CANADA KBA KEY BIODIVERSITY AREAS

# A National Standard for the Identification of Key Biodiversity Areas in Canada

Version 1.0







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Biodiversity elements represented in the cover photos are potential national KBA triggers for a range of criteria described in this document (threat statuses current as of October 2020).

The Liard River floodplain in Yukon, a high-integrity ecosystem. Photo © Hilary Cooke, WCS Canada.

The James Bay Lowlands in northeastern Ontario provide key stopover sites for shorebirds, which aggregate there in large numbers to rest and refuel during migration. Photo © Allie Anderson.

There are two Mapleleaf mussel (*Quadrula quadrula*) populations in Canada, one of which is nationally Threatened due to its small range, river pollution, and invasive species establishment. Photo © iNaturalist contributor Daryl Coldren, Creative Commons Attribution-NonCommercial 4.0 International license, cropped from the original.

Caribou (*Rangifer tarandus*) is emblematic of Canadian fauna. Several of the discrete Caribou populations found in Canada occur nowhere else in the world and have experienced important population declines. Photo © Susan Morse.

Western Spiderwort (*Tradescantia occidentalis*) is Critically Imperiled in Canada, despite being globally Secure. Nationwide, the species is restricted to four disjunct sand dune habitats that are at risk from habitat degradation. Photo © iNaturalist contributor amoorehouse, Creative Commons Attribution-NonCommercial 4.0 International license, cropped from original.

Black Oak savannas were once common on the sandy soils of Southern Ontario; however, land clearing and fire suppression drastically reduced the extent of this unique ecosystem. Few high-quality patches remain. Photo © Chelsea Marcantonio, the Nature Conservancy of Canada.

Quillback Rockfish (*Sebastes maliger*) inhabit coastal waters of the North Pacific, from the Gulf of Alaska to southern California. The species is Critically Imperiled in Canada due to pressures from commercial and recreational fisheries. Photo © iNaturalist contributor Sara Thiebaud, Creative Commons Attribution-NonCommercial 4.0 International license, cropped from original.

# A National Standard for the Identification of Key Biodiversity Areas in Canada

## Version 1.0

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**on behalf of the KBA Canada Coalition**



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WCS Canada houses the Secretariat of the KBA Canada Coalition and was responsible for coordinating the development of this document. The KBA Canada Management Committee provides overall guidance on the KBA Canada initiative. Members of this body include(d): Stephen Woodley (IUCN), Andrew Couturier (Birds Canada), Patrick Henry and Christine Terwissen (NatureServe Canada), Martin von Mirbach (WCS Canada), James Snider (WWF-Canada), Michael Bradstreet, Brenda Van Sleeuwen, and Marie-Michèle Rousseau-Clair (Nature Conservancy of Canada).

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1 https://www.conservation2020canada.ca/nsc

2 https://www.conservation2020canada.ca/who-we-are

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# I. FOREWORD

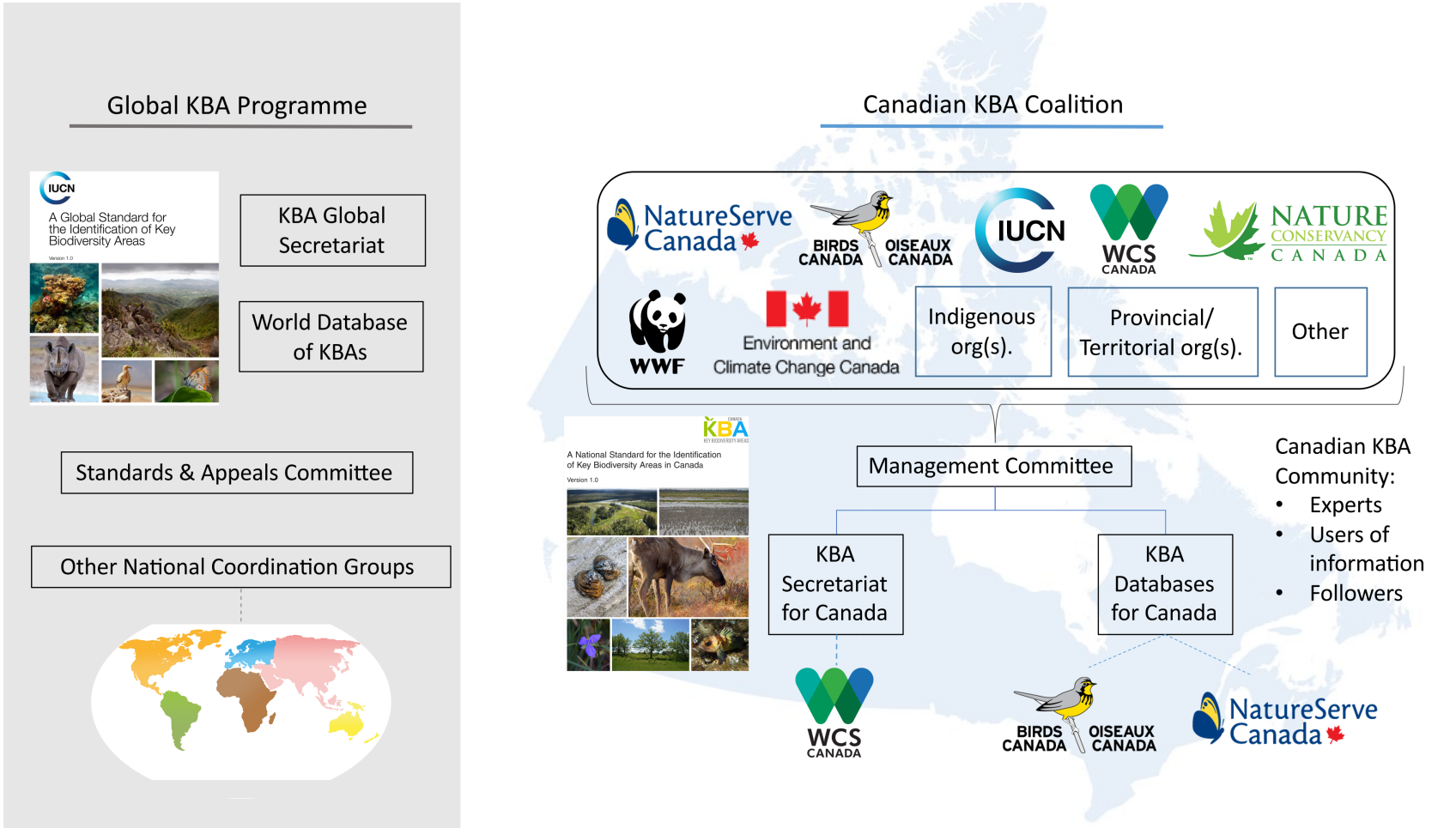
The Global Key Biodiversity Area (KBA) Standard (IUCN 2016; hereafter, the Global KBA Standard) was developed for use by national constituencies to identify sites that contribute significantly to the global persistence of biodiversity in terrestrial, subterranean, inland water, and marine environments. The KBA criteria can be applied to species from any taxonomic group as well as ecosystems. Identifying KBAs in an objective, transparent, and rigorous manner provides important knowledge about areas that could benefit from stewardship, enhanced management, formal protection, or other conservation measures.

The Global KBA Standard encourages coordinators of in-country KBA identification processes to adapt KBA Criteria for identifying sites of national significance, if doing so is considered to be valuable within that country. As the second-largest country in the world, Canada harbours a unique and rich natural heritage over a vast geography spanning considerable environmental and cultural heterogeneity. While some portion of this remains ecologically intact, a significant number of species and ecosystems are in some degree of peril, particularly in the southern part of the country (Kraus and Hebb 2020). For example, of 30,000 marine and terrestrial species in Canada for which there is sufficient information, 20% are imperiled to some degree (CESCC 2016), including 68% of reptile species and 36% of amphibian species (CESCC 2016). Shorebirds, grassland birds, and aerial insectivore populations have declined since the 1970s by 40%, 57%, and 59%, respectively (NABCI-Canada 2019). Terrestrial ecosystems like wetlands and grasslands have experienced significant and continuing loss in the southern part of the country (FPTGC 2010), and between 20 and 28% of watersheds are in a critical state, based on indices representing freshwater fish biodiversity, environmental conditions, and anthropogenic stress (Chu et al. 2015).

With habitat loss and degradation among the major drivers of biodiversity loss, attention has been growing in Canada, as it has around the world, to the need for strategic expansions of protected and conserved area networks in terrestrial and marine environments alike. Accordingly, commitments by Canada (ECCC 2019; Government of Canada 2020) have been made in the context of achieving global targets established by the Convention on Biological Diversity for the conservation of lands and oceans. There is likewise accompanying interest in private sector biodiversity policies, environmental standards, and certification schemes to support conservation planning and priority-setting at various scales. The application of the KBA methodology to identify areas of both national and global significance offers a system that can be applied consistently.

Discussions on implementing the Global KBA Standard in Canada began immediately after its 2016 publication, and the KBA Canadian Coalition was founded in 2019 (Figure 1). The KBA Canada Secretariat, led by WCS Canada, proceeded immediately with coordinating the task of assembling data and identifying KBAs through a series of regional workshops. Simultaneous work began on adaptation of the Global KBA Standard to a national context. To this end, a discussion document (Fraser 2019) was developed containing recommendations and associated rationales for adapting the Global KBA Standard to a national standard in Canada, which was then tested in regional KBA identification processes.

**Figure 1.** Overview of Global and Canadian KBA program governance. The Global KBA Programme is run by the KBA Partnership, comprising 13 of the world's leading nature conservation organizations (see www.keybiodiversityareas.org, hereafter the Global KBA Website) and houses the World Database of KBAs (global KBAs). The Canadian KBA Coalition was established in 2019 and comprises non-governmental organizations, governments, Indigenous partners, and academic institutions that are engaged in the work of identifying, delineating, and reviewing KBAs. The Management Committee is a subset of the Coalition and is responsible for accepting KBA proposals and steering the national KBA initiative. The KBA Community comprises individuals and organizations interested in following KBA work and engaging when opportunities arise. A current list of Canadian KBA Coalition members is available at http://www.kbacanada.org (hereafter, the KBA Canada Website). The Canadian KBA Coalition is open to anyone interested in participating in the work of identifying and delineating KBAs.



Canada is the first country to lead the formulation of a National KBA Standard, building on growing experience with the identification of KBAs in Canada. Represented by this document, the National KBA Standard for Canada focuses on identifying KBAs of significance to the national persistence of biodiversity. While this is conceived of as a national adaptation of the Global KBA Standard, the framework we have developed could serve as a model for other countries implementing the KBA Standard at the sub-global scale, including regional (i.e., multinational) scales elsewhere in the world. This document does not contemplate KBAs in Canada being identified below the national scale, although most provinces and territories are as large as many countries outside North America, making provincial and territorial KBAs a possibility in the future.

Guidelines to inform the implementation of the Global KBA Standard were developed in 2019 and revised in 2020 (KBA Standards and Appeals Committee 2020; hereafter Global KBA Guidelines). Most of the guidance in the Global KBA Guidelines also applies to the National KBA Standard, although where there are differences the National KBA Standard should prevail for national level KBAs. The Global KBA Guidelines define the key terms associated with each of the criteria and explain how to use different assessment parameters. They specify data standards and expand on rules about qualifying elements that could trigger KBA identification. The Global KBA Guidelines also describe how to delineate the boundaries of KBAs in a consistent and rigorous way.

In addition to technical guidance on the application of the Global KBA Standard, the Global KBA Guidelines provide principles for engaging with experts and rights holders during the KBA process. The KBA identification process should be a highly inclusive, consultative, and bottom-up exercise. Although anyone with appropriate information may propose a site as a KBA, consultation with rights holders and stakeholders at national and sub-national levels (both non-governmental and governmental organizations) is recommended during the proposal process. All site proposals undergo independent scientific review and are checked for consistency in the application of the KBA Standard.

This National KBA Standard provides additional guidance on KBA delineation (Section IX) and the KBA review process (Annex 2) that is relevant to the application of both the National and Global Standards in Canada. Tailored guidance for both national and global KBAs in Canada will continue to be developed by the Canadian KBA Secretariat as our experience grows with KBA identification and delineation. As such, this document will be updated as additional information becomes available during KBA identification processes in Canada and/or new versions of the Global KBA Guidelines are developed.

# II. INTRODUCTION AND BACKGROUND

## What are KBAs?

Key Biodiversity Areas (KBAs) are sites that contribute significantly to the global persistence of biodiversity. Launched in 2016 by the IUCN and partners, the Global KBA Standard is the result of a 12-year consultation with experts from conservation organizations, governments, academia, and the private sector to consolidate criteria and methodology for identifying KBAs. The KBA Standard built on more than 30 years of experience in identifying important sites for different taxonomic, ecological, and thematic subsets of biodiversity, such as Important Bird and Biodiversity Areas (IBAs), Alliance for Zero Extinction (AZE) sites, and Important Plant Areas (IPAs), all of which already exist in Canada. The aim of the KBA Standard is to provide “quantitative criteria and associated thresholds for identifying KBAs in an objective, repeatable and transparent way” (KBA Standards and Appeals Committee 2020).

KBAs contain rare or threatened species or ecosystems or have features that attract large gatherings of animals to feed, reproduce, or seek shelter. KBAs can also be unique natural areas that are undisturbed by industrial development and contain intact species assemblages and ecological processes in their natural state. The KBA approach brings many natural values (species or taxonomic groups, ecosystems, etc.) together under one roof for the first time, creating a robust and quantitative tool to identify areas of high biodiversity value and inform site-based conservation efforts to prevent further loss of wildlife and wild places. The recognition of a KBA does not lead to any management prescriptions, but provides a layer of information that can feed into management decisions of any kind, such as land use planning, protected area planning, local stewardship, and land use policies.

The following characteristics make KBAs a robust and unique tool to identify sites of importance for biodiversity:

- KBAs meet quantitative thresholds associated with a set of criteria;
- KBAs cannot be negotiated or rejected if there is sufficient evidence that a quantitative threshold has been met;
- KBAs are well documented and reviewed;
- KBAs capture a broad set of biodiversity elements from macroscopic species (all taxa) to ecosystems;
- KBAs may be triggered by single or groups of biodiversity elements;
- KBAs may be of any size that could reasonably be considered a manageable 'site' (see Section V, Definitions and Terms).

KBAs capture individual sites that are significant for the persistence of specific biodiversity elements. This approach may not include biodiversity elements that are better managed at other scales (e.g., species that occur at low densities in the landscape and require a systemic approach) and should be complemented with considerations of connectivity, climate change, bio-cultural values, and threats and pressures to ensure conservation of biodiversity in the long-term.

## The Dimensions of Biodiversity that Trigger KBA Criteria

Sites qualify as KBAs if they meet quantitative thresholds associated with one or more of 11 criteria, clustered into five high level categories:

A. Threatened biodiversity

B. Geographically restricted biodiversity

C. Ecological integrity

D. Biological processes

E. Irreplaceability through quantitative analysis

Global KBA criteria and thresholds are described in the Global KBA Standard. Using these global criteria, we have adapted national KBA criteria and thresholds that are presented in this document. The KBA criteria are explicitly designed to cover all levels of biodiversity, including genetic diversity, species, and ecosystems (Table 1). They can be applied to species and ecosystems in terrestrial, subterranean, inland water, and marine environments and the thresholds associated with each of the criteria may be applied across all taxonomic groups (other than micro-organisms) and ecosystems.

**Table 1.** Global KBA criteria and biodiversity elements

| Criterion | Genetic diversity | Species | Ecosystems |
|---|---|---|---|
| A. Threatened biodiversity | | | |
| A1 Threatened species | X | X | |
| A2 Threatened ecosystem types | | | X |
| B. Geographically restricted biodiversity | | | |
| B1. Individual geographically restricted species | X | X | |
| B2. Co-occurring geographically restricted species | X | X | |
| B3. Geographically restricted assemblages | | X | |
| B4. Geographically restricted ecosystem types | | | X |
| C. Ecological integrity | | X | X |
| D. Biological processes | | | |
| D1. Demographic aggregations | | X | |
| D2. Ecological refugia | | X | |
| D3. Recruitment sources | | X | |
| E. Irreplaceability through quantitative analysis | | X | |

*Note:* This table is adapted from KBA Standards and Appeals Committee (2020).

## A Precedent in Canada for National Adaptation of Global Conservation Standards: the IUCN Red List and COSEWIC

A significant precedent in Canada was set for adapting a global standard to a national scale when the Committee on the Status for Endangered Wildlife in Canada (COSEWIC) adapted the global IUCN Red List Categories and Criteria (IUCN 2012) for national use.

Initially created in 1964, the IUCN Red List of Threatened Species has become the leading protocol for global evidence-based conservation assessment at the species level. The continued application of this tool allowed for significant testing and maturation of the standard since its first appearance over 50 years ago. The need for sub-global assessments became evident with time and experience (Gärdenfors et al. 2001; Rodríguez 2008), given interest in classifying the status of species at the level at which they are managed, evaluating the status of taxa that are at risk at the national scale but are not imperiled at the global scale, informing sub-global conservation priorities, and underpinning the legal protection of species (Mounce et al. 2018). Reflecting such needs in Canada, COSEWIC was created in 1977 following a decision made at the Conference of Federal-Provincial-Territorial Wildlife Directors to develop "a single, official, scientifically sound, national classification of 'wildlife species'[3] at risk", and became a legislated advisory body under the Federal *Species At Risk Act* (2002) (COSEWIC 2020a). In 1999, COSEWIC revised its criteria to guide the status assessment of 'wildlife species' based on the revised IUCN Red List categories (IUCN 2012) and has been using this framework ever since (COSEWIC Operations & Procedures Manual).

[3] 'Wildlife species', defined under the Canadian *Species at Risk Act* (SARA), is equivalent to "taxon" in this document (see Section V), and will appear in quotations when used in this document.

While we can compare the experience of nationalizing the KBA standard with the COSEWIC experience, it is important to note some differences between the two systems: COSEWIC is a legislated body, which in contrast to the KBA Canadian Coalition, is legally mandated to perform its work. Moreover, COSEWIC assessments apply to species across their range in Canada, while KBAs pertain to specific sites. Nevertheless, the COSEWIC experience in Canada offers a valuable model for this national adaptation of the Global KBA Standard, given the depth of experience already in place by applying criteria and thresholds to the Canada scale.

### What to Expect in this Document

This document is the National KBA Standard for Canada – an adaptation of the Global KBA Standard that is relevant to the Canadian context and expands the scope of KBA identification in this country. The Canadian National KBA Standard is formally considered to include definitions, the criteria, and associated thresholds. It also contains sections on KBA-related procedures applied in a Canadian context, such as delineation and the Canadian KBA review process. The National KBA Standard should be used hand in hand with the Global KBA Standard and Guidelines. It may not be possible to determine whether a site meets global or national criteria until analyses have been completed, which is why we provide the global criteria and thresholds alongside the national criteria and thresholds in Section VIIII. The Global KBA Guidelines are pertinent to the application of the National KBA Standard and should be reviewed before undertaking KBA identification and delineation. Additional guidelines specific to Canada are provided in the annexes of this document and in other products of the Canadian KBA initiative accessible on the KBA Canada Website.

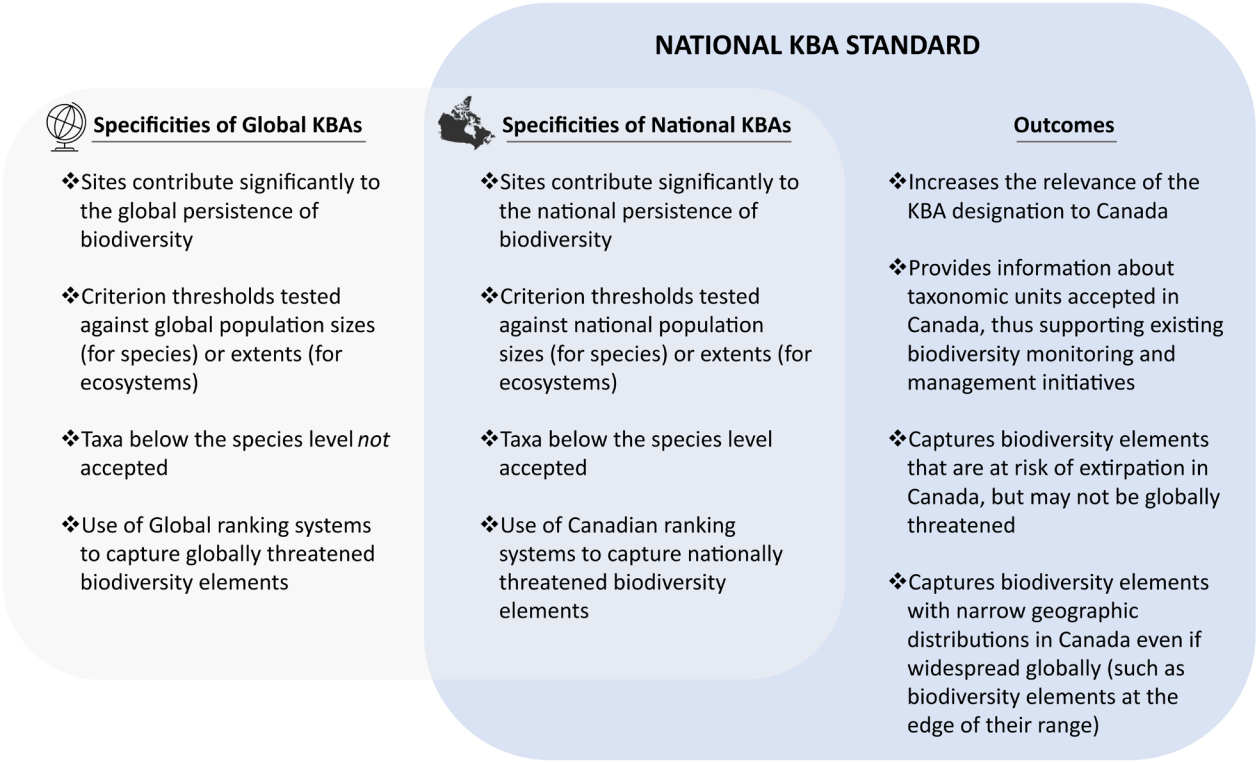
## III. IDENTIFYING GLOBAL AND NATIONAL KBAS IN CANADA

Any individual or organization can use the National KBA Standard and the Global KBA Standard to identify sites contributing significantly to the persistence of biodiversity in terrestrial, inland water, and marine environments in Canada. The Canadian KBA Coalition should be kept apprised of work to identify and delineate KBAs in Canada and has ultimate authority to recognize national KBAs. KBA proposals – whether for national or global KBAs – must be submitted through the Canadian KBA Coalition. As with the Global KBA Standard, it is recognized that the national KBA criteria and thresholds may need revision in the future as experience accumulates in their application.

### National Adaptation of Global KBA Criteria in Canada

The National and Global KBA Standards are complementary, and the identification of KBAs at both levels will provide a robust layer of information to guide conservation actions to safeguard biodiversity concentrated in these sites. Figure 2 presents the main differences between the two Standards as well as the desired outcomes associated with the development of a National KBA Standard for Canada.

**Figure 2.** Outcomes and specificities of the National KBA Standard, in contrast to global KBA specificities.




Criteria from the Global KBA Standard have been adapted for the National KBA Standard in Canada, with none added. However, 4 of 11 criteria are not included in this National KBA Standard, as follows:

**B2, B3** – Co-occurring geographically restricted species and geographically restricted assemblages. These criteria will not be adapted for the National KBA Standard, as they were determined not to be applicable at the national scale in Canada. This is because northern and northern temperate ecosystems tend not to hold assemblages of restricted-range species within a taxonomic group and those that occur will be captured by the Global KBA Standard.

**C** – Ecological integrity. This criterion may be adapted for the National KBA Standard in Canada. However, the national adaptation of criterion C is deferred until methods for applying global KBA criterion C have been developed for Canada.

**E** – Irreplaceability through quantitative analysis. This criterion may be adapted for the National KBA Standard in Canada. However, the national adaptation of criterion E is deferred until methods for applying global KBA criterion E have been developed and tested.

## Process for Identifying Global and National KBAs in Canada

The process for identifying KBAs in Canada is identical for both global and national KBAs. Figure 3 presents the KBA identification workflow for criteria A, B, and D. Workflows for identifying KBAs under criteria C and E will differ from that presented in Figure 3 and will be developed when these criteria are added to the National KBA Standard.

# IV. CONSIDERATIONS WHEN APPLYING THE NATIONAL STANDARD

This section describes a number of considerations that will inform the development of KBA proposals in Canada. Much of the text is adapted or taken directly from the Global KBA Standard but is included here again because of its importance to understanding KBA identification and delineation.

## Data Quality and Metrics for Inference

The KBA criteria have quantitative thresholds to ensure that site identification is transparent, objective, and repeatable. It is important to compile the best available data for KBA identification. A range of metrics can be used to estimate or infer whether a site holds a sufficient proportion of a species' global or national population size, reflecting the reality that the availability of high-quality data differs significantly between different taxonomic groups and regions. Acceptable metrics include number of mature individuals, area of occupancy, extent of suitable habitat, range, number of localities, and distinct genetic diversity. In assessing sites against the criteria, the metric for which the best data is available should be used.

Considerations in the use of metrics:

- Number of localities is only appropriate to use where sampling intensity is sufficiently high that the known localities can be assumed to represent adequately the range and area of occupancy of the species.

- Multiple localities may fall within a single KBA, and abundance may vary considerably across the different localities; thus it should not necessarily be assumed that a species occurring at 100 or fewer localities meets a 1% threshold at each of those localities.

- For the area-based metrics, a 1% threshold can typically be inferred where the site contains at least 1% of the global extent of a species' area of occupancy, extent of suitable habitat, or range, assuming the species is documented to occur at the site. These metrics should be used cautiously, however, given that species tend not to be evenly distributed throughout their range, area of occupancy, or extent of suitable habitat.

- Distinct genetic diversity differs from the other metrics in that it refers to the proportion of a species' genetic diversity that is encompassed by a particular area. A site holding more than the threshold proportion of a species' genetic diversity can qualify as a KBA (under criteria A1, B1), even if the proportion of the species' global population size at the site is insufficient to trigger KBA identification. Note that the application of distinct genetic diversity as a metric in KBA assessments is not yet well tested.

## Forms of Knowledge and Expert Input

All forms of knowledge relevant to understanding biodiversity distribution, ecosystems, and landscapes in which KBAs will be delineated are appropriate to include in KBA assessments in Canada. This includes specifically Indigenous and local knowledge. In addition to biodiversity data and published information, expert input is crucial to adequate application of the KBA Standards (Global and National). Experts can provide information, interpret data, assess survey effort, evaluate understanding of species distributions, and provide knowledge of sites to guide delineation.

**Figure 3.** Workflow for identifying KBAs in Canada, from the definition of objectives to the submission of the KBA proposal. The KBA Canada Secretariat should be contacted before undertaking KBA work and will coordinate Steps 7 and 8.

Experts should be involved both in the development of KBA proposals and in their review, with multiple review stages aimed at:

- Checking the validity and completeness of data and knowledge used in the KBA assessment;
- Verifying thresholds are met;
- Confirming the ecological relevance of boundaries;
- Verifying that KBA criteria are applied correctly and guidelines for application of the KBA Standard(s) have been followed; and
- Providing additional information about the KBA site, including physical and cultural characteristics, ongoing conservation actions, and threats.

## Uncertainty

The data used to assess whether quantitative thresholds of the KBA criteria have been met often contain considerable uncertainty. Such uncertainty can arise from natural variation, vagueness in the terms and definitions used, lack of data, sampling artefacts, and measurement error. For example, estimates of the population size of a species might range by more than an order of magnitude, and the numbers of individuals or reproductive units at a given site might be subject to substantial inter-annual variation. The documentation standards for KBA identification requires a minimum set of supporting information and requires assessment of the level of uncertainty in the identification and delineation of KBAs, while the progressive reduction of such uncertainty is promoted by the periodic re-evaluation of KBAs.

## Documentation

KBA identification is an iterative process and requires the confirmed presence of one or more biodiversity elements (e.g. species, ecosystem type) at the site that trigger at least one KBA criterion. These data must be traceable to a reliable source and be recent enough to give confidence that the biodiversity elements are still present. A minimum set of information is required for each KBA to support and justify the recognition of a site as a KBA, and additional specific information is recommended. The documentation standards are identical for global and national KBAs and are available for download on the global KBA website. They include:

- A completed nomination form;
- One or several spatial data files providing at least the boundaries of the KBA and ideally the specific locations of individual trigger biodiversity elements.

## Re-evaluation

Ideally, sites should be reassessed against the criteria and thresholds every 8–12 years, although practically speaking, this will not always be possible, especially for remote sites. More frequent monitoring of KBAs is recommended wherever possible. Both changes in biological status and changes in knowledge may affect the status of a site as a KBA. Sites that fail to meet any criteria upon re-evaluation will no longer be displayed as current KBAs, but will remain in the database and flagged as “historical”, “data deficient”, or “needs re-assessment” depending on whether there is reason to believe that the site could be identified as a KBA again with additional data or survey effort. Maintaining a record of such KBAs will be particularly important for remote sites that are difficult to visit (e.g., seabird colonies) or for which surveys are conducted very infrequently (e.g., the far north), or in cases where species may blink on and off according to range shifts, droughts, food availability, etc.

## Climate and Environmental Change

Environmental changes resulting from a range of stressors, notably climate change, may affect the biodiversity in a KBA to such an extent that the site ceases to qualify, which will be determined upon re-evaluation. It is also possible that a KBA may increase in importance as a result of climate change or that new sites will qualify. Re-evaluation of sites every 8-12 years will be important for maintaining accurate KBA designations over time.

It is desirable to predict short-term impacts of climate change and other environmental stressors, such as habitat destruction, pollution, and invasive species, and to conduct vulnerability analyses at sites. However, a prediction that a site is vulnerable to climate or other environmental change should not preclude its recognition as a KBA. Where manageability and topographic complexity allow (e.g. mountain systems that permit upslope movement), site delineation may take into account the possibility of habitat refugia or areas suitable for near-term shifts of species and ecosystems at risk. This should only be done for sites where data are adequate to make a defensible case.

It may be possible to predict the future locations of KBAs under climate change scenarios. Such predictive models will be important in national and regional conservation planning exercises. However, KBAs are identified on the basis of the current presence of biodiversity elements, rather than on projected future distributions.

# V. DEFINITIONS AND TERMS

This section contains essential terms that apply to the implementation of the National KBA Standard. Definitions that are used and do not change from the Global KBA Standard, denoted with an asterisk, are reproduced directly from the Global KBA Standard. This list of terms is not exhaustive and additional definitions can be found in the Global KBA Standard and Guidelines.

### Aggregation (Criterion D)*

A geographically restricted clustering of individuals that typically occurs during a specific life history stage or process such as breeding, feeding, or migration. This clustering is indicated by highly localized relative abundance, two or more orders of magnitude larger than the species' average recorded numbers or density at other stages during its life-cycle. A characteristic of aggregations is that the concentration of a significant proportion of a species population size in space and time increases the species' vulnerability to exploitation or other threats.

### Area of Occupancy (Criteria A, B)*

The area within the range of a species that is actually occupied (IUCN 2012).

### COSEWIC

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is an independent advisory panel to the Minister of Environment and Climate Change Canada that meets twice a year to assess the status of 'wildlife species' at risk of extinction. Members are wildlife biology experts from academia, government, non-governmental organizations, and the private sector responsible for designating 'wildlife species' in danger of disappearing from Canada.

### COSEWIC status category

COSEWIC provides an assessment of a 'wildlife species' risk of extinction or extirpation in Canada and a subsequent designation - the record of COSEWIC assessment results (COSEWIC 2020b). Of relevance to the National KBA Standard are COSEWIC categories E (endangered) and T (threatened).

### Designatable Unit (DU) (Criteria A, B, D)

Taxonomic entities below the species level as assessed by COSEWIC. Designatable units are discrete and evolutionarily significant units of the taxonomic species, where "significant" means that the unit is important to the evolutionary legacy of the species as a whole and if lost would likely not be replaced through natural dispersion (COSEWIC 2018).

### Ecological integrity (Criterion C)*

A condition that supports intact species assemblages and ecological processes in their natural state, relative to an appropriate historical benchmark, and characterized by contiguous natural habitat with minimal direct industrial anthropogenic disturbance.

### Ecosystem type (Criteria A, B)

A defined ecosystem unit for standard and repeatable assessment. The ecosystem type is defined by a particular 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 (Keith et al. 2013). KBA criteria should be applied consistently to units at a specified level in a globally or nationally consistent ecosystem classification hierarchy (e.g. Faber-Langendoen et al. 2014).

### Endemic*

A species having a global range wholly restricted to a defined geographic area such as a region, country, or site.

### Extent of suitable habitat (Criteria A, B)*

The area of potentially suitable ecological conditions, such as vegetation or substrate types within the altitudinal or depth, and temperature and moisture preferences, for a given species (Beresford et al. 2011).

### Geographically restricted (Criterion B)*

A biodiversity element having a restricted distribution, as measured by range, extent of suitable habitat, or area of occupancy, and hence largely confined or endemic to a relatively small portion of the globe such as a bioregion, ecoregion, or site.

### Infraspecies

A taxonomic unit below the species level, including subspecies, varieties, populations, and designatable units.

### Locality (Criteria A, B)*

A sampling locality is a point indicated by specific coordinates of latitude and longitude. Note that the term "locality", as defined here, is fundamentally and conceptually different from the term "location" used in the IUCN Red List Categories and Criteria (IUCN 2012).

### Mature individuals (Criteria A, B)*

The number of individuals known, estimated, or inferred to be capable of reproduction as defined in IUCN (2012).

### NatureServe ranks: G-rank and N-rank (Criterion A)

The conservation status ranks of a taxon globally (G) and nationally (N), as assigned by NatureServe (Faber-Langendoen et al. 2012).

### Population size (Criteria A, B, D)

The total number of mature individuals of the species (IUCN 2012). Population size is used throughout the National KBA Standard rather than simply "population", which IUCN (2012) uses to mean the total number of individuals of a species. Global population size is defined as the total number of mature individuals on Earth.

### Population size, National (Criteria A, B, D)

National population size is defined as the total number of mature individuals of a taxon in Canada. Different metrics can be used to estimate population size, including area-based parameters such as range, area of occupancy, etc. (see Section VIII). For migratory species, birds in particular, continental population size is often more relevant than national population size and can be used in national KBA assessments (see Annex 1).

### Range (Criteria A, B)*

The current known limits of distribution of a species, accounting for all known, inferred, or projected sites of occurrence (IUCN 2012), including conservation translocations outside native habitat (IUCN Standards and Petitions Subcommittee 2014) but not including vagrancies (species recorded once or sporadically but known not to be native to the area).

### Red List of Ecosystems (Criterion A2)

The IUCN Red List of Ecosystems Categories and Criteria is a global standard for assessing the status of ecosystems, applicable at local, national, regional and global levels.

### Red List of Threatened Species (Criterion A1)

The IUCN Red List of Threatened Species is a comprehensive inventory of the global conservation status of plant and animal species. It uses a set of quantitative criteria to evaluate the extinction risk of thousands of species. IUCN categories CR, EN and VU are relevant to the application of the Global KBA Standard.

### Reproductive unit (Criteria A, B)*

The minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site (Eisenberg 1977). Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species.

### Site

A geographical area on land and/or in water with defined ecological, physical, administrative, and/or management boundaries. There is no minimum or maximum size for a site in the context of KBAs, but the site should be of a 'manageable' size. In the context of KBAs, "site" and "area" are used interchangeably.

### Species

In the Global KBA Standard, the thresholds associated with the species-based criteria (i.e. A1, B1-3, D1-3, E) are designed to be applied at the species level. Subspecies, evolutionarily significant units, or varieties cannot trigger global KBAs (except if a site qualifies because it holds a threshold proportion of distinct genetic diversity for a species, See Criterion A1 in the Global KBA Standard). The National KBA Standard applies to species and taxa below the species level.

### Taxon/Taxa

A species or infraspecies (e.g., a designatable unit).

### Threshold (Criteria A, B, D)*

Numeric or percentage minimum that determines whether the presence of a biodiversity element at a site is significant enough for the site to be considered a KBA under a given criterion or sub-criterion.

### Trigger (Criteria A-E)*

A biodiversity element (e.g. species or ecosystem) by which at least one KBA criterion and associated threshold is met.

### Wildlife species

Wildlife Species defined under the *Species At Risk Act* (and by COSEWIC) as a "species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years" (COSEWIC 2019). Equivalent to taxon/taxa as used in this document.

# VI. BIODIVERSITY ELEMENTS ELIGIBLE FOR NATIONAL KBAs

## Species

Species-centric national KBA criteria (A1, B1, and D1-3) can be applied to both species and infraspecies (collectively termed "taxa")[4]. Eligible taxa must be accepted as taxonomic units in Canada. COSEWIC assessment and status reports are the primary source of validated taxonomic information for Canada. In the absence of a COSEWIC assessment or status report for a taxon, other taxonomic systems may be used, such as that adopted by NatureServe Canada (NatureServe 2018). Evidence must be provided to show that infraspecies are discrete and significant (COSEWIC 2018).

In addition, a taxon cannot trigger a national KBA in Canada if it is any of the following:

- Extinct;
- Extirpated or absent from Canada, and not reintroduced;
- Present in Canada only in accidental or irregular occurrences;
- Exotic to Canada;
- A hybrid.

[4] This differs from global criteria A1, B1, and D1-D3, which are applied at the species level only.

## Ecosystems

Ecosystems in Canada have not been consistently mapped at the national level, although there are different products at the provincial and national levels that can be adapted for KBA assessment, including the incomplete Canadian National Vegetation Classification, as well as provincial ecosystem and vegetation classifications. Every effort should be made to employ existing national or regional (ecosystem/vegetation) classification systems, where they exist, to ensure consistency with Canadian definitional standards and methodological conventions; we expect future iterations of this standard to include such details. We anticipate that more detailed guidance will be developed on the application of KBA criteria to ecosystems at the national level as experience is gained.

To trigger a national KBA in Canada, an ecosystem type must be mapped to the equivalent of level 5 of the Red List of Ecosystems 6-level classification system (hereafter referred to as the Red List of Ecosystems Typology) (Keith et al. 2020). This approximates the Group or Alliance levels in the International Vegetation Classification (IVC) and the Canadian National Vegetation Classification System (CNVC) (Faber-Langendoen et al. 2018, Baldwin et al. 2019). For KBA assessments, the Group level of the IVC or CNCV should be used for non-forested ecosystems and the Alliance Level for forested ecosystems (result of KBA expert workshop, February 2019, Ottawa).

# VII. NATIONAL KBA CRITERIA AND THRESHOLDS

This section provides specifications for each of the 7 criteria in the National KBA Standard. Many of the criteria and thresholds are identical to the Global KBA Standard, with the only differences being that the criterion is applied to the scale of Canada (i.e., to national population sizes or ecosystem extents as opposed to global population sizes and extents) and can be applied to taxa below the species level. An important exception is the allowance of continental or biogeographic population numbers for species that cross international boundaries (e.g. birds; Annex 1 provides further details about exceptions and rare cases).

## A. Threatened Biodiversity

### A1. Threatened species

Sites qualifying as national KBAs under criterion A1 hold a significant proportion of the national population size of a taxon facing a high risk of extirpation in Canada, and so contribute to the national persistence of biodiversity at genetic and taxon levels.

***Site regularly holds one or more of the following:***

***a) ≥0.5% of the national population size AND ≥5 reproductive units of a taxon that is nationally[5] threatened at level 1;***

***b) ≥1% of the national population size AND ≥10 reproductive units of a taxon that is nationally threatened at level 2;***

***e) Effectively the entire national population size of a taxon that is nationally threatened at level 1 OR the area where a taxon that is possibly extinct or possibly extirpated in Canada is most likely to occur in Canada.[6]***

[5] In rare cases, taxa that are globally threatened may also trigger national KBA under criterion A1 (any sub-criterion). See Annex 1.1.2 for additional information.

[6] Identifying a national KBA site for a taxon that is possibly extinct or possibly extirpated in Canada is permitted under sub-criterion A1e only, under the rare circumstance where there is a strong rationale to believe the taxon is still present at the site despite not having been detected.

Criterion A1 can be triggered by migratory species in both their breeding and non-breeding range (see Annex 1.1.3); at non-breeding sites, the reproductive units threshold can be interpreted as the number of mature individuals.

**Nationally threatened taxa**

A taxon is considered nationally threatened at:

- Level 1: if it has a COSEWIC status category of Endangered (E) or a NatureServe N-rank of Critically Imperiled (N1). If the taxon is endemic to Canada, then an IUCN category of Critically Endangered (CR) or Endangered (EN), or a G-rank of Critically Imperiled (G1 or T1), would also qualify the taxon as nationally threatened at level 1.
- Level 2: if it has a COSEWIC status category of Threatened (T) or a NatureServe N-rank of Imperiled (N2). If the taxon is endemic to Canada, then an IUCN category of Vulnerable (VU) or a G-rank of Imperiled (G2 or T2) would also qualify the taxon as nationally threatened at level 2.

Annex 1 provides information about accurately classifying taxa with two or more conflicting ranks.

As a general rule, only COSEWIC status categories, N-ranks, and G-ranks that are <12 years old, as well as IUCN categories that were assigned <10 years ago, should be considered when evaluating whether a taxon is nationally threatened to ensure use of the most up-to-date available information. Exceptions to this should be decided on a case by case basis, particularly when there is a lack of monitoring effort or lags in reassessments. In addition, if the taxon was assigned an N-rank that is a range (e.g. N1N3), then the most conservative option (i.e. N1) should be used[7].

**Proportion of a taxon's national population size**

Proportion of the national population size can be observed or inferred through any of the following:

(i) number of mature individuals;

(ii) area of occupancy;

(iii) extent of suitable habitat;

(iv) range;

(v) number of localities;

(vi) distinct genetic diversity.

## A2. Threatened ecosystem types

Sites qualifying as national KBAs under criterion A2 hold a significant proportion of the national extent of an ecosystem type facing a high risk of collapse globally, and so contribute to the national and global persistence of biodiversity at the ecosystem level.

[7] This handling of range ranks differs from that of the Global KBA Guidelines, which require that the rounded rank be retained for global A1 assessments. For national KBA assessments, a conservative approach will ensure that all threatened taxa are captured by criterion A1. The use of the most conservative rank also applies to G-ranks qualifying Canadian endemics as nationally threatened in Canada.

***Site holds one or more of the following:***

***a) ≥5% of the national extent of a globally CR or EN ecosystem type;***

***b) ≥10% of the national extent of a globally VU ecosystem type.***

Threatened ecosystem types include those assessed as globally Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) under the IUCN Red List of Ecosystems Categories and Criteria (IUCN 2015) at the level of ecosystem classification hierarchy specified in section VI[8].

## B. Geographically Restricted Biodiversity

### B1. Individual geographically restricted species

Sites qualifying as national KBAs under criterion B1 hold a significant proportion of the national population size of a taxon, and so contribute significantly to the national persistence of biodiversity at the genetic and taxon levels.

***Site regularly holds ≥10% of the national population size AND ≥10 reproductive units of a taxon.***

The regular occurrence of all life stages of a taxon at a site distinguishes criterion B1 from criterion D1.

**Proportion of a taxon's national population size**

Proportion of the national population size can be observed or inferred through any of the following:

(i) number of mature individuals;

(ii) area of occupancy;

(iii) extent of suitable habitat;

(iv) range;

(v) number of localities;

(vi) distinct genetic diversity.

### B2. Co-occurring geographically restricted species

KBA criterion B2 will not be adapted for the National KBA Standard. This is because northern and northern temperate ecosystems tend not to hold assemblages of restricted-range species within a ***single*** taxonomic group and therefore the criterion is less relevant to Canada. Please see the Global KBA Standard for information about identifying global KBAs using criterion B2.

[8] National-level threat assessments of ecosystems may be accepted in the future as experience is gained applying Criterion A2.

### B3. Geographically restricted assemblages

KBA criterion B3 will not be adapted for the National KBA Standard. This is because northern and northern temperate ecosystems tend not to hold assemblages of restricted-range species within a ***single*** taxonomic group and therefore the criterion is less relevant to Canada. Please see the Global KBA Standard for information about identifying global KBAs using criterion B3.

### B4. Geographically restricted ecosystem types

Sites qualifying as national KBAs under criterion B4 hold a significant proportion of the national extent of an ecosystem type, and so contribute significantly to the national persistence of biodiversity at the ecosystem level.

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

Ecosystem types considered are at the level of ecosystem classification hierarchy specified in section VI.

## C. Ecological Integrity

***KBA criterion C will be adapted for the National KBA Standard in Canada.*** However, this adaptation is deferred until methods for applying global KBA criterion C have been developed for Canada.

## D. Biological Processes

### D1. Demographic aggregations

Sites qualifying as national KBAs under criterion D1 predictably hold a significant proportion of the national population size of a taxon during one or more life history stages or processes, and so contribute significantly to the national persistence of biodiversity at the taxon level.

***Site predictably holds one or more of the following:***

***a) An aggregation representing ≥1% of the national population size of a taxon, over a season, and during one or more key stages of its life cycle;***

***b) A number of mature individuals that ranks the site among the largest 10 aggregations known for the taxon in Canada.***

Aggregations typically occur for breeding, feeding, or during migration and are indicated by highly localised relative abundance, two or more orders of magnitude larger than the taxon's average recorded numbers or densities at other stages during its life-cycle. A site is considered to "predictably" hold a taxon if the taxon is known to have occurred at the site in at least two thirds of the years for which adequate data are available for the relevant season (e.g., the breeding season in the case of a breeding aggregation); the total number of years considered should not be fewer than three.

Criterion D1 is not meant to identify sites that hold all key stages of a taxon's life cycle; those sites may be triggered by criteria A1 or B1. The concept of aggregation is broad enough, however, to include taxa that remain aggregated throughout most or all of their life cycles as they move between sites. In sub-criterion D1b, the threshold applies across all life-history functions rather than for specific functions (e.g. breeding or feeding). An aggregation cannot meet D1b if it is known that it doesn't meet D1a (i.e. it should only be applied to aggregations that hold at least 1% of the species population but for which there isn't sufficient data to test the threshold). Along migratory corridors, KBAs should be identified for stop-over or bottleneck sites rather than for the entire corridor.

**Proportion of a taxon's national population size**

Proportion of the national population size can be observed from the following:

(i) number of mature individuals.

### D2. Ecological refugia

Sites qualifying as national KBAs under criterion D2 hold a significant proportion of the national population of a taxon during periods of environmental stress, and so contribute significantly to the national persistence of biodiversity at the taxon level.

***Site supports ≥10% of the national population of a taxon during periods of environmental stress, for which historical evidence shows that it has served as a refugium in the past and for which there is evidence to suggest it would continue to do so in the foreseeable future.***

Taxa at any life stage 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 taxon at particular sites on the scale of multiple years or decades. This longer time horizon differentiates ecological refugia from the demographic and geographic aggregations described in criterion D1.

**Proportion of a taxon's national population size**

Proportion of the national population size can be observed from the following:

(i) number of individuals[9].

### D3. Recruitment sources

Sites qualifying as national KBAs under criterion D3 are where a significant proportion of the national population size of a taxon is produced, and so contribute significantly to the national persistence of biodiversity at the taxon level.

***Site predictably produces propagules, larvae, or juveniles that maintain ≥10% of the national population size of a taxon.***

[9] This differs from global KBA criterion D2, which requires population size to be observed from the number of mature individuals. Changing the metric to "number of individuals" in the National KBA Standard will allow national D2 KBAs to capture ecological refugia for juveniles and other life stages.

Unlike sites identified under criteria D1 and D2, where individuals of a taxon are moving into a site at nationally significant proportions, albeit at different time scales, criterion D3 applies to taxa where individuals disperse out of the site in nationally significant proportions. These sources make a large contribution to the recruitment of a taxon elsewhere, even though the number of mature individuals at the site may be low or zero. Hence, the threshold is applicable to the national adult population size occurring largely outside of the site, rather than to the number of immature individuals within the site.

**Proportion of a taxon's national population size**

Proportion of the national population size can be observed from the following:

(i) number of mature individuals.

### E. Irreplaceability Through Quantitative Analysis

***KBA criterion E may be adapted for the National KBA Standard in Canada.*** However, this adaptation is deferred until methods for applying global KBA criterion E have been developed and tested.

## VIII. COMPARATIVE SUMMARY OF NATIONAL AND GLOBAL KBA CRITERIA AND THRESHOLDS

The following tables provide a summary of national KBA criteria and thresholds. Information about global KBA criteria and thresholds is also included for comparison, with further details and definitions available in the Global KBA Standard and the Global KBA Guidelines. In all tables, the Population or Extent Threshold applies to the global population size (for species) or extent (for ecosystems) in the case of global KBAs, and to the national population size or extent in the case of national KBAs. The Reproductive Unit requirement is identical for global and national KBAs.

## A. Threatened Biodiversity

| Sub-Criterion | Trigger Biodiversity Element | | Pop. or Extent Threshold | Reproductive Units |
|---|---|---|---|---|
| | Global KBA | National KBA | | |
| **A1. Threatened species** | | | | |
| a | CR or EN species | Taxon nationally[10] threatened at level 1 | 0.5% | 5 |
| b | VU species | Taxon nationally threatened at level 2 | 1% | 10 |
| c | Species assessed as CR or EN due only to population size reduction in the past or present | | 0.1% | 5 |
| d | Species assessed as VU due only to population size reduction in the past or present | | 0.2% | 10 |
| e | CR or EN species | Taxon nationally threatened at level 1 | Entire population | - |
| | Site where a CR(PE) or CR(PEW) species is most likely to occur worldwide | Site where a taxon that is possibly extinct or possibly extirpated in Canada is mostly likely to occur in Canada | - | - |
| **A2. Threatened ecosystem types** | | | | |
| a | CR or EN ecosystem type | CR or EN ecosystem type | 5% | - |
| b | VU ecosystem type | VU ecosystem type | 10% | - |

## B. Geographically Restricted Biodiversity

| Sub-Criterion | Trigger Biodiversity Element | | Pop. or Extent Threshold | Reproductive Units |
|---|---|---|---|---|
| | Global KBA | National KBA | | |
| **B1. Individual geographically restricted species** | | | | |
| - | Any species | Any taxon | 10% | 10 |
| **B2. Co-occurring geographically restricted species** | | | | |
| - | Several restricted-range species from the same taxonomic group: either ≥2 species OR 0.02% of the global number of species in the taxonomic group, whichever is larger | | 1% | - |

[10] In rare cases, taxa that are globally threatened may also trigger national KBA under criterion A1 (sub-criteria a, b, or e). See Annex 1 for additional information.

| | | | | |
|---|---|---|---|---|
| **B3. Geographically restricted assemblages** | | | | |
| a | Several ecoregion-restricted species from the same taxonomic group: either ≥5 species OR 10% of the species restricted to the ecoregion, whichever is larger | | 0.5% | - |
| b | Several bioregion-restricted species from the same taxonomic group: either ≥5 species OR 30% of the bioregion-restricted species known from the country, whichever is larger | | - | 5 |
| c | Part of the globally most important 5% of occupied habitat for each of ≥5 species within a taxonomic group | | - | - |
| **B4. Geographically restricted ecosystem types** | | | | |
| - | Any ecosystem type | Any ecosystem type | 20% | - |

## C. Ecological Integrity

| Sub-Criterion | Trigger Biodiversity Element | | Pop. or Extent Threshold | Reproductive Units |
|---|---|---|---|---|
| | **Global KBA** | **National KBA** | | |
| - | One of ≤2 sites per ecoregion characterized by wholly intact ecological communities | -Deferred pending methodology development | - | - |

## D. Biological Processes

| Sub-Criterion | Trigger Biodiversity Element | | Pop. or Extent Threshold | Reproductive Units |
|---|---|---|---|---|
| | **Global KBA** | **National KBA** | | |
| **D1. Demographic aggregations** | | | | |
| a | Aggregation of a species over a season and during one or more key stages of its life cycle | Aggregation of a taxon over a season and during one or more key stages of its life cycle | 1% | - |
| b | One of the 10 largest aggregations known for a species worldwide | One of the 10 largest aggregations known for a taxon in Canada | - | - |

| | | | | |
|---|---|---|---|---|
| **D2. Ecological refugia** | | | | |
| - | Aggregation of mature individuals of a species during periods of past, current, or future environmental stress | Aggregation of individuals of a taxon during periods of past, current, or future environmental stress | 10% | - |
| **D3. Recruitment sources** | | | | |
| - | Propagules, larvae, or juveniles maintaining ≥10% of a species' global population size | Propagules, larvae, or juveniles maintaining ≥10% of a taxon's national population size | - | - |

### E. Irreplaceability Through Quantitative Analysis

| Sub-Criterion | Trigger Biodiversity Element | | Pop. or Extent Threshold | Reproductive Units |
|---|---|---|---|---|
| | Global KBA | National KBA | | |
| - | Irreplaceability of ≥0.90 (measured by quantitative spatial analysis) AND regular presence of any species | Deferred pending methodology development | - | 10 |
| | Irreplaceability of ≥0.90 (measured by quantitative spatial analysis) AND regular presence of EN or CR species | | - | 5 |

# IX. DELINEATION PROCEDURES IN CANADA

The aim of delineation is to derive site boundaries that are ecologically relevant and provide a basis for potential management activities. More specifically, the objective is to provide the best conditions for the persistence of the biodiversity elements for which the site is important, dependent on their ecological requirements and the socio-cultural, economic and management context, within the constraint that the final delineated site meets the threshold for at least one KBA criterion.

When delineating a KBA in Canada, the Global KBA Guidelines should be followed closely, in addition to guidelines provided here and available through the Canadian KBA Secretariat. The Global KBA Guidelines include guidance on proposing KBAs that build on existing KBAs (e.g., IBAs that may be expanded to include additional taxa besides birds), KBAs that overlap closely with existing management boundaries (e.g., protected area boundaries), and KBAs for which new boundaries must be drawn up. Below we summarize the main considerations for delineation from the Global KBA Guidelines, and then present additional guidance developed from experience identifying and delineating sites in Canada. Any additional guidance sought will likely be found in the Global KBA Guidelines. Note that there is much more experience delineating sites for species; guidance on delineation of KBAs identified under ecosystem criteria will be developed as experience with these criteria grows.

In addition to consulting experts, KBA nominators should consult rights holders and stakeholders, who will hold information that is relevant to the practical delineation of a site, in addition to information on the biodiversity elements on the site. Each case will be unique, and we recommend following the Global and Canadian guidelines and then using practical and expert judgment to determine the simplest and most ecologically relevant approach to delineation. Contextual knowledge will be important in applying the Standards and Guidelines, and ultimately making decisions about KBA boundaries.

## Summary of Guidance on Delineation from the Global KBA Guidelines

Some salient points from the Global KBA Guidelines are copied below in bullet form.

### General concepts

- There is no minimum or maximum size requirement for a KBA. Management considerations should be taken into account in all cases, as, a site should be a manageable unit. In the case of KBAs, manageability refers to the possibility of some type of effective management across the site. This is a broad guideline and is open to some degree of interpretation.

- Global KBA boundaries should not overlap with the boundaries of other global KBAs. KBA proposers should work to harmonize proposed KBA boundaries with existing ones. Guidance on overlapping national and global KBAs is different, see sections below.

- Spatial datasets can be explored to see which data may be useful in delineation (e.g. topographic data, ecosystem type boundaries, land cover).

### Deriving initial boundaries

- Species distribution maps are a useful starting point for delineation where there are no existing sites in the area of interest.

- For well-sampled KBA trigger biodiversity elements, it may be possible to derive distribution maps that represent their known local geographic extent from observed locality data. For elements with relatively few sampling localities, it may be necessary to infer the approximate geographic extent using knowledge of habitat requirements, habitat maps, and models.

- For biodiversity elements that do not occupy a whole KBA (e.g. if there is a case for identifying an existing protected area as a KBA), maps showing their distribution within the KBA should be submitted with the KBA proposal. Precise information on the location of trigger elements will guide their effective management. This additional spatial layer for localities of trigger elements is also important when assessing KBAs using range or area of occupancy (or any area-based parameter) as it provides evidence that the species is found within the site.

- Initial KBA boundaries can be derived that encompass the distribution of overlapping trigger biodiversity elements. These initial KBA boundaries should be delineated so that the area contained within them is distinct from surrounding areas in terms of importance to the trigger biodiversity elements or habitat, while minimizing the inclusion of land or water that is not relevant to the trigger biodiversity elements.

- In addition to habitat, it is advisable to consider the spatial aspects of ecological boundaries, including size, edge, and connectivity with other natural areas. In particular, delineating boundaries that align with natural topographic or habitat features may enhance prospects for the persistence of trigger biodiversity elements.

- Populations of trigger species may form part of a larger meta-population; they do not have to be self-sustaining. They do need to meet specified thresholds for reproductive units (RUs).

- Delineating ecological boundaries in wilderness areas will be challenging. If precise population data is not available, species distribution models may be used, validated by surveys. Topographic and environmental data such as elevation, ridgelines, geological features, etc. may be used to delineated boundaries.

## Practical Considerations for Delineation in Canada

It is important to keep in mind that there is not one delineation solution for any given KBA. Many decisions need to be made about delineation, taking into account guidelines, existing datasets, the ecology of the trigger species/ecosystems, and expert input from those who know the area where the site is located. As long as the site boundaries allow it to qualify as a KBA (meeting the quantitative thresholds) and the proposer is satisfied that the most relevant guidance and expert input were followed, the site boundaries are likely satisfactory. In cases where proposers have a lot of uncertainty about delineation decisions, they are invited to discuss approaches with the Canadian KBA Secretariat and Coalition. The KBA boundaries should be, in the following order:

**A. Ecologically meaningful:** At workshops and in consultation with species and ecosystem experts, management considerations should be set aside and the first step of delineation should focus on developing delineation options of ecological relevance.

**B. Relevant to management[11]:** KBA proposers should consider the locations of existing KBAs (e.g. IBAs) and conservation areas, land ownership, and other management considerations after the initial ecological boundaries have been drawn up. Management considerations can help with the selection among multiple delineation solutions that are each ecologically sound. In some cases, stakeholders may suggest that the ecological boundaries are management-relevant and require no further development.

Note that the development of ecologically meaningful boundaries (described below in Steps 1 and 2) needs to involve the input of taxonomic experts, ecosystem experts, and others that can provide information and understanding about the landscape where the KBA will be located. Land owners and other knowledgeable rights holders and stakeholders may also provide precise information about where habitat occurs within land parcels, or point out areas that are not relevant to the biodiversity elements in question, but will not have influence on KBA boundaries that alters the biodiversity significance of the site. Steps 3 and 4 can be conducted in a separate exercise where other types of expert input may be more relevant, for example KBA delineation experts and land managers. All decisions about delineations should be documented with rationales provided.

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[11] Note that the very idea of a 'site' suggests manageability. KBAs should be delineated using an ecological rationale, but would ideally also be practical for management. For example, if the location of trigger biodiversity elements is within an existing conservation or stewardship area, those boundaries may be appropriate for the KBA. In early KBA exercises in Canada, land managers and planners have indicated that ecologically delineated sites are preferred.

### Step 1: Developing ecologically relevant boundaries for individual trigger elements

The objective of delineation will be to capture a sufficient proportion of the trigger species population size or ecosystem extent and create boundaries that have ecological and management significance. New KBAs should be delineated based on ecological considerations first. The following instructions for developing ecologically relevant KBA boundaries are also relevant for drawing boundaries around individual trigger elements where multiple elements may be included within the KBA boundaries. Delineating individual trigger elements that are not the same as the final KBA boundaries occurs when combining multiple trigger elements, adding triggers to existing KBAs, or where KBA boundaries are delineated based on existing management boundaries (e.g. when an existing protected area boundary is of a relevant size and shape to serve as a KBA boundary). The site does not have to contain a self-sustaining population of the trigger species, but does need to meet threshold requirements. Aside from that, there is no precise prescription for delineating a site. What follows are a series of steps to take to delineate a new site. We provide some suggestions for data layers to use that are specific to terrestrial and aquatic ecosystems, information that will be expanded and available through the KBA website. Note that there is currently less experience delineating marine and coastal sites and delineation guidance will be added for these systems at a later date.

**Terrestrial systems**

In terrestrial systems, there may not always be obvious ecological boundaries, unlike for some freshwater systems, e.g. where the boundaries of lakes and rivers are clear. The following approaches can be taken:

For trigger species, you will want to delineate around relevant element occurrences (EOs) or other observations using relevant spatial data. Element Occurrences and Source Features (NatureServe 2020) provide good building blocks for the delineation of KBAs in Canada. The following spatial layers may be used to delineate around where the species has been observed to occur:

- Topographic data, if the distribution of the element is related to altitude
    - Superficial/bedrock geology, climate, soil, natural disturbance agents
    - Species habitat information, including critical habitat data layers, relevant land cover categories, species models, aerial photographs, satellite imagery, etc.
    - Watershed information if species management may be most relevant at that scale.
    - Land cover data not related to habitat, if there is information about built infrastructure, roads etc. that interrupt the landscape and create contiguous areas that qualify as a KBA.
    - If there aren't any relevant spatial layers to guide delineation, you can also delineate tightly around element occurrences (EOs) or observations, using a minimal buffer if there is spatial uncertainty associated with an observation.
- If area-based parameters are being used to test thresholds related to a species criterion, there is a minimum amount of the global or national area of occupancy/extent of suitable habitat/range that needs to be included within the KBA boundary. We recommend starting with observation data exploring what habitat is most relevant around these observations that should be captured in the final boundaries.

- For trigger ecosystems, use ecosystem extent maps, predictive ecosystem models, land cover information, aerial photos or satellite imagery to map extent of ecosystem and determine what area is needed to meet thresholds. There is less experience to date mapping ecosystem-based KBAs and we anticipate updating this document to add guidance on this topic as experience is gained.

- Expert input is required to identify the exact area that should be included in the KBA.

Note that there will likely be areas within the KBA that are not relevant to the trigger species or ecosystems and how much of this land to include is at the discretion of the proposer, who should take advice from experts who know the area. In general, as little land that is not relevant to the species or ecosystem should be included as possible, but especially for larger KBAs some inclusion of irrelevant land is inevitable. The rationale behind KBA delineation should be well documented and will be reviewed by species/ecosystem experts as well as experts in the KBA Standard and Guidelines.

**Aquatic systems**

For the most part, KBAs in aquatic systems will be identified for species at risk and geographically restricted species (Criteria A1 and B1).

- Canadian freshwater experts have proposed that delineating tightly around trigger elements (as for terrestrial species and ecosystems) is the most appropriate approach to delineation for freshwater KBAs – and most specifically for elements that are entirely aquatic. This guidance translates into mapping specific sections of streams and rivers, and portions of, or entire, lakes. A minimal 30m buffer is suggested for the delineation of lakes and rivers to account for imprecisions in spatial data and inter-annual variation.

- There has been discussion about the use of larger buffers to capture the interplay between terrestrial and aquatic ecosystems and one recommendation from the IUCN freshwater biodiversity unit is to make use of HydroBASINS subcatchment level 12 data (Lehner and Grill 2013) to delineate freshwater KBAs. This remains a possibility as well, so we recommend that expert opinion is sought on the delineation of specific sites to make sure that the KBA delineation captures the most relevant elements. This may be a good delineation solution if there are surrounding terrestrial trigger species nearby.

- Where there are aquatic trigger elements and nearby trigger elements in surrounding terrestrial habitats, use expert judgement to determine whether the elements should be integrated into a single KBA and to determine the most relevant approach to KBA delineation.

- Another option that has been tested in some regions in Canada is to delineate around lakes and wetlands using contour lines that capture a broader border around these habitats. The specific contour line and whether it needs to be cut off manually where it stretches too far away is a subject for expert discussion. Whether the trigger species is aquatic or a wetland species will have an impact on how the KBA is delineated.

- For lakes, delineating the lake itself can be done using the Global Lakes and Wetlands Database (Lehner and Doell 2004) or similar (and likely more precise) local or regional datasets that include lakes.

### Step 2: Integrating multiple trigger elements into one KBA

If there are multiple trigger elements present in one area, the first step is to assess which precise areas would qualify as KBAs for each trigger element (meeting quantitative thresholds). If multiple areas that are overlapping or close together qualify for different trigger elements, KBA boundaries should be drawn tightly around the grouping of biodiversity trigger elements, either using relevant spatial datasets (e.g. elevation lines) or a hand-drawn boundary (e.g. tight delineation around biodiversity elements, with a minimal 30m buffer if appropriate). If the qualifying biodiversity elements are far apart, but are all included within an existing management boundary (e.g. a national park), then the existing management boundary could be used as the KBA boundary, depending on whether the size of the management boundary is comparable to the KBA trigger element grouping. If there is no existing or proposed management boundary, the decision about whether to delineate the elements separately or together should be based on distance between the elements (although there is no threshold distance), understanding of the ecological needs of the different trigger elements, and understanding of the landscape and habitats. There is no one right way to make the decision. If the various trigger elements do not share any habitat requirements, they could be delineated separately. If there are overlaps in habitat requirements, they could be delineated together. In some cases, trigger elements may be broken into multiple sites, as long as each site still meets criteria thresholds and there is no spatial overlap among KBAs. In general, KBAs should be single polygons with no holes in them (there may be exceptions to this rule with larger KBAs). If in doubt, check with the KBA Secretariat and Coalition for input.

### Step 3: Integrating trigger elements into existing KBAs

Identifying and delineating KBAs for multiple criteria and for multiple trigger elements presents a challenge of sequence – it is possible that additional elements may need to be added to existing KBAs that have been delineated at different points in time. There is no easy solution to this issue and we anticipate that KBA boundaries will need to be adjusted from time to time as more KBAs are identified. This is currently most relevant around existing IBAs that were identified over the course of the past several decades in Canada. The follow guidance applies to these situations:

- If the ecological boundaries for one or multiple trigger elements fall wholly within or largely within the boundaries of an existing KBA, the boundary of the existing KBA should be used for delineation. Data on the new trigger biodiversity element(s) should be added to the existing KBA's qualifying data.

- If the newly proposed KBA extends beyond the boundaries of an existing KBA, then the additional area(s) should be:

    a. Left out if they are not necessary for meeting the relevant criterion threshold and are not ecologically relevant.

    b. Added to the existing KBA boundary. In this case, a proposal for modification should be sent with justification to the proposer of the original KBA via the Canadian KBA Coalition.

    c. Delineated as a separate, adjacent KBA. This may occur if the original boundaries cannot be modified for any reason (e.g. a political process is tied to the original boundaries). The new adjacent KBA must qualify independently as a KBA.

    d. If the original and the new area are needed for a site to qualify, and the original boundaries cannot be modified, seek advice from the KBA Coalition.

- If the newly proposed KBA engulfs an existing KBA entirely, new boundaries for one KBA that incorporates all trigger elements may be proposed (in consultation with proposers of original KBA).

- If original KBA boundaries are not ecologically or management relevant (e.g. older KBAs may have been delineated with a different set of guidelines that were less instructive), consultations with proposers of original site are needed to adjust original boundaries in order to make a decision about next steps.

- For all possibilities listed above, if there are multiple KBA trigger elements, the relevant area for each KBA trigger element should be mapped, in addition to the final KBA boundary that includes all the trigger elements. Information on how to map around KBA trigger elements is found in Step 1.

### Step 4: Taking management considerations, including existing management boundaries, into account in delineation

- If the scale of existing management boundaries is relevant to the delineation of a new KBA, the existing boundaries where active management is underway should be used.

- If existing management boundaries are not suitable for KBA trigger elements, a KBA may be proposed that overlaps with, or exists within, a conservation area.

- In cases where the existing conservation area is much larger than the area of interest for the KBA trigger element(s), KBA boundaries should be developed at a scale that best informs management decisions, as opposed to adopting the conservation area boundary as the KBA boundary.

- A site may have multiple relevant existing boundaries in the vicinity (e.g. a pre-existing KBA, as well as one or multiple conservation areas). In cases like this, it is complicated to figure out which boundary to use (if any) and how to integrate KBA trigger elements into the mix.

    - Existing KBA boundaries should be adopted, if reasonable.

    - If the existing KBA boundaries do not make sense for additional trigger species, then discussion with original KBA proposers is needed to change the boundaries.

    - If the conservation area boundaries are more ecologically relevant than the existing KBA boundaries, discussion with original KBA proposers is needed.

    - In some cases where KBA boundaries were delineated a long time ago and may not have been developed with a high level of precision, it may be useful to work with the original proposers to suggest new boundaries.

- In some cases, KBA trigger elements can be divided into multiple sites where each site will still meets criteria thresholds. In these cases, delineation solutions can range from having one large KBA all the way to having dozens of small KBAs, all of which could meet criteria thresholds. Discussions with experts are needed to determine whether one or multiple KBAs are more appropriate depending on how far apart the potential sites are, the ecology and behavior of the trigger species, land cover across and between potential sites, among other things. In addition, consideration about how they can be integrated with multiple existing management boundaries may also be relevant.

- Land managers and rights holders in the area should be contacted to provide them with the opportunity to contribute information about the site that may be relevant to delineation. Boundaries may be changed to account for management considerations if the change is justified and KBA criteria are still met within the boundaries.

- For all possibilities listed above, if there are multiple KBA trigger elements, the relevant area for each KBA trigger element should be mapped, in addition to the final KBA boundary that includes all the trigger elements. Information on how to map around KBA trigger elements is found in Step 1.

## Integrating Global and National KBA Sites

One issue that will arise regularly in Canada is the need to integrate information on global and national trigger species for KBAs that overlap. Our experience to date shows that complex situations arise frequently where multiple global and national KBAs are in close proximity and if delineated separately, would overlap. Global KBAs are not allowed to overlap with other global KBAs, for multiple reasons including the need to communicate a stand-alone 'site' that could be managed or stewarded appropriately. Any such overlaps need to be resolved by combining KBAs into one larger KBA or having adjacent KBAs. To the extent possible, this is also the recommendation when delineating national KBAs. However, if there are circumstances where it isn't possible to combine a global and national KBA or two national KBAs, overlaps may be allowed in some cases. Proposers should first contact the KBA Secretariat for advice if this situation arises.

The following guidance on integrating global and national KBAs is based on early experience delineating sites at the two scales, and it is likely that additional principles will be identified as more experience is gained.

- A site may qualify as a global KBA and also as a national KBA for additional biodiversity elements. If the boundaries are the same for each level of KBA, a global nomination form should be completed and the additional list of national trigger species should be included as 'additional biodiversity'. Where possible national triggers should be assessed for these sites and the national triggers that meet thresholds at the site should be recorded.

- If a site qualifies both as a global KBA and as a national KBA for additional biodiversity elements, and the boundaries for each level are different, the location of national triggers may impact the global KBA boundaries. If a national trigger element is present in sufficient quantities to meet KBA thresholds, this is a management consideration that should impact the delineation of the global KBA. The boundaries of the KBA should be expanded to accommodate both levels of information about trigger elements. The need to integrate multiple trigger elements may depend on the precise locations of the various trigger elements and experts should be consulted about whether the better solution is to delineate the elements together in one site, or to have separate sites.

- A site may have previously qualified as a national KBA and now qualifies as a global KBA for other trigger elements, or vice versa. The Canadian KBA Coalition will need to be consulted before any decision is made on a final delineation.

    - If the boundaries do not need to be changed, then there is no issue and the existing boundaries should be adopted.

- If the boundaries need to be expanded, then it will be important to talk with the proposers of the original site and negotiate a new boundary that is still relevant to any groups stewarding the area. In general, even if the site is initially a national KBA, its existence and any existing stewardship associated with it make the national boundaries important to take into consideration and they should be respected where reasonable.

- In all cases, the precise locations of biodiversity trigger elements should be provided in a separate spatial layer to the external KBA boundary spatial layer.

## How to Develop KBA Shapefiles for Submission of KBA Boundaries

Guidance on preparing KBA boundary spatial layers is presented in Annex B of the Global KBA Proposal Process (KBA Secretariat 2019). Two types of spatial layers for KBA submission perform different functions: (1) the KBA boundary, and (2) precise locations of trigger biodiversity elements inside the KBA boundary. This is an important information piece for informing wise management of the landscape. Large areas may be included in KBAs for various reasons, and therefore the KBA boundary layer may be less useful to identifying areas where certain activities should be prohibited (e.g. hiking within a national park). In some cases, both layers might be identical, in which case this should be specified. Where final KBA boundaries are adopted from existing conservation or stewardship areas, it is preferable to also submit the second category of spatial data file in order to have precise information on the biodiversity elements that may need to be managed specifically. Because precise locational information is not always available for some species or it may be sensitive, this second category of spatial data file is not required, but should be provided when possible. All KBA boundaries should be checked with Provincial and Territorial Species at Risk authorities (first via the Canada KBA Secretariat, where a list of sensitive species and data restrictions per Province/Territory is curated) to ensure that data on sensitive species is managed appropriately and that KBA boundaries for these species is developed in accordance with Provincial or Territorial policies.

# X. REFERENCES


Baldwin, K., K. Chapman, D. Meidiner, P. Uhlig, L. Allen, S. Basquill, D. Faber-Langendoen, N. Flynn, C. Kennedy, W. Mackenzie, M. Major, W. Meades, C. Morneau, J.-P. Saucier. 2019. The Canadian National Vegetation Classification: Principles, Methods and Status. Natural Resources Canada, Canadian Forest Service. Information Report GLC-X-23: 162 p.

Beresford, A. E., G. M. Buchanan, P. F. Donald, S. H. M. Butchart, L. D. C. Fishpool, and C. Rondinini. 2011. Minding the protection gap: estimates of species' range sizes and holes in the Protected Area network. *Animal Conservation* **14:**114-116.

CESCC (Canadian Endangered Species Conservation Council). 2016. Wild Species 2015: The General Status of Species in Canada. National General Status Working Group: 128 p. Available at https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/reports/Wild%20Species%202015.pdf.

Chu, C., C. K. Minns, N. P. Lester, and N. E. Mandrak. 2015. An updated assessment of human activities, the environment, and freshwater fish biodiversity in Canada. *Canadian Journal of Fisheries and Aquatic Sciences* **72(1)**:135–148. Available at http://dx.doi.org/10.1139/cjfas-2013-0609.

COSEWIC (Committee on the Status for Endangered Wildlife in Canada). 2018. COSEWIC guidelines for recognizing designatable units. Available at http://cosewic.ca/index.php/en-ca/reports/preparing-status-reports/guidelines-recognizing-designatable-units.

COSEWIC (Committee on the Status for Endangered Wildlife in Canada). 2019. COSEWIC definitions and abbreviations. <https://cosewic.ca/index.php/en-ca/about-us/definitions-abbreviations#W>. Downloaded on November 13, 2020.

COSEWIC (Committee on the Status for Endangered Wildlife in Canada). 2020a. Brief history: Committee on the Status of Endangered Wildlife in Canada. <http://cosewic.ca/index.php/en-ca/about-us/brief-history>. Downloaded on October 5, 2020.

COSEWIC (Committee on the Status for Endangered Wildlife in Canada). 2020b. Canadian Wildlife Species at Risk 2020. <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/publications/canadian-wildlife-species-risk-2020.html>. Downloaded on November 13, 2020.

Eisenberg, J. F. 1977. The evolution of the reproductive unit in the Class Mammalia. In Rosenblatt, J. S., and B. R. Komisaruk, editors. Reproductive Behavior and Evolution. Plenum Publishing Corporation, New York City, New York, USA.

ECCC (Environment and Climate Change Canada). 2019. Summary of Canada's 6th National Report to the Convention on Biological Diversity. Government of Canada, Gatineau, QC, Canada. Available at https://biodivcanada.chm-cbd.net/sites/biodivcanada/files/inline-files/EN_Summary%20of%20Canada%27s%206th%20National%20Report_Final_2.pdf.

Faber-Langendoen, D., J. Nichols, L. Master, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, A. Teucher, and B. Young. 2012. NatureServe Conservation Status Assessments: Methodology for Assigning Ranks. NatureServe, Arlington, VA, USA.

Faber-Langendoen, D., T. Keeler-Wolf, D. Meidinger, D. Tart, B. Hoagland, et al. 2014. EcoVeg: a new approach to vegetation description and classification. *Ecological Monographs* **84**:533–561.

Faber-Langendoen, D., K. Baldwin, R. K. Peet, D. Meidinger, E. Muldavin, T. Keeler-Wolf, and C. Josse. 2018. The EcoVeg approach in the Americas: US, Canadian and international vegetation classifications. *Phytocoenologia* **48(2)**:215-237.

FPTGC (Federal, Provincial and Territorial Governments of Canada). 2010. Canadian biodiversity: ecosystem status and trends 2010. Canadian Councils of Resource Ministers, Ottawa, Ontario, Canada. Available at https://biodivcanada.chm-cbd.net/sites/biodivcanada/files/2018-01/EN_CanadianBiodiversity_FULL.pdf.

Fraser, D. 2019. Discussion Paper: Adapting the Global Key Biodiversity Standard for National Use in Canada. Unpublished report to Environment and Climate Change Canada. December 10, 2019.

Gärdenfors, U., C. Hilton-Taylor, G. M. Mace, and J. P. Rodríguez. 2001. The application of IUCN Red List Criteria at regional levels. *Conservation Biology* **15**:1206–1212.

Government of Canada. 2020. Canada joins the High Ambition Coalition for Nature and People. News release from Environment and Climate Change Canada. September 28, 2020. Ottawa, Ontario, Canada.

IUCN (International Union for the Conservation of Nature). 2012. IUCN Red List Categories and Criteria: Version 3.1. Second edition. IUCN, Gland, Switzerland and Cambridge, UK.

IUCN (International Union for the Conservation of Nature). 2016. A Global Standard for the Identification of Key Biodiversity Areas, Version 1.0. First edition. IUCN, Gland, Switzerland. Available at https://portals.iucn.org/library/sites/library/files/documents/2016-048.pdf.

IUCN (International Union for the Conservation of Nature) Standards and Petitions Subcommittee. 2014. Guidelines for Using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee. Available at http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

KBA (Key Biodiversity Areas) Secretariat. 2019. Key Biodiversity Areas Proposal Process: Guidance on Proposing, Reviewing, Nominating and Confirming sites. Version 1.0. Prepared by the KBA Secretariat and KBA Committee of the KBA Partnership. Cambridge, UK. Available at http://www.keybiodiversityareas.org/working-with-kbas/proposing-updating/proposal-process.

KBA (Key Biodiversity Areas) Standards and Appeals Committee. 2020. Guidelines for using A Global Standard for the Identification of Key Biodiversity Areas. Version 1.1. Prepared by the KBA Standards and Appeals Committee of the IUCN Species Survival Commission and IUCN World Commission on Protected Areas. IUCN, Gland, Switzerland. https://portals.iucn.org/library/node/49131.

Keith, D. A., J. P. Rodríguez, K. M. Rodríguez-Clark, E. Nicholson, K. Aapala, A. Alonso, M. Asmussen, S. Bachman, A. Basset, E. G. Barrow, and J. S. Benson. 2013. Scientific foundations for an IUCN Red List of Ecosystems. *PLOS one* **8(5):**e62111.

Kraus, D., and A. Hebb. 2020. Southern Canada's crisis ecoregions: identifying the most significant and threatened places for biodiversity conservation. *Biodiversity and Conservation*:1-18. Available at https://doi.org/10.1007/s10531-020-02038-x.

Lehner, B., and G. Grill. 2013. Global river hydrography and network routing: baseline data and new approaches to study the world's large river systems. *Hydrological Processes* **27(15):**2171–2186. Data available at www.hydrosheds.org.

Lehner, B., and P. Doell. 2004. Development and validation of a global database of lakes, reservoirs and wetlands. *Journal of Hydrology* **296/1-4**:1-22. Data available at https://www.worldwildlife.org/pages/global-lakes-and-wetlands-database.

Mounce, R., M. Rivers, S. Sharrock, P. Smith, and S. Brockington. 2018. Comparing and contrasting threat assessments of plant species at the global and sub-global level. *Biodiversity and conservation* **27(4)**:907-930.

NatureServe. 2018. Biotics 5: Web-Enabled Biodiversity Information Management System. <http://www.natureserve.org/conservation-tools/biotics-5>. Downloaded on October 5, 2020.

NatureServe. 2020. Conservation Tools and Services. <https://www.natureserve.org/conservation-tools/natureserve-learning-center/fundamental-skill-building/data-use-training>. Downloaded on October 5, 2020.

NABCI-Canada (North American Bird Conservation Initiative Canada). 2019. The state of Canada's Birds. Environment and Climate Change Canada, Ottawa, Canada. Available at http://nabci.net/resources/state-of-canadas-birds-2019.

Rodríguez, J.P. 2008. National Red Lists: the largest global market for IUCN Red List Categories and Criteria. *Endangered Species Research* **6**:193–198.

# ANNEX 1. ADDITIONAL SPECIFICATIONS FOR NATIONAL STANDARD CRITERIA AND THRESHOLDS

This section contains additional specifications relevant to the application of national KBA criteria. Guidance is provided on uncommon instances that may arise when assessing whether biodiversity elements meet KBA criteria, and on conflicts between different systems of assessment.

## 1.1 Further Specifications for Applying Criterion A1

### 1.1.1 Identifying National Criterion A1 Trigger Species

A taxon's IUCN Red List category, G-rank, COSEWIC status category, and N-rank determine whether it is considered nationally threatened, and at which level, as shown in the following table. National A1 trigger species are identified in the yellow rows of the table below. Note that only G-ranks, N-ranks, and COSEWIC status categories that are <12 years old are considered, whereas only IUCN categories that were assigned <10 years ago are considered. There may be cases where the use of an older rank is allowed, if a compelling rationale is provided (e.g. the population trends have remained stable and reassessment is simply behind schedule); see Section VII for further guidance on this.

| | **All Taxa** | | **Taxa Endemic to Canada Only** | |
|---|---|---|---|---|
| | COSEWIC status category | N-rank | IUCN Red List category | G-rank |
| Possibly extinct or possibly extirpated[12] | - | Possibly Extirpated (NH) | Possibly Extinct (CR(PE)) or Possibly Extinct in the Wild (CR(PEW)) | Possibly Extinct (GH or TH) or Possibly Extinct in the Wild (GHC or THC) |
| Nationally threatened at level 1 | Endangered (E) | Critically Imperiled (N1) | Critically Endangered (CR) or Endangered (EN) | Critically Imperiled (G1 or T1) |
| Nationally threatened at level 2 | Threatened (T) | Imperiled (N2) | Vulnerable (VU) | Imperiled (G2 or T2) |
| Not nationally threatened | Special Concern (SC), Not At Risk (NAR) or Data Deficient (DD) | Vulnerable (N3), Apparently Secure (N4), Secure (N5) or Unrankable (NU) | Near Threatened (NT), Least Concern (LC) or Data Deficient (DD) | Vulnerable (G3 or T3), Apparently Secure (G4 or T4), Secure (G5 or T5) or Unrankable (GU or TU) |

[12] Identifying a national KBA site for a taxon that is possibly extinct or possibly extirpated in Canada is permitted under sub-criterion A1e only and under rare circumstances, namely when there is a strong rationale to believe the taxon is still present at the site despite not having been detected.

In cases where a taxon has been assigned ranks belonging to more than one row in the above table, collectively termed "conflicting ranks", then the following rules apply:

1. If the conflicting ranks were assigned more than 5 years apart, then use the most recent rank.

2. If the conflicting ranks were assigned within 5 years of each other, use the most conservative rank, namely the one corresponding to the highest risk category (i.e. to the highest row in the table), unless there is good reason not to (e.g. if new information has led to a reassessment in one system that is more correct and up to date).

3. If there is a good reason to prefer one status assessment system over another for a species or taxon, an accompanying rationale must be provided if the above rules are not followed.

If the taxon is considered nationally threatened, then the most recent rank responsible for this determination is termed the "qualifying rank".

### 1.1.2 Potential global KBA triggers that qualify as National Criterion A1 triggers

Certain taxa ranked by NatureServe as globally threatened (G-ranks of G1, G2, T1, or T2) are not considered trigger species under global KBA criterion A1, due to the primacy of IUCN Red List assessments in the Global KBA Standard and because global KBAs cannot be identified for infraspecies. These taxa belong to at least one of five categories described below.

1. Taxon is ranked G2G4, and therefore is considered G3 for global KBA purposes.

2. Taxon has an IUCN Red List category that is out of date (i.e. >10 years old), and therefore it cannot be a global A1 trigger until its IUCN category is reassessed.

3. Taxon has an IUCN Red List category that disqualifies it from global KBA criterion A1 (e.g. DD).

4. Taxon occurs outside of the US and Canada, and therefore its G-rank cannot be used for global A1 assessments.

5. Taxon is an infraspecies and therefore cannot trigger a global KBA.

Taxa belonging to all of these categories and that are not otherwise national A1 triggers exist in Canada. These taxa will be accepted as triggers for national KBA criterion A1, in which case the rules for resolving conflicts among national threat ranks (section 1.1.1) should be applied to resolve any conflicts among global threat ranks. When national A1 KBAs are proposed for globally threatened taxa, population thresholds should be tested against national population sizes, like for other taxa. However, in the case of globally threatened taxa, it is recommended that population sizes at the site also be tested against global population sizes to determine whether future IUCN Red Listing of the taxon would qualify the site as a global A1 KBA.

### 1.1.3 Species that qualify as A1 triggers with a different status in different parts of their range

If status ranks differ among the taxon's breeding, non-breeding, and migrant populations (e.g. N1B,N3N,N3M under the NatureServe system), then "N-rank" refers to the level of threat applicable to the population at the KBA site under consideration. For example, if the candidate KBA site is in the taxon's breeding range, then in this example the "N-rank" of the breeding population would be used (N1). In this case, the total breeding population in Canada would be used to calculate whether the population threshold is met.

## 1.2 Using Continental Population Sizes when Reliable National Population Estimates are Not Available or Relevant (All Criteria)

One of the key differences between global and national KBAs is the denominator against which estimates of site-level population size (for taxa) or extent (for ecosystem types) are compared to test whether a criterion threshold is met. For global KBA assessments under criteria A, B, or D, site-level estimates are assessed against global-level population estimates to calculate the percentage of the global population size or ecosystem extent present within a candidate site. By contrast, for national KBA assessments, site-level values are assessed against national-level estimates of population size or ecosystem extent.

For some taxa, however, using national-level estimates of population size may not be practical or pertinent. For species that migrate across international borders (such as many bird taxa, but also species like caribou, monarchs and some dragonflies), national population estimates may be less relevant than continental/ biogeographic population estimates and national population estimates are often not available. In these cases, continental population size estimates are accepted for use as the denominator for national KBA assessments. In effect, this will result in the application of stricter rules for the identification of national KBAs: a national KBA identified using continental population sizes would also qualify using national population sizes, whereas the opposite may not be true. In practice, for species that move entirely into Canada at times, the continental population may sometimes be equal to the national population (e.g. some caribou populations, many species of migratory birds).

# ANNEX 2. CANADIAN REVIEW PROCESS

Key Biodiversity Areas: Process for identification, delineation, outreach, and review

Version of October 2020

*This document has been previously reviewed and accepted by the Pathway to Canada Target 1 National Steering Committee.*

## Background

The primary objective of the Canadian KBA initiative, as supported by the Pathway to Canada Target 1 initiative, is to identify and delineate important sites for biodiversity in Canada, applying the Global KBA Standard developed by the IUCN for global KBAs and an adaptation of those criteria to determine nationally significant KBAs. Our goal is to have sound proposals that include the best available science and other knowledge, and to involve individuals and groups that may have useful knowledge or have interests in a KBA proposal. The process outlined here aims to support the development of rigorous and consistent proposals.

Once a KBA has been identified (meaning that a particular location is found to meet one or more KBA criteria), it then needs to be delineated (i.e. with mapped boundaries). The identification and delineation of a KBA is primarily a scientific process. KBAs are defined based on the biodiversity elements that exist on the site and in many cases they will reflect the success of existing management approaches. They do not imply the need for any particular management response, but rather provide important information to help guide management in retaining the biodiversity value of sites.

The review process outlined below is intended to ensure that KBAs are scientifically credible. At the same time we are carrying out outreach intended to ensure that the agencies and interests most likely to use KBAs to inform decision-making are aware of and understand the significance of KBAs.

Given that the KBA process in Canada must address the broad and complex scope of biodiversity (species, ecosystem, genetic), as well as our rich and diverse geographic, social and economic contexts, we are aiming to create a KBA identification process that provides consistency while being sufficiently flexible in order to reflect this diversity.

## Steps in the KBA Identification and Review Process

### 1. Identify a proposed KBA

Any individual or organization can propose a KBA to the Canadian KBA Secretariat. However, the typical way that KBAs are identified is through workshops that bring subject matter experts together with specialization in different taxa (plants, birds, mammals, etc) or ecosystems. This can include experts from government, scientific institutions, Indigenous groups and NGOs. This first stage of KBA identification does not necessarily require exhaustive input from experts, but there should be reasonable confidence that relevant data and knowledge have been gathered regarding species, ecosystems, and other aspects of the KBA assessment process. This expert-driven process is limited to gathering relevant knowledge and data and interpreting the KBA criteria. During the workshop (or alternative assessment process), names should be gathered of anyone else who has knowledge or data relevant to the site, ecosystem or species, in order to improve the rigour of the KBA proposal. These additional people can be contacted to provide further input, and review the proposal content for completeness and accuracy.

Whatever the process used to identify a KBA, it should use the guidelines published for that purpose and provide clear evidence as to how a particular defined area meets one or more KBA criteria. If an individual or a small group develops the first draft of a KBA proposal in the absence of a workshop or other such group process, they will need to identify and reach out to subject matter experts and knowledge holders and see that their input is included in the draft proposal. Similarly, when existing IBAs are assessed against the KBA criteria, additional review from diverse experts will ensure that the KBA considers all relevant taxa.

Output: A proposed KBA described in a nomination form, accompanied by spatial data for nominal KBA boundaries and locations of relevant biodiversity elements (species or ecosystems).

### 2. Subject matter review

One or more knowledgeable people should review the proposal to ensure that:

- the knowledge base for the proposal is sufficient;
- the proposal accurately represents available knowledge and input from subject experts;
- the criteria are correctly interpreted; and
- a reasonable boundary for the KBA is proposed.

If there is a regional coordinator leading the local KBA identification process, that person can complete this step, with input from the Canadian KBA Secretariat. In other cases, the KBA Secretariat will lead the review process.

### 3. Technical review

The proposal will be reviewed by the Canadian KBA Secretariat to confirm that the proposal is technically complete and meets the requirements of national and global KBA guidelines. Where appropriate, additional subject matter expert input may be required to address any gaps or shortcomings.

### 4. Review by rights holders

Governments, Indigenous rights holders and landowners (referred to collectively here as ‘rights holders’) whose land may fall within the boundary of a potential KBA (including sites previously identified as IBAs) will be notified of the proposed KBA delineation and invited to contribute relevant information and perspectives. This could include information that the rights holder chooses to share about the site’s biodiversity or conservation actions being applied to the site, as well as proposed refinements to the KBA boundary. New or missing information about species and ecosystems may be provided at this time as well, although this will be rare if experts from the management agencies have been involved in earlier stages of the process. KBAs are identified on the basis of scientific information and do not require formal approval by governments, Indigenous rights holders or landowners. Likewise, a KBA delineation does not presume, determine or require any particular management response.

### 5. Public outreach

Once the above steps have been completed, the Canadian KBA Secretariat will ordinarily have:

- a draft KBA proposal, in the format and containing the information needed for review by the International or national KBA Secretariats; and
- a summary suitable for the public, including a map.

Where appropriate, the public summary will be posted on the KBA Canada website and appropriate measures will be taken to inform local communities, landowners and organizations about KBAs and their purpose, as well as the identification and delineation of particular KBAs that may be of particular interest to them. While this stage is not considered part of the review and no feedback will be directly requested, an opportunity for comment will be provided and any comments received will be reviewed and considered by the Canadian KBA Secretariat.

### 6. Management Committee Acceptance

Finalized KBA proposals are accepted by the KBA Canada Management Committee and subsequently published in the Canadian KBA database. For national KBAs no other review is required, but global KBAs are then submitted to the international KBA Secretariat.

### 7. Approval of global KBAs

For global KBAs, the Global KBA Secretariat (housed at Birdlife International) will review the nomination form and accompanying spatial layer(s) and may request additional work or review as needed. Upon approval by the Global KBA Secretariat, global KBAs will be published in the World Database of KBAs.

### 8. Periodic review

Sites should be reassessed against the criteria and thresholds at least once every 8–12 years. Both genuine changes in status and changes in knowledge of the biodiversity element(s) triggering the criteria and thresholds may affect the status of a site as a KBA. Sites that fail to meet any global or national criteria will no longer be considered KBAs.


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