Consultation Document on an IUCN Standard for the Identification of Key Biodiversity Areas

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DRAFT

Credit Cover Photo: *Table Mountain, in South Africa, is home to the only known population of the Critically Endangered (CR) Table Mountain Ghost Frog (*Heleophryne rosei*) and is therefore considered to be an Alliance for Zero Extinction site and a Key Biodiversity Area © Rachel Lovinger*

IUCN (International Union for Conservation of Nature)

IUCN helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN works on biodiversity, climate change, energy, human livelihoods and greening the world economy by supporting scientific research, managing field projects all over the world, and bringing governments, NGOs, the UN and companies together to develop policy, laws and best practice. IUCN is the world's oldest and largest global environmental organization, with more than 1,200 government and NGO members and almost 11,000 volunteer experts in some 160 countries. IUCN's work is supported by over 1,000 staff in 45 offices and hundreds of partners in public, NGO and private sectors around the world.

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IUCN Species Survival Commission (SSC)

The IUCN Species Survival Commission (SSC) is a science-based network composed of around 9,000 species experts including scientists, field researchers, government officials and conservation leaders, volunteer experts from almost every country of the world, all working together towards achieving the vision of "A just world that values and conserves nature through positive action to reduce the loss of diversity of life on earth". SSC advises IUCN and its members on the wide range of technical and scientific aspects of species conservation, and is dedicated to securing a future for biodiversity. SSC has significant input into the international agreements dealing with biodiversity conservation.

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IUCN World Commission on Protected Areas (WCPA)

The IUCN World Commission on Protected Areas (WCPA) is the world's leading network of protected area expertise. It is administered by IUCN's Programme on Protected Areas and has over 1,400 members, spanning 140 countries. IUCN WCPA works by helping governments and others plan protected areas and integrate them into all sectors; by providing strategic advice to policy makers; by strengthening capacity and investment in protected areas; and by convening the diverse constituency of protected area stakeholders to address challenging issues.

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This consultation document presents a draft of the standard for identification of Key Biodiversity Areas, comprising the criteria, thresholds, delineation guidance, and definition of terms. This will be presented for adoption by IUCN Council in due course. It will in turn form the basis for establishment of a knowledge product, additionally encompassing the rules and procedures for application of the standard, the list and underlying database of Key Biodiversity Areas and associated documentation, capacity-building mechanisms and tools to support the use of Key Biodiversity Areas, and the presentation of these data on the Key Biodiversity Areas website. It is also anticipated to underpin a global Key Biodiversity Areas initiative of joint efforts to advance site conservation through developing and promoting the Key Biodiversity Areas knowledge product, integrating and extending beyond BirdLife International's Programme to identify and conserve Important Bird and Biodiversity Areas, and related initiatives.

KEY BIODIVERSITY AREAS

Key Biodiversity Areas are sites contributing significantly to the global persistence of biodiversity.

Site—A geographical area on land or in water (both freshwater and the oceans) with defined ecological, physical, administrative or management boundaries that it is actually or potentially manageable as a single unit (e.g. a protected area or other managed conservation unit). For this reason, large-scale regions of conservation priority such as Ecoregions, Endemic Bird Areas and Biodiversity Hotspots, which often span multiple countries, are not considered to be sites. In the context of KBAs, "site" and "area" are used interchangeably.

Biodiversity—We follow the definition of the Convention on Biological Diversity (UN 1993) of *biodiversity* as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." Typically, this implies that elements of *biodiversity* are species or ecosystems. This definition is also used by IUCN in its Programme 2013-2016.

Persistence—The *persistence* of a biodiversity element implies not only avoidance of its loss (e.g., species extinction, ecosystem collapse) but also of its decline (e.g., of species populations, ecosystem extent and condition), both today and in the medium-term future, as climate change and other environmental drivers continue.

Contributing—The *contribution* of a site to the persistence of biodiversity depends on two factors. The first is the distribution of the elements of biodiversity occurring at the site. Sites holding species or ecosystems occurring in few (or no) other places make high contributions to persistence. The second is the risk of loss facing the biodiversity elements occurring at the site. Sites holding species or ecosystems that face a high risk of loss make high contributions to persistence.

Significantly—*Significant* means that the proportion of a biodiversity element occurring at the site (e.g., species population size or ecosystem extent) exceeds a predetermined threshold of significance. Thus, sites meeting or exceeding the threshold hold more of a given biodiversity element than sites that do not.

Global—*Global* implies that the contributions of a site to the persistence of a given biodiversity element are measured in relation to the worldwide extent of the element.

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FOREWORD

Biodiversity, the marvellous library of life and evolution, and the nurturing web it represents for all species and all generations, is very unevenly distributed around our planet and it is being lost rapidly. Under the combined impacts of habitat conversion, climate change, unsustainable use, and invasive species and diseases, many places holding outstanding biodiversity are in danger of disappearing for good.

There is great demand from across society to know, with precision, where these places that contribute so significantly to the global persistence of biodiversity occur. Most obviously, conservation agencies in governments and civil society – the IUCN Membership – need this information to guide their priorities and strategies for establishment of protected areas and other site-based actions. But many other actors also want to know the location of important sites for biodiversity. The multilateral environmental agreements (MEAs), including the Ramsar Convention, the World Heritage Convention, the Convention on Migratory Species, and the Convention on Biological Diversity, use such information to facilitate the implementation of commitments like the Aichi Targets, notably Target 11, the identification of relevant sites, such as Ramsar sites or Ecologically and Biologically Significant Marine Areas, and the Global Strategy for Plant Conservation, and then to support national reporting against such commitments. The implementation of the European Union’s Birds Directive requires member states to identify relevant sites as Special Protection Areas (SPA). Financial institutions and private sector companies use biodiversity information to structure their environmental safeguard policies and certification mechanisms. Local and indigenous communities use it to support their stabilization of land tenure, attract investment, retain and conserve ecosystem services upon which they depend, and mobilize local pride and sense of place. Scientists use it to study patterns and processes in life on Earth. And citizens everywhere use it to guide their nature recreation and ecotourism, as well as in education and inspiration of the world around us all.

For nearly four decades, a range of institutions have invested in compiling information on the location of sites that are significant for biodiversity. Since the late 1970s, BirdLife International has maintained criteria for the identification of Important Bird and Biodiversity Areas (originally known as Important Bird Areas), with more than 12,000 sites identified worldwide. Building on this success, other approaches have been developed, including Important Plant Areas; Alliance for Zero Extinction sites; B-ranked Sites; Prime Butterfly Areas; and KBAs identified for multiple taxonomic groups in freshwater, terrestrial, and marine environments. There is no doubt that these taxon-, ecosystem-, and theme-specific approaches comprise rich sources of information, have focussed much conservation effort to priority sites and resulted in many of them becoming formally protected or otherwise managed for the benefit of biodiversity.

Faced with many different approaches to identify important sites for biodiversity, however, how does an indigenous community, or a mining company, or the World Bank, know which sites are the most ‘important,’ i.e. make the most significant contributions to the global persistence of biodiversity? To address this challenge, in 2004, the governments and government agencies, and NGOs, who between them comprise the IUCN Membership, asked the Union “to convene a worldwide consultative process to agree a methodology to enable countries to identify Key Biodiversity Areas.”

Developing this Standard for Key Biodiversity Area identification has been a challenging task. It required leadership from a Joint Taskforce on Biodiversity and Protected Areas, convened jointly by the World Commission on Protected Areas and the Species Survival Commission with extensive input from IUCN’s other four Commissions and from many IUCN Secretariat staff, notably from the IUCN Global Species Programme. It has required the generosity and vision of donors from across sectors, including governments (Abu Dhabi, Brazil, Canada, France), philanthropic foundations (John D. and Catherine T. MacArthur Foundation, MAVA Foundation), the private sector (Rio Tinto, Shell, The Biodiversity Consultancy), academia (Cambridge Conservation Fund, Instituto Venezolano de Investigaciones Científicas, Sapienza Università di Roma), and conservation organizations (Fondazione Bioparco di Roma, BirdLife International, NatureServe, UNEP-WCMC). Conservation International and the Critical Ecosystem Partnership Fund provided proof-of-concept. Above all, it has required great efforts, creativity, patience and willingness to compromise from hundreds of Commission members, staff of IUCN Member organizations and of the IUCN Secretariat (both in the regions and HQ), and scientists, practitioners, and policy-makers from institutions around the world.

It has been worth it. For the first time ever, we have a standard developed and owned by the conservation community for assessment of sites contributing significantly to the global persistence of all biodiversity. This builds on and preserves the nearly four decades of previous initiatives, but also adds significant components (for example, for ecological integrity, and for genetic and phylogenetic diversity and process) missing from existing approaches. Most important, it gives us an umbrella standard for biodiversity in its complete sense and carefully defined thresholds, such that user communities from all sectors of society can have confidence that Key Biodiversity Areas are indeed *key* – and that processes to identify them will yield equivalent sites (as far as possible) between countries and assessors, and over time.

With the standard in hand, the baton now passes to the biodiversity conservation community – IUCN Members and other institutions at the national level, supported as needed by international partners. The identification of Key Biodiversity Areas, expanding from the datasets developed by existing approaches, according to the new standard, must be led and owned at national levels. Indeed, this has been fundamental to the success of many of the existing approaches, including IBAs, where data gathered locally are collated and analysed at the national level prior to regional review and assessment against a global standard. Experience has shown that maximising national involvement from the beginning of the process offers the best prospects of successful conservation outcomes. Centralised guidance by IUCN and partners will be offered in the application of the new Standard. Given the rate of global biodiversity loss, expanding the Key Biodiversity Area inventory across all countries is urgent.

Even more urgent, however, is use of the existing information compiled through the range of approaches to identify Key Biodiversity Areas. The identification of Key Biodiversity Areas is not prescriptive and does not demand the implementation of any particular kind of conservation action at any given site. KBAs can and should be used to assess protected area gaps and identify new sites for protected area status; sites for which legal, statutory protection may not be relevant should be managed for biodiversity and harmful activities should be avoided there. We call on all sectors of society to use Key Biodiversity Area information to guide their own activities, such that the glorious biodiversity of outstanding sites around our planet persists into the future.

Simon Stuart, Ph.D.
Chair
IUCN Species Survival Commission

Ernesto Enkerlin-Hoeflich, Ph.D.
Chair
IUCN World Commission on Protected Areas

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LIST OF ACRONYMS

AZE	Alliance for Zero Extinction
CBD	Convention on Biological Diversity
CEC	Commission on Education and Communication
CEESP	Commission on Environmental, Economic and Social Policy
CEM	Commission on Ecosystem Management
CEPF	Critical Ecosystem Partnership Fund
EBSA	Ecologically or Biologically Significant Marine Area
FPIC	Free Prior Informed Consent
FPP	Forest Peoples Programme
HCVF	High Conservation Value Forest
IBA	Important Bird and Biodiversity Area
IFC	International Finance Corporation
IPA	Important Plant Area
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
NGO	Non-Governmental Organization
PS6	Performance Standard 6 (IFC)
SPSC	Standards and Petitions Subcommittee
SSC	Species Survival Commission
SPA	Special Protection Areas of the European Union
UN	United Nations
UNEP	United Nations Environment Programme
WCC	World Conservation Congress
WCEL	World Commission on Environmental Law
WCMC	World Conservation Monitoring Centre
WCPA	World Commission on Protected Areas

EXECUTIVE SUMMARY

In 2004 at the World Conservation Congress, held in Bangkok, Thailand, the IUCN Membership requested IUCN "to convene a worldwide consultative process to agree a methodology to enable countries to identify Key Biodiversity Areas." In response to this Resolution (WCC 3.013), the IUCN Species Survival Commission and the IUCN World Commission on Protected Areas established a Joint Task Force on Biodiversity and Protected Areas. Over a period of three years, the Joint Task Force mobilized input from IUCN Commissions, Members and Secretariat staff, other conservation organizations, academics, national decision-makers, donors and the private sector to consolidate the scientific criteria and methodology for identifying Key Biodiversity Areas (KBAs) as **sites that contribute significantly to the global persistence of biodiversity**.

The KBA Standard provides an overarching framework to harmonize existing approaches to identify important sites for biodiversity. It builds on more than 30 years of experience in identifying sites for different taxonomic, ecological or thematic subsets of biodiversity, in particular Important Bird and Biodiversity Areas (see Box 1), but also Important Plant Areas, Alliance for Zero Extinction sites, and Key Biodiversity Areas in freshwater, marine and terrestrial systems identified under previously published criteria. The KBA Standard also supports the identification of additional sites important for components of biodiversity not addressed by existing approaches.

The KBA criteria can be used to identify sites that contribute significantly to the global persistence of:

(A) Threatened biodiversity,
(B) Geographically restricted biodiversity,
(C) Ecological integrity,
(D) Biological processes, and
(E) Biodiversity through comprehensive quantitative analysis of irreplaceability.

Quantitative thresholds have been established for each criterion to ensure that KBA identification is transparent and rigorous. The thresholds in the IUCN Standard are for the identification of KBAs at the global level. In addition, sites of regional rather than global significance can be identified as KBAs if they meet appropriate thresholds approved by KBA Partner organisations. Sites meeting global and regional thresholds are here collectively referred to as sites of international importance. IUCN and KBA Partner organisations will also encourage countries and institutions to establish and apply national thresholds, if doing so is considered to be valuable within a given country.

Because KBAs are appropriate for biodiversity elements that benefit from safeguard or management at the site scale, some elements, such as wide-ranging species that occur at low densities, will require complementary land- or sea-seascape approaches to ensure their global persistence.

KBAs are delineated to achieve site boundaries that are biologically relevant yet practical for management, even if no specific management prescription is implied by the delineation of KBA boundaries (for example, not all KBAs will be, nor should be, formal protected areas). Delineation is an iterative process that involves assembly of spatial datasets, derivation of initial site boundaries based on biological data, refinement of the biological map to yield practical boundaries, consultation of all key stakeholders, and the documenting of the level of confidence in the delineation.

Sets of required and of recommended documentation are compiled for each site to support and justify the recognition of a site as a KBA. This documentation also allows basic analysis of KBAs across taxonomic groups, ecosystem types and countries and helps users to search and find information easily on the website.

It is foreseen KBAs will primarily be nominated by national organisations. However, any individual or organisation can submit an expression of interest to IUCN to identify one or more KBAs for a region or a taxa/ecosystem. Upon submission to IUCN, the proposed KBAs will be peer-reviewed and checked for consistency in application of the Standard. Following successful review, KBAs meeting thresholds at the global level will be endorsed by IUCN and published on the website. KBAs meeting regional thresholds, as determined by KBA Partner organisations, will also be included on the website. Dissemination of data on KBAs meeting national but not international thresholds would be a role of relevant national institutions, not of IUCN as a Union. KBAs should be reassessed and updated every 8-12 years to ensure they still meet the criteria and thresholds.

A KBA committee, reporting to the SSC and WCPA Steering Committees and deriving authority from a KBA Partnership Agreement, will provide the high-level strategic direction for the KBA Standard and its implementation. The committee will serve as the custodian of the scientific standards, criteria and guidelines; establish and oversee the processes to nominate, review and endorse KBAs; develop and help oversee strategy and work program; and promote appropriate use of KBA data.

The applications and end-users of the new KBA Standard are diverse and numerous. KBA data should guide the strategic expansion of protected-area networks by governments and civil society working toward achievement of the Aichi Targets, particularly Target 11. Because the KBA criteria partially or fully align to criteria used to identify Ecologically or Biologically Significant Marine Areas (EBSAs; within the framework of the CBD), Ramsar sites, and natural World Heritage sites, KBAs can be considered as ‘shadow lists’ for site designation under these international conventions and in the designation of Special Protection Areas (SPA) in the European Union. KBA data can also inform private sector safeguard policies, environmental standards, and certification schemes.

1. INTRODUCTION

Biodiversity loss is occurring at an alarming rate across the world's terrestrial, freshwater and marine biomes. A crisis in its own right, evidence is mounting that the loss of genes, species and ecosystems also jeopardizes the delivery of services provided by biodiversity to human communities. Reversing this trend requires slowing, and eventually stopping, the destruction, degradation and overexploitation of natural habitats. Given limited resources for conservation, there is a need to know which places on the planet make particularly significant contributions to the global persistence of biodiversity, to facilitate management of these sites in ways consistent with the maintenance of the biodiversity for which they are important.

The IUCN Standard for identifying Key Biodiversity Areas (KBAs) responds directly to this need. In doing so, it supports local, regional and national governments in achieving the Strategic Plan for Biodiversity 2010-2020, adopted in 2010 by the Convention on Biological Diversity (CBD), but now adopted as a framework by all the biodiversity-related conventions.[1], which aims to halt the global decline in the world's biodiversity. Of particular relevance is the Strategic Plan's Aichi Target 11, which aims to increase the amount of the earth's land and water under effective protection, "especially areas of particular importance for biodiversity." Because many protected areas have been established for their scenic or cultural values, significant gaps in coverage of important biodiversity remain (Venter et al. 2014). KBAs can guide the strategic expansion and strengthening of protected-area networks by governments and civil society as they work to achieve the Aichi Targets.

This KBA Standard builds upon existing approaches to identify areas of importance for biodiversity (Section 2), notably Important Bird and Biodiversity Areas (IBAs), which are KBAs of international importance for birds identified by BirdLife International (see Box 1). Over 12,000 IBAs have been identified and documented worldwide in terrestrial, inland water and marine habitats. Other examples include sites identified by the Alliance for Zero Extinction, by IUCN for some freshwater taxa in particular regions, by organizations developing ecosystem profiles for the Critical Ecosystem Partnership Fund, as well as by several other initiatives, following publication of the original KBA concept (Eken et al. 2004, Langhammer et al. 2007). The IUCN standard for KBAs provides a common framework to harmonize these and other approaches globally, and to support the identification of additional sites.

Box 1. KBAs and Important Bird and Biodiversity Areas

The BirdLife International Partnership pioneered the effort to identify important sites for biodiversity with the Important Bird and Biodiversity Areas (IBAs) approach. Since the late 1970s, over 12,000 IBAs have been identified, delineated and documented worldwide in virtually all countries and territories, in terrestrial, freshwater and marine environments. This represents by far the largest existing systematically identified network of important sites for biodiversity, and

[1] https://www.cbd.int/sp/

forms the starting point for the development of the KBA concept presented in this Standard. The criteria and thresholds for identifying IBAs – relating to the populations of threatened, restricted-range, biome-restricted and congregatory species that a site supports – have been influential in the development of the KBA criteria and thresholds presented in this Standard.

IBAs have had considerable policy impact, being used to inform the designation of protected areas by national governments, Special Protection Areas under the European Union Birds Directive, Wetlands of International Importance under the Ramsar Convention, Emerald Network sites under the Berne Convention, the identification of Ecologically and Biologically Significant Areas through the Convention on Biological Diversity, and the implementation of site safeguard policies of the International Finance Corporation, World Bank and Regional Development Banks. IBAs have also widely influenced the setting of priorities, funding for and implementation of conservation action on the ground. The KBA concept integrates, builds upon and extends the successful IBA approach to biodiversity more generally.

1.1 Global consultation process and development of the KBA standard

There has been a long-recognized need to support decision-makers, communities and citizens working at local, national, regional and international scales in identifying important sites for biodiversity. The identification of important sites for specific taxonomic groups, biomes and regions dates back nearly four decades and has resulted in many important conservation outcomes. However, the calls by policy-makers, industry and local communities to pinpoint and safeguard important sites for biodiversity in a more comprehensive sense (considering all species, ecosystems, and ecological systems) have become increasingly urgent.

To this end, IUCN Members passed Resolution WCC 3.013 at the World Conservation Congress in 2004 requesting a common framework for identifying important sites for biodiversity. The Resolution asked IUCN “to convene a worldwide consultative process to agree a methodology to enable countries to identify Key Biodiversity Areas.” The methodology was to build from existing approaches in developing quantitative and transparent site-identification criteria that could be applied to all taxonomic groups and across all environments (terrestrial, freshwater, and marine). In response to this Resolution, the Chairs of the IUCN Species Survival Commission and the IUCN World Commission on Protected Areas created a Joint Task Force on Biodiversity and Protected Areas in 2009 to convene the global consultation process. The Joint Task Force mobilized input from IUCN Commissions, Members and Secretariat staff, other conservation organizations, academics, national decision-makers, donors and the private sector, to consolidate the scientific criteria and methodology for identifying KBAs.

1.1.1 “Framing” workshop

A “Framing” workshop (June 2012, Cambridge, UK) yielded consensus on the over-arching vision and mission of the IUCN KBA standard and purpose of the criteria (Box 2). This workshop defined Key Biodiversity Areas as sites contributing significantly to the global persistence of biodiversity, including at genetic, species, and ecosystem levels. It clarified that KBAs are important sites for biodiversity but are not necessarily equivalent to conservation priorities, which require additional data on threats, costs, and opportunities. (The relationship between KBAs and systematic conservation planning is discussed in Annex 1.)

Box 2: Vision, mission and purpose of the IUCN Standard for Key Biodiversity Areas

> **Vision—**A world where decisions impacting nature are guided by knowledge of areas of significance for biodiversity in order to maintain and enhance biodiversity and thereby contribute to human well-being.
> **Mission—**Building on existing approaches, to develop a global standard and system for identifying and documenting areas of significance for biodiversity across multiple scales and implemented by stakeholders.
> **Purpose of the criteria—**Identify areas contributing significantly to the global persistence of biodiversity.

It was also agreed at the workshop that spatial delineation of KBAs should go beyond biological and environmental information and consider the actual or potential manageability of the site. Manageability considers compatible land-use decisions, but it should be stressed that identification of a site as a KBA does not imply any formal designation, specific management scheme, or land-use regime. KBAs will generally fall within a size range that is comparable to that of protected areas or other conservation management units in the regions where they are identified.

1.1.2 Regional consultations, working groups, and technical workshops

The Framing workshop also outlined the main technical issues to be addressed in developing the IUCN Standard for KBAs, accomplished through regional and thematic consultations, working groups and technical workshops. Eleven regional consultations, involving more than 300 participants in total, were conducted in Africa, Asia, Australasia, the Caribbean, Europe, the Middle East and North America (Appendix A). Thematic consultations were convened at the Convention on Biological Diversity's Subsidiary Body on Scientific, Technical, and Technological Advice (May 2010, Nairobi) and Conference of the Parties (November 2012, Hyderabad), International Association for Impact Assessment (February 2013, Washington DC), and ConGRESS (April 2013, Greynog). A Joint Marine Working Group was created with the Global Ocean Biodiversity Initiative to strengthen synergies between KBAs and Ecologically or Biologically Significant Marine Areas (EBSAs), as defined by the Convention on Biological Diversity, at a meeting in Oct 2013 (Marseilles) held during the third International Marine Protected Areas Conference (Section 2.2.1).

Three technical aspects of the KBA Standard were addressed in dedicated expert workshops:

- Criteria and Delineation—proposed scientific criteria for identifying KBAs and developed guidelines for delineating sites (March 2013, Front Royal, USA);
- Governance, Rules and Procedures—proposed institutional arrangements, rules and procedures for the new KBA Standard, in particular the role of the different stakeholders, relationships between national and global processes, and the mechanisms to propose, review and endorse KBAs (November 2013, Brasilia, Brazil);

- Thresholds—proposed quantitative thresholds for measures of biodiversity significance at the global level for each of the KBA criteria, in other words, how “key” should a site be to qualify as a global KBA (December 2013, Rome, Italy).

The results of the consultations, working groups and technical workshops formed the basis of the IUCN Standard for KBAs detailed in this publication.

1.1.3 End-users consultation and applications of KBAs

Finally, during the Framing workshop, the primary likely end-users of the KBA Standard were identified and comprise those who lead or influence decision-making processes that include safeguarding biodiversity and avoiding biodiversity loss. At the national level, end-users include government agencies, businesses and investors, cultural and spiritual institutions, national and local NGOs, and local and indigenous communities. At the global level, these include international conventions and legal instruments, multilateral development banks, donors, multi-national companies and industry associations, especially the extractive industries, and international conservation and development NGOs.

Subsequent to the Framing workshop, interviews were conducted with 26 potential end-users spanning the sectors above. All end-users agreed on the importance of a centralised, accessible data source for KBAs, identified using widely accepted criteria, applicable to all taxonomic groups and across terrestrial, freshwater, and marine environments. Many stressed that the KBA Standard and data system should be implemented as soon as possible.

As can be expected with the variety of institutions interested in using KBAs, the potential applications of these data are very diverse:

- Governments and NGOs plan to use this information to prioritise sites for conservation or restoration and help meet international commitments, such as reporting progress towards the Aichi targets.
- Donors and financial institutions incorporate this knowledge in their investment strategies for biodiversity.
- Financial institutions and the private sector are expected to incorporate the data into their decision-making processes for development proposals and for structuring their environmental safeguard policies and certification mechanisms.
- Identification of sites as KBAs is seen to offer additional recognition in certain cases (for example, in some countries, it has strengthen indigenous and local people rights on indigenous and community conserved areas; in other cases, it enhanced the recognition of important wetlands not yet designated as Ramsar sites) and to provide information on sites for natural resource-dependent indigenous and community groups.
- Finally, scientists are interested in using KBA data to prioritize field work, for example to fill information gaps or identify good places for conducting research on particular species or ecosystems.

These end-users interviews also included discussions on the types of products required by each group of end-users and their fears or concerns regarding the KBA methodology and the process. These detailed case studies are compiled in Dudley et al. (2014).

1.2 Purpose and aims of the IUCN Standard for Key Biodiversity Areas

KBAs are identified using a set of globally agreed, empirically tested and pragmatic criteria and thresholds, which relate to the confirmed presence of biodiversity that is globally threatened, geographically restricted, or of outstanding ecological integrity or biological processes (Box 3). The definition of biodiversity encompasses genes, species and ecosystems (UNEP 1992) across their compositional, structural and functional elements (Noss 1990).

The KBA identification process aims to locate, document and delineate all sites known to meet at least one of the selection criteria in terrestrial, inland water and marine systems. KBAs are identified for biodiversity elements that benefit from legal protection, safeguard or management at the site scale (Eken et al. 2004). Some biodiversity elements, such as wide-ranging species that occur at low densities, will require actions at the scale of entire landscapes or seascapes (e.g. fishery regulations) to ensure their global persistence (Boyd et al. 2008). Because KBAs are typically nested within land- and seascapes, the two approaches are complementary.

Box 3: Summary of Key Biodiversity Areas

> Key Biodiversity Areas (KBAs) are sites contributing significantly to the global persistence of biodiversity. KBAs are identified using globally standardised criteria and thresholds, and have delineated boundaries. They may or may not receive formal protection, but should ideally be managed in ways that ensure the persistence of the biodiversity (at genetic, species, and/or ecosystem levels) for which they are important. The IUCN KBA Standard builds upon existing approaches, notably BirdLife International's Important Bird and Biodiversity Areas (IBAs), sites identified by the Alliance for Zero Extinction, Plantlife International, the IUCN Freshwater Biodiversity Unit, organizations developing ecosystem profiles for the Critical Ecosystem Partnership Fund, and others.

The process of KBA identification is led, wherever possible, by experts and organizations working at the national and local level. It involves a thorough review (including expert consultation) of existing knowledge of the relevant taxon groups or ecosystems in the country or region of study and their overall distribution. Site boundary delineation also involves consultation with all relevant stakeholders by the individuals or organizations leading KBA identification. It is envisioned that technical guidance on the application of the KBA criteria and thresholds and delineation of boundaries will be provided by IUCN and its partner organizations.

The KBA Standard as described here is used to identify sites that meet global thresholds. However, the criteria may also be used to identify sites of regional significance (sites meeting global and / or regional thresholds are collectively termed sites of international importance), or important sites at the national level, using progressively 'lower' thresholds. Indeed, such regional-level thresholds are already in use for specific taxonomic groups (e.g., IBAs, IPAs).

Key Biodiversity Areas are not necessarily formally protected: identification as a KBA according to scientific criteria is unrelated to a site's legal status. Many do, however, overlap wholly or partly with existing protected area boundaries, including sites designated under international conventions (e.g., Ramsar and World Heritage) and at national and local levels. Experience demonstrates that many protected areas have been designated and delineated explicitly following KBA (particularly IBA) identification. For example, in the European Union during the period 1993–2013, the total area of IBAs that was formally designated as Special Protection Areas (SPAs) in the European Union rose by 47 million hectares[2]. However, formal protection may not be appropriate or even desirable for all KBAs. Nevertheless, identification as a KBA does imply that the site should be managed in ways that ensure the persistence of the biodiversity elements for which it is recognised.

1.3 Overview of this document

The purpose of this document is to present the IUCN Standard for identification of KBAs in sufficient detail that practitioners can achieve a good understanding of what is required to locate, nominate, and begin the process of safeguarding sites. It should be read in conjunction with the more detailed user guidelines that will be maintained as an electronic resource[3].

Section 2 explains the relationships between KBAs and other initiatives. This is crucial, because the KBA Standard is designed to build from and add value to existing approaches; it must not duplicate them or reduce their value. These include existing approaches for identifying important sites for biodiversity; sites designated by international conventions; sites incorporated into private and financial sector safeguard and best practices; and knowledge products delivered through IUCN and partners.

The core of the KBA Standard is presented in Sections 3-6: definition of key terms; description and rationale for the five criteria and quantitative thresholds for identifying sites contributing significantly to the global persistence of biodiversity; guidelines for delineating sites; and minimum documentation standards required for endorsement of a site as a KBA by IUCN.

Finally, Section 7 presents some proposed broad principles for the governance of the KBA knowledge product, including procedures for the nomination, review, and endorsement of KBAs.

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[2] http://www.birdlife.org/datazone/sowb/casestudy/244

[3] At the time of writing (2014), this document is in the process of development.

2. HOW KEY BIODIVERSITY AREAS RELATE TO OTHER INITIATIVES

The KBA Standard intentionally has specific and complementary relationships with existing approaches for identifying important sites for biodiversity, designation of sites by international conventions, and private and financial sector standards for safeguarding sites. This section analyses these relationships and also explains how KBAs relate to other knowledge products mobilised through IUCN.

2.1 KBAs and existing site-based approaches

Existing site-based approaches aim to identify important sites for different taxonomic groups, regions, ecological systems (e.g., freshwater, marine) or other subsets of biodiversity using data-driven criteria and quantitative thresholds. The IUCN Standard for KBAs provides an overarching common framework to integrate these approaches, and to support the identification of additional sites important for components of biodiversity not addressed by existing approaches (Figure 1). The existing site-based approaches upon which the KBA standard primarily builds are described below, and the alignment of their criteria and thresholds with the KBA Standard is documented in Appendix B.

2.1.1 Important Bird and Biodiversity Areas

The BirdLife International Partnership pioneered the effort to identify important sites for biodiversity with the Important Bird and Biodiversity Areas (IBAs) approach. The first IBA directory covered 649 sites in eight countries in Europe and was published in response to a 1979 European Community Directive to conserve wild birds in the territories of its member states (Osieck & Mörzer-Bruyns 1981). Since that time, the programme has evolved and expanded considerably, such that its coverage is now global, with regional site directories compiled and published by the BirdLife Partnership for Europe (Grimmett and Jones 1989, Heath and Evans, 2000), the Middle East (Evans 1994), Africa (Fishpool and Evans 2001), Asia (BirdLife International 2004), the Americas (Devenish *et al*. 2009), Australia (Dutson *et al*. 2009) and for the marine environment (BirdLife International 2012). In addition, over 130 sub-regional, national and state level IBA directories, have also been published, in a diversity of languages[4]. As a result, over the past 35 years, more than 12,000 IBAs have been identified, delineated and documented worldwide in terrestrial, inland water and marine habitats[5].

2.1.2 Important Plant Areas

Building on the success of IBAs, Plantlife International developed the Important Plant Areas (IPAs) approach (Plantlife International 2004), where IPAs are internationally significant sites for plant diversity (including algae, fungi, lichens, liverworts, mosses, and wild vascular plants). They are identified at national level, using a set of

[4] www.birdlife.org/datazone/info/ibainventories

[5] www.birdlife.org/datazone/site/search

internationally standardised criteria: threatened species (A), species richness (B), threatened habitats (C), and they provide a framework for implementing international commitments, such as the CBD's Global Strategy for Plant Conservation of the Convention on Biological Diversity, as well as for conserving wild plants and their habitats in situ. Projects to identify IPAs are currently implemented in sixty-nine countries.

2.1.3 Prime Butterfly Areas

The identification of important sites was extended to invertebrates a few years later with the publication of the Prime Butterfly Areas of Europe (van Swaay and Warren 2006). More than 400 sites were identified across Europe for 34 butterfly species that are globally or regionally threatened with extinction, restricted range, or included in international legislation. This effort led to the establishment of Butterfly Conservation Europe[6], which is working actively towards the protection and recovery of European butterflies and moths.

2.1.4 Alliance for Zero Extinction sites

The Alliance for Zero Extinction (AZE) seeks to identify and safeguard all sites holding Critically Endangered or Endangered species, as assessed for The IUCN Red List of Threatened Species effectively restricted to single sites (Ricketts et al. 2005). To date, AZE has identified 587 sites for 920 species of mammals, birds, amphibians, reptiles, conifers and reef-building corals that face imminent extinction without effective conservation action. AZE sites can be seen as the 'first tier' of KBAs because of their extremely significant contribution to the global persistence of biodiversity.

2.1.5 Freshwater, marine and terrestrial KBAs

Following publication of the KBA concept in scientific literature (Eken et al. 2004), the the multi-taxon approach was tested for biodiversity in the freshwater (Darwall & Vie 2005) environment and is now in widespread use for the identification of freshwater KBAs (Holland et al. 2012). Over the last decade, terrestrial KBAs have been identified in a number of countries and regions (e.g. Anadón-Irizarry et al. 2012, Tordoff et al. 2012) using previously published criteria (Langhammer et al. 2007) similar to those in the IUCN Standard. This work has been largely supported by the Critical Ecosystem Partnership Fund[7] as the basis of its investment strategies (ecosystem profiles) in biodiversity hotspots. The original key biodiversity area concept was tested in the marine environment (Edgar et al. 2008) and used to identify globally important marine sites in several regions (e.g. Ambal et al. 2012).

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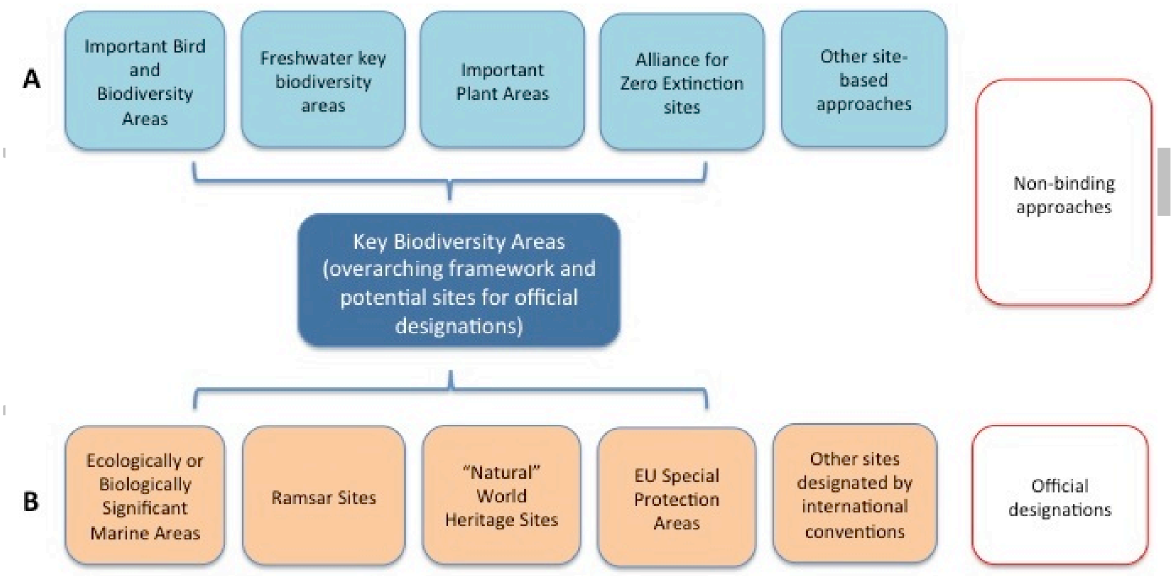
6 http://www.bc-europe.eu

7 http://www.cepf.net/resources/publications/Pages/ecosystem_profiles.aspx

2.1.6 B-ranked sites

Approaches to identification of important sites across multiple elements of biodiversity (at genetic, species and ecosystem levels, and across terrestrial, freshwater, and marine systems) dates back several decades in North America with the work of the Natural Heritage Network, supported by NatureServe (since 2000; The Nature Conservancy before 2000) in identifying "B-ranked" sites in North America. For example, sites containing highly threatened species or species known to occur at one or a few sites are ranked as having outstanding importance ("B1") or very high importance ("B2"). This system, which has five levels of significance, has been applied to both species and ecosystem types.

Figure 1 - Relationship between KBAs and (A) existing site identification approaches and (B) sites designated by international conventions



2.2 KBAs and sites designated by international conventions and instruments

The multilateral environmental agreements concerned with biodiversity conservation confer an official status or designation to specific sites. These include Ecologically and Biologically Significant Marine Areas (EBSAs)[8] under the Convention on Biological Diversity; Wetlands of International Importance under the Ramsar Convention[9] on Wetlands; and World Heritage sites under the World Heritage Convention[10]. Because the KBA criteria and thresholds align to the criteria used to identify EBSAs, Ramsar sites, and natural World Heritage sites (Appendix B), KBAs can be considered as sites for

[8] http://www.cbd.int/marine/doc/ebsa-brochure-2012-en.pdf

[9] http://www.ramsar.org

[10] http://whc.unesco.org/en/list/

designation under these conventions. In all cases, KBAs would need to go through the selection and application processes by the respective conventions in order to achieve official denomination.

2.2.1 Ecologically or Biologically Significant Marine Areas (EBSAs)

Ecologically or Biologically Significant Marine Areas (EBSAs) are areas of open-ocean or deep sea in need of protection. They are identified using seven criteria adopted by the Convention on Biological Diversity in 2008 (CBD Decision IX/20, Annex I). There has been significant progress in describing EBSAs through a process enabled by the CBD Secretariat involving CBD signatory countries (Dunn et al. 2014) and with support, amongst others, from IUCN and BirdLife International through the Global Ocean Biodiversity Initiative (Weaver & Johnson 2012). As successfully demonstrated with marine IBAs, KBAs can support the EBSA process further by pinpointing sites in open ocean or deep sea that meet global or regional thresholds of biodiversity significance as well as EBSA criteria (Appendix B). In addition, "KBAs can provide information for spatial analysis or management options within an EBSA; they are an avenue for scientists to put data forward; and they ensure the consistency and repeatability of the data that complement the EBSA process" (Dudley et al. 2014).

2.2.2 Wetlands of International Importance under the Ramsar Convention

The Convention on Wetlands of International Importance, the Ramsar Convention, dates to 1971 and is the oldest biodiversity-related convention; in 2014 it has 168 nations as contracting parties. The convention requires each of the signatory countries to designate suitable wetlands within their territory as "Wetlands of International Importance". To do this, the Ramsar Convention proposes a set of criteria and thresholds, which have considerable overlap with those in the KBA Standard (Appendix B). Thus, many KBAs identified for freshwater species and ecosystems could be considered by countries as potential Wetlands of International Importance. In practice, this has already happened as many IBAs have been mapped to Ramsar criteria to produce lists of 'shadow Ramsar sites' and indeed many Ramsar sites have been designated as a result of their recognition as IBAs (BirdLife International 2001, BirdLife International 2002, Crosby & Chan 2005).

2.2.3 World Heritage natural sites under the World Heritage Convention

The World Heritage Convention, adopted in 1972, has in 2014 190 nations as its parties. World Heritage site nominations are submitted by countries through the World Heritage Convention process and, if successful, are added to the World Heritage list. World Heritage sites are those places on earth with natural and cultural heritage of Outstanding Universal Value. Two of the four criteria used to identify natural World Heritage sites based on biodiversity align with the criteria of the KBA Standard (KBAs are not identified for scenic or geologic features). Consequently, countries could use KBAs to identify potential candidate sites to be inscribed on the Word Heritage List. Bertzky et al. (2013), for example, suggest that KBAs, in particular AZEs, can be used to identify potential candidate sites to be included in the World Heritage list.

2.2.4 Special Protection Areas under the Birds Directive of the European Union

The Birds Directive ('Council Directive on the conservation of wild birds')[11] of the European Union (EU) is an international legal instrument which requires all Member States to designate and manage a network of Special Protection Areas (SPAs) for almost 200 bird species. The means by which IBAs are identified in the EU deliberately align with SPA selection criteria. Consequently, the value of BirdLife's IBA inventory as a 'shadow list' of SPAs has repeatedly been recognised by the European Court of Justice and the European Commission in a series of cases brought against Member States for failure to designate sufficient SPAs.

2.3 KBAs and private and financial sector approaches and standards

Some actors in the private and financial sector have become increasingly concerned about managing environmental risk related to biodiversity impact and have established best-practice standards to minimize harm to biodiversity and ensure sustainability. These best practices have been implemented in many different ways, which include developing overarching frameworks to manage impacts; producing safeguard policies and sustainability standards to ensure responsible lending and operations; and the establishment of sustainable certification schemes to promote sustainable production of commodities across the entire supply chain (see UNEP-WCMC 2011 for a full review and ICMM 2010, IUCN 2014 for case studies). The alignment between KBAs and both IFC Performance Standard 6 and High Conservation Value Forests is mapped out in Appendix B.

The Integrated Biodiversity Assessment Tool (IBAT) for business is a tool designed to facilitate access to accurate and up-to-date biodiversity information to support business decisions. The tool is the result of a partnership between BirdLife International, Conservation International, IUCN and UNEP-World Conservation Monitoring Centre. At its core, IBAT is a central database for globally recognized biodiversity information, including Key Biodiversity Areas and legally Protected Areas. Through an interactive mapping tool, decision-makers are able to access and use this information to identify biodiversity risks and opportunities within a project boundary. Target users of IBAT are decision-makers in businesses, especially those involved with risk management, the identification of critical habitat and safeguards, ISO 14000 certification and on-going audit, sustainability reporting (such as Global Reporting Initiative – GRI) and CSR teams interested in understanding the biodiversity values at or near to their areas of operation. Currently, more than 35 companies are subscribing to IBAT, drawn from a diversity of sectors, including mining, oil and gas, finance and agri-business.

[11] http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

2.3.1 KBAs in safeguard policies and sustainability standards

A number of safeguard policies and environmental standards have been established to inform decisions on allocation of resources for development that aim to ensure sustainability in the lending and project-granting processes. These include safeguard policies from development banks such as the World Bank, the Asian Development Bank, and the Inter-American Development Bank, and also private sector financial bodies such as the International Finance Corporation (part of the World Bank Group) and the Equator Principles Association.

For instance, The International Finance Corporation's Performance Standard 6—Biodiversity Conservation and Sustainable Management of Living Natural Resources, or IFC PS6 (IFC, 2012) is fast becoming a global benchmark for corporate best practice in relation to biodiversity. Critical habitat and natural habitats as defined in IFC PS6 are terms used by many other safeguard policies to describe habitats that are either especially sensitive to impacts or of high biodiversity significance. Because the criteria used to identify critical habitats and the KBA criteria are extremely closely aligned, KBAs can be considered candidates to be classified as critical or natural habitats and as such their use is specifically recommended in IFC PS6.

2.3.2 KBAs in sustainable certification schemes

The proliferation of sustainable certification schemes in the past years responds to society's demands for sustainable production and sourcing of commodities across the entire value chain. These include, in many cases, sector-specific voluntary standards with which companies need to comply to be certified by a number of industry organizations, such as the Roundtable for Sustainable Biomaterials, Roundtable for Sustainable Palm Oil, the Sustainable Forestry Initiative, and the Responsible Jewellery Council, which all recommend consideration of KBAs in their standards (IUCN 2014).

A well-known example is the Forest Stewardship Council's forest management standards, which require the management of forests of outstanding or critical importance (called High Conservation Value Forests) in order to maintain or enhance the values identified. Initially developed in 1999, the HCVF approach has been expanded to other sectors and is becoming an important tool for responsible resource management and sourcing. The HCVF approach uses three criteria (I, II, and III) for global values that need to be identified and managed by companies in a specific concession area, which align closely with the KBA criteria and thresholds, as well as three other criteria for local values which do not align with the KBA criteria, because they address elements other than biodiversity. Therefore, KBAs– and the species and ecosystems for which they qualify – should, and can easily, be considered in the assessment area in any process involving identification of High Conservation Value Forests (Brown et al. 2013).

2.4 KBAs and other knowledge products mobilised through IUCN

Knowledge products are platforms that comprise assessments of authoritative biodiversity information, supported by standards, processes, guidelines, data, tools, capacity-building, and tangible products. They are mobilised by IUCN's Commissions, Members, Secretariat and partners, harnessing networks of experts, and following strict validation and quality control processes. The KBA Standard is the basis of an emerging Key Biodiversity Areas knowledge product that will be delivered by BirdLife International, IUCN, and other KBA Partnership organisations. The backbone of the KBA knowledge product will be formed by the sites of international importance that have been identified to date, namely 12,000+ IBAs, but also AZE sites and multi-taxa KBAs identified under previously published criteria. The knowledge product will grow and be strengthened as sites are identified for additional elements of biodiversity and in new areas.

The following section describes the links between KBAs and other knowledge products, which are crucial for the identification and delineation of KBAs including application of the criteria and thresholds (Figure 2).

2.4.1 KBAs and The IUCN Red List of Threatened Species

The IUCN Red List of Threatened Species provides information and analyses on the status, trends, and threats to species in order to inform and catalyse action for biodiversity conservation (Mace et al. 2008, IUCN 2012a).

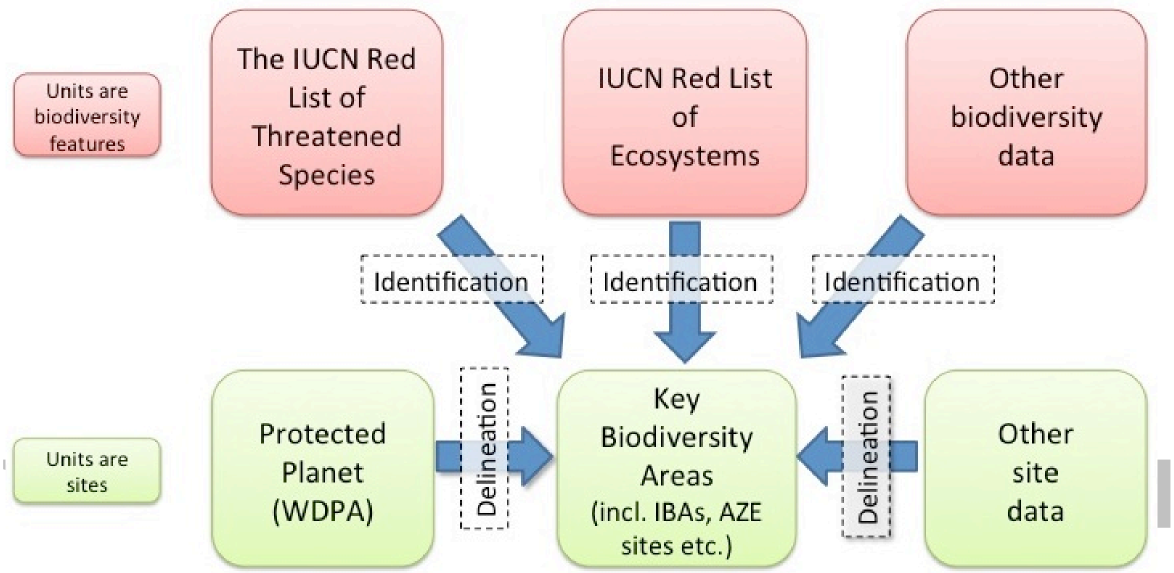
Biodiversity information associated with IUCN Red List assessments, whether for threatened, Near Threatened or Least Concern species, will be fundamental to the identification of KBAs (Rodrigues et al. 2006, Hoffmann et al. 2008). Sites that hold species assessed as globally threatened—Critically Endangered, Endangered, or Vulnerable—by The IUCN Red List of Threatened Species are candidates to meet Criterion A of the KBA Standard, which deals with threatened biodiversity. Similarly, presence of restricted-range species (e.g. narrow endemics) in a particular site could trigger Criterion B, which deals with geographically restricted biodiversity. Some species will trigger more than one KBA criterion, for example, because they are both globally threatened and geographically restricted.

The species for which a KBA has been identified should be documented, along with potentially occurring threatened species, and reference and links to the Red List assessments should be made, when relevant. The taxonomic groups for which the KBA has been assessed should also be documented.

2.4.2 KBAs and the IUCN Red List of Ecosystems

The IUCN Red List of Ecosystems is a knowledge product in development (Keith et al. 2013, IUCN in press). It is designed to be a global standard for assessing the status of the world's ecosystems by quantifying their risk of collapse. For global scale assessments, ecosystems will be operationally defined as units that approximate to ecological communities, vegetation types or habitat types (Section 3). As assessments gradually become available, sites can be identified as KBAs using the ecosystem-level criteria (Section 4), much the same way that The IUCN Red List of Threatened Species is fundamental to the application of species-level criteria for KBA identification.

Figure 2. Relationship between Key Biodiversity Areas and other knowledge products mobilised through IUCN and partner organisations



2.4.3 KBAs and Protected Planet

Protected Planet is a knowledge product underpinned by the World Database on Protected Areas (WDPA), mobilised by IUCN and UNEP-WCMC. It documents the category, location, governance and effectiveness of the world's protected areas and serves as a tool to track progress in achieving conservation targets related to protected areas (Bertzky et al. 2012).

Protected Planet provides geographically referenced protected-area boundaries that are particularly important in KBA delineation. It is fundamental that KBA boundaries allow implementation of practical management and governance solutions at a site level. Thus, in many cases, KBA proposed boundaries coincide with protected area boundaries.

Although KBAs are not necessarily protected areas, the geographical relationship between protected area and KBA boundaries could also be used by governments to make decisions on the expansion of their protected-area networks or to explore connectivity strategies between protected areas. This is important in order to inform strategic decisions at regional and national levels related to biodiversity protection and to meet national and international targets. For example, at a policy level, the spatial overlap between Protected Planet and KBAs provides a picture of the degree to which protected areas cover important sites for biodiversity. In addition, given that protected areas have not always been necessarily established in order to conserve biodiversity optimally, information on

KBAs will assist in the potential expansion of protected area networks to represent "areas of particular importance for biodiversity" as a critical element of CBD's Aichi Biodiversity Target 11 (Bertzky 2012).

2.5 KBAs and regional-scale approaches

Approaches to identifying *sites* important for biodiversity differ from global scale analyses that identify large areas that may span several countries or extend across regions. Notable examples of the latter are Biodiversity Hotspots (Myers et al. 2000), High Biodiversity Wilderness Areas (Mittermeier et al. 2003b), Global 200 Ecoregions (Olson & Dinerstein 1998), and Endemic Bird Areas (Stattersfield et al. 1998). One reason for this difference is the requirement that KBAs be actually or potentially manageable, resulting in units for which it should be possible to implement conservation or other appropriate actions. For example, BirdLife International have identified IBAs within Endemic Bird Areas, with the presence of populations of restricted-range species (which define EBAs) being one criterion for IBA identification, and the Critical Ecosystem Partnership Fund uses KBAs to target investment for projects within Biodiversity Hotspots (CEPF 2007). Thus, the identification of KBAs complements such larger scale approaches.

3. DEFINITION OF KEY TERMS

Table 1 defines the key terms used throughout the KBA Standard, particularly those required to apply the criteria and thresholds (Section 4), delineate sites (Section 5), compile the required and recommended documentation for each site (Section 6), and nominate sites as KBAs for IUCN endorsement (Section 7).

Table 1: Definition of key terms used in the KBA Standard

Term	Definition	Related terms	References
Aggregation	The geographically restricted clustering of individuals that typically occurs during a specific life history stage or process.	Ecological process	Mittermeier et al. (2003a)
Area of occupancy	Area within its 'extent of occurrence', which is occupied by a taxon, excluding cases of vagrancy.	Geographically restricted, Threatened, Threshold	IUCN (2001)
Biodiversity	The CBD defines biodiversity as the "variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems". Other definitions explicitly encompass the composition, structure, and function of diversity.	Biodiversity element	Noss (1990), UNEP (1992)
Biodiversity element	A component of biodiversity: genes, species or ecosystems.	Biodiversity	Jenkins (1987)
Biological process	Demographic and life history processes that maintain species populations.	Aggregation	
Biome	Major terrestrial and aquatic habitat types distinguished by their climate, flora and fauna[12].	Geographically restricted	Olson et al. (2001), Abell et al. (2008)
Biome restricted assemblage	A group of species that possess distributions largely or wholly confined to individual biomes	Geographically restricted	Plantlife International (2004), BirdLife International (2004)
Candidate	A site which is likely to meet the KBA criteria and thresholds, but for which evidence to document this is not yet available. This does not include sites identified to meet global thresholds prior to the IUCN Standard. These are documented as being priorities for updating if not yet shown to meet revised global thresholds.	Identification, Update	
Centre of endemism	An area of less than 50,000 km^2 that contains a relatively high percentage of taxa endemic to it, compared to the total diversity in a region when considering other species in the same group (Class or Order). Also can be defined according to a published global or continental analysis of centres of endemism covering at least one vertebrate Class or one	Geographically restricted	

12 http://wwf.panda.org/about_our_earth/teacher_resources/webfieldtrips/major_biomes/

	Order for other taxonomic groups.		
Criteria	Five groups of properties, assessment against the thresholds for which determines whether a site contributes significantly to the global persistence of biodiversity, and is therefore a KBA. Sites should be assessed against all criteria, but only need to exceed thresholds for one criterion to qualify as a KBA.	Ecological integrity, Ecological process, Geographically restricted, Irreplaceability, Threatened, Threshold	
Complementarity	Integration of data on the distribution of multiple biodiversity elements to identify networks of sites that meet predefined targets	Irreplaceability	Pressey et al. (1993)
Compositional biodiversity	Referring to the identity and variety of biodiversity elements, including species and genetic diversity, in a site (or land-/seascape)	Biodiversity element, Criteria	Noss (1990)
Delineation	Process through which the boundaries of a KBA are drawn in a geographic space on a map	Identification	Langhammer et al. (2007)
Designation	Policy process to apply a particular management regime to a site, for example through international conventions (e.g., Ecologically & Biologically Significant Areas under the Convention on Biological Diversity, Wetlands of International Importance under the Ramsar Convention, natural World Heritage Sites) or as national or regional protected areas	Identification	
Ecological integrity	Supporting species assemblages and ecological processes in their natural state relative to a historical benchmark and characterized by contiguous natural habitat with minimal anthropogenic disturbance	Intact species assemblage	Parks Canada Agency (2000), Karr et al. (1986)
Ecosystem type	A defined unit of ecosystem for standard and repeatable assessment. It is delineated by a particular and described set of variables related to its characteristic native biota, an abiotic environment or complex, the interactions within and between them, and a physical space in which these operate. Other terms applied in conservation assessments, such as "ecological communities," "habitats," "biotopes" and (largely in the terrestrial context) "vegetation types," are regarded as operational synonyms of ecosystem type.	Macrogroup	Keith et al. (2013), IUCN (in press)
Endemic	Restricted in distribution to a defined geographic area such as region, country, river or site		
Endorsement by IUCN	Recognition by IUCN as a Union that a delineated site qualifies as a global KBA under the KBA criteria and global thresholds, supported by the minimum documentation standards.	Nomination, Review	
Expression of interest	Process through which an individual or organization interested in nominating global KBAs in a country or region alerts IUCN, triggering technical guidance and support in KBA identification.	Identification Nomination	
Extent of occurrence	Area contained within the shortest continuous imaginary boundary which can be drawn to	Geographically restricted,	IUCN (2001)

	encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy.	Threatened, Threshold	
Extent of suitable habitat	"the area of potentially suitable vegetation types within the altitudinal preferences and geographic distribution of the species"	Geographically restricted, Threatened, Threshold	Beresford et al. (2011)
Functional biodiversity	Refers to ecological and evolutionary processes that maintain biodiversity	Biodiversity element, Criteria	Noss (1990)
Functional reproductive units	Minimum number and/or a combination of individuals necessary to trigger a successful reproductive event at a site.	Threatened	Eisenberg (1977)
Geographically restricted	Having a small distribution measured by extent of occurrence, area of occupancy, extent of suitable habitat, or number of locations.	Centre of endemism, Irreplaceability	
Global KBA Initiative	The ongoing efforts to finalise the IUCN KBA Standard, and the joint efforts to advance site conservation through developing and promoting the Key Biodiversity Areas Knowledge Product, integrating and extending beyond BirdLife's Programme to identify and conserve IBAs, and related initiatives (Section 2).		
Higher taxon/taxa	Taxonomic ranks above the species level, relevant to KBA identification for centres of endemism for vertebrate Classes and for invertebrate and plant Orders	Taxon/Taxa, Centre of endemism	
Identification	Process through which data are compiled to document that a given site meets the criteria and thresholds to be considered a KBA	Delineation, Designation	
Intact species assemblage	Having the complete complement of species known or expected to occur in a particular site or ecosystem, relative to a historical benchmark, within the bounds of natural variation.	Ecological integrity	Morrison et al. 2007
Irreplaceability	Either 1) the likelihood that an area will be required as part of a system that achieves a set of representative targets; or 2) the extent to which the options for achieving a set of targets are reduced if the area is unavailable for conservation. It is heavily influenced by geographically restricted biodiversity, but irreplaceability is a property of an area within a network rather than of an element of biodiversity.	Centre of endemism, Geographically restricted	Ferrier et al. (2000), Pressey et al. (1994)
KBA Knowledge product	Consists of the list of KBAs, their associated documentation (including, inter alia, location, boundary, habitats, threats, protected area coverage, trigger species and criteria triggered), the presentation of these data on the KBA website, and the underlying KBA database.		
KBA Standard	The KBA criteria, thresholds, delineation guidance, definition of terms and some principles of governance which will be presented for adoption by IUCN Council in due course and be drawn from this *Consultation Document on an IUCN Standard for the Identification of KBAs*.		
Macrogroup	"A combination of moderate sets of diagnostic	Ecosystem	National

	plant species and diagnostic growth forms reflecting biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes."		Vegetation Classification Standard[13]
Manageable/ manageability	Property that allows implementation of some type of coherent or homogenous management across the site. Being a manageable site implies that it is possible to implement actions on the ground to ensure the persistence over time of the biodiversity elements for which a KBA has been identified. This requires considering relevant aspects of the socio-economic context of the site (e.g. land tenure, political boundaries) in the delineation phase.	Delineation	Eken et al. (2004), Langhammer et al. (2007)
Nomination	Following proposal and review, official submission of data to IUCN to recognize site(s) as KBAs.		
Phylogenetic diversity	"total phylogenetic branch length spanned (represented) by its member species"	Centre of endemism, Restricted range	Faith et al. (2004)
Population	The total number of individuals of the taxon. For functional reasons, primarily owing to differences between life forms, population size is measured as numbers of mature individuals only.	Threshold	IUCN (2012a)
Proposal	Submission of complete KBA dataset to IUCN for review.		
Restricted range	Refers to a species with a global extent of occurrence less than or equal to the 25th percentile of the range-size distribution in a globally analysed Class/Order OR (if these data are not available) a global extent of occurrence less than 10,000 km^2.	Centre of endemism, Geographically restricted, Higher taxon	
Review	Peer review of proposed global KBAs including criteria, thresholds, delineation, and minimum documentation		
Species	A group of individuals sharing common characteristics that actually or potentially can interbreed in nature	Ecosystem, Taxon/Taxa	
Structural biodiversity	"…physical organization or pattern of a system, from habitat complexity as measured within communities to the pattern of patches and other elements at a landscape scale."	Biodiversity element, Criteria	Noss (1990)
System	Refers to terrestrial, freshwater, marine, or subterranean environments		
Taxon/Taxa	The terms 'taxon' and 'taxa' in this document are used to represent species or lower taxonomic levels, including forms that are not yet formally described. (In other uses, taxon can also refer to higher ranks than species, such as Family or Order).	Higher taxon/taxa, Species	IUCN Standards and Petitions Subcommittee (2014)
Threatened	Assessed through globally standardised methodologies as having a high probability of extinction or collapse in the medium term	Ecosystem, Species, Taxon/Taxa	IUCN (2012a); Keith et al. (2013); IUCN

13 http://mtnhp.org/ecology/nvcs/

	future. Threatened taxa or ecosystems are Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) according to The IUCN Red List of Threatened Species or the Red List of Ecosystems.		(in press)
Threshold	Numeric or percentage cut-offs which determine whether the presence of a biodiversity element at a site is significant enough for the site to be considered a KBA, according to four criteria	Biodiversity element, Criteria	
Trigger	A biodiversity element (e.g. species or ecosystem) that triggers, or meets, at least one KBA criterion and associated threshold		
Unique genetic diversity	The genetic diversity of a taxon which is restricted to a particular site	Geographically restricted, Threatened, Threshold	Faith (1992)
Update	Periodic reassessment of sites against the KBA criteria and thresholds, incorporation of new or updated information into the documentation for each site		
Vulnerability	A measure of the probability of persistence of the biodiversity elements of an area, used in systematic conservation planning.	Threatened	Pressey & Taffs (2001)

4. CRITERIA AND THRESHOLDS FOR KEY BIODIVERSITY AREAS

World Conservation Congress Resolution 3.013 mandated that the KBA Standard build from existing approaches in developing site identification criteria, and that these be applicable to all taxonomic groups and environmental systems (terrestrial, freshwater, marine). Having data-driven criteria and quantitative thresholds ensures that site identification is, as far as possible, transparent, objective and repeatable.

This section describes the KBA criteria, gives their rationale, and proposes quantitative thresholds for identifying sites that contribute significantly to the global persistence of:

A. Threatened biodiversity
B. Geographically restricted biodiversity
C. Ecological integrity
D. Biological processes
E. Biodiversity through comprehensive quantitative analysis of irreplaceability.

Because the Standard uses the CBD definition of biodiversity (UN 1993), the KBA criteria encompass biodiversity at genetic, species, and ecosystem levels, and across structural, functional and compositional components. The scope of the criteria is, however, limited to macroscopic biodiversity: they are not designed to include the identification of sites triggered by micro-organisms, despite the overall importance of microbial biodiversity (Nee 2004), because site management practices are usually of so little relevance to these taxa. The KBA criteria and thresholds are summarized in Table 2.

Although all of the KBA criteria may not be applicable to all taxa (e.g., not all taxonomic groups have species that aggregate), it is important that the thresholds associated with each criterion are be applicable to all taxa, as was done in developing thresholds for The IUCN Red List of Threatened Species (Mace et al. 2008, IUCN 2012a). Having different thresholds for different taxonomic groups would increase the complexity of the Standard significantly and require an impractical level of knowledge about all taxonomic groups from the outset.

Table 2. Summary of KBA Criteria and Thresholds

CRITERIA (and SUB-CRITERIA)	THRESHOLDS
A: Threatened biodiversity	
A1: Threatened taxa	(a) Site regularly holds ≥95% of the global population of a globally Critically Endangered (CR) or an Endangered (EN) taxon; OR (b) Site regularly holds ≥0.5% of the global population AND ≥5 functional reproductive units of a globally Critically Endangered (CR) or Endangered (EN) taxon; OR (c) Site regularly holds ≥1% of the global population AND ≥10 functional reproductive units of a globally Vulnerable (VU) taxon; OR (d) Site regularly holds ≥0.1% of the global population AND ≥5 functional reproductive units of a globally Critically Endangered (CR) or Endangered (EN) taxon qualifying under Criterion A of The IUCN Red List of Threatened Species; OR

	(e) Site regularly holds ≥0.2% of the global population AND ≥10 functional reproductive units of a globally Vulnerable (VU) taxon qualifying under Criterion A of The IUCN Red List of Threatened Species.
A2: Threatened ecosystem types[14]	(a) Site holds ≥5% of the global extent of a globally CR or EN ecosystem type; OR (b) Site holds ≥10% of the global extent of a globally VU ecosystem type.
B: Geographically restricted biodiversity	
B1: Geographically restricted species	Site regularly holds ≥20% of the global population and ≥10 functional reproductive units of a species.
B2: Centres of endemism	Site regularly holds ≥33% of the complement of species within a vertebrate Class or non-vertebrate Order whose restricted ranges collectively define a centre of endemism.
B3: Biome restricted assemblages	Site regularly holds [≥X%] of the set of species restricted to a particular [biome][15]
B4: Geographically restricted ecosystem types	Site holds ≥20% of the global extent of an ecosystem type.
C: Ecological Integrity	
Outstanding ecological integrity	Site is one of ≤2 sites per region of outstanding ecological integrity characterized by wholly intact species assemblages, comprising the composition and abundance of native species and their interactions.
D: Biological processes	
D1: Demographic aggregations	Site regularly or predictably holds an aggregation representing ≥1% of the global population of a species during one or more key stages of its life cycle
D2: Ecological refugia	Site supports ≥20% of the global population of one or more species during periods of environmental stress
D3: Source populations	Site maintains ≥20% of the global adult population of a species through production of propagules, larvae, or juveniles.
E: Biodiversity through quantitative analysis	
Sites of very high irreplaceability for the global persistence of biodiversity as identified through a comprehensively quantitative analysis of irreplaceability This criterion is applied to species (or other relevant biodiversity elements) that can be used to trigger one or more of the other criteria (A-D).	Site has a level of irreplaceability of 0.90 or higher (on a 0-1 scale), measured by quantitative spatial analysis. Sites should be characterized by the regular presence of ≥ 10 functional reproductive units of a species, or ≥ 5 units in case of geographically restricted species (*sensu* KBA criterion B), EN or CR species (*sensu* IUCN Red List). The irreplaceability analysis should be based on the contribution of individual sites to minimum representation targets defined to achieve species persistence.

[14] Ecosystem type in the KBA criteria shall follow the definition used by the IUCN Red List of Ecosystems for global-scale assessments (Section 3).
[15] Square brackets [ ] indicate elements that are still under active discussion and for which feedback would be particularly valuable.

The confirmed presence of the biodiversity element(s) meeting one or more criteria and the corresponding thresholds is required. Caution should be taken in identifying KBAs for poorly known species only reported from their type locality; these species should not, in general, automatically trigger KBA status since there is a reasonable chance that with additional research they would be discovered at more sites.

Similar to The IUCN Red List criteria for threatened species, sites identified as KBAs should ideally be assessed against all criteria, but meeting any one of the criteria (or sub-criteria) is enough for a site to be considered for qualification as a KBA. Individual species may trigger the thresholds for more than one criterion. Table 3 summarizes how the criteria span across functional, structural and compositional components of biodiversity and across genetic, species and ecosystem elements of biodiversity.

Table 3. Alignment of the KBA Criteria across elements and components of biodiversity

		Elements of biodiversity		
		Genetic	Species	Ecosystem
Components of biodiversity	Composition	A1vi, B2ii, B2iii	A1i–v, B1, B2i, D1	A2, B3, B4
	Function	B3	D1, D2	C
	Structure	B3	D3	C, B3

4.1 Criterion A: Threatened Biodiversity

The persistence of biodiversity requires that its loss and degradation ceases. Globally threatened species and ecosystems face a high risk of extinction or collapse, and sites that continue to hold these threatened biodiversity elements in significant numbers (or extent) therefore make a large contribution to their global persistence. A site identified as a KBA under Criterion A holds a threatened taxon or ecosystem, even though the site itself might not be vulnerable. Consideration of pressures on the site itself are not part of the KBA identification process, but should be included in the documentation process (Section 6) and taken into account when planning and prioritizing potential conservation actions at sites (Annex 1).

All existing approaches to the identification of important sites for biodiversity, upon which the IUCN KBA Standard builds, have incorporated threatened species and/or ecosystems as a criterion. These include Important Bird and Biodiversity Areas (Fishpool et al. 1998), Important Plant Areas (Plantlife International 2004), and KBAs identified for multiple taxonomic groups in freshwater, marine, and terrestrial biomes (Langhammer et al. 2007, Edgar et al. 2008, Holland et al. 2012) (Section 2; Appendix B). The KBA Standard builds on these efforts and explicitly addresses threatened biodiversity, both below and above the species level, by including intraspecific diversity within threatened taxa and by adding a separate sub-criterion for threatened ecosystems.

4.1.1 Sub-criterion A1: Threatened taxa

At the global level, the taxa that can trigger, or meet, KBA Sub-criterion A1 encompass species, subspecies, plant varieties (e.g. forma, morph, cultivar), and isolated subpopulations (IUCN SPSC 2014) assessed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) under The IUCN Red List of Threatened Species Categories and Criteria. This includes taxa published on The IUCN Red List of Threatened Species, as well as taxa assessed as globally threatened following initial peer review but prior to final consistency checking and being published. A site can be identified as a KBA if one or more taxa meeting these standards occur at the site at or above threshold levels.

Despite its taxonomic and geographic gaps (Stuart et al. 2010), The IUCN Red List of Threatened Species is the global standard for species threat assessments and using it as the authority for threatened taxa increases the rigor and transparency of the KBA process. Taxa that are expected to be assessed as threatened once their extinction risk is formally evaluated can trigger "candidate KBA" status at the global level. These include:

a. Taxa assessed as threatened at the regional, national or sub-national level that are endemic to that region, nation, or sub-national jurisdiction;
b. Taxa listed as threatened under out-dated versions of The IUCN Red List Categories and Criteria
c. Taxa assessed under other documented global assessments of extinction risk (e.g. Master 1991); and
d. Taxa assessed as globally threatened under The IUCN Red List Categories and Criteria but not yet subjected to peer review or consistency checking.

Allowing potentially threatened species (a-d above) to trigger full KBA status at the global level would introduce subjectivity and instability into KBA identification, as well as a lack of transparency. Identifying a site as candidate KBAs allows proposers to compile available data for the sites and "flag" them in the KBA database). This will streamline the review process once the data are complete, so documenting that the candidate site meets KBA thresholds. For some taxonomic groups such as plants, which are under-represented on the IUCN Red List, the majority of potentially (and actually) threatened species have very small ranges. The sites where many of these species occur will be qualifying for KBA status under Sub-criterion B1 for geographically restricted species.

Most previous efforts to identify KBAs for threatened species have used absolute numbers of individuals at a site, for example 30 individuals or 10 pairs, for the threshold of global significance. Numeric thresholds are easier to apply in data-scarce situations, such as when there is only a rough estimate of global population numbers, and they ensure that a minimum number of individuals occur at the site. However, it is very difficult to set an absolute numeric threshold that is appropriate for all taxonomic groups. A site with 30 tigers may be of global significance while a site with 30 individuals of a threatened beetle species may not. Percentage thresholds circumvent this problem by requiring >X% of the global population of a threatened taxon to occur at the site. The challenge of applying a percentage threshold for poorly known taxa can sometimes be ameliorated by using surrogates for estimates of abundance, such as extent of suitable habitat and extent of occurrence. However, these measures will be conservative as surrogates for population percentages, making it more difficult for any given site to meet the threshold, because species typically do not occur everywhere in significant numbers throughout their extent of suitable habitat or occurrence. In addition, site-level population estimates are easier to obtain and are more reliable for some taxa than extent of suitable habitat.

Thresholds for **Sub-criterion A1—Threatened taxa**:

> *(a) Site regularly holds ≥95% of the global population of a globally Critically Endangered (CR) or an Endangered (EN) taxon; OR*
>
> *(b) Site regularly holds ≥0.5% of the global population AND ≥5 functional reproductive units of a globally Critically Endangered (CR) or Endangered (EN) taxon; OR*
>
> *(c) Site regularly holds ≥1% of the global population AND ≥10 functional reproductive units of a globally Vulnerable (VU) taxon; OR*
>
> *(d) Site regularly holds ≥0.1% of the global population AND ≥5 functional reproductive units of a globally Critically Endangered (CR) or Endangered (EN) taxon qualifying under Criterion A of The IUCN Red List of Threatened Species; OR*
>
> *(e) Site regularly holds ≥0.2% of the global population AND ≥10 reproductive units of a globally Vulnerable (VU) taxon qualifying under Criterion A of The IUCN Red List of Threatened Species.*

For application of the thresholds A1a-e above, the proportion of the global population of the taxon at the site may be observed or inferred by any of the following:

- (i) number of individuals,
- (ii) area of occupancy,
- (iii) extent of suitable habitat,
- (iv) extent of occurrence,
- (v) number and area of sites, or
- (vi) unique genetic diversity.

Metrics *i-v* should be applied in the order listed, so that the best data available are used to assess the proportion of the global population at a site. Metric *vi* refers to the genetic diversity of a threatened taxon that is unique to the site. Including this metric ensures that sites holding a disproportionately high genetic diversity of a threatened taxon can trigger KBA identification, even if the population of the taxon at the site is relatively small and insufficient to trigger KBA identification in its own right.

A functional reproductive unit is the minimum number and/or a combination of individuals necessary to trigger successful reproductive events at the site or elsewhere. Examples of five functional reproducing units would be five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species. Spawning aggregations should be large enough and with sufficient numbers of each sex to be considered reproductively viable.

Except for Sub-criterion A1a, a taxon must meet the thresholds for both the population percentage and number of functional reproductive units. This requirement is necessary to avoid the possibility of selecting KBAs for populations of threatened taxa that are unlikely to be sustained through reproduction in the short term, although some flexibility may be permitted for highly threatened species with very small populations where it is thought that sites holding sub-threshold numbers of functional reproductive units have a reasonable prospect of being sustainable, for example through conservation intervention work. The requirement is not applicable to threatened migratory species at non-breeding sites.

Because the threshold numbers for functional reproductive units are low for highly threatened species (CR and EN), longer-term persistence may require population replenishment. For CR and EN species effectively restricted to a single site (A1a) (i.e. those sites triggering the criteria for the Alliance for Zero Extinction; Ricketts et al. 2005), there is no requirement for a threshold number of functional reproductive units. These sites are places where species extinctions are imminent without effective conservation action. Many such sites will also qualify under Sub-criteria A1b and B1, but to avoid excluding sites with very small populations (i.e. not meeting the threshold for reproductive units), a separate threshold is warranted.

Although much lower than A1a, the thresholds for A1b and A1c are still relatively high compared with the absolute thresholds typically used to date. A lower threshold of 0.5% is set for species facing higher risk of extinction (CR or EN), compared to 1% of the global population for VU species, because sites for these highly threatened species necessarily contribute more to the global persistence of biodiversity.

Some threatened taxa have declined so precipitously that application of the thresholds under A1b and A1c would fail to identify any sites for many of these species. These species, which trigger the A Criterion of the IUCN Red List Categories and Criteria, often occur at very low densities and/or are wide-ranging. It may not be appropriate to identify KBAs for the many sites where such species occur (Boyd et al. 2008), but sites where these species occur in particularly significant numbers make a large contribution to the global persistence of biodiversity. Thus, for species threatened under the IUCN Red List A Criterion, the thresholds for KBA identification are set five times lower than those for other threatened taxa (A1d, A1e).

4.1.2 Sub-criterion A2: Threatened ecosystem types

The IUCN Red List of Ecosystems aims to assess the world's ecosystems for their risk of collapse at a global level (Keith et al. 2013, IUCN in press). This knowledge product will allow for the expansion of the KBA criteria to include the ecosystem level of biodiversity in a standardized and rigorous way.

For application under the KBA criteria, ecosystem type shall follow the definition used by the IUCN Red List of Ecosystems for global-scale assessments. This is a defined unit of ecosystem for standard and repeatable assessment, delineated by a particular and described set of variables related to its characteristic native biota, an abiotic environment or complex, the interactions within and between them, and a physical space in which these operate. For the Red List of Ecosystems in the Americas (Rodríguez et al. 2012), macrogroups, as defined by the US National Vegetation Classification (Jennings et al. 2009), were used as the units of assessment. The terms "ecological communities," "habitats," "biotopes" and (largely in the terrestrial context) "vegetation types," are operational synonyms of "ecosystem type".

For application of Sub-criterion A2 of the KBA Standard, threatened ecosystem types include those assessed as Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) under the IUCN Red List of Ecosystems Categories and Criteria (IUCN in press).

Among the existing approaches to identify important sites for biodiversity, Important Plant Areas (Plantlife International 2004) include a criterion for threatened habitats. A site qualifies as an Important Plant Area if it contains 5% or more of the national extent of a habitat recognized on a regional list to be threatened. The proposed KBA thresholds for threatened ecosystems take a similar approach, applied at the global level.

Thresholds for **Sub-criterion A2—Threatened ecosystem types:**

(a) Site holds ≥5% of the global extent of a globally CR or EN ecosystem type; OR

(b) Site holds ≥10% of the global extent of a globally VU ecosystem type.

The proportion of ecosystem extent is used for evaluation against the Sub-criterion A2 thresholds, given that alternatives such as metrics of ecosystem quality or functionality (which would more closely parallel the metrics for proportion of population used for Sub-criterion A1) are deemed impractical because of the lack of consistent global standards for measuring these. The thresholds for CR and EN ecosystem types are lower than that for VU ecosystem types, because sites holding a given proportion of a more severely threatened ecosystem type contribute more to the global persistence of biodiversity than do those holding less threatened ecosystem types. The thresholds for Sub-criterion A2 are an order of magnitude higher than those for A1, because species vary widely in abundance over their ranges (Brown 1984) whereas ecosystems tessellate over space. Thus, sites holding a given proportion of a species' population are expected to be less frequent, and thus to contribute more to the global persistence of biodiversity, than sites holding the same proportion of extent of an ecosystem type.

4.2 Criterion B: Geographically Restricted Biodiversity

Sites holding species, species assemblages or ecosystem types with globally restricted distributions make significant contributions to the global persistence of biodiversity because there are few other sites where these elements occur. There are limited options for safeguarding the biodiversity held by these sites and therefore the loss of any one may have significant impact. For this reason, most existing site-based approaches for identifying important sites include criteria for geographically restricted biodiversity (Appendix B). Criterion B draws extensively from this experience and aims to identify sites for geographically restricted biodiversity at four levels of ecological organization: individual species, species defining centres of endemism, species assemblages, and ecosystem types.

4.2.1 Sub-criterion B1: Geographically restricted species

The smaller the geographic distribution of a species, the larger the probability that a given site in which it occurs will make a significant contribution to its global persistence. Sub-criterion B1 is designed to identify sites permanently holding a large proportion of the global population of any such species. In practice, many restricted-range species will trigger this criterion. However, because some species with large global distributions have many individuals concentrated in just a few areas within their range, range restriction is not a pre-requisite for application of Sub-criterion B1. This type of geographic restriction, for 'highly clumped populations', has been incorporated into existing proposals for the criteria identification of KBAs for non-avian taxa (Langhammer et al. 2007, Edgar et al. 2008).

Threshold for **Sub-criterion B1—Geographically restricted species**:

> *Site regularly holds ≥20% of the global population and ≥10 functional reproductive units of a species*

For application of the B1 threshold, the proportion of the global population of the species at the site can be observed or inferred by any of the following:

- (i) number of individuals,
- (ii) area of occupancy,
- (iii) extent of suitable habitat,
- (iv) number and area of sites, or
- (v) extent of occurrence.

As for Sub-criterion A1, the best data available should be used to assess the proportion of the global population of a species at a site; hence, the metrics should be applied in the order listed above. In contrast to A1, unique genetic diversity is not proposed as a metric for application of B1, because in general geographically restricted species exhibit low genetic diversity among sites (Frankham 1996).

The 20% global population threshold is higher than proposed previously (e.g., Foster et al. 2012), because the great majority of sites contributing significantly to the global persistence of restricted-range biodiversity fall within centres of endemism (and so trigger identification under Sub-criterion B2). By contrast, Sub-criterion B1 is intended to ensure that KBAs are identified for those sites holding very high proportions of species populations outside of centres of endemism. A percentage threshold of 20% means that a maximum of five sites could be identified for any given trigger species. However, this situation is expected to be uncommon since species are typically not distributed evenly throughout their range.

4.2.2 Sub-criterion B2: Centres of endemism

Sites holding species with globally restricted ranges have long been recognized as making a significant contribution to the global persistence of biodiversity. IBA criterion A2 identifies sites “known or thought to hold a significant component of the restricted-range bird species whose breeding distributions define an Endemic Bird Area (EBA) or Secondary Area (SA)”[16]. In extending the IBA framework to other taxonomic groups, this criterion was originally modified so that any individual restricted-range species could trigger qualification of a KBA if ≥5% of its population occurred at the site, regardless of whether it was located in a centre of endemism or co-occurred with other restricted-range species (Langhammer et al. 2007, Edgar et al. 2008, Holland et al. 2012). This approach reflected the lack of data on global centres of endemism for other taxonomic groups.

In developing the criteria for the IUCN KBA Standard, the importance of identifying sites holding groups of species whose distributions define centres of endemism was reinforced, even if a lack of data continues to make this challenging to apply in the short term for many taxa. Sub-criterion B1 ensures that some sites will be selected even if they contain just one geographically restricted species. Sub-criterion B2, by contrast, aims to identify sites that capture significant proportions of the unique complements of species confined to centres of endemism.

Threshold for **Sub-criterion B2—Centres of endemism**:

> *Site regularly holds ≥33% of the complement of species within a vertebrate Class or non-vertebrate Order whose restricted ranges collectively define a centre of endemism.*

A centre of endemism for KBA identification refers to an area typically less than 50,000 km^2 that contains a high percentage of taxa endemic to it, compared to the total diversity in a region when considering other species in the same group (Class or Order)[17]. It can also be defined according to a published global or continental analysis of centres of endemism covering at least one vertebrate Class or Order for taxonomic groups other than vertebrates. This taxonomic division is admittedly arbitrary but is considered

[16] http://www.birdlife.org/datazone/info/ibacritglob

[17] This definition differs from that used by BirdLife International in the identification of IBAs for geographically restricted birds (Sattersfield et al. 1998).

practical given the taxonomic levels at which biogeography studies are typically conducted.

Rather than requiring two or more endemic species to meet a population threshold at the site, the B2 threshold requires regular presence at the site of at least one-third of the species within a vertebrate Class (or Order for other taxonomic groups) whose global ranges are restricted to the centre of endemism. This threshold will ensure that sites making the highest contributions to the global persistence of unique biodiversity are identified as KBAs. [Exceptions to this may be made for those restricted-range species which are found, through analysis, never to co-occur with more than threshold numbers of other species, as a result of specialised habitat requirements or distributions confined to the periphery of the centre of endemism, and would therefore otherwise be omitted.]

4.2.3 Sub-criterion B3: Biome-restricted assemblages

Sub-criterion B3 aims to identify sites holding relatively intact species assemblages that are restricted to particular biomes. These sites contribute significantly to the global persistence of biodiversity because they are unique, albeit at a broader spatial scale than centres of endemism. Safeguarding sites with biome-restricted assemblages is a way of ensuring that habitat is maintained for these species. Sub-criterion B3 has been implemented by BirdLife International and Plantlife International in identifying sites holding a significant component of the group of species with distributions restricted to individual biomes (Fishpool and Evans 2001) and habitats (Plantlife International 2004), respectively.

Biomes are major terrestrial and aquatic habitat types that are distinguished by their climate, flora and fauna. A number of different biome classifications have been published; for example, Olson et al. (2001) categorized terrestrial ecoregions into 14 separate biomes[18]. Work is still underway to determine an appropriate definition of biome for the application of Sub-criterion B3 of the KBA Standard, but it is likely to be a modified version of the WWF 'realm-biomes' (Olson et al. 2001, Abell et al. 2008). The rationale for this is that biomes themselves span very large regions and do not adequately reflect, for the purposes of KBA definition, the biogeographic differences in biodiversity, for example, between the tropical forests of Australasia and those of Africa.

Thresholds for **Sub-criterion B3—Biome restricted assemblages**:

Site regularly holds [≥X%] of the set of species restricted to a particular [biome]

Because the appropriate biogeographical unit has yet to be defined for B3, the threshold proportion of geographically restricted species occurring at the site (i.e. X%) is also still undefined. Testing is currently underway to inform an appropriate threshold for KBA

[18] Examples of biomes in this classification include tropical and subtropical moist broadleaf forests; temperate grasslands, savannas and shrublands; deserts and xeric shrublands; tundra; etc.

Sub-criterion B3. The size of X will be influenced by the range of the numbers of species confined to the different biome units and by how species endemic to the unit are distributed within them. As for Sub-criterion B2, application of the B3 threshold would be restricted to within a particular taxon (vertebrate Class / invertebrate Order).

Application of the B3 threshold will need to ensure that, as far as possible, all biome-restricted species are represented in at least one KBA. Conversely, the threshold or guidelines for application will need to ensure that a proliferation of sites for the more common or widely distributed species is prevented.

4.2.4 Sub-criterion B4: Geographically restricted ecosystem types

Sub-criterion B4 is intended to capture ecosystem types that are naturally restricted, such as coastal salt marsh and vegetated cliff ecosystems. It is not expected that many ecosystem types will trigger B4, because those that have been greatly reduced from their former extent will likely be assessed as globally threatened and trigger Sub-criterion A2. However, sites may qualify under B4 if they are geographically restricted but have not had their threat status assessed, assuming thresholds are met. KBA Sub-criterion B4 should be applied to the same ecosystem types as used in the IUCN Red List of Ecosystems.

Threshold for **Sub-criterion B4—Geographically restricted ecosystem types**:

Site holds ≥20% of the global extent of an ecosystem type.

The 20% threshold proposed for Sub-criterion B4 will ensure that sites selected under this Criterion make high contributions to the global persistence of biodiversity.

4.3 Criterion C: Ecological Integrity

Sites that contribute significantly to the global persistence of biodiversity include those that have exceptional ecological integrity and naturalness. Criterion C aims to identify truly outstanding examples at the global scale of still-natural and intact places that maintain fully functional ecosystem types and their components. Essentially undisturbed by significant human influence and free from substantial anthropogenic fragmentation, sites of outstanding ecological integrity support and maintain their full complement of species in their natural abundances or biomass, support the ability of species to engage in natural movements, and allow for the unimpeded functioning of ecological processes (Parks Canada Agency 2000, Karr et al 1986). Ecologically intact areas have experienced minimal invasion of exotics and are large enough in size to be resilient to edge effects, persist through most natural disturbance events, facilitate species adaptation and allow for species to retreat to refugia or move to more suitable climates (Lee et al. 2006, Watson et al. 2013). Such areas provide particular support to the persistence of native species with large spatial requirements, such as top predators, and those sensitive to human disturbance (Morrison et al. 2007, Friedlander et al. 2010).

It is envisioned that KBAs identified under Criterion C will represent globally outstanding examples of ecologically intact areas, and will therefore be fewer in number and larger in size, on average, than those identified by most other criteria. Smaller intact sites, such as caves, tepuis and coral atolls, will likely trigger KBA identification under Criterion B rather than Criterion C; such sites contribute to the global persistence of biodiversity because of the unique nature of their components, rather than because the ecosystems are particularly pristine.

Threshold for **Criterion C—Outstanding ecological integrity**:

> *Site is one of ≤2 per Region of Outstanding Ecological Integrity characterized by wholly intact species assemblages, comprising the composition and abundance of native species and their interactions.*

Regions of Outstanding Ecological Integrity are typically large (e.g. > 50,000 km^2) areas characterized by contiguous native habitat and minimal human disturbance, and contain intact species assemblages thought to be >95% similar to an appropriate historical benchmark (such as AD 1500). Criterion C will not be applicable in many parts of the world due to the pervasiveness of the anthropogenic footprint. Ecological integrity can be observed or inferred from:

(i) Direct measures of species composition and abundance/biomass, contextualized by historical information that allows inference on the natural bounds of variation for diversity or abundance in the ecoregion, particularly for species indicative of long-term structural stability (e.g. corals or tree species) and functionality (e.g. predators, keystone species), or those known to be highly sensitive to human impact (e.g. large predators, migratory fish or economically valuable species); OR

(ii) Absence (or very low levels) of direct human impact, as quantified by appropriate indices at the scale of interest and verified on the ground (e.g. deforestation inferred from satellite imagery, maps of shipping lanes or roads, human population density data and field-based measures of habitat condition/impact).

Regions of Outstanding Ecological Integrity can be identified by overlaying global-scale analyses of human impact or intactness. Examples include intact forest landscapes (Potapov et al. 2008), the last of the wild (Sanderson et al. 2008), frontier forests (Bryant et al. 2007), roadless areas (Selva et al. 2011), human impacts in marine systems (Halpern et al. 2008), river fragmentation (Nillson et al. 2005) and intact large mammal assemblages (Morrison et al. 2007). Identifying regions of outstanding ecological integrity may be more challenging in near-shore marine environments, although remaining unfished, remote coral reef wilderness areas are certainly analogous to the terrestrial wilderness concept (Graham and McClanahan 2013). Ground-truthing should focus on those aspects that cannot be inferred from remotely sensed data, such as extent of non-native species intrusion, overexploitation, or water quality. Although it is anticipated that ecological integrity will provide resilience to global ecological change such as climate change and ocean acidification (Watson et al. 2013), it is not recommended that they be included in impact metrics defining ecological integrity due to the pervasive and indirect nature of such changes across all marine and/or terrestrial areas. This issue will require further guidance given the rate at which integrity is being disrupted across the planet.

KBAs identified under Criterion C should ideally be delineated to be at least 10,000 km^2 in size, within the confines of manageability. The size guideline ensures that KBAs selected under Criterion C are in keeping with both the definition of 'wilderness' (e.g. Mittermeier et al. 2003b, Watson et al. 2009, Graham and McClanahan 2013) and IUCN Protected Area Category 1b-Wilderness Area. The threshold requirement of not more than two sites per region will help ensure that entire regions are not selected as KBAs, which otherwise would stretch the credibility of a site-scale approach. Because KBA identification typically proceeds at the national level, Criterion C may be applied in practice to country-components of Regions of Outstanding Ecological Integrity.

4.4 Criterion D. Biological Processes

The inclusion of Criterion D into the KBA standard is an explicit attempt to address species-level functional and structural components of biodiversity by identifying demographic and life-history processes that are manifested at specific sites over timescales meaningful for human actions.

4.4.1 Sub-criterion D1: Demographic aggregations

Sites where species aggregate in large numbers for breeding, migration, and other key life history events make significant contributions to the global persistence of functional biodiversity. In addition, large aggregations are often vulnerable to exploitation and other threats. Existing approaches to identify important sites for biodiversity, such as IBAs and important freshwater sites, have included a criterion for globally significant congregations, where appropriate for the taxa in question (Appendix B).

Examples of aggregations include non-breeding concentrations of migratory birds, fish spawning aggregations, bat roosting sites, waterbird feeding aggregations, breeding bays for some whales, and localized migratory bottleneck sites. While many species aggregate seasonally or during a specific life stage, others do so throughout the year or during more than one life stage. Sub-criterion D1 includes both types of species.

Proposed thresholds for **Sub-criterion D1—Demographic aggregations**:

> *Site regularly or predictably holds an aggregation representing ≥1% of the global population of a species during one or more key stages of its life cycle.*

An aggregation is a geographically restricted clustering of individuals that typically occurs during a specific life history stage or process. This clustering is indicated by high localised relative abundance, often two or more orders of magnitude larger than the species' average recorded densities at other stages during its life-cycle. However, there are some species that remain aggregated throughout most or all of their life cycles, including when they move between sites, such as some flamingos, and the concept of aggregation as used here is broad enough to include these.

Species which aggregate during migration or other life history stages face a unique set of challenges (Wilcove 2010) that warrant the thresholds proposed under D1 being set at the equivalent level to Sub-criterion A1c, i.e. for species assessed as VU for The IUCN Red List. These are higher than the thresholds for highly threatened EN and CR species (Sub-criterion A1b), but lower than those for geographically restricted species (Sub-criterion B1) where sites permanently support a large proportion of the global population of a species. Aggregations are frequently overexploited because of the large number of individuals at a site at a particular time. Populations of migratory species rely upon multiple sites, and habitat loss or degradation at breeding, non-breeding, feeding or stop-over sites can disrupt vital life history processes and ecological functions. Finally, these species face obstructions and other dangers as they move through or over inhospitable areas. The 1% threshold also has precedent in the site-based approaches used to date (Appendix B), and it aligns with Criterion 6 of the Ramsar Convention for the designation of Wetlands of International Importance.

4.4.2 Sub-criterion D2: Ecological refugia

Species may become concentrated in sites that maintain necessary resources, such as food and water, during periods of environmental stress, when conditions elsewhere become inhospitable. These temporary changes in climatic or ecological conditions, such as severe droughts, may concentrate individuals of a species at particular sites on the scale of years or decades. This longer time horizon differentiates ecological refugia from the demographic and geographic aggregations described in Sub-criterion D1. These sites make a significant contribution to the global persistence of biodiversity, through their role in maintaining ecological functionality over decadal timescales.

Proposed threshold for **Sub-criterion D2—Ecological refugia**

> *Site supports ≥20% of the global population of one or more species during periods of environmental stress, within a moving window of 100 years.*

If a site has supported, and will continue to support, recurrent aggregations during periods of environmental stress within a moving window of 100 years (e.g. 50 years in the past and 50 years into the future), it would qualify under Sub-criterion D2 if it supports at least 20% of the global population of a species during those periods. A higher threshold for D2 compared to D1 is warranted because species are not aggregating seasonally and facing the same frequent hazards encountered by migratory species (Wilcove 2010).

4.4.3 Sub-criterion D3: Source populations

The defining feature of sites identified under Sub-criteria D1 and D2 is that individuals of a species are moving *into* the site at globally significant numbers, albeit at different time scales. The reverse situation exists for some species, where individuals disperse *out of* the site in globally significant numbers. First used as a criterion for identifying KBAs in the marine environment (Edgar et al. 2008), these source populations make a large contribution to the recruitment of a species elsewhere. They contribute significantly to structural components of global biodiversity by supporting the meta-population structure of populations.

Threshold for **Sub-criterion D3—Source populations**

> *Site maintains ≥20% of the global adult population of a species through production of propagules, larvae, or juveniles.*

The threshold of 20% of the global population is the same as for Sub-criterion D2, to ensure that sites selected under this criterion make highly significant contributions to the global persistence of biodiversity.

4.5 Criterion E. Biodiversity through quantitative analysis

Criterion E provides a comprehensively quantitative equivalent to the other KBA criteria for identifying sites of high significance for global persistence of biodiversity. Criterion E also stands to provide an important quantitative check that sites contributing significantly to the global persistence of biodiversity have not been missed by the other criteria. Criterion E builds from the recent scientific developments in the identification of areas of high irreplaceability for achieving pre-defined representation targets (Moilanen et al. 2009). Targets are defined to be consistent with the other KBA criteria.

Proposed thresholds for **Criterion E—Sites of very high irreplaceability for the global persistence of biodiversity as identified through a comprehensively quantitative analysis of irreplaceability:**

> *Site has a level of irreplaceability of 0.90 or higher (on a 0–1 scale), measured by quantitative spatial analysis, and is characterised by the regular presence of species with ≥10 functional reproductive units known or inferred to occur (or ≥ 5 units for geographically restricted EN or CR species).*

The irreplaceability analysis should be based on the contribution of individual sites to minimum representation targets defined to achieve species persistence. Targets can be of two types:

(a) Representing at least X mature individuals of each species, where X is the larger value among:

i. the total number of individuals currently existing in the wild, if either: the global population is lower than 1,000 mature individuals; or the species' global extent of occurrence is smaller than 1,000 km^2; or the area of occupancy is smaller than 20 km^2;

ii. the population necessary to ensure the global persistence of the species with a probability of 90% in 100 years, as measured by quantitative viability analysis or inferred by expert knowledge;

iii. 1,000 individuals;

iv. the average population in 1,000 km^2 within the species' extent of occurrence or 20 km^2 within the species' within area of occupancy (as appropriate);

(b) Representing at least an area of Y km^2 for each species, where Y is the larger value among:

i. the total area where the species occurs, if either: the global population is lower than 1,000 mature individuals; or the species' global extent of occurrence is smaller than 1,000 km^2; or the area of occupancy is smaller than 20 km^2;

ii. the area necessary to ensure the global persistence of the species with a probability of 90% in 100 years, as measured by quantitative viability analysis or inferred by expert knowledge, up to a minimum of 10% of the total species distribution (i.e., extent of occurrence or area of occupancy, as appropriate);

iii. 1,000 km^2 within the extent of occurrence or 20 km^2 within the area of occupancy (as appropriate);

iv. the area correspondent to the extent of occurrence or the area of occupancy (as appropriate) necessary to include a population of 1,000 individuals.

The 0.9 threshold for site irreplaceability means that, given the biodiversity elements used in the analysis, and the targets set, area X is found in 90% of all possible sets of areas meeting those targets. For the same given targets, any one element may not point to area X as irreplaceable, but a *set* of all elements and their targets can make area X irreplaceable. This threshold is set deliberately high to avoid selecting site of marginal significance for the persistence of biodiversity.

The targets are derived from: The IUCN Red List of Threatened Species criterion D1 (IUCN 2001), for the target of 1,000 mature individuals; Rodrigues et al. (2004), for the target of extent of occurrence < 1,000 km^2; IUCN Red List criterion D2, for the area of occupancy < 20 km^2; IUCN Red List criterion E, for the target of probability of global persistence of the species of 90% in 100 years.

KBA assessment to identify sites under Criterion E should be implemented through complementarity-based irreplaceability analyses. *Irreplaceability* is defined in two ways (Ferrier et al. 2000): "(1) the likelihood that it will be required as part of a conservation system that achieves the set of targets; and (2) the extent to which the options for achieving the set of targets are reduced if the area is unavailable for conservation". *Complementarity* reflects the need to identify sites that best complement each other (rather than replicating each other) in terms of the biodiversity elements they hold, to minimize the number or extent of new areas needed to achieve a set of targets (Ferrier et al. 2000).

Existing approaches and software can be used to measure site irreplaceability. These include statistical analyses (Ferrier et al. 2000) and spatial prioritization algorithms (Ball et al. 2009). Other complementarity-based approaches rely on the use of benefit functions to determine the marginal loss of biodiversity value, related the potential loss of a given site, thus performing a hierarchical ranking of sites (Moilanen et al. 2012). All such methods can be used to identify highly irreplaceable sites under Criterion E. The use of methods currently under development as well as those potentially available in the future is not precluded, provided that such methods reflect the original objective of measuring complementarity-based site irreplaceability.

The irreplaceability analyses performed under Criterion E need to take into account the entire range of species, and so must either (a) be conducted at a global scale, or (b) focus only on the endemics from the region analysed, or (c) scale the representation targets to reflect the fraction of the global population of each species that is included in the study area. For analyses at the sub-global scale, the targets need to be scaled according to the fraction of the global population of each species that is included in the study area. The requirements that species occur regularly and with a minimum number of functional units ensure that the contribution of each site toward biodiversity persistence is not trivial.

As with the other criteria, the analysis should be based only on data appropriate for assessing the significance of a site's contributions to the global persistence of biodiversity, and should not include other conservation-related factors (e.g. management costs, likelihood of success, conservation opportunities, etc.). The irreplaceability analysis would not in itself identify KBA boundaries, which will be defined in a subsequent delineation process, as for sites identified under the other KBA criteria (Section 5).

The spatial resolution at which the irreplaceability analysis is performed is a key factor to consider, because the irreplaceability of a site depends on the species included in it, with larger sites likely to include more species. The spatial units in which the study area is subdivided should be equal-area or approximately equal-area. Ideally, functional management units of approximately equal size should be used; alternatively, grid-based units, such as those used in species atlases, can be adopted. The size of individual spatial units should be in the order of approximately 100–1,000 km^2. This is a common order of magnitude for the spatial resolution of, for example, species atlas data, and a good compromise between higher irreplaceability values and total area (Di Marco 2013).

As with the other criteria, species distribution proxies (such as Area of Occupancy, Extent of Suitable Habitat, or Extent of Occurrence) can be used to calculate sites' irreplaceability, but not to justify regular species presence or the occurrence of functional units within a site.

5. DELINEATION OF KEY BIODIVERSITY AREAS

The aim of KBA delineation is to derive site boundaries that are biologically relevant yet practical for management. Taking account of the actual or potential manageability of sites in their delineation is likely to enhance prospects of biodiversity persistence. However, no specific management prescription is implied by the delineation of KBA boundaries. Likewise, not all KBAs will be, nor indeed should be, formal protected areas.

Site boundaries, even if only preliminary, are an obligatory element of the KBA nomination process. Sites with defined boundaries are useful in the real world for a variety of purposes, including environmental impact assessments, in spatial conservation planning, the creation or expansion of protected areas and analysing gaps in protected area coverage. Work using existing KBAs shows they can have numerous other potential applications, including the establishment of baselines for monitoring, the measurement of ecosystem services provided by sites, and avoidance of harm by industry. KBAs mapped as points cannot effectively be used in these ways.

The delineation of a particular site as a KBA, however, does not mean that the land or water outside is unimportant. These areas may have nationally significant biodiversity or other cultural or ecological values. Furthermore, conservation of areas not designated as KBAs may be essential for maintaining connectivity of the landscape or aquatic system and may be essential for keeping many common species common. There is also the possibility that these areas will include other potential KBAs once additional taxonomic groups are assessed.

Delineation requires guidance rather than a set of formal rules because, more than other aspects of the KBA identification process, delineation is context dependent. There is considerable experience in site delineation to draw upon from existing initiatives, such as the IBA and AZE programs, as well as from policy processes for site designation including World Heritage sites, Ramsar sites, and EBSAs (Section 2). The guidance in this section builds upon this existing practice and recommendations from a technical workshop on Criteria and Delineation, held as part of the global consultation for the KBA standard (Section 1). Delineation is an iterative process but typically involves the following steps: assembly of spatial datasets, derivation of initial site boundaries based on biological data, refinement of the biological map to yield practical boundaries and documenting of confidence in the delineation. Ideally, all steps should be undertaken through consultation and serious engagement with relevant stakeholders.

5.1 Assembling spatial datasets

Compiling locality data for those biodiversity elements for which the site is being proposed is the first step in KBA identification. The next requires the assembly of a number of additional datasets (i.e. data layers), ideally in a geographic information system.

Helpful biological data layers include, but are not limited to:

- range maps for geographically restricted species;
- habitat suitability and extent;
- species distribution models;
- one-off counts, population monitoring, density or abundance estimates;
- tracking and movement data;
- known nest, den or breeding sites;
- seasonal refugia (e.g. deep pools in rivers).

Traditional indigenous and local knowledge of the location of biodiversity elements play an important role. It is essential to obtain the boundaries of any existing KBAs that have already been identified, such as IBAs and AZE sites.

The following non-biological datasets are also very helpful for delineation:
- land use, including roads, cities and agricultural areas;
- management units, such as protected areas, indigenous territories, concessions and administrative boundaries;
- topographic data, such as elevation and aspect, sub-catchments, seamounts and outer reef passages.

5.2 Deriving initial site boundaries based on biological data

In all cases, the boundaries for a KBA should first be based on biological considerations, which may then be amended to yield sites that are actually or potentially manageable. Once datasets have been compiled, the next step is to map the local extent of the biodiversity elements triggering the KBA criterion or criteria.

For species or ecosystem types that are well surveyed and monitored, deriving a boundary that represents their known local geographic extent may be possible. For lesser-known elements, it may be possible to estimate approximate geographic extent using modelled species distribution data, or knowledge of habitat requirements and maps of remaining habitat (e.g. forests, wetlands, seagrass beds). Land cover, inland water and marine data derived from satellite imagery are becoming increasingly available for all biomes. In some cases, a species or ecosystem may be so poorly known that the only biological information is the point locality itself. It is important that sensible and practical boundaries are defined based upon the information available, while acknowledging its limitations.

There is no minimum or maximum size set for a KBA. IBAs and sites identified under previous iterations of the KBA criteria (e.g. Langhammer et al. 2007) are typically 100–1000 km^2 in size but range from 1 ha to over 33 million ha. However, some sites smaller than 100 km^2 make highly significant contributions to the global persistence of certain species. Wherever possible, the delineation process should aim to develop site boundaries that are large enough to support viable populations while minimizing the inclusion of land or water that is not relevant to the conservation of the biodiversity element(s) for which the site is identified. The maximum size is context dependent and constrained by manageability (including inaccessibility or politically stability), although it is recognized that some very large KBAs, based on existing protected area boundaries, are managed as single units. In general, this means that most KBAs are substantially smaller than, and are encompassed within, landscapes and seascapes (e.g., Boyd et al. 2008), although some large KBAs may be considered as land- or seascapes in their own right. However, for those KBAs selected on the basis of ecological integrity, the large size of the intact area is a key reason for its selection. In the marine environment, the precise location of sites may move from year to year (e.g. tuna spawning aggregations) within a larger area, which should be factored into KBA delineation (Section 5.4.4).

In many cases, KBA identification will be triggered by multiple taxa; in some of these, initial mapping based on biological data may yield multiple overlapping and incongruent polygons. KBA delineation is therefore not complete until boundary refinement has been considered, using additional data to ensure that, wherever possible, the result is a single, manageable site.

5.3 Refining the biological map to yield practical boundaries

The next step is to ensure that site boundaries are relevant and practical. This often means refining biologically derived boundaries with additional data, especially in situations where the extent of a biodiversity element falls within an existing KBA, occurs within or overlaps with an existing protected area, overlaps incongruently with other KBA trigger elements, or falls within large blocks of contiguous habitat.

5.3.1 Delineation with respect to existing sites of importance for biodiversity

Important sites for biodiversity, such as IBAs, IPAs and sites identified for multiple taxonomic groups under previously published KBA criteria, have been identified in many countries and marine areas to date (Section 2.1). Wherever possible, identification and delineation of KBAs for new biodiversity elements or application of additional criteria should take into consideration the boundaries of these existing sites because many have national recognition, active conservation and monitoring initiatives, and/or are linked to international, national, regional legislative and policy processes.

Striving for congruent site boundaries as additional species and ecosystem types are considered in KBA identification is important for a number of reasons. KBAs with harmonized boundaries are more understandable and easier to advocate for than is a set of incongruent sites. Harmonized boundaries can bring together multiple national constituencies for various elements of biodiversity—advocates for different species groups, ecosystem types and biomes—around a common cause. Clear boundaries are more likely to garner support. If the locality and extent of an additional biodiversity element triggering one or more criteria falls within the boundary of an existing site, and it contains enough of the new element to meet the threshold of significance, the boundary of that site should be used for the delineation (Tordoff et al. 2012, Natori et al. 2012).

If the additional biodiversity element partially overlaps an existing site or is larger, there are generally three options: disregard the area of overlap (if trivial), extend the existing boundary if agreeable to stakeholders (including the group who originally delineated the site), or delineate a new KBA. The appropriate option will typically depend on how much of an overlap there is. If the additional area is minimal or not critical for the persistence of the triggering species, then it can be disregarded (i.e. no change to boundary). If the additional area is important but not core (i.e. more of the population is within the existing site than the new area), then the boundary can be extended, if agreeable to stakeholders including the group who originally delineated the site. If the additional area is core for a triggering species, then a new KBA is most appropriate.

Modifying the boundaries of existing sites to incorporate additional biodiversity elements without proper stakeholder consultation can be destabilizing and might jeopardize positive management actions underway at the site, and so should be avoided, where possible. If there are significant concerns about an existing boundary, the constituency contributing new information should, where possible, seek to work closely with the group that originally delineated the site to try to resolve the problems.

5.3.2 Delineation with respect to protected areas

When a biodiversity element triggering the KBA criterion or criteria falls within an existing protected area, and its biodiversity is being effectively conserved, it is often advisable to use the protected-area boundary to delineate the KBA (Ambal et al. 2012, Natori et al. 2012). Many protected areas are recognized management units with the goal of safeguarding the biodiversity contained within them, and the additional recognition of the site as a KBA, using the existing boundaries, helps to consolidate the importance of these management units. If the protected-area boundary is used for KBA delineation, the map showing the known extent of the biodiversity element (or its habitat, if this is unknown) within the protected area, if available, should be retained as a data layer to support specific management actions and monitoring. This is particularly important for freshwater biodiversity, for which existing protected areas often provide no effective protection. In marine systems, protected areas can include temporally constrained protection of spatially delimited areas important for migratory species or for species that congregate seasonally.

However, protected-area managers should be consulted during delineation because the decision to use the protected-area boundary should depend on the following factors: (a) the management needs of the biodiversity element(s) triggering the KBA criterion or criteria, (b) the spatial extent of the biodiversity element(s) relative to the size of the protected area, and (c) whether management is occurring throughout the protected area in a manner that supports persistence of the biodiversity element in question, which is often not the case for freshwater biodiversity, in particular. In the terrestrial and marine systems, some very large protected areas (e.g. >100,000 km^2) either have no management or have different management regimes within them, which may not be compatible with the persistence of the biodiversity element in question. In such situations, using congruent biological boundaries within the protected area for the KBA delineation may be preferable.

The situation is more complex when a biodiversity element triggering one or more criteria partially overlaps and/or extends well beyond the boundaries of an existing protected area. There are generally two options in such circumstances. First, the initial biological boundary, based on the known extent of the biodiversity element or remaining habitat, can be used for site delineation and the site would be considered as “partially protected” (assuming the protected area offered protection to the biodiversity element(s) in question). This option makes sense if, for example, there is precedent in the country or region for expansion of existing protected areas (Ambal et al. 2012). A second option is to use the existing protected-area boundary for the delineation of one KBA and delineate a second KBA covering the portion of the biodiversity element outside the protected area, assuming both areas meet the thresholds of significance in their own right (Langhammer et al. 2007: Fig15b). This option will generally be used when it is easier to create new safeguard mechanisms than to expand established protected areas.

5.3.3 Refining boundaries using other management data

Mapping the extent of each species or ecosystem triggering the KBA criterion or criteria, especially in areas of high biodiversity, can result in a set of many overlapping and incongruent polygons. This union of overlapping polygons, representing the biological map of multiple KBA trigger species, can approximate to entire land- or seascapes, ecoregions or hotspots. In these situations, subdivision into multiple smaller KBAs on the basis of habitat or land-use boundaries is generally warranted, provided that the smaller units continue to meet identification thresholds in their own right. This will depend on the local context, because, in some regions, very large sites can be managed as single units. A similar challenge is faced when delineating KBAs in large blocks of contiguous habitat, specifically where these areas cannot be practically managed to ensure the persistence of the KBA trigger element(s) because, for example, of overlapping jurisdictional boundaries.

For these reasons, when delineating sites that fall outside existing KBAs and protected areas, it is often necessary to incorporate other data on land/water management to derive site boundaries that are practical. These management data layers should be of an appropriate scale or grain of land- or water-use in the region, and can include private lands managed for biodiversity, language groups, national and sub-national administrative boundaries such as counties or districts, catchments in the case of integrated basin management, and other permanent management units. Where sites overlap one or more national boundaries, identifying different KBAs in each country may maximize the potential manageability of the site (Kouame et al. 2012), but there are some exceptions, such as in cases of pre-existing transboundary protected areas or transboundary catchment management is in place. Because upstream impacts and species movement patterns do not stop at national boundaries, delineation of transboundary KBAs for freshwater biodiversity is desirable when the resulting site can be manageable as a single unit.

In some cases, however, refining site boundaries based on management units is not feasible because the units themselves are either too small or too large to be useful. For example, a biodiversity element triggering one or more criteria may cover many small landholdings and using these boundaries would either result in a set of sites too small to meet the KBA threshold(s) or lacking the potential to provide effective management of the biodiversity element in question. At the other extreme, a biodiversity element may fall within a very large unit with land- or water uses that are incompatible with management of the biodiversity for which the KBA is important. In these cases, using congruent biological boundaries is the best approach.

When the actual extent of a KBA trigger element is unknown, and the locality falls within a large block of contiguous habitat without useful management units for aiding delineation, topographic data such as elevation, ridgelines, seamounts and other identifiable elements on the land/seascape can be used to derive site boundaries.

5.3.4 Reconciling KBA delineation for terrestrial and aquatic biodiversity

These guidelines are intended to be applicable for the delineation of KBAs for terrestrial, freshwater and marine biodiversity. However, the inherent connectivity of aquatic systems presents challenges for site delineation. Many aquatic species are wide-ranging and/or highly mobile and may not occur at readily identifiable sites in globally significant populations. In the marine environment, populations may shift location in response to gyres or the movement of prey species. In the freshwater riverine environment, there is the significant added challenge that upstream activities, such as pollution events, can have rapid and severe impacts on downstream and coastal sites, and the introduction of non-native species can rapidly invade downstream or upstream areas. Freshwater KBA delineation has typically used sub-catchments for delineating site boundaries. These are units that should be managed to address the needs of freshwater KBA trigger species. Except in the case where integrated river basin management incorporating biodiversity is being successfully implemented, these units often contain land surrounding the rivers that is managed by different authorities or for different purposes by different authorities (or stakeholders). In contrast, terrestrial site delineation has tended to result in boundaries that are actually being managed as single units or are sufficiently comparable such that management is realistic.

Because of these different approaches and considerations, there are instances where terrestrial and freshwater sites identified using previously published KBA criteria (Langhammer et al. 2007, Holland et al. 2012) overlap non-congruently, where freshwater sites ‘contain’ multiple terrestrial sites and, in some instances, vice versa. Retaining terrestrial and freshwater KBAs as separate, overlapping data layers is however held to be sub-optimal, because incongruent KBA boundaries do not send clear messages to industry, governments and other land management organisations. It is important to strive for congruence in boundaries, wherever feasible, in order to simplify communication, unify the biodiversity community around a set of sites and support management of those sites.

Several processes are underway which may bring the terrestrial and freshwater delineation approaches into better alignment. First, in the short-term, non-congruent sites previously identified as KBAs can remain distinct, while a process is set up for review and possible convergence over the medium-term (Section 7). This recognizes the considerable work that has gone into terrestrial and freshwater site delineation to date, while setting a course towards greater congruence. Second, pilot projects that aim to identify KBAs simultaneously for both freshwater and terrestrial biodiversity can provide practical experience and guidance for harmonizing KBA delineation in the two systems. Third, recent efforts to harness local and national expertise in the delineation of "focal areas" for freshwater biodiversity within sub-catchments, which are directly aligned in scale and manageability to most sites previously identified as KBAs in terrestrial and marine environments, may, in some cases, provide the basis for delineating single management units appropriate for both terrestrial and freshwater biodiversity elements. Fourth, the recommended documentation for each KBA (Section 6) includes major threats to each site and the required conservation actions to address them. It is intended that this information, where possible, will be displayed for each KBA on the website. This will provide a means for highlighting conservation actions that must be implemented at a broader scale than individual KBAs to maintain populations of trigger species at the site.

Finally, the emerging IUCN Red List of Ecosystems (Keith et al. 2013, IUCN in press) will be an additional mechanism for highlighting threats to freshwater ecosystems, such as pollution, siltation, water extraction and hydrological modification, as well as declining large-scale biological processes (e.g. migrations), pointing to ecosystem-wide degradation. Where freshwater ecosystems assessed for the Red List of Ecosystems align with catchments, this will be a high-profile mechanism for highlighting threats operating beyond the scale of individual KBAs and the large-scale conservation actions necessary to address them.

In the marine environment, KBA delineation should consider the boundaries of marine IBAs; marine protected areas, fisheries closure areas and other management units, where these exist within territorial waters *and* are useful, as well as EBSAs designated by the CBD (Section 2). Where these sites do not exist, delineation can align to fine-scale oceanographic features, such as seamounts, reef edge (Bass et al. 2011), depth contours (Ambal et al. 2012), and seagrass beds. It is conceivable that "mobile KBAs" could be delineated, if the biodiversity element triggering KBA status shifts its location in response to resource availability. In many cases, it may make sense to combine adjacent terrestrial and marine KBAs as these present opportunities for collaboration and more holistic ridge-to-reef management (Ambal et al. 2012).

5.4 Consulting key stakeholders

Delineation is typically undertaken following the application of the criteria and thresholds (Section 4). However, delineation should occur in collaboration with relevant stakeholders, and identification of stakeholders for consultation is contextual to scale and region. It usually includes local scientists and experts with knowledge (including traditional indigenous and local knowledge) of the biodiversity elements of the site, government agencies tasked with managing natural areas or wildlife populations and civil society conservation groups working in the area. Where site delineation overlaps with areas owned, occupied, managed or claimed by indigenous peoples, the principle of free prior and informed consent (FPIC) should be observed (FPP 2007). Stakeholder consultation should come as early in the process as possible, usually during step 3 (Refining the biological map to yield practical boundaries). One or more workshops or informal meetings with these constituencies can provide additional context and data to inform delineation. Stakeholder consultation should not be overly complicated, because delineating a KBA is not the same as prioritizing investment or planning conservation action at the site, which require detailed follow-up consultation.

5.5 Documenting confidence in delineation

KBA delineation is an iterative process that makes use of better data as they become available. Stable boundaries are desirable but the delineation process must be able to accommodate changes in knowledge and the reality on the ground. A description of how the boundary was derived should be included in the documentation for each KBA, even if the boundary is preliminary. In addition, it is useful to also have a brief description within the GIS data layers generated during delineation.

The cartography around KBAs—how they are displayed on a map—should reflect the level of confidence in the boundaries and degree of stakeholder consultation. Three levels are suggested:

- Draft— limited data and/or inadequate stakeholder consultation permits only a rough delineation
- Revised—existing boundaries have been better defined because of additional biological and management data including local knowledge
- Confirmed—boundary has been subjected to independent review and relevant stakeholders have been adequately consulted.

These different levels of confidence should be displayed on KBA maps, for example by using broken and solid lines or different line weights. An example of this type of cartography can be drawn from Coastal Zone Management concepts for marine coastal areas.

6. DOCUMENTATION FOR KBA NOMINATIONS

KBA identification requires the confirmed presence of one or more biodiversity elements at the site that both trigger at least one KBA criteria and meet the corresponding required thresholds. These data must be traceable to a reliable source and sufficiently recent (and updated) to give confidence that the biodiversity elements are still present.

This section outlines a range of supporting information that is either:

- Required for each site nominated as KBA before it can be confirmed by IUCN, or
- Recommended for each site

This information (both the required and the recommended) supports and justifies the identification of a site as a KBA and allows basic analysis of KBAs across taxonomic groups, ecosystem types and countries. It also helps users to search and find information easily on the website.

6.1 Required information

A minimum set of information is required for each KBA to enable peer review of the data and a basic presentation of each site on the KBA website. Some of the documentation for each KBA is required under all circumstances (Table 5), some can be generated automatically by IUCN, and some is only needed under specific circumstances (Table 6). Data will be clearly attributed to the organisation(s) or individual(s) that provided them as part of the KBA nomination process.

Every effort has or will be made to minimise, simplify and automate the required documentation for KBAs, to reduce the time burden on proposers, in particular through the provision of authority files and classification schemes directly from IUCN Red List of Threatened Species, the IUCN Red List of Ecosystems, and the World Database on Protected Areas (WDPA), through drop-down menus. The onus is on the proposer to provide supporting information; any KBA nomination that does not include all of the information listed in the following table will be returned to the proposers for completion before the nomination can be progressed.

Table 5: Required information for all KBA nominations submitted to IUCN (in all circumstances).

Required information	Description	Type	Purpose
KBA Name (National and International)	Unique name for the site, in a national language and in English, if it exists	Text	• To identify which site is nominated • To support website functionality
Geopolitical unit	Country, territory, high seas or other geopolitical unit where KBA is located	Drop-down menu (allows multiple selections for transboundary sites)	• To support website functionality (in particular country search) • For basic analysis
System	Coding of the site as terrestrial, marine,	Drop-down menu (allows multiple	• To support website functionality

	freshwater, subterranean	selections for sites spanning systems)	• For basic analysis
KBA criteria met	Coding of KBA criteria for which the site is documented to meet thresholds	Drop-down menu	• To identify for which type of biodiversity the site is important • To support website functionality • For basic analysis
“Trigger” biodiversity elements	Taxa (including scientific name and higher taxonomic details), ecosystem types, and biological processes for which the site is considered to qualify as a KBA and which KBA criteria and thresholds they meet	Drop-down menu (Criterion A from Red Lists, Criterion B3 from Red List of Ecosystems, Criterion C from Ecoregions); Text (other criteria)	• To identify for which species/ecosystem a site is important • To support website functionality • For basic analysis
Parameter value(s) for criteria met	Documentation of how the relevant parameters for each criterion exceed the relevant thresholds	Numeric	• To identify for which type of biodiversity the site is important • To support website functionality • For basic analysis
Date	Year in which parameter value(s) measured/estimated	Numeric (year)	• To identify for which type of biodiversity the site is important • For basic analysis
Uncertainty in parameter values	Estimated probability that the parameter values used are accurate	Drop-down menu (using fuzzy number logic, as does SIS for the Red List)	• To identify for which type of biodiversity the site is important • For basic analysis
KBA criteria not assessed	Coding of KBA criteria not assessed for the site	Drop-down menu	• To highlight which biodiversity elements might not yet have been considered in KBA identification
Rationale for the KBA nomination	Brief explanation of the reasons why a site is triggering the KBA criteria and thresholds and of the potential inferences or uncertainties that relate to data.	Text	• To justify the nomination of the site and the criteria selected
Bibliography	References (cited in full) and data sources used	Text in bibliographic format	• To underpin the nomination and provide all source of data and information used to support the site nomination
Stakeholder engagement	Brief description of stakeholder engagement in KBA nomination	Text	• To ensure involvement of local relevant stakeholders in the identification and site delineation process
Delineation status	Status of stakeholder consultation	Drop-down menu (Draft, Refined, Confirmed)	To ensure involvement of local relevant stakeholders in the identification and site delineation process
Delineation precision	Coding of precision in the	Drop-down menu	• To allow spatial analysis

	delineation	(<100m, 100 – 1,000m, >1,000m)	
Delineation rationale	Brief explanation of proposed delineation of KBA boundary	Text	• To justify the boundaries used
Geo-referenced polygon of the site boundaries	GIS data layer indicating the proposed delineation for the site and the spatial projection used	GIS	• To allow visualization on the website (and spatial queries) • For spatial and basic analysis
Proposer(s)	Names and contact details of the individuals who nominate the KBA	Text	• To acknowledge those involved in the nomination • To allow to contact Proposer(s) easily in the case of the site being questioned or assessed for other taxonomic groups (contact details will not be published on the website)

The following data can be generated automatically by IUCN following endorsement:

Reviewers	Names and contact details of the individuals that participate in internal and external review of the data	Text	• To demonstrate that the appropriate review process has been undertaken • To allow to contact Reviewer(s) in cases where details of the site are challenged (contact details will not be published on the website)
Year of Assessment	Year that the KBA was endorsed by IUCN	Numeric (year)	• To ensure the site identification is not out-of-date
KBA size	Areal extent of the KBA in km^2	Numeric (km^2)	• To allow spatial analysis
Central coordinates	Central coordinates of the KBA in decimal degrees	Numeric (decimal degrees)	• To allow spatial analysis
Protection status	Overlap of the nominated KBA with one or several protected area(s) in the WDPA	Numeric (%) (with option to indicate variation if WDPA is incomplete/out of date)	• Useful for providing indication of the legal status of protection of the site
Protected Area(s) name(s)	Name and site ID from the World Database on Protected Areas that overlap with the nominated KBA	Drop-down menu (from WDPA; allows multiple selections; with option to indicate variation if WDPA is incomplete/out of date)	• Useful for providing indication of the legal status of protection of the site

Table 6: Required information for all KBA nominations submitted to IUCN (under specific circumstances). This list of information is essential for KBA nominations that meet the conditions outlined below.

Required information	Specific conditions	Description	Type	Purpose
KBA nomination history	If the KBA nominated is equivalent to or is overlapping with an existing KBA	Designation of the site as an existing KBA (e.g., IBA, AZE, IPA)	Drop-down menu + Text	• To ensure continuity of information • To distinguish between overlapping elements • For basic analysis
Information on the reason for change in the KBA listing	For sites being updated	Coding justifying the changes of criteria used to classify a site as KBA or the delisting of a site		• To distinguish between changes related to the biodiversity occurring at the site or changes related to the site itself

6.2 Recommended information

Compiling a set of additional information about each nominated KBA will support management of the biodiversity elements triggering the criteria; site-scale monitoring; national conservation planning and priority-setting; and global and regional analyses of KBA status. It is recommended that the additional information in Table 7 be compiled for each KBA during the nomination process.

Table 7: Recommended information for all KBA nominations submitted to IUCN.

Recommended information	Description	Type	Purpose
Site description	Concise description of the site for a general audience	Text	• To provide a brief overview for website
Major Threats	Coding and description of major threats at the site, using IUCN Threat Classification Scheme	Drop-down menu + Text	• To provide information for further prioritization of sites • To support website functionality • For basic analysis
Conservation actions in place	Coding and description of conservation actions in-place, using IUCN Conservation Actions Classification Scheme	Drop-down menu + Text	• To provide information for further prioritization of sites • Useful for providing high-level indications of the most important actions in place • For basic analysis
Conservation actions needed	Coding and description of conservation actions needed at site, using IUCN Conservation Actions Classification Scheme	Drop-down menu + Text	• To guide decisions on conservation actions • To provide information for further prioritization of sites

			• Useful for providing high-level indications of the most important actions in place • For basic analysis
Ecosystem service values	Coding and description of ecosystem services provided by the site, if known	Drop-down menu + Text	• Useful for providing information on the additional importance of the site
Cultural values	Description of cultural values provided by the site, including degree of dependence of local communities for livelihood	Drop-down menu + Text	• Useful for providing information on the additional importance of the site
Additional biodiversity values	Description of other biodiversity elements for which the site is likely important but data do not allow application of KBA criteria	Text	• Useful for providing information on the additional importance of the site
Habitat	Description and coding of major habitats encountered in the site, using the IUCN Habitat Classification Scheme	Drop-down menu + Text	• To support the nomination with contextual information
Habitat Cover	% of the KBA containing each type of habitat	Numeric (percentage)	• To support the nomination with contextual information
Altitudinal range	Maximum and minimum altitude occurring at the site	Numeric	• To allow spatial analysis
Administrative region	Occurrence of site in major sub-national diversions, (e.g. State or Province)	Drop-down menu + Text	Useful for searching by sub-national division
Customary jurisdiction	Occurrence of site in customary jurisdictions, if applicable	Text	• To support the delineation with contextual information
Land-use regimes	Description of land uses at the site	Text	• To support the delineation with contextual information
Supporting spatial data	Key data layers that support management of the trigger species at the site (i.e. initial biological element map)	GIS	• To support the delineation with contextual information • To guide decisions on conservation actions • To provide information for further prioritization of sites
Information gaps	Description of key information gaps at the site	Text	• To highlight the biodiversity elements that might also be important in the site but could not be assessed

7. PROPOSED PROCEDURES FOR KBA IDENTIFICATION

This section outlines the proposed governance arrangements and procedures for identifying and documenting KBAs, in particular the role of the different stakeholders, relationships between national and global processes, and the process to nominate, review and endorse KBAs. It is based on discussions at the Framing workshop and a dedicated workshop that addressed Governance issues (Section 1.1).

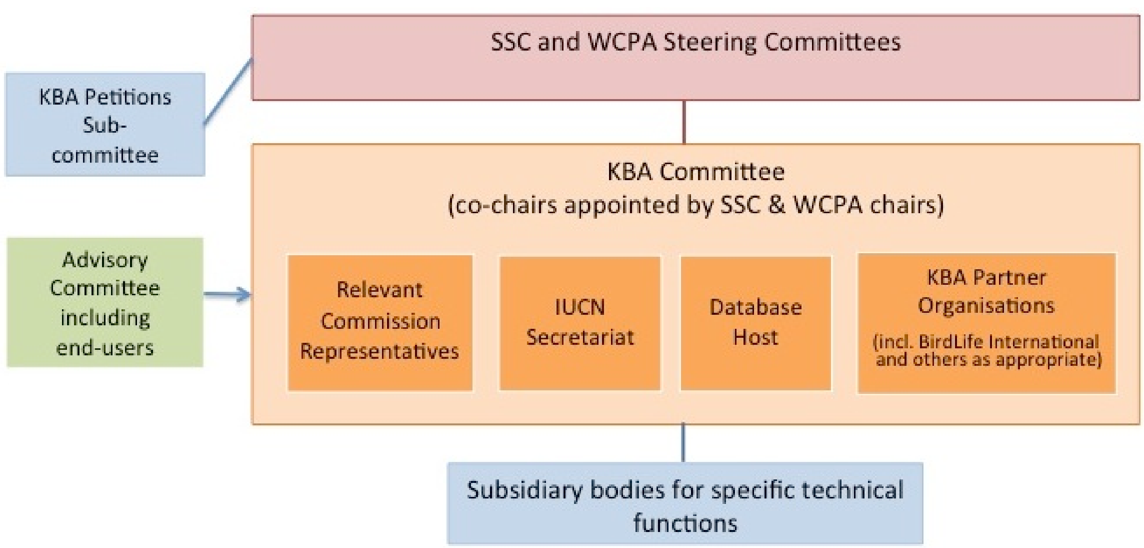
7.1 Establishment of a KBA Committee

Recognizing the need for strategic direction and steering of the overall KBA initiative, the KBA workshop on Governance, Rules and Procedures proposed the establishment of a KBA Committee, developed a terms of reference for it, and proposed a structure to deliver it.

7.1.1 Creation of a KBA Committee

Governance of the KBA Knowledge Product will be accomplished through the creation of a new KBA Committee, reporting to the Steering Committees of the WCPA and the SSC and deriving its authority from a KBA Partnership Agreement. The KBA Committee shall comprise four main components: relevant IUCN Commission representatives, IUCN Secretariat (including relevant staff from an IUCN KBA Unit), IUCN Members and partner organizations identifying KBAs (BirdLife International and others as appropriate), and the host organisation of the KBA database (Figure 3). The KBA Committee will establish sub-committees to address specific technical functions, as needed. It will receive advice and input from an Advisory committee that includes end-users of the KBA data. The Petitions process (Section 7.3) will be the responsibility of a separate sub-committee that reports directly to the SSC and WCPA Commission Chairs.

Figure 3. Proposed structure of the KBA Committee



7.1.2 Role of a KBA Committee

The KBA committee will aim to do the following:

Serve as the custodian of the KBA Standard, criteria, and guidelines

- Establish rules for data validation
- Provide quality control and quality assurance
- Maintain the scientific standards for KBAs and develop guidelines on the application of these standards

Define, establish, and oversee the processes

- Establish, authorize and oversee sub-committees and other subsidiary bodies
- Establish and oversee the partnership of institutions engaged in identification and conservation of KBAs
- Oversee the independence, rigour and audit of the review of KBA nominations

Develop and help oversee strategy and work program

- Advise on priorities within the agreed program
- Establish the financial model and assist with fundraising
- Accountability and reporting on strategy

Promote appropriate use of KBAs

- Catalyse and promote appropriate synthesis of KBA information
- Secure regular feedback from end-users
- Promote the value and application of existing KBA datasets
- Establish policies and rules for terms of use of data

Develop, promote, and represent the KBA brand

- Lead in the promotion of the KBA approach
- Help ensure effective and accurate communication

7.2 Process for proposal, nomination, endorsement, and update of KBAs

For the KBA initiative to become a ‘standard’, both in the sense of it being underpinned by a common approach worldwide, applicable to all components of biodiversity, as well as implying universal rigour and recognition, there is need for oversight, quality control, rules and guidelines. This section outlines the proposed process for handling IBAs and other sites previously identified as KBAs in terrestrial, freshwater and marine environments. It also outlines the process for the nomination of new sites as KBAs.

7.2.1 Process for handling sites previously identified as KBAs

The criteria and thresholds for the new KBA Standard are not identical to those used to identify IBAs or those previously used to identify KBAs for other taxa and ecosystems. Given that there are already more than 13,000 such sites worldwide, it is important to streamline assessment of these sites as far as possible. The proposed process for assessment of existing sites as KBAs is as follows:

- Cross-walk all existing sites against the criteria, thresholds and minimum documentation requirements for the new KBA standard
- Assess site status as one the following possibilities:
    - KBA confirmed to meet thresholds at the global level
    - KBA presumed to meet thresholds at the global level and is a 'priority for update' (involving compiling relevant data to demonstrate that it meets the thresholds) within an 8-12 year window
    - KBA meets thresholds at the regional level
- For sites that are a 'priority for update' or meeting regional thresholds, check to see if they can be confirmed to meet global thresholds of other KBA criteria (not the ones relating to those criteria under which they were identified originally), or for other biodiversity elements (i.e. taxa or ecosystems) not previously assessed against the KBA criteria.

The earlier identification of KBAs for non-avian taxa sometimes resulted in non-identical boundaries where these sites overlapped with existing IBAs. This is a result of these other taxa sometimes having different habitat requirements, as well as reflecting the involvement of different organizations and experts. Much time and effort has, in the past, been spent in trying to resolve conflicting delineations of sites in some regions. The proposed process for handling overlapping boundaries of existing sites meeting global thresholds is as follows:

- In the short term, existing non-congruent boundaries will remain distinct.
- Over time, boundaries of existing non-congruent sites will be reviewed and refined with the aim of convergence, wherever possible.
- Sites proposed for new taxa or under new criteria should attempt to align with existing boundaries, wherever possible, or identify new sites that are congruent, following the guidance in Section 5.
- Any changes to the existing boundary should be justified and agreed by originator, wherever possible.
- Resort to the petitions process may ultimately be needed if parties cannot reach agreement on site delineation.

7.2.2 Process for nomination of new sites as KBAs

The proposed process for nominating new sites as KBAs has received intensive consideration and is outlined below as a series of discrete steps, with longer stages of work in between (Table 8).

Expression of Interest, Proposal Development and Proposal Submission

Although it is expected that most proposals for new KBAs will come from within the country in which the sites are located, any individual or organization interested in undertaking KBA identification, may submit an **Expression of Interest**, even if not based in the country concerned. This will trigger support and guidance from IUCN, specifically by assigning a KBA Focal Point to support proposal development. KBA

Focal Points will have experience in applying the KBA methodology and may provide training as required. They also have knowledge of previous or current KBA identification processes in the region, to ensure that existing important sites for biodiversity are taken into consideration in the identification of KBAs for new biodiversity elements. In the *Proposal Development* stage that follows, the proposer works to identify and delineate KBAs, compiles the required and recommended documentation for each site, consults with relevant stakeholders and receives input from the KBA Focal Point. When complete, the data are submitted online to IUCN as a **Proposal** for review, and at this point the site(s) would be termed a "Proposed KBA**".**

Table 8. Summary of process to nominate, review, and endorse new sites as KBAs

Step	Stage that follows	Status of site	Description
Expression of interest			Individual(s) or organisation(s) wanting to propose one or more KBAs in a country or region submits expression of interest to IUCN. This triggers support and guidance from a KBA Focal Point within the KBA Unit.
	Proposal Development		Proposer assembles data to identify and delineate KBAs, applies criteria and thresholds, compiles required and minimum documentation for each site, and consults relevant stakeholders. Process is supported by the KBA Focal Point.
Proposal		Proposed KBA	Proposer submits KBA data online for review
	Review		KBA Focal Point i) works with the proposer to ensure minimum documentation requirements are met and to make initial checks, and ii) co-ordinates input from relevant Commissions (by invitation), other relevant organisations and individuals (by invitation) and through an open forum. This work continues until all issues arising are satisfactorily resolved.
Nomination		Reviewed KBA	Proposer submits revised data to IUCN as the official nomination of sites for KBA status. KBA Focal Point approves nomination online.
	Consistency checking		IUCN KBA Unit checks for consistency of application of the Standard. Where appropriate, the KBA Committee can require an audit for the accuracy and appropriateness of information used.
Endorsement		Endorsed KBA	IUCN endorses KBAs meeting global thresholds, with data published on the KBA website, attributed to the nominating organisation(s) or individual(s).
	Reassessment		Data on changes to the site itself, or in knowledge or status of biodiversity element(s) triggering the KBA criteria, are compiled as they become available by original proposers or other qualified individuals.
Update			KBA data are updated every 8-12 years

Review and Nomination

In the subsequent *Review* stage, the KBA Focal Point works with the proposer to carry out initial checks on the information used and the way in which the Standard has been applied (e.g. regarding criteria, thresholds and delineation). Once this internal review has been satisfactorily completed, KBA data are sent out for external peer review. Reviews would involve the following:

1) Automated invitations to review to existing IUCN Commission structures, including to some or all of the below, as relevant:
    a. Red List Authorities of the Species Survival Commission for application of the thresholds and criteria to relevant taxon-site relationships
    b. Equivalent structures in the Commission on Ecosystem Management for equivalent application to ecosystem types
    c. Regional mechanisms of the World Commission on Protected Areas
    d. Regional mechanisms of the Commission on Environmental, Economic and Social Policy
2) Other solicited expert reviewers, as necessary and appropriate, at the discretion of the respective KBA Focal Point
3) Open online forums established specifically to facilitate open-review by interested parties (akin to those already in use for species).

KBA Focal Points will share the names of potential reviewers with the KBA Committee to reduce possible conflicts of interest. Although a number of reviewers may be invited or solicited, a minimum of one external review of the KBA data is required, provided this is sufficient to cover all aspects of the proposal. KBA Focal Points will co-ordinate the review process, distributing proposals for review, receiving the reviews, returning these to the proposer and repeating the process until the reviewers and KBA Focal Point are satisfied that criteria, thresholds and delineation guidelines have been applied appropriately and that the information used is sound and sufficient. A site successfully completing the review stage would be called a “Reviewed KBA”. The proposer then makes an official **Nomination** of the site for KBA status by submitting the revised data through the online KBA database.

Consistency Check and Endorsement

Pending approval by the KBA Focal Point, the IUCN KBA Unit conducts a *Consistency Check* of the data, a light-touch appraisal to ensure the consistent application of the criteria, thresholds and delineation guidelines across regions and taxa/biomes. At the request of, or in discussion with, the KBA committee, it also could include an audit of the underlying information, including species-site relationships. When all issues have been addressed, the KBA Unit makes an **Endorsement** of the site on behalf of IUCN, and the data are made available via the website. At this stage a site is termed “Endorsed KBA”.

IUCN will endorse KBAs meeting global thresholds while relevant KBA Partner organisations will be responsible for ensuring that regional KBAs meet regional thresholds, where appropriate. Sites meeting national but not international thresholds may be approved by the relevant national institutions, not by IUCN as a Union.

Update

To ensure that KBA data do not become obsolete once sites are endorsed, the KBA unit will contact the proposers to request a reassessment every 8-12 years. If the proposer is unable or unwilling to do so, the KBA unit will work to find a competent alternative. The reassessment should track the following changes that may affect KBA status of a site:

- actual status of biodiversity element at the site, including confirmed presence (e.g. species becomes locally extinct)
- actual status of biodiversity element globally, such that significance of site changes (e.g. species is down listed from VU to NT following policy interventions)
- knowledge of the biodiversity element at the site (e.g. point locality record discovered to be an error)
- knowledge of biodiversity element globally such that significance of site changes

Reassessed sites are submitted online as an **Update** after a maximum of 12 years; sites that have not been reassessed after 12 years are flagged as "priority for update". Further discussion is needed on the process for handling sites that remain flagged for update for extended periods of time, dealing with partial updates (i.e. some, but not all, of the information affecting KBA trigger species is updated), and delisting sites if they are found no longer to meet KBA criteria and thresholds.

7.2.3 Operationalizing the Review and Consistency Checking processes

The review process outlined above cannot work simply on a voluntary basis and is dependent on a set of KBA Focal Points. Focal Points could be drawn from IUCN Regional Programmes, NGOs conducting KBA work, and universities. For example, BirdLife International would serve as the KBA Focal Point and authority for birds. In addition to the Focal Points, there is a need for a KBA Unit to handle Expressions of Interest, conduct consistency checking, support the maintenance of the database and website, and support integration with other IUCN knowledge products. It is envisioned that the KBA Focal Points would report to the KBA committee or one of its subsidiary bodies.

7.2.4 Regional and national KBA thresholds

The recommendation from the Framing workshop that the KBA methodology should also be applicable at regional and national levels was affirmed at the Governance workshop. In identifying KBAs at regional levels, it is anticipated that same criteria would be used but with less stringent thresholds. Through a partnership agreement, KBA Partner organisations will have the authority for ensuring that sites of international importance at the regional level meet appropriate regional criteria and thresholds; thus, for those KBAs already identified at the regional level, such as IBAs and IPAs, pre-existing criteria and thresholds will continue to apply. IUCN may be able to give guidance on the application of KBA criteria at the national level, but the appropriate thresholds would be determined nationally. BirdLife International, IUCN and other KBA Partner organizations, will manage and make available data on all KBAs of international importance. It is anticipated that information on sites of national (but not international) importance would be made available by those institutions responsible for their identification.

7.2.5 Candidate KBAs

Sites that are not currently documented to meet global thresholds for any of the KBA criteria but are thought likely to do so once more complete data become available can be considered as "candidate KBAs". There will be separate flag or field in the database to indicate sites that are candidate KBAs. Although these sites will not be subjected to peer review or appear on the website as candidate sites, having data for the sites compiled in the database will streamline the review process once the data are complete and will allow sharing of the data with end-users in case-by-case situations. Candidate KBAs do not include sites previously identified as KBAs at the global level; these sites are 'prioritised for update'.

Other sites that may trigger candidate status include those holding threshold populations of species (or extents of ecosystems) likely to be assessed as globally threatened (once the assessment is undertaken) but are not yet on the Red List; sites for which only partial species counts are available; sites for which there is historical information that a taxon occurred there but lack recent observations; and sites from which a threatened taxon has been extirpated but which is extant elsewhere (including for taxa assessed as Extinct in the Wild) and into which reintroduction is imminent. It could also be used to flag sites meeting threshold populations of taxa that may become threatened in the future due to climate change, or that are predicted to be important as a result of changing distributions of taxa or ecosystems in the future. Some of these sites may meet sub-global thresholds and be indicated in the database as such.

7.3 Petitions process

It is recommended that the KBA petitions process be analogous to that for the IUCN Red List of Threatened Species. Petitions against the listing of a site as a KBA can be made by anyone, but only with respect to data related to criteria, thresholds and delineation. Every effort should be made to reach an agreement between the petitioner and the proposer of the site without the need to enter formally into the petitions process, but if consensus is not possible, then the matter is referred to a Petitions Sub-committee. The Petitions Sub-committee structure would comprise a small working group of fixed membership, with a chairperson appointed by the SSC and WCPA Commission Chairs, and reporting directly to them, not to the KBA Committee. Its Terms of Reference would be broadly similar to those for the Standards & Petitions Sub-Committee of the IUCN Red List of Threatened Species, i.e. spanning both:

1) Handling of petitions processes post-Endorsement
2) Maintaining (electronic) KBA Guidelines (on the application of the KBA criteria and thresholds) as these are revised over time.

7.4 Monitoring environmental and climate change in KBAs over time

It is now well recognized that our world is in the early stages of rapid human-induced climate change. According to the Intergovernmental Panel on Climate Change (IPCC), the warming of the climate system is unequivocal (IPCC 2013). The observed changes are that the atmosphere and ocean have warmed, the amounts of snow and ice have diminished, the sea level has risen and concentrations of greenhouse gases have increased. These changes will have increasing implications for all aspects of the lives of all living things on earth.

Climate change impacts have already been documented across a range of systems (Murray & Ebi 2014; Staudinger et al. 2012). For many species and ecosystems climate change is an additional stress to exacerbate other issues such as fragmentation, habitat loss, pollution, invasive species and overharvest. Because of existing ecological stresses, many species and ecosystems will have less capacity to cope with the new or additional climate-related stresses. The impacts therefore are cumulative (Kissling et al. 2010, Maclean and Wilson 2011, Williams and Jackson 2007).

All conservation systems, including the identification of KBAs, need to account for the impacts of climate change. However, it is not the intention of the KBA Standard to detail methods for predictive models or vulnerability assessments for areas identified as KBAs. There are existing guidelines for conducting vulnerability assessments and managing ecosystems in the face of climate change, including those in preparation by SSC (for species) and WCPA (for protected areas).

If areas meet the global KBA criteria, then these sites should be recognized as KBAs. It is highly desirable to predict short-term impacts of climate change at sites and conduct vulnerability analyses. However, a prediction that a site is vulnerable to climate change should not preclude its recognition as a KBA. KBAs are identified for existing conditions. Where terrain and topographic complexity allow (e.g. mountain systems that allow for up-slope movement), site delineation may precautionarily take into account the possibility of habitat refugia or areas suitable for near-term expansion of species and ecosystems at risk. This should be done only for sites where data are adequate to make a defensible case.

Site management of KBAs should consider climate change impacts and manage them to the extent that this is possible, according to the best available guidance. It should be noted that KBAs, as with protected areas, can make a contribution to climate change adaptation and mitigation (Hole et al. 2009). KBAs are to be reassessed every 10-12 years and part of that reassessment will include checking whether the site still meets the KBA criteria. Climate change, in concert with other stressors, may change the system significantly so that sites may no longer meet the criteria. This is one of the reasons for the need for reassessment.

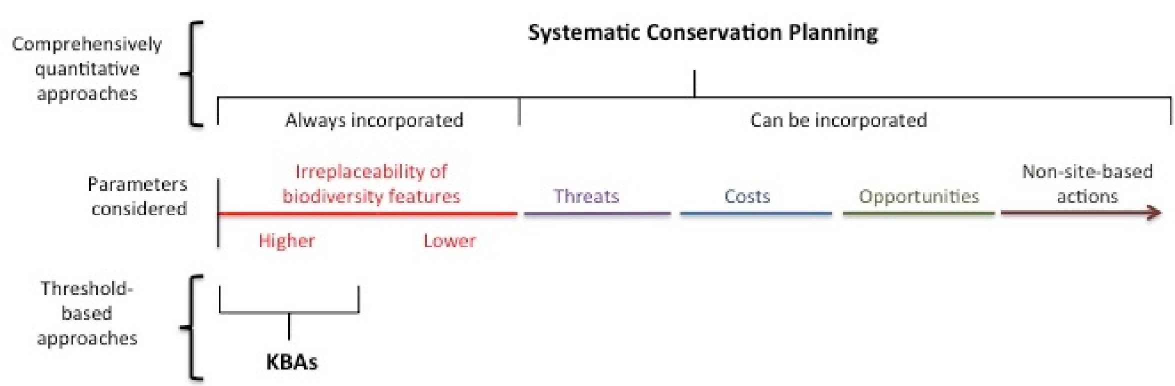
If may be possible to predict the future locations of potential KBAs under climate change scenarios. Such predictive models will be important in national and regional conservation planning exercises. However, KBAs should be designated on the basis of the actual presence of species and ecosystems and assessed according to the KBA criteria. KBAs should not be identified on the basis of predictive models.

ANNEX I. Relationships between the identification of KBAs and systematic conservation planning

In parallel to the development of KBAs over the last 40 years, systematic conservation planning has emerged as a scientific discipline for identifying priority areas, with its earliest roots dating back to the early 1980s (Kirkpatrick 1983) and now encompassing an extensive literature (Margules & Pressey 2000), textbooks (Margules & Sarkar 2007, Kukkala & Moilanen 2013), and software (Ball et al. 2009, Moilanen et al. 2012). Systematic conservation planning is an operational model for identifying and implementing priority areas for conservation. This annex describes the relationship, differences, and potential synergies between the identification of KBAs and priority areas in systematic conservation planning.

The systematic conservation planning approach identifies important areas but it has a wider thematic remit than the identification of KBAs because it is often also used to identify broader ecological networks and linkages, and focus landscape-level actions. An initial part of the process is defining the objectives and specifying which features (e.g., species, ecosystems, ecological processes) should be represented in a conservation network and then setting a target or benefit function for each one. This allows the measurement of the relative importance of each site (or other unit) based on the concepts of irreplaceability and complementarity. A highly irreplaceable site is one that must be selected to achieve the conservation goals (i.e. there are few, or no, other sites that can serve as a replacement for this one), while for a site with low replacement costs or irreplaceability, these goals can be still be achieved by swapping this site for any of a large number of similar sites. Setting targets or benefit functions also lets planners incorporate socio-economic and implementation-related considerations without compromising conservation goals. Including these additional data has no influence on the location of totally irreplaceable sites (i.e. sites for which no alternative exists): they will always be selected. But when choosing between similar sites with lower irreplaceability scores there is flexibility, so systematic conservation planning analyses are designed to select sites that whenever possible minimize threats and costs, maximize opportunities, etc. (Figure 4).

Figure 4. Relationship between KBAs and Systematic Conservation Planning



In contrast, the KBA approach simply identifies sites that make significant contributions towards the global persistence of biodiversity in their own right, without comprehensive consideration of these contributions relative to other sites elsewhere. In other words, if any individual KBA were completely lost to the world (i.e. destroyed in some way) then this would be expected to have a significant impact on the global persistence of whatever elements of biodiversity occurred at this site. A KBA is identified when one or more biodiversity elements at a site meet the KBA criteria at threshold levels. Although threats and opportunities are recorded in the standard documentation for each KBA (section 6), this information does not factor into site identification. So while KBAs are important for biodiversity, they are not necessarily all important for any particular type of conservation action, such as protected area establishment. They also have applications in sectors far outside of conservation, for example in intergovernmental agreements. Dudley et al. (2014) describe this breadth of end-use applications of KBAs in detail.

What are the potential synergies between the two approaches? Systematic conservation planning often involves designing networks or prioritizing actions that could include KBA protection. Each KBA must have met a threshold of global significance to have been identified, so a target-based systematic conservation plan would set the target for these KBAs as 100%, i.e., every KBA is considered irreplaceable. However, it should be noted that not all irreplaceable sites are KBAs, as they can be selected for reasons other than the KBA criteria. The priority for action assigned to a given KBA in systematic conservation planning may still depend on the vulnerability of the site, the type of action being considered, and the cost and/or opportunity associated with this action. For example, a KBA with low vulnerability to future threat relative to other KBAs may be considered a low priority for purchase as a protected area, especially if the cost of this purchase is relatively high. Systematic conservation planning techniques can also be used to prioritize allocation of resources among KBAs (or among KBA management and other conservation actions). Finally, techniques from systematic conservation planning (specifically, the comprehensively quantitative calculation of irreplaceability; Ferrier et al. 2002) are the basis for the E Criterion for KBAs, and have also been used to calibrate thresholds for the other criteria.

The identification of KBAs and systematic conservation planning are therefore complementary approaches and can intersect in two ways in practice, depending on timing. First, where systematic conservation planning has already been used to design conservation networks, sites that meet the relevant thresholds can be identified as KBAs at a later date. Second, and more commonly, the KBA approach can be used to identify sites important for the global persistence of biodiversity within a region and then systematic conservation planning subsequently used to prioritize allocation of resources among these sites and design efficient networks for maintaining connectivity and filling the gaps to meet regional goals.

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APPENDIX A. List of consultations in development of the KBA Standard

All events included at least a 10-15 minute update of the KBA process followed by a round of questions. The consultations involved more than 900 participants in total.

Date	City, Country	Event	Type of event	Number of participants
10-21 May 2010	Nairobi, Kenya	Fourteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 14) to the Convention on Biological Diversity.	End- user consultation	20
December 2011	Auckland, New Zealand	International Congress for Conservation Biology	Event at a Conference/Congress/ Symposium/Meeting	36
3-27 February 2012	Abu Dhabi, United Arab Emirates	IUCN Species Survival Commission Chairs Meeting.	End- user consultation	120
21 February 2012	Abu Dhabi, United Arab Emirates	SSC Invertebrates Sub-Committee	End- user consultation	12
20 February 2012	Abu Dhabi, United Arab Emirates	Species Survival Commission (SSC) Plants Sub-Committee.	End- user consultation	15
5-8 June 2012	Cambridge, UK	Framing workshop. Consolidating the standards for identifying sites that contribute significantly to the global persistence of biodiversity.	Technical workshop	66
14-18 April 2012	Oregon, USA	Biodiversity Without Boundaries Conference	Event at a Conference/Congress/ Symposium/Meeting	20
7-10 August 2012	Bangalore, India	Biodiversity Asia 2012. Society for Conservation Biology Regional Conference.	End- user consultation	50
28 August -1 September 2012	Glasgow, Scotland	European Congress for Conservation Biology.	Expert panel discussion	30
6-15 September 2012	Jeju, South Korea	IUCN 2012 World Conservation Congress.	End- user consultation	20
8 - 19 October	Hyderabad, India	11th Conference of the Parties of the Convention on	Event at a Conference/Congress/	20

2012		Biological Diversity (CBD COP11).	Symposium/Meeting	
8-9 November 2012	London, UK	Protected Areas - are they safeguarding biodiversity? Zoological Society of London (ZSL) Symposium.	Event at a Conference/Congress/ Symposium/Meeting	50
4-6 December 2012	Johannesburg, South Africa	Biopama Regional Workshop: Eastern and Southern Africa	Event at a Conference/Congress/ Symposium/Meeting	53
22-24 January 2013	Bridgetown, Barbados	Biopama Regional Workshop: Caribbean	Event at a Conference/Congress/ Symposium/Meeting	20
4-6 February 2013	Suva, Fiji	Biopama Regional Workshop: Pacific	Event at a Conference/Congress/ Symposium/Meeting	56
5-7 February 2013	Dakar, Senegal	Biopama Regional Workshop: West & Central Africa	Event at a Conference/Congress/ Symposium/Meeting	15
7-8 February 2013	Washington DC, USA	International Association for Impact Assessment Symposium on Biodiversity and Ecosystem Services.	End- user consultation	20
11-15 March 2013	Front Royal, Virginia, USA.	Criteria and Delineation Workshop at the Smithsonian-Mason School of Conservation.	Technical workshop	40
14-18 April 2013	Baltimore, USA	Biodiversity without Boundaries Conference.	End- user consultation	35
18 April 2013	Gregynog, UK	ConGRESS. Conservation Genetic Resources for Effective Species Survival. Final meeting.	Event at a Conference/Congress/ Symposium/Meeting	35
23 July 2013	Baltimore, USA	International Congress for Conservation Biology.	Expert panel discussion	25
29 August 2013	Gland, Switzerland	Capacity Building session on KBAS for IUCN Regional Office directors and IUCN Headquarters staff	End- user consultation	16
17th October 2013	Montreal, Canada	Seventeenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA 17) to the Convention on Biological Diversity.	Event at a Conference/Congress/ Symposium/Meeting	35
21-27 October 2013	Marseille, France	IMPAC 3. International Marine Protected Areas Congress 3.	Event at a Conference/Congress/ Symposium/Meeting	20
6-9 November 2013	Brasilia, Brazil	Governance Workshop at the Ministerio do Medio Ambiente do Brasil.	Technical workshop	34
1-5 December 2013	Rome, Italy	Thresholds Workshop at Sapienza Universita di Roma and Fondazione Bioparco di Roma	Technical workshop	30
21 January 2014	Cambridge, UK	Governance Follow-up Meeting at UNEP-WCMC	Technical workshop	9
1-4 April 2014	Cebu City, Philippines	The 23rd Philippine Biodiversity Symposium at University of San Carlos Talamban Campus.	Event at a Conference/Congress/ Symposium/Meeting	30

APPENDIX B. Alignment of KBA criteria to those of existing site-based approaches, sites designated by international conventions, and private sector standards for risk management

KEY BIODIVERSITY AREAS[1]:		Threatened Biodiversity		Geographically Restricted Biodiversity				Ecological Integrity	Biological Processes		
		Threatened taxa	Threatened ecosystem types	Geographically restricted species	Centres of endemism	Biome restricted assemblages	Geographically restricted ecosystem types	Outstanding ecological integrity	Demographic aggregations	Ecological refugia	Source populations
EXISTING SITE-BASED APPROACHES											
Important Bird and Biodiversity Areas[2]	Globally threatened species	The site is known, estimated or thought to hold a population of a species categorized by the IUCN Red List as CR, EN, VU									
	Restricted range species				The site is known or thought to hold a significant component of a group of species whose breeding distributions define an Endemic Bird Area or Secondary Area						
	Biome restricted assemblages					The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome					
	Congregations								Site known or thought to hold, on a regular basis, 1% of the global population of a congregatory species.		
Important Plant Areas[3]	Species of global conservation concern	Site holds significant populations of one or more rare species that are of global or regional conservation concern									
	Exceptionally rich flora in relation to its biogeographic zone					Site has an exceptionally rich flora in a regional context in relation to its biogeographic zone					
	Threatened habitats		Site is an outstanding example of a habitat or vegetation type of global or regional plant conservation and botanical importance								

Prime Butterfly Areas[4]	Restricted global distribution			The world range of the species [occurring at site] is restricted to Europe							
	Threatened species	Species [occurring at site] is threatened according to the Red Data Book of European Butterflies or the IUCN Red List of threatened species									
	Bern Convention or EU Habitats Directive										
AZE sites[5]	CR or EN species restricted to a single site	Site is sole area where an EN or CR species occurs, contains >95% of known resident population of the EN or CR species, or contains >95% of known population for one life history segment of the EN or CR species		Site is sole area where an EN or CR species occurs, contains >95% of known resident population of the EN or CR species, or contains >95% of known population for one life history segment of the EN or CR species							
Terrestrial and Freshwater key biodiversity areas[6]	Globally threatened species	Site is known or thought to hold a significant number of one or more globally threatened species or other species of conservation concern									
	Restricted range species			A site is known or thought to hold non-trivial numbers of one or more species (or infraspecific taxa as appropriate) of restricted range							
	Bioregionally restricted assemblages					Site is known or thought to hold a significant component [25%] of the group of species that are confined to an appropriate bio-geographic unit or units					
	Globally significant congregations & critical life history stages								Site is known or thought to be critical for any life history stage of a species; or to hold more than a threshold number of individuals of a congregatory species		
Marine key biodiversity areas[7]	Globally threatened species	Regular occurrence of a globally threatened species [presence for CR and EN species]									
	Species with highly clumped distributions			Site holds 5% of the global population of a species with large but clumped distributions							
	Restricted range species			Site holds 5% of global population of a species with a global range less than 100,000 km2							

	Congregatory species								Site holds 1% of global population seasonally present at site for congregatory species		
	Source populations										Site is responsible for maintaining 1% of global population of a species
B-ranked sites[8]	Outstanding biodiversity significance (irreplaceable)	Excellent occurrence of a globally critically imperiled species; concentration of good occurrences of globally imperiled species	Excellent occurrence of a globally critically imperiled community	Only known occurrence of a species			Only known occurrence of a community				
	Very high biodiversity significance (nearly irreplaceable)	Good or fair occurrence of a globally critically imperiled species; excellent or good occurrence of a globally imperiled species; one of the most outstanding occurrences rangewide of a globally vulnerable species	Good or fair occurrence of a globally critically imperiled ecosystem; excellent or good occurrence of a globally imperiled community								
	High biodiversity significance	Fair occurrence of a globally imperiled species; excellent or good occurrence of a globally vulnerable species	Fair occurrence of a globally imperiled community; excellent or good occurrence of a globally vulnerable community			Up to 5 of the best occurrences of a globally secure community in an ecoregion					
	Moderate or local biodiversity significance										
	General or local biodiversity significance										

1 KBA thresholds presented in Table 2
2 http://www.birdlife.org/datazone/info/ibacritglob
3 Plantlife International (2004)
4 van Swaay & Warren (2006)
5 http://www.zeroextinction.org/overviewofaze.htm
6 Langhammer et al. (2007; Holland, Darwall & Smith (2012)
7 Edgar et al. (2008)
8 TNC (2001)

KEY BIODIVERSITY AREAS:		Threatened Biodiversity		Geographically Restricted Biodiversity				Ecological Integrity	Biological Processes		
		Threatened taxa	Threatened ecosystem types	Geographically restricted species	Centres of endemism	Biome restricted assemblages	Geographically restricted ecosystem types	Outstanding ecological integrity	Demographic aggregations	Ecological refugia	Source populations
SITES DESIGNATED BY INTERNATIONAL CONVENTIONS											
Ecologically and Biologically Significant Marine Areas (Convention on Biological Diversity)[9]	Uniqueness or rarity			Area contains unique, rare or endemic species, populations or communities	Area contains unique, rare or endemic species, populations or communities		Area contains unique, rare or endemic species, populations or communities				
	Special importance for a species' life history								Areas that are required for a population to survive and thrive		Areas that are required for a population to survive and thrive
	Threatened, endangered or declining species and habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species								
	Biological productivity								Area containing species, populations or communities with comparatively higher natural biological productivity		
	Biological diversity					Area contains comparatively higher diversity of ecosystems, habitats, communities, or species or has higher genetic diversity					
	Naturalness							Area with comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation			
	Vulnerability, fragility, sensitivity, slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile or with slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile or with slow recovery								

Wetlands of International Importance (Ramsar Convention)[10]	Representative, rare, or unique wetland types						Wetland contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region				
	Threatened species or ecological communities	Wetland supports vulnerable, endangered, or critically endangered species or threatened ecological communities	Wetland supports vulnerable, endangered, or critically endangered species or threatened ecological communities								
	Species maintaining the biodiversity of a particular biogeographic region					Wetland supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region					
	Critical life cycle stages or ecological refuges								Wetland supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions		
	Significant waterbird populations								Wetland regularly supports 1% of the individuals in a population of one species or subspecies of waterbird; wetland regularly supports 20,000 or more waterbirds		
	Fish species or life history stages representative of wetland benefits and/or values								Wetland supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity		
	Food sources, spawning grounds or migration paths important for fish stocks								Wetland is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend		
	Significant populations of wetland-dependent non-avian animal species			Wetland regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species							

natural World Heritage sites (World Heritage Convention)[11]	Superlative natural phenomena or beauty										
	Outstanding geological processes or geomorphic features										
	Outstanding ecological and biological processes								Outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals	Outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals	Outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals
	Most significant natural World Heritage sites for biodiversity conservation	The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation			

9 www.gobi.org
10 www.ramsar.org
11 whc.unesco.org/en/criteria/

KEY BIODIVERSITY AREAS:		Threatened Biodiversity		Geographically Restricted Biodiversity				Ecological Integrity	Biological Processes		
		Threatened taxa	Threatened ecosystem types	Geographically restricted species	Centres of endemism	Biome restricted assemblages	Geographically restricted ecosystem types	Outstanding ecological integrity	Demographic aggregations	Ecological refugia	Source populations
PRIVATE SECTOR STANDARDS FOR RISK MANAGEMENT											
Performance Standard 6 (PS6) Critical Habitat[12]	Threatened species	Habitat of significant importance to Critically Endangered and/or Endangered species									
	Endemic and/or restricted-range species			Habitat of significant importance to endemic and/or restricted range species	Habitat of significant importance to endemic and/or restricted range species						
	Concentrations of migratory species and/or congregatory species								Habitat supporting globally significant congregations of migratory species and/or congregatory species		
	Threatened and/or unique ecosystems		Highly threatened and/or unique ecosystems				Highly threatened and/or unique ecosystems				
	Key evolutionary processes	Areas associated with key evolutionary processes			Areas associated with key evolutionary processes	Areas associated with key evolutionary processes					
High Conservation Value (HCV) Forests[13]	Endemic, rare, and threatened species	Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels		Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels	Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels						
	Large landscape-level ecosystems							Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance			

	Rare or threatened ecosystems		Rare, threatened, or endangered ecosystems, habitats or refugia							Rare, threatened, or endangered ecosystems, habitats or refugia	
	Critical ecosystem services										
	Resources fundamental for satisfying basic necessities of local communities or indigenous peoples										
	Sites or landscapes of global or national cultural, archaeological or historical significance										

12 www.ifc.org

13 www.hcvnetwork.org