit, with the fine-resolution weights; see Table 1).

When determining the percentage of the spatial unit that meets functional criteria (see sections 4.5.1–4.5.3), this estimate is typically based on the area of the species' habitat within the spatial unit, which should be assessed at the benchmark date (i.e., what areas were thought to be suitable and occupied by the species at the benchmark date, even if those areas have since been lost). It is also important to note that a mapped polygon indicating spatial unit extent may not consist entirely of habitat. Because habitat is evaluated at the benchmark date, if habitat has been lost and cannot be restored, it may not be possible for a spatial unit to be functional over 100% of habitat area. However, this relative level of recovery is still communicated in the assessment results (see section 11).

In general, when assessing whether a spatial unit is functional or not functional using the default weights (binary), in most cases the "Functional" state should be applied only if the species meets functional criteria in at least 50% of the habitat area within the spatial unit. However, there may be valid exceptions, and if assessors conclude that a different threshold or indicator is appropriate, this should be justified in the assessment documentation.

While habitat area is the recommended method for evaluating the percentage of the spatial unit that meets functional criteria, there may also be exceptions. For example, if there are spatially delineated subpopulations within the spatial unit (including subpopulations that are known/inferred to have existed at the benchmark year), spatial unit functionality could be based on the percentage of subpopulations meeting the criteria. Or, some habitat areas may be more critical to functionality than others (e.g., if spatial units are assessed on the basis of migratory stocks). Nonetheless, any alternative methods should be described thoroughly in the assessment documentation.

4.5.1. *Assessing Functionality without Identifying Function: Proxies*

Although it might not be easy or even possible to identify the principal functions of a species, incorporation of functionality whenever possible is a critical element of an aspirational conservation vision. When a function cannot be easily identified for a species, a number of proxies can be used to determine if the spatial unit populations are functional:

- **Pre-impact population size/density:** The natural or pre-disturbance spatial unit population size or carrying capacity of a species can be used as a proxy for functional density. This assumes that at pre-impact densities the species did fulfill its ecological roles and functions. It is important to consider that carrying capacities vary naturally across the range and over time for many species.
- **No- or low-impact areas:** If human impacts vary over the range of the species, population size, density, or age structure in areas with negligible human impact can be used as a proxy. It is important to consider that these properties vary naturally across the range and over time for many species, and that even low levels of human impact may have profound effects on functionality.
- **Similar species:** Information from similar species can be useful in determining either the principal ecological functions of the species, and densities that allow these functions; or the pre-, low-, or no-impact characteristics that can be used as a proxy for functional density.

4.5.2. *Assessing Functionality without Identifying Function: The Elimination Approach*

The elimination approach (Akçakaya et al. 2020) extends the use of the proxies discussed above with a more systematic examination of the spatial unit population. It looks for symptoms of reduced functionality, analogous to the Red List approach of identifying symptoms of reduced viability. Table 2 lists questions and considerations to guide the assessors in this process. This is not a comprehensive list; it aims to guide the assessors towards a systematic consideration of the evidence for determining whether the size, density and the demographic structure of the spatial unit population are appropriate for the species' ecological function(s).

Table 2: Examples of information to consider in inferring functionality of populations (modified from Table 3 in Akçakaya et al. 2020).

1. Based on available information on the interactions of the species being assessed with other species, and its ecology in general, consider whether a reduction in population size or density of the species being assessed, or a change in its demographic (e.g., age) structure has the potential to cause non-trivial changes of any of the following types.
    a. a reduction in the abundance of another native species;
    b. an increase in the abundance of a non-native species or over-abundance of another species;
    c. a reduction in a demographic rate in any life stage of another native species (e.g., germination, seed production, nest success, natal dispersal, etc.) that has the potential to decrease its abundance or otherwise reduce its viability;
    d. a change in any ecosystem process or structural feature;
    e. a change in the typical patterns of behavior (e.g., social interactions, patterns of aggregation, movement) among individuals of the species being assessed or other species;
    f. change in genetic structure or variability of the population that indicates that one or more of the ecological functions of the species are, or will become, impaired (e.g., Hoban et al. 2020).
2. Comparing spatial units, areas, or subpopulations with different densities or abundances of the species, consider any evidence which suggests that the reduced population size or density of the species, or a change in its demographic (e.g., age) structure has caused or may cause any of the outcomes a-f listed above. It is important to consider that ecological function of a species and its natural density or carrying capacity may be different in different ecological settings. So, this comparison is more relevant between spatial units, areas, or subpopulations with similar ecological characteristics.
3. Comparing time periods when the species was at different densities or abundances, consider any evidence which suggests that the reduced population size or density of the species, or a change in its demographic (e.g., age) structure has caused or may cause any of the outcomes a-f listed above.
4. Based on information on the functional traits of the species, and an analysis of relationships between trait and function in similar species, consider the potential that reduced population size or density of the species, or a change in its demographic (e.g., age) structure may cause any of the outcomes a-f listed above.

4.5.3. *Assessing Functionality by Identifying Function: The Confirmation Approach*

This method focuses on the mechanisms of functionality rather than its symptoms. The confirmation approach (Akçakaya et al. 2020) starts with a list of the interactions of the focal species with others, and continues by identifying the ecological processes (such as predation, dispersal, facilitation, etc.) that are involved in these interactions. All the types of function listed below should be considered when creating this list (see Akçakaya et al. 2020, Table 2 for additional information about these types of function).

- **Direct interactions** of the species with one or more other species, often involving physical contact between the species, and exerting strong influence on each others' population dynamics, including but not limited to pollination, seed dispersal, herbivory and predation. In some cases of direct interactions, the relationship between functionality and abundance is strongly non-linear (McConkey and Drake 2006), even a step function (Estes et al. 2010), making it easy to determine the point at which to consider the focal species to be functional. In other cases, there is a more gradual relationship, with higher abundance resulting in higher function, which makes it more difficult to make the same determination. For example, even if a species is not a keystone species (whose decline would likely cause the extirpation of other species), changes in abundance, age structure, or density could reduce the strength of interactions, e.g., its function as a significant food source for its predators/consumers, or as a significant disperser of seeds or pollen. In such cases, the focal species is considered not functional if its density (and therefore functionality) is so low as to cause another species' population to be not viable (as defined above) in the long term.
- **Indirect interactions** of the species with other species, through creation of habitat structures, features and conditions that affect the dynamics of those species. These include creation of habitat for other species, ecosystem engineering, substrate stabilization, peat formation, bushfire fuel accumulation, and facilitation of landscape connectivity or heterogeneity. Examples include creation of landscape heterogeneity through grazing and wallowing by the American Bison (Sanderson et al. 2008); construction of cavity and burrow nests by birds (Casas-Criville and Valera 2005) and tortoises (Lips 1991); creation of refuges from predators via rugosity of biogenic reefs (Alvares-Filip et al. 2009); substrates for nests and mistletoes provided by woody plants.
- **Diffuse interactions** of the species with other components of the ecosystem, through its contributions to ecosystem processes. A spatial unit population can be considered functional if its population size and demographic structure allow the species to contribute to an ecosystem process (as defined by Pettorelli et al. 2017) such as primary production, decomposition, nutrient cycling or redistribution, modification of fire or hydrological regimes, among others. Examples include modification of the flux of nitrogen and oxygen and sediment characteristics by large suspension feeders or deposit feeders (Thrush et al. 2006), nutrient input to terrestrial systems by breeding salmon populations (Gende et al. 2002), and

nutrient cycling and energy transfer by vultures and other scavengers (DeVault et al. 2003).

- **Intra-specific interactions,** i.e., within-species processes and patterns of behaviour that are characteristic of the species, such as colony formation and other aggregations, and spatial patterns of movement and dispersal. A spatial unit population can be considered functional if the species' population size, density, or structure allows it to display the notable social or behavioral phenomena that are characteristic of the species. Elements of animal culture (e.g., Vachon et al. 2022) also fall under this category.

Note that some definitions of functional extinction include termination of basic demographic processes such as reproduction (e.g., Roberts et al. 2017). However, these are not considered to be functions for the purpose of the IUCN Green Status of Species, because spatial unit populations that do not perform such basic demographic functions would not be Viable, and therefore the process is already considered in the assessment.

Information about species interactions in the above categories, together with a knowledge of the functional traits that are often associated with such interactions, would allow identifying the ecological conditions that determine how much the spatial unit population contributes to these identified ecological process. These ecological conditions (called "determinants of functionality" in Akçakaya et al. 2020, Table 2) often involve population density (e.g., for a bee species, high enough to pollinate rarer plant species) or age structure (e.g., for a tree species old enough to provide cavities for nesting).

The next step is identifying the variable to assess functionality. Depending on the function, this could be, for example, the total number of seeds dispersed by a mammal, the number of plant species pollinated by an insect, or the contribution (in units of mass or volume per unit time) to distribution of a particular nutrient.

Finally, the relationship between this response variable and the determinants of functionality (e.g., population density or age structure) is established. In some cases, this relationship is non-linear (e.g., a step function, or sharp peak, and even hysteresis), naturally leading to a categorical assessment of functionality (e.g., as functional vs. not functional), based on threshold values of population size, density and structure. If the function- density relationship is gradual (i.e., close to linear), functionality can be assessed with a subjective threshold (e.g., >50%) that is consistent with the level of ambition of the species recovery objectives.

If more than one function can be identified for a species, functionality can be assessed based on the function that is the most straightforward to measure or evaluate, the function that is unique among the species in the same ecosystem, the function that allows a better approximation of the species' role and population characteristics prior to major human impacts, the function that requires the highest density, or the function that represents a strong interaction (Akçakaya et al. 2020).

Some species may perform their ecological functions across several ecosystems, providing 'mobile links' between them (Lundberg and Moberg 2003). In such cases, functionality should be assessed not only in terms of spatial unit population size and structure, but also considering the maintenance of movement dynamics. In determining the function of a species, assessors should consider the possibility that some species may occur in multiple ecosystems, and perform different roles in each. Similarly, the function of a species, or the functionality of a population in a spatial unit may change in time. For these and other considerations (e.g., issues of functional redundancy and function as contribution to ecosystem resilience), and for proposed methods of assessing functionality in a spatial unit, see Akçakaya et al. (2020).

4.5.4. *Dependence on Other Species*

Functions are assessed relative to the focal species (the species being assessed); e.g., a prey species could be deemed functional even if its predator populations are not. This is because the main point of assessing functionality is to determine how close a population is to its size and structure when it was not depleted. If the lack of predators does not necessitate any conservation actions focused on the prey, then there is no conservation benefit to considering the prey not functional. However, if the lack of predators (or the fact that the predators are below their functional densities) caused populations of a prey species to become overabundant, and thereby cause disruption of ecological processes or threaten native species, the prey population should be considered non-functional. Thus, a population's density may be either too low or too high for the species to be functional (Akçakaya et al. 2020).

Similarly, the focal species may be depleted because of reduced or extirpated populations of its host, prey, mutualist, or other species that the focal species is dependent on, especially if it is an obligate relationship. In these cases, the focal species would be considered not functional. However, if there are alternate hosts (or other interacting species) such that the species is at the same population level that would have been expected with its primary host (or other interacting species), the population would be considered functional.

There are, of course, cases that present complexity when determining functionality for species with interaction partners. It is possible that anthropogenic activity has caused a shift in interactions (for example, if a predator switches to feeding on livestock rather than wild prey). In such cases, assessors must make a species-specific determination as to whether the change in interaction affects the species' functionality.

4.6. ***Relationship between Viability and Functionality***

Although, in principle, a non-viable population can perform some ecological functions (e.g., contribute to a particular ecosystem process even as it is at a high risk of extirpation), for the purposes of the Green Status of Species, the functional score is only applied to spatial units that are both Viable and Functional (with one exception, discussed below). This hierarchy between viability and functionality is set based on the reason that functionality was included in Green Status assessments in the first place: to provide ambitious recovery targets that go beyond viability. Allowing non-viable populations to be given the highest score (because they fulfill a function to some degree) would go against this goal.

In addition, there are two practical reasons:

(1) Although some functions may be fulfilled by a non-viable population for a limited time, for a species to make long-term, sustainable contributions to ecosystem processes, it must be viable. Functionality cannot be sustainable into the future unless the population is viable; a non-viable population will cease to function sooner or later. Because it is difficult to assess when this might happen, the precautionary approach is to require that the Functional state is applied only to populations that are also Viable.

(2) Although a single function or a few functions may be fulfilled by a non-viable population, for a population to fulfill all of the functions of a species, generally it has to be viable first. Since it is impossible to evaluate all, even many, of a species' functions, the precautionary approach is to require that Functional score is applied only to populations that are also Viable.

An exception is the rare cases of a spatial unit with a naturally small population (<1000 mature individuals) which is performing its ecological functions at baseline levels (i.e., at levels expected in non-impacted populations), but which would not meet the criteria for Viable because it would be assessed as VU under criterion D1. If such a spatial unit population is not declining, is not under a specific threat (defined as a human activity that increases the risk of extirpation), and does not meet other criteria for VU, it may be assessed as Functional.

Further guidance around the viability exception is under development, and any uncertainties around the application of this exception will be addressed at the assessment review stage.

5. Conservation Legacy

In order to evaluate the difference that past conservation has made, i.e. the species' Conservation Legacy, it is necessary to infer what would have happened to the species without any conservation action. The Conservation Legacy metric compares the Current status of the species under assessment with the (counterfactual) status that would have been observed had no conservation actions been taken since some predetermined point in the past. The difference between these two (if any) is a measure of the success or impact of past conservation. Assessing Conservation Legacy requires following the guidance of the previous sections to calculate the Green Score in two different ways: based on the Current states in the spatial units and based on the Counterfactual Current states. For an explanation of the possible states, see section 4.3.

Doing this requires four main considerations:

1. What counts as conservation action; i.e., which activities that may have impacted the species should be considered when estimating the Counterfactual Current state in each spatial unit?
2. Temporally, which conservation actions are considered relevant when estimating the counterfactual; i.e., from what starting date are conservation actions counted?
3. What are the acceptable methods for determining the counterfactual state of the species in each spatial unit?
4. When there is uncertainty associated with the counterfactual, how can this be transparently communicated?

The first 3 questions are addressed in the following subsections. Guidelines for incorporating uncertainty are given in section 9.

5.1. ***Defining conservation actions***

Assessing the species' status under the counterfactual scenario of no conservation requires determining what types of conservation actions should be considered (i.e., "taken out" of the counterfactual scenario). In general, any action that could be categorized according to the IUCN classification of conservation actions (Salafsky et al. 2008) should be considered, even when the budget is coming from sources other than conservation programs.

Conservation actions do not have to specifically target the species in question. General conservation measures (such as protected and conserved areas, habitat restoration and clean-up projects, broad legislation related to wildlife protection) should all be considered in the assessment. For example, a counterfactual scenario for a species whose range includes protected areas, and whose populations are protected by hunting regulations, should assume that both the protected areas and the hunting regulations had never been put in place.

There is a potential grey area concerning actions that were not designed for the sole purpose of biodiversity conservation, but nonetheless had a positive impact on the species being assessed. These actions should be considered only when conservation was a foreseen collateral outcome. For example, a gun confiscation scheme established for regional political stability would not count, even if it ended up having a conservation impact, as it was not implemented with any biodiversity aim in mind. By contrast, the establishment of a watershed protection forest for a hydropower dam where biodiversity conservation was seen as a co-benefit would count.

When identifying past conservation actions, it is important to keep in mind that the ultimate goal of the Green Status exercise is to inform future conservation strategies. Therefore, factors that have nothing to do with conservation decision-making should not be considered. For example, traditional or religious activities and beliefs that have a beneficial impact in terms of biodiversity conservation should not be included, because they are generally not subject to change by decisions taken by conservationists or politicians.

Hoffmann et al. (2015) provide a summary of basic concepts to consider when defining conservation actions in the context of the counterfactual. These concepts should be used as a starting point in defining conservation actions for Green Status assessments.

All conservation actions that are considered when estimating the counterfactual status should be listed, using the existing nomenclature (Salafsky et al. 2008).

5.2. *Determining the starting date*

When estimating the Current Counterfactual state in each spatial unit, all conservation actions that have been in place since 1950 should be considered (i.e., their effects removed in the counterfactual). If a conservation action (e.g., a protected area or a law regulating hunting) was initiated prior to 1950, its effects should be considered in the assessment if the action was still in effect in 1950. In any case, assessors should explicitly state the starting year of conservation actions considered in the assessment, especially if later than 1950.

Note that assessors are not required to determine what the Green Score was at this starting date ("Former" in Fig. 1) to calculate Conservation Legacy; they only need to determine the Current score, and then determine what the Current score would likely have been if no conservation actions had been taken since the starting date (Counterfactual Current). However, if assessors choose to calculate the Former score, that should be calculated for 1950 or for the starting date of major conservation actions, whichever is later. One reason that assessors may choose to calculate the optional Former Green Score is that it enables production of an index of change over time.

5.3. *Evaluating the counterfactual status*

To evaluate the Counterfactual Current status of the species, the influence of past conservation must be estimated in each spatial unit. When considering past conservation impact, pre- and post-action population trend data might be available, but rarely are conservation actions implemented such that they could be robustly evaluated to allow causal attribution (i.e., using experimental or quasi-experimental designs). Instead, most Green Status assessments of conservation impact will rely on inferential evidence, linking observations of change in species status in a spatial unit and information on the conservation actions that were carried out.

Inferential counterfactual approaches are commonly used to evaluate conservation impact. For example, several studies have estimated what the IUCN Red List category of a given species would have been in the absence of conservation, based on expert judgment (Butchart et al. 2006, Hoffmann et al. 2010, 2015, Szabo et al. 2012, Young et al. 2014, Bolam et al. 2020). Examples of the application of counterfactual thinking to assess conservation status beyond Red List category include Adams et al. (2019) and Zavaleta-Cheek et al. (2023).

Table 3 gives a selection of methods which could be used to draw inferences about the impact of conservation in a given spatial unit. These methods, along with examples of their application, are further described in Grace et al. (2021b). Note that these methods can also be used to make inference about the Future-with-conservation and Future-without-conservation states (sections 6 and 7). All these methods must consider the effectiveness of conservation actions, which is determined by a variety of factors, including, for example, their duration, frequency, and spatial scale; their capacity to reduce or mitigate against threats; and the biological attributes of the species (such as maximum rate of population growth and generation length) that determine its responsiveness to conservation.

Note that if no conservation actions have been taken, the Current and Current Counterfactual states in each spatial unit are by definition the same, and in such cases Conservation Legacy = 0.

Table 3. Potential methods for gathering inferential evidence to estimate the impact of conservation actions modified from Table 1 in Grace et al. 2021b).

Method	Application
Logical argument Interrogation of the assumptions underlying the purported observed impact of conservation, to see how far along the chain (from conservation actions, to changes in vital rates and behavior, to changes in population size and functionality, to changes in the species' Green Status) attribution can reasonably be inferred.	Evidence to evaluate assumptions of impact can come from key informants/experts (see below), species status assessments, or documentation (e.g. project reports). Further guidance on how this inference can be made is given in Hoffmann et al. (2015), and Grace et al. (2021b), including how to interpret the effects of the cessation of protected areas and the role of ex situ conservation.
Expert elicitation Asking a range of experts associated with the species to predict what would have happened, or what will happen, to the status of the spatial unit under the different past and future scenarios.	Could feasibly be done as part of an Action Planning process. Expert elicitation techniques (such as a Delphi method) can be used to reduce bias and increase consensus between different experts' points of view.
Action plan assessment If a prioritised action plan is available and being reported against, then past and expected future progress can be assessed against that plan, assuming that any improvement of a spatial unit's status is, or would be, due to the implementation of this plan. This assumption needs to be based on inference using one of the other methods.	This is a rather indirect and implicit application of the logical argument approach, but may be quicker and more feasible in an action planning context. In the long term, encouraging such a method could help increase the number of action plans developed.

Population modelling Retrospective or forward modelling of species dynamics (population, metapopulation or habitat), e.g. population viability analysis (PVA).	Such methods can be used even in the absence of any conservation project that is currently implemented, or when there is limited scope for causal inference based on project documentation.

The methods in Table 3 assume that robust causal attribution of conservation impact is not possible because the conservation action under consideration was not designed with impact evaluation in mind. However, if conservation actions are designed in an experimental or quasi-experimental way (for example, using matching (Schleicher et al. 2020), or a Before-After-Control-Impact design (Smokorowski and Randall 2017), then the evidence for the past influence of conservation on a species in a spatial unit will become stronger; the uncertainty of species status in the counterfactual scenario will likely also decrease.

For a detailed set of steps to guide assessors through estimation of Conservation Legacy, see Appendix 1.

6. Conservation Dependence

This measure addresses the question of how dependent a species is on ongoing conservation efforts. In other words, if conservation actions (as defined in Section 5.1) ceased, what would happen to the species in the short-term future (10 years)? Thus, Conservation Dependence measures the expected change (usually deterioration) in the status (Green Score) of the species in a future scenario in which all conservation actions (current or planned) are terminated: the Future-without-conservation.

The types of information to consider when assessing the likely species states in the Future-without-conservation scenario are similar to those for the Counterfactual Current scenario discussed above (section 5; Table 3). Assessors should consider data on spatial unit population size and trends, spatial characteristics (EOO, AOO, fragmentation), severity, scope and intensity of threats. The assessor should consider both current threats and plausible future threats (that the species is likely to face in the near future). To the extent possible, future threats should be based on specific evidence (such as development plans, socioeconomic projections, etc.) and should not be speculative.

It should be noted that Conservation Dependence could replace the current provision in the Red List Guidelines (IUCN Standards and Petitions Committee 2024) that allows species that otherwise would be listed as LC to be listed as NT if a conservation intervention is preventing listing in a threatened category. This would remove an inconsistency in the Red List Guidelines, since it is clear that species at any threat level (not just LC) can be dependent on conservation and could slip to a higher threat category in the absence of conservation.

Conservation Dependence is quantified as the difference between the Current Baseline Green Score and the Future-without-conservation Green Score (Figures 1 & 2). The Current Baseline Green Score is the predicted value of the Green Score in the short-term future (10 years), considering the likely benefits of conservation actions that are currently in place or very likely to be in place within 1 year. If Current Baseline is not specified, it is assumed to be the same as the Current Green Score; this is an option if assessors do not wish to calculate the Current Baseline Green Score. For further discussion of considerations for using the "dynamic" Current Baseline vs. the "static" Current Green Score to calculate Conservation Dependence, see section 7.1.

For a detailed set of steps to guide assessors through estimation of Conservation Dependence, see Appendix 1.

7. Conservation Gain

This measure addresses the question of how much species status (Green Score) is expected to improve in the short-term future with ongoing and planned conservation action. In other words, if existing conservation actions remain and conservation actions that are planned to be put in place within the 10-year assessment period are implemented, what would happen to the status of the species? Thus, Conservation Gain measures the expected change (usually improvement) in the status of the species given current and planned conservation actions.

Conservation Gain is quantified as the difference between the Current Baseline Green Score (defined in Section 6) and the Future-with-conservation Green Score (Figs. 1 & 2). The same Current Baseline Green Score is used in assessing Conservation Gain and Conservation Dependence, so it need only be calculated once.

As with the Future-without-conservation scenario, when estimating spatial unit states in the Future-with-conservation scenario assessors should consider data on spatial unit population size and trends, spatial characteristics (EOO, AOO, fragmentation), severity, scope and intensity of threats. Assessors should consider both current threats and plausible future threats (that the species is likely to face in the near future).

In addition, assessors should consider the likely effects of all conservation actions that are currently in place or are planned and ready to implement in the very near future. However, assessors should not consider conservation actions that are thought of but not planned (e.g., if no cost estimates or time frames are specified). For planned actions, assessors need to make realistic assumptions about (i) the probability that the action will be implemented, and (ii) the probability that the conservation actions will result in the species' recovery in a given spatial unit. For actions in place, the assessors should consider (ii). The likely benefits expected from these conservation actions should be discounted by these probabilities, and any uncertainty about the effectiveness of implementation can be reflected in the upper and lower bounds.

In addition, assessors should consider information on the effectiveness of each type of conservation action, e.g., from monitored populations of the species, or similar projects involving related species. In determining the expected impact of not having these conservation actions on the state of each spatial unit, the assessors should consider the methods of evaluating the counterfactual status discussed in section 5.3 and Table 3.

If the expected outcome of the conservation actions above is a downlisting in Red List Category within a spatial unit (i.e., an improvement in status), this predicted outcome can be reported in the future-with-conservation scenario. While the Red List guidelines (IUCN 2012b, IUCN Standards and Petitions Committee 2024) stipulate that a taxon must qualify for a lower threat category for at least five years before changing the category (the “five-year rule”), this precautionary approach does not apply to the Green Status scenarios, which are intended to show the expected impact of conservation. A similar approach is taken when calculating the Red List Index (Butchart et al. 2004). Nonetheless, to avoid any potential confusion, when reporting an expected downlisting of a spatial unit in the future-with-conservation scenario, assessors should state in the justification that the spatial unit population “qualifies for [the downlisted state] and is likely to remain that way.”

Similar reasoning applies when estimating the impact of (re)introductions or population supplementation planned over the 10-year period. The Green Status assesses the state of wild populations specifically, and the Red List guidelines stipulate that released individuals must produce viable offspring and that five years must pass before they can be considered wild. The five-year rule does not apply when such actions are planned within the future-with-conservation scenario, BUT other stipulations of wildness must be met (e.g., production of offspring that have reached maturity or are likely to do so). The uncertainty of the success of such actions should be reflected in the minimum and maximum states.

For a detailed set of steps to guide assessors through estimation of Conservation Gain, see Appendix 1.

7.1 Baseline against which to evaluate Conservation Dependence and Gain

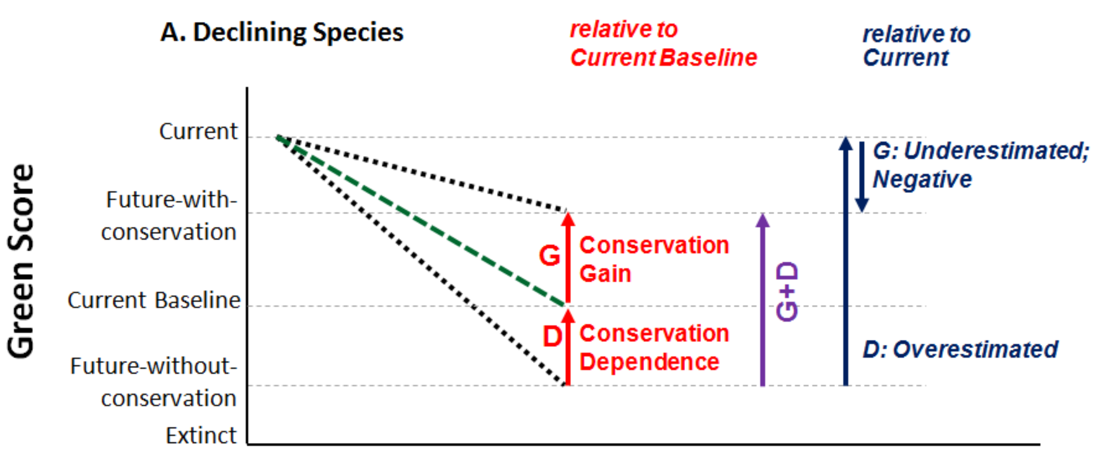
The most straightforward way to define the Current Baseline against which to compare future scenarios with or without conservation is to use the Current Green Score of the species, i.e., a "static" baseline. A static baseline assumes that the only factor affecting the trajectory of a species’ Green Score is the presence or absence of conservation actions, so adding conservation actions (as is possible in the Future-with-conservation scenario) is generally expected to improve the Green Score, and removing conservation actions (as is done in the Future-without-conservation scenario) is generally expected to decrease the Green Score. This can be used by assessors as the default option.

For some species, using the Current Green Score of a species as the baseline might be inappropriate (for example when there is ongoing degradation of habitat caused by factors outside of conservationists' control, such as climate change; e.g. Maron et al. 2015). Therefore, a more fine-tuned approach is to compare scenarios to a "dynamic" Current Baseline, i.e., a scenario in which things proceed according to "Business as Usual". The dynamic current baseline therefore represents the expected Green Score in 10 years considering the effects of ongoing conservation actions and actions for which all required conditions are met, and all required resources are in place, or are extremely likely to be so within the year. If a dynamic baseline is used, it must be used to calculate both Conservation Gain and Conservation Dependence, rather than the static Current Baseline.

Using a dynamic Current Baseline can provide a more accurate assessment of the importance of conservation for the short-term future of the species. This is especially the case in the relatively common situation in which the status of the species is expected to deteriorate despite the continuation of current conservation actions. In such a case, using the Current status (the static baseline) may result in a zero or even negative Conservation Gain (Fig. 2a), which is misleading because conservation may in fact substantially slow the deterioration of the species status. Such an output of the Green Status assessment could disincentivize conservation.

On the other hand, in some cases use of a static baseline can produce an inflated Conservation Gain and/or underestimated Conservation Dependence (Fig. 2b), which would present a misleadingly optimistic picture of species status. Note that the overall value of conservation (the difference between the Future-with-conservation and Future-without-conservation lines, i.e., Conservation Gain + Conservation Dependence) is the same whether Current or Current Baseline is used, showing that the species stands to benefit to the same extent from conservation regardless of the baseline being static or dynamic.

Note that if a dynamic baseline is used, it has to be used for calculating both Conservation Gain **and** Conservation Dependence. So in the case of an ongoing deterioration of the species' status because planned conservation is inadequate to address the threats a species faces, using a dynamic rather than a static baseline would produce a larger Conservation Gain score because it recognizes that conservation is doing something, even if not enough. This would in consequence produce a smaller Conservation Dependence score, because even with conservation there is still a negative trend.



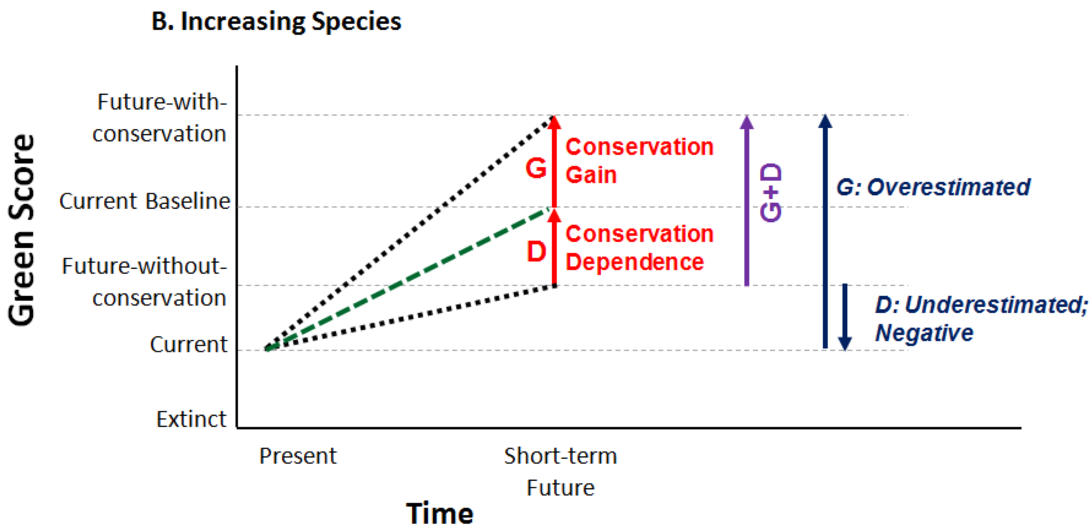


Figure 2. Conservation Gain (G) and Conservation Dependence (D) calculated relative to Current Baseline (red; left) and Current (blue; right), for a species that is declining despite ongoing conservation (A), and a species that would increase somewhat even without conservation (B). As in Figure 1, the green-dashed line represents the dynamic baseline that results in the Current Baseline Green Score. In this figure, the arrows indicate the value and the sign of the metric: an upward arrow indicates a positive value and a downward arrow indicates a negative value. In both cases A and B, the overall value or impact of conservation (G+D) is the same regardless of whether Current or Current Baseline is used. However, calculating the metrics relative to Current introduces a bias to the individual metrics: For the declining species, Conservation Gain is underestimated (actually, in this example, negative) whereas Conservation Dependence is overestimated. For the increasing species, Conservation Gain is overestimated whereas Conservation Dependence is underestimated (actually, in this example, negative).

8. Recovery Potential

This measure is about setting an aspirational yet achievable vision for the recovery of the species. Many species will never be Fully Recovered because, for instance, parts of the ranges have been irreversibly converted to cities and other intensive human uses. While recognizing such constraints, this measure aims to quantify an ambitious but possible long-term recovery potential, in order to track the recovery progress of the species more objectively and realistically and to incentivize recovery to the maximum possible extent.

Thus, Recovery Potential measures how much the status (Green Score) of the species could potentially be improved with sustained conservation efforts and conservation innovation, over the long-term time horizon of 100 years (Figure 1). It is measured against Current status, the static baseline (see section 7.1). This is because it is not realistic to extrapolate current trends in a dynamic baseline over a 100-year time horizon (as it is over a 10-year time horizon).

It is important to note that Recovery Potential is not meant to replace recovery objectives, targets and goals that are part of the conservation action planning process, which brings together all stakeholders in the planning process, and is the ideal and appropriate venue to set conservation targets. Although action plans are often developed with actions covering only a relatively short time horizon (e.g., five or ten years), they are usually nested within a longer-term vision, which may often be 50-100 years. The Recovery Potential metric defined in the context of the Green Status of Species is similar to this long-term vision. The time frame for Recovery Potential is set at 100 years, to link explicitly to the vision statements in many conservation strategies and action plans. The Recovery Potential should ideally be taken from the long-term vision statement of a recognized action planning process, involving considered and appropriate stakeholder engagement. If such a process has not taken place, the assessors should consider the following points.

To determine Recovery Potential, assessors need to make assumptions that are both optimistic and realistic. The assessors should consider not only conservation actions that are planned, but any conservation action that is plausible, even if they have not been considered or tried for the conservation of the assessed species. A good way to start is to consider the main threats and all the conservation actions that have been tried to counteract them for any similar species, anywhere in the world, and assess whether their application for the assessed species is plausible. Assessors should not limit the potential recovery options to elimination of threats, but should also consider opportunities for habitat restoration and increased connectivity and, where relevant, translocations and other direct species management actions.

The Recovery Potential should be biologically realistic, considering the biological limitations of the species (such as generation time and maximum rate of population increase), its genetic diversity and adaptive potential (i.e., for plants, does climate-adapted seed exist?) and its habitat (such as rates of regeneration). It should also be realistic in terms of social and economic factors (e.g., not envision moving towns and cities), but should not be limited by the current budgetary or political constraints.

The Recovery Potential must also be realistic about likely changes that will detrimentally affect the species over the next 100 years. For example, the habitat area of a species may be expected to be reduced due to climate change. Climate models such as the Representative Concentration Pathway (RCP) scenarios (see van Vuuren et al. 2011), which model the expected outcomes under a range of climate scenario assumptions, can help estimate future expected changes in habitat suitability. Shared socioeconomic pathways (SSPs) have also been used to estimate future impacts on species (e.g., Sanderson et a. 2019). Detailed guidance is available for incorporating these changes to calculate future reduction (IUCN Standards and Petitions Committee 2024; section 12.1); the same methods can be used for GSS assessments.

In some cases, it may be difficult to determine whether a factor should be considered in the 100-year scenario; for example, a potential positive development, such as improvements in technology that make captive breeding possible, or a potential negative development, such as introduction of an invasive species, are contingent on many interacting factors. Therefore, when considering the best estimate of a spatial unit state to calculate Recovery

Potential, events should only be included when there is a >50% probability that the event will occur.

Note that the Recovery Potential metric (as well as the other metrics) are applicable not only to taxa recovering as a result of conservation, but also to taxa that have not declined, and thus did not need to recover. The metrics are also applicable to taxa that have not been the focus of conservation action so far. Taxa that have not experienced declines would by definition have a Recovery Potential of 0; however, these species may have high Conservation Dependence, e.g., because of expected future impacts. These taxa would be identified by the Green Status approach, which is designed to recognize prevented declines as well as reversed declines.

9. For a detailed set of steps to guide assessors through estimation of Recovery Potential, see Appendix 1.Conservation Impact Metrics when there are Expected Additional Spatial Units

In the rare cases where there are new spatial units in the expected additional range (EAR; see section 4.2.3), the calculation of some Green Scores will include these additional spatial units. In all cases, a conservation impact metric must be calculated with two Green Scores based on the same set of SUs in the denominator. So, for example, if there is one SU in the indigenous range, and 2 SUs will be added in the long-term future due to expected additional range, then Recovery Potential must be calculated based on 3 SUs. Recalling that

Recovery Potential = Long-term Potential – Current

both Green Scores (for Long-term Potential and for Current) must be calculated for 3 SUs (see Table 4 for an example). However, when reporting Species Recovery Score and Conservation Legacy, these metrics must always be calculated based on the SUs in the indigenous range only. This means that in the cases with expected additional spatial units, two Current Green Scores must be calculated (Table 4): one with only the SUs in the indigenous range (to be used for calculating Species Recovery Score and Conservation Legacy), and the other with SUs in the indigenous range and EAR (to be used in calculating Recovery Potential).

In even rarer cases, the new expected additional range SUs will be added (i.e., become suitable and occupied) in the short-term future, so the same considerations as above will also apply to Conservation Gain and Conservation Dependence.

Table 4. An example of calculating Current Green Score in a case where two new SUs will be added in the EAR in the long-term future.

Spatial Unit	**Current**	**Counterfactual Current**	**Future-with-conservation**	**Future-without-conservation**	**Long-term Potential**
Indigenous	Viable	Present	Functional	Viable	Functional
Expected Additional #1	none	none	none	none	Present

Expected Additional #2	none	none	none	none	Present
Green Score-Indigenous	67%*	33%	100%	67%	NA
Green Score-with EAR	22%	NA	NA	NA	56%

'none': the SU does not exist yet, so there is no State. NA=Green Score is not applicable. Based on the above, Species Recovery Score=67%; Conservation Legacy=33%; Conservation Gain=33%; Conservation Dependence=0%; Recovery Potential=34%

10. Uncertainty

All aspects of a Green Status assessment involve uncertainties. The IUCN Red List Guidelines already contain detailed documentation on handling uncertainty in determining the current Red List category and criteria (Akçakaya et al. 2000; IUCN Standards and Petitions Committee 2024). The level of uncertainty is usually higher in a Green Status assessment, e.g., when attempting to determine the counterfactual Green Score or the future Green Scores, because there is no way of actually observing what would have happened in the absence of past conservation, and what will happen in the future. Hence, a robust system will require that assessors choose spatial unit states they consider to be most likely, with a clear and explicit rationale, as well as indicating other states that may be plausible. These guidelines will eventually replicate the guidelines for the Red List both in handling uncertainty and attitude to risk.

For Green Status assessments, it is important to record the uncertainty in the state of each spatial unit. For example, a species may be considered Viable (score 6) in a given spatial unit, but with Present (3) and Functional (9) as plausible categories as well. In extreme circumstances, a species may be data deficient in a given unit, if its status for that spatial unit could plausibly range from Absent to Functional (0-9). Thus, data deficient is not an explicit state separate from the others, but is implied by the lower and upper values specified for a given spatial unit.

Uncertainty about the status in each spatial unit should be explicitly stated using a multi-step procedure (Speirs-Bridge et al. 2010; Burgman et al. 2011), answering the following questions:

1. What is the lowest plausible value?
2. What is the highest plausible value?
3. What is your best estimate? (the most likely value)?

If more than one assessor is assessing the status, then a structured elicitation procedure should be followed (see McBride et al. 2012 for details).

Based on the uncertainty in the state of spatial units, the four conservation impact metrics for the species are calculated with best-estimate, minimum, and maximum values. For example, Conservation Legacy (L) is given as L_{best}, L_{min}, and L_{max}, the best-estimate, minimum, and maximum values, respectively.

In rare cases, the state in a particular SU would not only range from Absent to Functional, but it may also be impossible to select a 'best' state (i.e., the state is unknown). This would be a rare occurrence because it means that all four states are equally plausible; if any state is more plausible than others, it should be selected as the 'best' state. If all states are equally plausible as the best estimate, the assessors have two options: (i) Any metric that this unknown state contributes to is categorized as Indeterminate. (ii) The assessor sets the 'best' first to Absent (0), then to Functional (9), and checks the category of the metrics (see Section 11). If the category of a metric is different under these two assumptions, then it is set to Indeterminate. If the category does not change, then assessors should enter Present or Viable as the best estimate of the state. The second option is given because if there are several SUs, the extreme uncertainty in one SU may not affect the category of a metric, although it would affect its numerical value.

11. Categories

The Green Status system is relatively complex, with a Species Recovery Score and four conservation impact metrics produced for each species, because it is trying to address a number of different questions (section 2). However, each of these questions target different audiences (e.g., general public, politicians, conservation managers, researchers, donors), so that any one report or synthesis of assessments might include only a subset of the results.

The communication of the Species Recovery Score and the four conservation impact metrics is further simplified by converting the numerical scores to categories. This is conceptually similar to the Red List system, which divides the continuum of risk of future extinction into broad Red List categories of LC to CR (Collen et al. 2016), and the probability that a species is extinct into extinct, possibly extinct and extant (Akçakaya et al. 2017).

Species Recovery Score ranges from 0% to 100%. The values of the four conservation impact metrics also range mostly from 0% to 100%, but can include negative values in some cases. In order to provide context and allow interpretation of the percentage value of the metric, and to highlight cases of outstanding conservation impact, this range of values is divided into categories, using thresholds that are given in the Standard. The thresholds have been determined based on the test cases of 181 species. They were set to be meaningful (e.g., capture what most assessors understand as High impact conservation), and to be useful (e.g., so that there are more than a negligible and less than an overwhelming number of species in each category). This is similar to the way Red List thresholds are considered to be useful (Collen et al. 2016; IUCN Standards and Petitions Committee 2024). For each metric, the rules are evaluated in the order given in the Standard and if the condition given for a category is met, no further categories are evaluated.

For the Species Recovery Score, the value of 100% corresponds to Fully Recovered. However, species that have not benefitted from conservation (i.e., with a Conservation Legacy value of 0%) but also have a Species Recovery Score of 100% are categorized as

"Non-Depleted" because the concept of recovery is not relevant in these cases. A Species Recovery Score of 0% corresponds to extinction (i.e., the species is Absent in all spatial units). The values between 0% and 100% are divided into four categories representing the degree of depletion (Slightly Depleted, Moderately Depleted, Largely Depleted, Critically Depleted), based on the thresholds given in the Standard. If the uncertainty is high (defined as the range of plausible values being >40%), the Species Recovery Category is set as Indeterminate.

The values for the four conservation impact metrics are categorized as High, Medium, Low, Zero, Negative, or Indeterminate (e.g., a species could have a Medium Conservation Dependence). For each conservation impact metric, if the minimum value is less than 0% and the maximum value is more than 40%, the category is set as Indeterminate and no further conditions are checked.

For each metric the High category can be achieved in one of three ways: the numerical value is more than 40%; the numerical value is small but represents avoidance of extinction; or the numerical value is small but is substantial compared with the Current score (as defined in Standard).

If the metric does not qualify for the High category, but its value is more than 10%, it qualifies for Medium category. Otherwise, it qualifies for one of Low (>0%, <10%), Zero (0%), or Negative (<0%) categories.

Note that for certain types of use (for example analysis across multiple species for a scientific publication), the numerical scores (percentages), as well as their uncertainties, would be more appropriate as they would allow a more comprehensive representation of the results that could be lost with the cruder categories.

12. Regional Assessments (including national assessments)

Green Status assessments at regional spatial scales are possible, but require careful considerations of the "range" and "parts of the range" aspects of the definition of Fully Recovered. Regional assessments (which include national assessments) should only be done after Steps 1, 2, and 3 of a global assessment (as described in the *Test Protocol* document). These steps involve determining the indigenous and expected additional global range, delineating spatial units (the parts of the range), and defining and quantifying functionality.

To the extent possible, the species' range considered in a regional (including national) assessment should involve one or more of the spatial units of the global assessment in their entirety. In other words, to the extent possible, regional assessments should not divide a spatial unit determined and delineated for the purposes of a global assessment in such a way that one part of a global SU is within the region and another part is outside the region (though this may not always be possible e.g. for national assessments). Including whole spatial units (of the global assessment) in regional assessments will make it possible to combine results of two or more regional assessments, and therefore facilitate the information flow from regional to global assessments.

13. Required and Recommended Information

An IUCN Green Status of Species assessment includes the state in each spatial unit in each scenario (Current, Counterfactual current, Future-with-conservation, Future-without-conservation, Long-term Potential), the Green Scores derived from these states, the resulting conservation impact metrics and categories, and a range of supporting information (documentation). The purpose of providing supporting information with the assessment is:

1. To support and justify adequately each Green Status assessment.
2. To allow basic analysis of the Green Status across species.
3. To allow users to search and find information on the website.

The more relevant supporting information is attached to an assessment, the more useful the assessment will be for all three of the above purposes. There are two tiers of supporting information to include in a Green Status assessment.

13.1. *Required Supporting Information*

Supporting information is required for all Green Status assessments before they can be accepted for publication (see Table 5). A Green Status of Species assessment can only be undertaken where a Red List assessment for the same species already exists. The Red List assessment need not be published, but it must already be in SIS. Further, a Green Status assessment cannot be submitted for publication unless its parent Red List assessment has been submitted for publication. The Required supporting information details provided below therefore require that information requirements 1-13 detailed in Annex 1, Table 1, of the *Rules of Procedure for IUCN Red List Assessments* are met. Note some information is only Required under certain conditions (Table 6). A Green Status assessment must always include the Current Green Score, also known as the Species Recovery Score (even if no other assessment for any other time period is completed). This provides a measure of distance from full recovery.

13.2. ***Recommended Supporting information***

Recommended supporting information is not essential for a Green Status assessment to be accepted for publication, but is encouraged to provide maximum information to support conservation efforts. See Table 7 and Appendix 1.

Table 5: Required supporting information for all assessments submitted to the IUCN Green Status of Species. Any assessments that do not include all of the information listed in this table will be returned to Assessors.

Required Information	Purpose	Guidance Notes
1. Benchmark year for indigenous range	Clarify the reference date used for indigenous range	See section 4.1.
2. Narrative text defining the indigenous range at the stated benchmark year, and (if applicable) the expected additional range	To describe the range of the species at the stated benchmark year, and areas which are expected to become suitable and inhabited by the species in the next 100 years	Provide sources of evidence justifying the delineation of indigenous and (if applicable) expected additional range (subfossils, historical records, backcasting habitat suitability, etc.)
3. GIS map delineating the range of the species, specifically distinguishing the indigenous range and (if applicable) expected additional range. For sensitive species, see documentation guidelines for Red List.	To visualize the distribution of the species on the website, both in the past and projected into the future To inform conservation planning	Use best available information to construct a map accurately reflecting the range at the benchmark year (see Grace et al. 2019). Parts of the indigenous range where the species is not currently found should be coded up using presence codes for Possibly Extinct or Extinct; Expected additional range should be coded up using presence code for "Expected Additional Range." For further guidance, see IUCN SSC Red List Technical Working Group 2024.
4. Name, and brief but sufficiently detailed description of the location and extent, of each spatial unit (which allows readers to fully understand the extent of each SU), and the basis for their definition	For easy reference to spatial units in the Green Status of Species assessment, and clarify the basis upon which these units have been delineated	See section 4.2. The rationale for spatial unit delineation must be in relation to indigenous range (not current range).
5. Coding of species' ecological function(s)	To enable the inclusion of species functionality in the Green Status of Species assessment	See section 4.5 and Akçakaya et al. (2020)
6. Definition of how species functionality would be demonstrated within a spatial unit	To enable the inclusion of species functionality in the Green Status of Species assessment	See section 4.5 and Akçakaya et al. (2020)
7. Minimum, Maximum and Best (most likely estimate) of state in each spatial unit for each scenario assessed	To assess the condition of the species in the spatial unit To reflect uncertainty about the state in each spatial unit	See sections 4.3, 4.4, 4.5, 4.6, and the Standard
8. A brief rationale for the state in each spatial unit for each scenario assessed	To justify the state selected in each spatial unit and to qualify or explain the counterfactual for each time period assessed	Discuss any inferences, assumptions or uncertainty that relates to the interpretation of the data and information. The rationale must provide a sufficient basis for reviewers to understand how the assessment has been made. See sections 5 to 8.

Required Information	Purpose	Guidance Notes
9. Species Recovery Score and Species Recovery Category[calculated automatically once the assessor completes the states]	To provide an overall measure of species recovery at the time of assessment (expressed both as a percentage and a category) for the species, based on the states in all spatial units.	A Green Status of Species assessment must always include an assessment of the state for at least the "Current" scenario (even if no other assessment for any other time period is completed). The Current Green Score (or Species Recovery Score) is calculated automatically as a percentage of Fully Recovered, based on the state in each spatial unit and also expressed as a category
10. Bibliography (cited in full; including unpublished data sources but not personal communications)	To underpin the assessment and provide all sources of data and information used to support the Green Status of Species assessment	In SIS, references are recorded in the Reference Manager.
11. Names and contact details of the Assessor(s) and at least one Reviewer	To demonstrate that the appropriate assessment and review process has been undertaken To acknowledge those involved in the assessment. To allow Assessors and Reviewers to be contacted easily in the case of the assessment content being questioned	All contact details are stored in SIS; only names are displayed on the website. More than one Reviewer is encouraged in certain cases, including: i) commercially significant species; ii) species that have undergone a genuine improvement; or iii) species for which assessments may otherwise be contentious. Also recording Contributor(s), Compiler(s), and Facilitator(s) allows them to be acknowledged on the website, but is not required.
12. Answers to self-review questions	To provide further documentation of the inferences made in the assessment	Questions are found in Appendix I.

Table 6: Required supporting information for Green Status of Species assessments under specific conditions. The list of required supporting information (under specific conditions) is essential for all assessments that meet the conditions outlined below. Any assessments for taxa meeting these conditions that do not include all of the information listed below will be returned to Assessors.

Required Information (under specific conditions)	**Specific Condition**	**Purpose**	**Guidance Notes**
Conservation impact metrics and categories [calculated automatically once the assessor completes the states]	For any Green Status of Species assessment that wishes to document the impact of past and/or future conservation	To identify the status of the species for each of the four conservation impact metrics; To support website functionality; To allow basic analyses; For the GSS Index	The metrics are calculated as the difference between two Green Scores. Each can potentially vary from 0 to 100%, and each metric is divided into categories according to a set of defined thresholds (see section 11).
Generation length	If any spatial unit meets the criteria for any threatened Red List category under the criteria A or C1.	To determine whether the spatial unit meets the criteria for the Viable state.	See the current version of the *Guidelines for Using the IUCN Red List Categories and Criteria*. If this information differs from that used in a Red List assessment (or is absent in the Red List assessment), the justification for its derivation must be provided.
Red List category and criteria (in each spatial unit) for the time period assessed	For any Green Status of Species assessment in a spatial unit using the Fine-resolution State	To support the Fine-resolution State selected in each spatial unit	**See section 4.3,** *IUCN Red List Categories and Criteria***,** and the current version of the *Guidelines for Using the IUCN Red List Categories and Criteria.*
Year of the start of conservation actions	If any conservation actions have been implemented or are currently in place	To support the estimation of the Counterfactual Current state	
Table showing area of each SU in each country (in km^2)	For any Green Status of Species assessment that will be included in the GSS Index*	To allow disaggregation of the Index value to countries	Row headings should match the name given to each SU; column headings should be country names used in SIS
Information on the Reason for change in Species Recovery Category or Conservation Impact Categories, and whether the taxon has qualified for a genuine change or not	For any repeat Green Status of Species assessment	To distinguish changes resulting from genuine improvement or deterioration from those resulting from changes in taxonomy, new information or change in knowledge, assessor attitude or other factors. This allows calculation of the GSS Index and its disaggregations	This should be coded regardless of whether a species qualifies in the same or for a different category. Non-genuine changes may result from changes in knowledge, level of ambition, assessor attitude, method for delineating and defining spatial units, benchmark date, or a change from static to dynamic baseline.

*The Green Status of Species Index will comprise a predetermined set of species (that will be made available to assessors) for which the Required documentation is a table showing area of each SU in each country, and the Recommended information would be a GIS map delineating the spatial units so that this can be automatically generated

Table 7: Recommended supporting information for Green Status of Species assessments

Recommended Information	Purpose	Guidance Notes
1. GIS distribution maps with polygons showing the delineation of spatial units	To describe the limits of the species according to the individual spatial units	For further guidance, see IUCN SSC Red List Technical Working Group 2024. Note that guidance around delineation of Spatial Units is currently in preparation.
2. Coding of major threats that applied when considering the state in each spatial unit for the scenario assessed	To indicate the main factors that have plausibly affected the species' status To allow basic analyses	These complement the information contained in the brief rationale and should follow the IUCN Threats classification scheme. For the current period, these should match the Red List assessment.
3. Coding of important conservation actions that applied for estimating the state in each spatial unit for scenario assessed	To indicate the important actions that led to the predicted change in the state in the spatial unit (which the assessor will need to have considered and explained in the justification) To allow basic analyses	These codes complement the information contained in the brief rationale and should follow the IUCN Conservation Actions classification scheme. For the current period, these should match the Red List assessment.
4. Species' Red List categories and criteria for each scenario	To complement the conservation impact categories	To compare how recovery and extinction risk are expected to co-evolve, the IUCN Red List category of the species as a whole can be assessed under each scenario. Should be expressed as Minimum, Maximum and Best estimate, and indicating the criteria met.

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Appendix 1. Building scenarios to estimate conservation impact metrics

This Appendix provides guidance for assessors on building scenarios to estimate the four conservation impact metrics (Conservation Legacy, Conservation Dependence, Conservation Gain, and Recovery Potential).

Part 1: Developing a counterfactual to estimate Conservation Legacy

1.1. At the year 1950, were any conservation actions in place that may have impacted this species? Have any actions been put in place since 1950? Answer Yes if either is correct, answer No if both are incorrect.

Conservation actions do NOT have to have been implemented solely for the benefit of this species (e.g., wildlife laws, environmental legislation, establishment of a protected area, etc. are also considered). Also consider that in some cases conservation actions might have occurred outside of the species' range but had an effect on the species (e.g. demand reduction campaigns in consumer countries).

If yes, continue to Step 1.2. If NO, the Counterfactual Current and Current states are the same (i.e., Conservation Legacy = 0), and you should proceed to Part 2.

1.2. Identify conservation actions that have potentially affected species status

Think broadly; what was the first conservation action that plausibly could have provided benefit to this species? If this action was still in place or in effect in the year 1950, this conservation action should be considered in this assessment. All subsequent conservation actions (that were in effect in 1950 or were implemented after 1950) should be considered. If no actions were in effect in 1950, then consider all conservation actions that were put into effect since 1950.

You should do this for each spatial unit individually, while recognising that some conservation actions apply across spatial units.

OPTIONAL: To ensure you consider all relevant factors, speed up assessment and aid consistency across processes (e.g., IUCN Red List assessments and conservation planning), consider using the IUCN Red List conservation actions classification scheme.

1.3. In what year did these conservation actions begin?

Review the conservation actions that will be considered for this assessment (identified in Step 1.2). State the year that the very first of these actions began.

1.4. OPTIONAL: Estimate the Former State.

If the date identified in Step 1.3 is before the year 1950, then the Former State should be estimated at the year 1950. If the date identified in Step 1.3 is after the year 1950, the Former State should be estimated at that date. Assess and record the state (Absent, Present, Viable, Functional) for each spatial unit at the appropriate date to estimate the Former State.

If you do not need or wish to perform this contextualising step, proceed to Step 1.5.

1.5. Identify the main factors that have plausibly affected species status since the year identified in Step 1.3.

Think about both positive and negative factors (i.e., advantages and threats). You should consider both anthropogenic and natural factors.

You should do this for each spatial unit individually, while recognising that some factors apply across spatial units.

*OPTIONAL: To ensure you consider all relevant factors, speed up assessment and aid consistency across processes (e.g., IUCN Red List assessments and conservation planning), consider using the IUCN Red List classification schemes, paying attention to the difference between "**threats**" and "**stresses**" as defined in their respective classification schemes. For the purposes of this step, a negative factor can be either a threat or a stress.*

1.6. Given the factors identified in Step 1.5, what do you expect the status of the species would have been today in the absence of the conservation actions identified in Step 1.2?

On the balance of the evidence, would these factors have resulted in the species having a different Green Score today if conservation actions had not been taken? Do you expect that the factors (advantages or threats) would have continued affecting the species at the same level in the absence of conservation?

You should do this for each spatial unit individually, while recognising that some factors and conservation actions apply across spatial units.

1.7. On the balance of the evidence, is it likely that the conservation actions identified in Step 1.2 prevented the introduction of new threats, or potentially created new threats? How does this change your answer from Step 1.6?

You should do this for each spatial unit individually, while recognising that some factors and conservation actions apply across spatial units.

1.8. Based on your answers to 1.6 and 1.7, and using one of the inferential approaches listed in Table 3 (or experimental or quasi experimental evidence if available), record the expected state (Absent, Present, Viable, or Functional) in each spatial unit in the absence of conservation actions.

This is the Counterfactual Current scenario, and the difference between the Green Score generated in this scenario and the Current Green Score is the Conservation Legacy.

Part 2: Developing scenarios to estimate Conservation Dependence and Gain

2.1. List all currently ongoing conservation actions.

Remember that conservation actions do NOT have to have been implemented solely for the benefit of this species (e.g., wildlife/ environmental legislation, establishment of a protected area, etc. are also considered). Also consider that in some cases conservation actions might be occurring outside of the species' range but have an effect on the species.

You should do this for each spatial unit individually, while recognising that some conservation actions apply across spatial units.

OPTIONAL: To ensure you consider all relevant factors, speed up assessment and aid consistency across processes (e.g., IUCN Red List assessments and conservation planning), consider using the IUCN Red List conservation actions classification scheme.

2.2. List any additional conservation actions that will be implemented within one year of this assessment.

To include additional conservation actions, they must be actions for which all required conditions are met and all required resources are in place, or are extremely likely to be so within the year. This requires a "beyond a reasonable doubt" burden of proof.

You should do this for each spatial unit individually, while recognising that some conservation actions apply across spatial units.

Together steps 2.1 and 2.2 result in a list of the actions to consider when generating the Current Baseline, a dynamic baseline against which to assess Conservation Dependence and Conservation Gain. Assessors not wishing to estimate a dynamic baseline may default to using a static baseline of the Current Green Score to assess Dependence and Gain.

2.3. List any additional conservation actions that are planned for implementation within 10 years of this assessment.

Plans for these actions do not need to be definite, but they do need to be feasible and likely. This could include actions which are listed in a Species Action Plan, or which are envisaged in funding proposals or government planning. They should have a time frame and ideally an assessment of the cost and likely outcome of the action.

You should do this for each spatial unit individually, while recognising that some conservation actions apply across spatial units.

Together steps 2.1 to 2.3 result in a list of the conservation actions to consider when assessing the Future-with-conservation and Future-without-conservation Green Score.

2.4. Identify the main factors, other than conservation actions, which will impact species status going forward.

Think about both positive and negative factors (i.e., advantages and threats). You should consider both anthropogenic and natural factors.

Consider both currently-operating factors and factors which are expected, on the balance of the evidence, to emerge within the next 10 years. Be sure to consider changes in population size, density, spatial distribution, and age structure that may affect the species' functionality, as well as those that may affect its persistence in the spatial unit.

You should also consider factors which are not likely to occur, but would have a large effect on species status if they do occur. For example typhoons or flooding in areas which are not prone to them, emerging diseases, or the emergence of a black market for the species.

You should do this for each spatial unit individually, while recognising that some factors apply across spatial units.

*OPTIONAL: To ensure you consider all relevant factors, speed up assessment and aid consistency across processes (e.g., IUCN Red List assessments and conservation planning), consider using the IUCN Red List classification schemes, paying attention to the difference between "**threats**" and "**stresses**" as defined in their respective classification schemes. For the purposes of this step, a negative factor can be either a threat or a stress.*

2.5. Estimate Conservation Dependence

2.5a. Given the factors identified in Step 2.4, and using one of the inferential approaches listed in Table 3 (or experimental or quasi experimental evidence if available), what do you expect the status of the species will be in 10 years in the absence of the conservation actions identified in Steps 2.1-2.3?

In addition to the most likely status, you should specify the “upper” and “lower” possibilities, to reflect uncertainty, as well as the inclusion or exclusion of unlikely events that may have large impacts.

Consider the species' life history (e.g. generation length and reproductive rate) to provide realistic bounds on population growth when projecting species status from the present day into the future.

Be sure to consider changes in population size, density, spatial distribution, and age structure that may affect the species' functionality, as well as those that may affect its persistence in the spatial unit.

You should do this for each spatial unit individually, while recognising that some factors apply across spatial units.

2.5b. OPTIONAL: Given the factors identified in Step 2.4, and using one of the inferential approaches listed in Table 3 (or experimental/quasi experimental evidence if available), what do you expect the state of the species in each spatial unit will be in 10 years in the presence of the conservation actions identified in Steps 2.1-2.2 only?

The Green Score generated in this scenario is the value of the dynamic Current Baseline against which the future-with-conservation and future-without conservation Green Scores should be compared. The alternative to this step is to use the Current Green Score as a static Current Baseline.

In addition to the most likely status, you should specify the “upper” and “lower” possibilities, to reflect uncertainty, as well as the inclusion or exclusion of unlikely events that may have large impacts. Consider the species' life history (e.g. generation length and reproductive rate) to provide realistic bounds on population growth when projecting species status from the present day into the future.

Be sure to consider changes in population size, density, spatial distribution, and age structure that may affect the species' functionality, as well as those that may affect its persistence in the spatial unit.

You should do this for each spatial unit individually, while recognising that some factors apply across spatial units.

2.5c. On the balance of the evidence, is it likely that the conservation actions identified in Steps 2.1-2.3 will prevent the introduction of new substantive threats, or potentially create new threats? How does this change your answer from Step 2.5a?

2.5d. Record the expected state (Absent, Present, Viable, or Functional) in each spatial unit in the absence of any future conservation actions (as described in steps 2.1-2.3).

The difference between the Green Score generated in this Future-without-conservation scenario and the Current Baseline Green Score is the Conservation Dependence.

2.6. Estimate Conservation Gain

2.6a. Given the factors identified in Step 2.4, and using one of the inferential approaches listed in Table 3 (or experimental or quasi experimental evidence if available), what do you expect the status of the species will be in 10 years if all conservation actions in steps 2.1-2.3 are continued or implemented?

In addition to the most likely status, you should specify the "upper" and "lower" possibilities, to reflect uncertainty, as well as the inclusion or exclusion of unlikely events that may have large impacts.

Consider the species' life history (e.g. generation length and reproductive rate) to provide realistic bounds on population growth when projecting species status from the present day into the future.

Be sure to consider changes in population size, density, spatial distribution, and age structure that may affect the species' functionality, as well as those that may affect its persistence in the spatial unit.

You should do this for each spatial unit individually, while recognising that some factors apply across spatial units.

2.6b. Based on one of the inferential approaches listed in Table 3 (or experimental/quasi experimental evidence if available), how do you expect the conservation actions identified in Steps 2.1-2.3 to modify the factors identified in Step 2.4?

On the balance of the evidence, is it likely that the conservation actions will reduce the effects of threats identified in Step 2.4, or prevent new threats from emerging?

You should do this for each spatial unit individually, while recognising that some conservation actions apply across spatial units.

2.6c. Record the expected state (Absent, Present, Viable, or Functional) in each spatial unit if conservation actions in steps 2.1-2.3 are continued or implemented.

This is the Future-with-conservation scenario.

The difference between the Green Score generated in this Future-with-conservation scenario and the Current Baseline Green Score is the Conservation Gain.

Part 3: Estimating Recovery Potential

The goal of Part 3 is to estimate the best plausible scenario for the species that could be achieved within 100 years. It is important to note that this does NOT necessarily represent a specific conservation vision or goal; rather, it aims to describe all opportunities for future recovery actions.

3.1. Which currently-occupied spatial units will no longer be available to the species in 100 years' time (if any)?

On the balance of the evidence, are there plausible, immitigable, substantive threats which would lead to the species becoming absent in any spatial units?

3.2. Are there any spatial units which are not currently occupied, but where the species could recolonize naturally or be reintroduced?

Spatial units within the indigenous range which are currently unsuitable but which could be made suitable in 100 years, if habitat restoration and/or threat removal were undertaken, should be included.

3.3. In 100 years' time, is it likely that will there be new spatial units occupied by the species?

These spatial units would be considered part of the species' **expected additional range**. This is a rare scenario and will not apply for most species assessments. It requires both that:

i) The species moves (or is moved) outside of its indigenous range, and

ii) The new distribution cannot be captured using the original spatial units. For example, if spatial units were delineated by ecoregions, a range shift would only create a new spatial unit if the species moves into a new ecoregion.

Note that if the species is moved by humans to a new area outside its indigenous range, this relocation must fit the definition of "conservation translocation" as defined by the IUCN Red List in order to be counted as a new spatial unit.

3.4. In Steps 3.1-3.3, you identified the spatial units which could be available to the species in 100 years' time. For each spatial unit, estimate the best possible status that could be achieved in 100 years.

In this scenario, there are no financial or resource restrictions. In other words, in a scenario with unlimited budget and unlimited resources, what is the maximum status (Absent, Present, Viable, Functional) that could be achieved in 100 years in each spatial unit, taking into account immitigable pressures on the species?

The difference between this the Green Score generated in this scenario and the Current Green Score is the Recovery Potential.

Final Step: Self- Review

1. Disclose any potential conflicts of interest which could bias the assessment.

2. Is there any discrepancy between this assessment and the Red List assessment for the species?

If so, comment on the likely reason for this discrepancy.

3. Review the impact that you assigned to the various factors and conservation actions.

Would the trajectory of the species be very different if other choices were made? If so, review your justification for these choices. If appropriate, widen the bounds (change the lower and upper plausible values) to reflect the uncertainty introduced by the possibility of these other choices.

Appendix 2. Questions to be considered by the external reviewers

It is recommended that each assessment be reviewed by at least two experts.

1. Disclose any potential conflicts of interest which could bias your review.
2. After reviewing the assessment, and given any personal knowledge of the species and the region, can you think of any other factors which could affect species status besides those listed by the assessor(s)?
3. Can you think of any other conservation actions which may have had an impact on species status besides those listed by the assessor(s)?
4. Do you disagree with the assessor(s)' evaluation of the impact of any of the factors or conservation actions on the species? E.g., do you disagree with the evaluation of the extent (spatial or temporal) of the factor/ action, or its magnitude (in the case of actions, effectiveness)?
5. Do you disagree with any of the probabilistic assertions made by the assessor(s) (i.e., do you disagree that on the balance of the evidence, a certain outcome would be observed)?
6. Do you think that uncertainty in outcomes has been appropriately accounted for?
7. Do you have knowledge of any conflict of interest on the part of the assessor(s) that they did not document?
8. Do you have any concerns about the assessment process which was employed?
9. What is the effect of your answers to 1-8 on the final assessment made by the assessor(s)?
10. Do you recommend that the assessment be referred back for further evaluation?