**6th Meeting of the Sessional Committee of the**

**CMS Scientific Council (ScC-SC6)**

*Bonn, Germany, 18 – 21 July 2023*

UNEP/CMS/ScC-SC6/Inf.12.2.1b

**ECOLOGICAL CONNECTIVITY DOCUMENTS – COMPILATION OF COMMENTS FROM THE CMS SCIENTIFIC COUNCIL WORKING GROUP ON ECOLOGICAL CONNECTIVITY**

*(Prepared by the Secretariat)*

Summary:

This document provides a summary compilation of comments from the CMS Scientific Council Working Group on Ecological Connectivity on the following three documents for the Sessional Committee meeting:

* UNEP/CMS/ScC-SC6/Doc.12.2.1.1 *Ecological connectivity - policy aspects*
* UNEP/CMS/ScC-SC6/Doc.12.2.1.2 *Ecological connectivity - technical aspects*
* UNEP/CMS/ScC-SC6/Inf.12.2.1 *Initiatives on connectivity*

The Working Group provided its comments during an online meeting on 22 June 2023 and by email in the period from 24 June – 6 July 2023.

**ECOLOGICAL CONNECTIVITY DOCUMENTS – COMPILATION OF COMMENTS FROM THE CMS SCIENTIFIC COUNCIL WORKING GROUP ON ECOLOGICAL CONNECTIVITY**

Comments on document UNEP/CMS/ScC-SC6/Doc.12.2.1.1: *Ecological connectivity - Policy aspects*

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| **Document element** | **Comments** |
| Activities to implement Resolution 12.07 (Rev.COP13) The Role of Ecological Networks in the Conservation of Migratory Species; *and*  Activities to implement connectivity-related aspects of the Global Biodiversity Framework (GBF); *and*  Activities to implement Resolution 12.26 (Rev.COP13) Improving ways of addressing connectivity in the conservation of migratory species | Flyway-scale networks, landscape-scale restoration, collective contributions of the CMS Family instruments, synergy with UNFCCC and BBNJ processes are all suggested as areas of emphasis.  It is encouraged engaging with local and subnational governments to advocate for protective measures, and integrating migratory species considerations into urban planning frameworks can help ensure that the needs of migratory species are considered in development processes. Local actions can support the creation and implementation of policies, regulations, and management strategies that safeguard migratory species and their habitats in urban areas. |
| Annex 1: Proposed amendments to Resolution 12.26 (Rev. COP13) on Improving ways of addressing connectivity in the conservation of migratory species | It would be more effective to have one resolution (and relevant decisions) on ecological connectivity. Easier for parties to focus on and easier for parties/sec to report on.  In the preambular paragraph that refers to connectivity featuring in Targets 2, 3 and 12 of the Kunming-Montreal Biodiversity Framework, add reference also to Target 1 (spatial planning) where it is implied.  Where operative paragraph 1(iii) refers to strengthening and expanding ecological networks, add also “identifying”.  In operative paragraph 1, add “(vi) measuring and monitoring ecological connectivity in the prioritised ecological networks in a way that allows assess their evolution over time”.  Suggestion to amend the first part of operative paragraph 5 as follows:  *Also requests* the Secretariat to bring this Resolution to the attention of ~~the process under the auspices of~~ the Convention on Biological Diversity ~~for identifying and describing Ecologically or Biologically Significant Marine Areas~~....  In operative paragraph 6, correct the reference to UNEP/CMS/COP13/Doc.30.2.1 to refer instead to COP14.  Suggestion to delete (newly numbered) paragraphs 7, 8 and 9 “as they are very specific and not suitable for a resolution. Potentially a decision if considered really important, but I think the technology has either moved on or this is very specific to a European context”. |
| Annex 2: Proposed amendments to Resolution 12.7 (Rev. COP13) on The role of ecological networks in the conservation of migratory species | Suggest to combine these two Resolutions into one. Would be more effective if preambular paras were contained to 2 pages or less.  After the preambular paragraph that refers to marine migratory species depending on a range of habitats, insert a new preambular paragraph as follows: “*Recognizing* the importance of rivers and their associated ecosystems as corridors in a changing climate (IUCN WCC-2020-Res-008) to facilitate flows of freshwater and migrations of freshwater species”.  In the “Also acknowledging” preambular paragraph that refers to IBAs, insert “freshwater” after “terrestrial” (or change “terrestrial and marine” to “terrestrial and aquatic”).  Suggest deleting the “Acknowledging” and “Also acknowledging” preambular paragraphs that refer to examples of transboundary area-based measures and IBAs, noting that “these references are very specific and are not required in preambular paras. The question arises - why single out these initiatives to reference where there are a lot more. Less preambular text is better than more”.  Suggest deleting the whole of the preambular paragraph that refers to taking note of various IUCN processes.  Suggest deleting all of the final eight preambular paragraphs, noting also in the case of the first of these that it is not required and is outdated.  Suggest deleting operative paragraphs 2 and 3, as not useful/appropriate.  Where operative paragraph 13 refers to “promote ecological networks and connectivity”, add also “identify”.  Suggest deleting operative paragraphs 19 and 20, noting that “carrying over old paras that specifically reference one or two initiatives is no longer useful”.  Suggest deleting (newly numbered) operative paragraphs 21 and 22, as the EBSA detail is not needed.  Suggest deleting (newly numbered) operative paragraphs 28 and 29.  In re-numbered operative paragraph 31, delete “and” at the end.  Suggest deleting (newly numbered) operative paragraphs 30 and 31 – if they are needed, they would be better in a Decision. |
| Annex 3: draft Decisions | In 14.AA (13. 113) (a), after “Global Biodiversity Framework”, delete the words “connectivity elements”.  In line 1 of the chapeau to 14.BB (13. 114), replace “shall” with “is requested” (ie restore original wording).  In line 2 of the chapeau to 14.BB (13. 114), delete “to”. [NB change not needed if suggestion above is followed].  In relation to paragraph 14.BB (13. 114), an observation (not an amendment) points out that one of the relevant databases will be the global database of ecological corridors being developed by UNEP-WCMC. |
| Annexes 1, 2 and 3 | The role of local governments in ecological connectivity can be incorporated in the Resolutions and Decisions, which is vital for effective conservation and the promotion of sustainable development. Their involvement in planning, habitat conservation, ecosystem restoration, infrastructure design, collaboration, public engagement, policy development, and monitoring contributes to the creation of resilient landscapes that support biodiversity conservation, protect ecosystem services, and enhance the overall well-being of communities. |

Comments on document UNEP/CMS/ScC-SC6/Doc.12.2.1.2: *Ecological connectivity - Technical aspects*

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| Activities to implement Decision 13.114 (a) – (e) Improving Ways of Addressing Connectivity in the Conservation of Migratory Species:  Data/knowledge-holding and analysis “under CMS auspices” - Decision 13.114 (b) | The proposals of a repository platform and the publication of a Global Atlas of Animal Migration are supported as is the development of policy recommendations which are inclusive by including not only the perspectives from the Parties, but also other levels of government (subnational governments, cities and other local authorities), stakeholders and Indigenous peoples and local communities (IPLCs).  CMS could play a key role in developing tools for monitoring. |
| Activities to implement Decision 13.114 (a) – (e) Improving Ways of Addressing Connectivity in the Conservation of Migratory Species:  Additional guidance on assessing threats to migratory species connectivity - Decision 13.114 (e) | There are several threats to migratory species connectivity from cities and increasing urbanization (including barriers to migration, anthropogenic additional mortality, fragmented resources and disrupted processes, genetic isolation, population non viability, altered behavior patterns, etc.). For example, there is mounting evidence of anthropogenic impacts on bird migration “…*one such major impact is by altering land cover, with urbanization in particular creating habitats that are in many ways radically distinct from natural ones. The resulting changes to local environmental conditions may plausibly affect the migratory decisions of urban birds. First, urban areas are often ‘heat islands’, multiple degrees warmer than surrounding areas (Collier, 2006), which may buffer birds against harsh winter temperatures (Shochat et al., 2006) and thus increase their probability of remaining over winter. Second, urban areas can provide particular resources, for example through bird feeders, garbage, and garden flowers and fruits (e.g. Robb et al., 2008a; Greig et al., 2017). These may either buffer populations against the low resources of winter, and thus increase the probability of breeding birds remaining over winter, or provide resources in the breeding season that increase the odds that wintering birds remain to breed. Overall, urbanization is thus expected to increase the propensity to residency among migratory birds*”. (Bonnet-Lebrun, A-S et al, 2020, [*https://www.sciencedirect.com/science/article/abs/pii/S0006320719317240*](https://www.sciencedirect.com/science/article/abs/pii/S0006320719317240) ). As a response, it is recommended focusing on green infrastructure planning, habitat conservation and ecosystem restoration, integrating ecological corridors in spatial and land use plans, and introducing measures to reduce light and noise pollution. All of these work areas facilitate multilevel action and collaboration with organizations, academic institutions, conservation agencies, and community groups. |
| Annex 1: Databases to support relevant analyses and syntheses of information on connectivity – Decision 13.114 (a) | In relation to paragraph 3 (on further development of Atlas modules), a comment points out that “an example of analysis based on the results of the Migratory Connectivity Module of the CMS/EURING Eurasian-African Bird Migration Atlas is described in Fattorini N, Costanzo A, Romano, Andrea, Rubolini D, Baillie S, Bairlain F, et al. Eco-evolutionary drivers of avian migratory connectivity. Ecol Lett. 2023;26(7):1095–107. DOI:10.1111/ele.14223 (open access).  At paragraph 4 (linking atlas data with mapped data layers), comment that: “In the Americas there are at least three large databases on connectivity of migratory birds that are of relevance:  1. Migratory Connectivity Project  [*http://migratoryconnectivityproject.org/*](http://migratoryconnectivityproject.org/) Smithsonian Migratory Bird Center and US Geological Survey. This is primarily band recovery data, so similar to the Eurasian-African Atlas.  2. Shorebird Science and Conservation Collective  [*https://nationalzoo.si.edu/migratory-birds/shorebird-science-and-conservation-collective*](https://nationalzoo.si.edu/migratory-birds/shorebird-science-and-conservation-collective) Smithsonian Migratory Bird Center. Focus on tracking data for individual shorebirds (waders).  3. Migratory Bird Initiative  [*https://www.audubon.org/conservation/migratory-bird-initiative*](https://www.audubon.org/conservation/migratory-bird-initiative) National Audubon Society. This brings together multiple data sets, from tracking data to the models generated from eBird data.  At paragraph 5 (application of data from Movebank), comment that: “In addition to Movebank, there is also the Motus Wildlife Tracking System motus.org for radio telemetry (detected via largely fixed stations)”.  Where paragraph 6 refers to ICARUS, comment that “ICARUS is only one of many projects feeding tracking data to Movebank. Therefore, it is not suggested to give this particular emphasis to ICARUS only rather word it more ‘open’ give credit to all other already existing and future tracking projects, respectively”.  At paragraph 13 (waterbirds), “Additional surveys in the Americas which could provide relevant data are the International Shorebird Survey ([International Shorebird Survey - Manomet](https://www.manomet.org/project/international-shorebird-survey/) [*https://www.manomet.org/project/international-shorebird-survey/*](https://www.manomet.org/project/international-shorebird-survey/) , and in particular [Iss Map (manomet.org)](https://www.manomet.org/iss-map/) [*https://www.manomet.org/iss-map/*](https://www.manomet.org/iss-map/) and the Migratory Shorebird Project ([Migratory Shorebird Project – Connecting Communities across the Americas from Alaska to Chile](https://migratoryshorebirdproject.org/) [*https://migratoryshorebirdproject.org/*](https://migratoryshorebirdproject.org/) )”.  In relation to paragraph 14, which refers to the database of Important Marine Mammal Areas, it could also be helpful to mention The World Database of Key Biodiversity Areas [*https://www.keybiodiversityareas.org/*](https://www.keybiodiversityareas.org/) .  At paragraph 14 (IMMAs) (though perhaps this comment belongs elsewhere, as it is about birds): “A resource for shorebirds in the Americas is [Important Shorebird Sites – WHSRN](https://whsrn.org/about-shorebirds/important-sites-map/) [*https://whsrn.org/about-shorebirds/important-sites-map/*](https://whsrn.org/about-shorebirds/important-sites-map/) which allows for sites to be filtered by flyway, species and population.  Amend the second part of paragraph 16 (on swimways) as follows:  “Outputs from this pilot ~~may not now be available or operable, but the approach it adopted may point the way to future possibilities~~ include an online explorer of the results of the project (<http://www.explorer.globalswimways.org/>) and a manuscript proposing development of a Global Swimways program and next steps towards its development (https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/fee.2550). UNEP-WCMC, ~~T~~the World Fish Migration Foundation, and WWF were~~as~~ ~~a~~ partners in the project”.  In paragraph 19, which refers to datasets on turtles, suggestion to add at the end “WWF and partners also recently published a [map of blue corridors for whales](https://wwfwhales.org/resources/protecting-blue-corridors-report), based on a compilation of satellite tagging data”. (It refers to recent mapping done by WWF with a wide range of partners of whale corridors, based on a compilation of satellite tagging data).  In paragraph 23 which refers to the World Database on Ecological Corridors, suggestion to delete “linked to the World Databases on Protected Areas and OECMs (now combined in ‘Protected Planet’, <https://www.protectedplanet.net/en)>” and that “it could be useful to highlight Protected Planet itself.  <https://www.protectedplanet.net/en/> as the authoritative source of data on protected areas and other effective area-based conservation measures (OECMs). It exists due to the extensive efforts of governments and other stakeholders to map, monitor and report data on protected areas and OECMs. Through the Protected Planet website, users can explore the World Database on Protected Areas (WDPA), World Database on OECMs, Global Database on Protected Area Management Effectiveness (GD-PAME), and a wealth of associated information”.  In paragraph 24, observation that the link *https://consbio.org/products/tools/linkage-mapper-software-v20* appears to be incorrect.  In paragraph 25 on “other platforms and facilities”, suggestion that “Despite being part of Movebank it might be worth mentioning the Arctic Animal Movement Archive [*https://www.movebank.org/cms/movebank-content/arctic-animal-movement-archive*](https://www.movebank.org/cms/movebank-content/arctic-animal-movement-archive) . |
| Annex 2: CMS Connectivity data sources survey - Decision 13.114 (d) | Suggestions for target institutions for survey:  • Norwegian Institute for Nature Research (NINA)  • Conservation International  • Colorado State University  • Institute for Resources, Environment and Sustainability, University of British Columbia  • Joint Research Centre, European Commission  • European Environment Agency – Biodiversity Ecosystems Data and Information.  Suggestion for the survey to ask whether any of the data sources have been used to inform an indicator. [Could perhaps be mentioned in questions 3 or 4 under “How to complete the survey”, although it may be too specific a point for this context].  In “How to complete the survey”, amend question 4 as follows:  4. Are the results directly applied in practice to the shaping or implementation of spatial planning or migratory species conservation policies in your country/area? If yes, please describe.  The intricate web of urban environments can serve as essential stopovers, corridors, and even havens for migratory species, making urban conservation efforts pivotal in their protection. The survey should include in more detail the role of corridors, add spatial aspects and its relation to urban settlements; and it should identify cities that have undertaken biodiversity assessments, such as Singapore Cities Biodiversity Index which include data on migratory species.  In Section (i).A.(C) on birds, “Why not including light-level geo-locator data or the new geo-locator data that also combine atmospheric pressure data?”.  In Section (i).A.(C) on birds, in relation to population-level movement patterns, suggestion that radar data is potentially also useful for broad movement patterns; and noctural migration audio recordings too.  In Section (i).B.(C) on birds, in relation to temporal use of areas, suggestion to mention radio tracking data (nanotags) as well.  In Section (i).B.(C) on birds, in relation to conservation and management measures, suggestion to add Analyses of the effectiveness of management action (such as the WHSRN Site Assessment Tool *https://whsrn.org/site-support/site-assessment/* .  In Section (ii).B on mammals, suggested amendment in column A: Identifying core areas and ecological corridors that play a key role in the connectivity of mammal migration systems.  In Section (ii).B on mammals, suggested amendments in column B:  - Location of relevant core areas and ecological corridors  - Extent/boundaries of core areas and ecological corridors  - Temporal use of core areas and ecological corridors  - Sufficiency of coverage of protected and conserved areas vis-a-vis mammals’ occurrence (at population level) throughout the annual cycle; sufficiency of ecological network ensuring protected and conserved areas are ‘well-connected’ (ie ecological network mapped and managed to ensure mammal movement between protected and conserved areas.)  - Level of protection in place for each area and ecological corridor  - Level of conservation management in place for each area and ecological corridor  - Conservation and management measures in individual areas and ecological corridors that are aimed at supporting/ enhancing/restoring connectivity.  In Section (ii).B on mammals, suggested amendment in column C: Boundaries and coordinates of areas and corridors.  (Regarding the various corridor-related additions above): “more context on 'ecological corridors' should be added in the survey. Corridors are really the 'missing' piece of knowledge / global reporting, with PCAs already being reported under CBD for example, so it would be excellent if this survey could gather information on corridors specifically. The need for corridors is most obvious for 'mammals', but information on corridors could benefit other taxa as well.”  In Section (iv).A.(C) on fish, in both rows (distance and timing) add “Telemetry (sonic, radio, satellite)”.  In Section (iv).B.(C) on fish, in the first, second and fourth rows (location, extent, temporal use) add “Telemetry (sonic, radio, satellite)”.  In Section (iv).C.(C) on fish, in the row for “type of resulting impact” add “recruitment data”; in the row for “extent and severity of fragmentation impacts” add (after “fish”) “or other aquatic species (e.g., river turtles)” [NB this section deals only with fish – turtles and other species are covered elsewhere]; and in the row for “management regimes” add (in the first bullet point, after “commissions”) “commitments to keep river sections/swimways connected”. |
| Annex 3: Linkages between migratory species connectivity and ecosystem resilience - Decision 13.114 (c) | Migratory species also contribute to the provision of ecosystem services in urban areas. Because migratory species depend on habitat in different locations, their ability to provide ecosystem services in one area depends on the spatial subsidies, or support, provided by habitat and ecological processes in other areas. This creates telecouplings, or interconnections across geographic space, of areas such that impacts to the habitat of a migratory species in one location will affect the benefits enjoyed by people in other locations (López-Hoffman, L, et al, 2017 - [*https://www.annualreviews.org/doi/10.1146/annurev-environ-110615-090119*](https://www.annualreviews.org/doi/10.1146/annurev-environ-110615-090119) ). By promoting the conservation and restoration of habitats that support migratory species, urban settlements can enhance the delivery of ecosystem services, benefiting local communities and improving urban resilience. Urban planning and design can incorporate green infrastructure elements that support migratory species connectivity. Creating green corridors, planting native vegetation, protecting areas of intact habitats and ecosystems, and designing urban green spaces with the needs of migratory species in mind can enhance habitat quality and connectivity. Urban settlements can also focus on reducing barriers, such as light pollution or physical obstacles, that hinder migratory movements. By implementing local actions that promote green infrastructure and connectivity, urban areas can contribute to maintaining migratory pathways and supporting ecosystem resilience.  Amend paragraph 23 as follows:  23. The index uses a modelling approach to project changes in terrestrial species composition under a plausible range of climate scenarios, and relates these to a grid-based spatial representation of connectedness of suitable terrestrial habitat, to indicate the capacity of terrestrial ecosystems to retain biological diversity under climate change. Connectivity is assumed to be a positive factor in allowing shifts of terrestrial organisms (plants, invertebrates and vertebrates) in response to climatic factors; and scores are assigned to cells in the spatial grid according to each cell’s habitat condition and its connectedness to surrounding areas that are projected to support a similar composition of species under changes in climate.  Amend paragraph 24 as follows:  24. While the BERI index works with (projected) changes in species composition at the ecosystem level, in a theoretical way, the UK research project described in the previous section addresses impacts and implied resilience factors for a range of species and taxonomic groups in turn, using more empirical data. Both of these perspectives can complement each other, and both are relevant to CMS interests in this subject. Ideally these approaches would be expanded to cover freshwater and marine species and ecosystem connectivity needs as well. |
| Annex 4: Priorities for future research on connectivity - Decision 13.114 (d) | It would be good to put the list in order of priority. GBF indicators would be a high priority, as would methods for enhancing connectivity and mitigating threats.  Urban settlements can impact migratory species and their connectivity through habitat loss, fragmentation, pollution, and other human activities. Recognizing the presence and needs of migratory species in urban areas is essential for conserving urban biodiversity and maintaining ecosystem resilience.  In relation to paragraph 6 (climate change), support for giving climate change particular emphasis, “it should not neglected the fact that land-use changes are the most if it comes to threats to connectivity, in the past and future. Therefore, future research must consider the continuing and dramatic changes in land-use as well. Consequently, it should be given similar attention as climate change”.  In paragraph 6 (climate change), amend the last bullet-point as follows:  - identifying refugia that allow animals to escape extreme fire and flood events, droughts and changing water temperatures, and the means of ensuring access to these locations.  In the item on “mitigating barriers” in paragraph 6 (climate change), suggestion that “a very interesting idea would be research on prediction or investigation of barriers for connectivity that may evolve with climate change. Another interesting topic would be efficiency of mitigation measures for functional connectivity”.  Amend paragraph 9 (Ecological networks) as follows:  9. One of the connectivity indicators proposed for monitoring relevant targets in the Kunming-Montreal Global Biodiversity Framework (‘ProtConn’) addresses (on a modelling basis) the structural connectivity of protected area systems. The two main scientific papers that present the analyses this indicator can produce (Saura et al. 2017[[1]](#footnote-2) and Saura et al. 2018[[2]](#footnote-3)) mention the desirability of further work to cover aspects they have not covered, including the needs of species (such as migratory birds) that require international networks of non-contiguous suitable areas, and the specific “connectivity performance of protected area management” (that latter point echoing one of those made in the preceding paragraph above). Ideally this indicator would also be expanded to cover the connectivity needs of freshwater obligate species (e.g., migratory freshwater fish and river turtles).  In relation to paragraph 13 (“Migratory connectivity”), comment that “It might be implicit that ‘connectivity’ does also mean ‘functional connectivity’ but for most readers connectivity is taken as connectivity in space and time sensu Webster et al. 2002. Therefore, it is suggested mentioning ‘functional connectivity’ and its better understanding explicitly in order to draw attention on it. Without understanding the functional links between spatially connected sites (carry-overs) we will not be able to extract the needs for conservation measures”. |

Comments on document UNEP/CMS/ScC-SC6/Inf.12.2.1 *Initiatives on connectivity*

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| (Additions to list of initiatives) | Suggestion to insert an additional initiative at the end of the document (but “not necessarily expecting it to be included, or in this way – this is simply to share the information”):  Conservation Investment Strategies  Starting in 2011, migratory bird conservation in the Americas has been increasingly organized through conservation strategic frameworks (or investment strategies), which place local action within a flyway context and facilitate collaboration at the population scale necessary to be effective. Each investment strategy assembles and synthesizes current knowledge to create a comprehensive (and full annual cycle) approach for addressing the most pressing conservation needs of migratory birds within the relevant flyway. Increasingly these efforts are aligned with existing national and regional conservation frameworks through the development of national migratory bird conservation plans and strategies, and as ways to help meet national obligations under multilateral environmental agreements. Information on the frameworks for the three shorebird flyways is available [*https://shorebirdflyways*](https://shorebirdflyways)*.org/*.  Suggestion to insert an additional initiative at the end of the document:  Cities with Nature  [CitiesWithNature (CWN)](https://citieswithnature.org/) *https://citieswithnature.org/* is a partnership initiative between ICLEI, UNEP, IUCN, WWF and many more, that offers a unique platform designed to empower urban leaders to actively participate in conserving our planet's biodiversity. CWN provides a shared platform for cities and their partners to engage and connect, working with shared commitment towards a more sustainable urban world. It has access to different resources and tools, a monthly newsletter. It is a growing community that has now reached 295 plus cities and subnational governments from 71 countries globally. The Convention on Biological Diversity (CBD) has recognized CitiesWithNature and its sister platform, [RegionsWithNature (RWN)](https://regionswithnature.org/) [*https://regionswithnature.org*](https://regionswithnature.org) , in CBD Decision 15/12 as the place where cities will monitor and report on their their commitments to contributing to the implementation of the Kunming-Montreal Global Biodiversity Framework (GBF) and national biodiversity strategies and action plans (NBSAPs). CMS and ICLEI can explore practical ways in which to encourage cities and regions to incorporate the necessary measures into the CWN Action Platforms to allow cities to capture and monitor actions that will contribute to both the GBF targets and the CMS objectives. |

1. Saura, S, Bastin, L, Battistella, L, Mandrici, A and Dubois, G (2017). Protected areas in the world’s ecoregions: how well connected are they? Ecological Indicators 76: 144–158. [↑](#footnote-ref-2)
2. Saura, S, Bertzky, B, Bastin, L, Battistella, L, Mandrici, A and Dubois, G (2018). Protected area connectivity: shortfalls in global targets and country-level priorities. Biological Conservation 219: 53–67. [↑](#footnote-ref-3)