



The Coalition for Conservation Genetics statement on genetic diversity in the CBD First Draft of the post-2020 Global Biodiversity Framework and Proposed Indicators. February 2022

In the context of the Convention on Biological Diversity post-2020 Framework, and towards a mutual aim of conserving all biodiversity, we the Coalition for Conservation Genetics¹ provide the following statements regarding genetic diversity in the First draft of the Framework (CBD/SG2020/3/3 and CBD/WG2020/3/3/Add.1 and Co-Chair's Reflections on the 3rd Open Ended Working Group). This statement builds on our [prior Statements](#) and adds a new section, Frequently Asked Questions (see pages 4 and 5). These comments echo suggestions made by Parties at [SBSTTA 24](#) part 1.

¹The GEO BON Genetic Composition Working Group, IUCN Conservation Genetics Specialist Group, Society for Conservation Biology Conservation Genetic Working Group, and EU Cost Action Genomic Biodiversity Knowledge for Resilient Ecosystems, G-BiKE

- **Genetic diversity** is a basic pillar of all biodiversity that *must be maintained, protected, managed, and monitored* to enable all species to adapt to environmental change, ensure resilient ecosystems, support other biodiversity levels, and benefit humanity. Genetic diversity of populations is also a key barrier against diseases, invasive pests, and climate change. Loss of genetic diversity will reduce adaptation, increase extinctions, destabilize ecosystems, and harm human well-being and economies (see [Hoban et al 2021](#)).
- We welcome that the first draft includes a 2050 Goal (Goal A) and a 2030 Milestone (A.3) for genetic diversity of all species. We also welcome that a 2030 Action Target (Target 4) references genetic diversity of all species. Further, we welcome and strongly support the proposed Headline Indicator “The proportion of populations within species with a genetically effective population size (N_e) >500” (A.0.4) and additional indicators on genetic diversity (for example see below).

To further align the post-2020 Global Biodiversity Framework with the best available scientific knowledge, we suggest rewording and clarifications in the Table below. For questions, comments, contacts to experts across the world, or for assistance to Parties in drafting genetic diversity language in their comments to the CBD, please write to linda.laikre@popgen.su.se, shoban@mortonarb.org, cristiano.vernesi@fmach.it or gernot.segelbacher@wildlife.uni-freiburg.de. Emails in multiple languages other than English are welcome.

Text of 1 st draft WG2020/3/3	Suggested formulation from Coalition for Conservation Genetics (changes in <i>italics</i>)	Comment
Goal A: “.... and genetic diversity of wild and domesticated species is safeguarded, with at least 90 percent of genetic diversity	“....and the genetic diversity <i>and adaptive potential among and within populations of all species</i> is safeguarded, with <i>100% of genetically distinct populations</i> and at least 97% of	Retaining 97% of genetic diversity within populations over 30 years (2021-2050) will help achieve long- term conservation (Allendorf &

within all species maintained.”	genetic diversity within <i>populations</i> maintained, <i>with large effective population sizes and appropriate genetic exchange.</i> ”	Ryman 2002, Hoban et al 2021). This wording also makes clear that populations must be maintained. Progress can be measured by accepted indicators: If each population reaches effective size $N_e > 500$ (Indicator A.0.4) and if all populations are maintained (Indicator A.8.1) then Goal A with this wording will be reached.
2030 Milestone A.3. “Genetic diversity of wild and domesticated species is safeguarded, with an increase in the proportion of species that have at least 90 per cent of their genetic diversity maintained.”	<i>“The proportion of populations large enough to maintain genetic diversity and adaptive potential, measured by effective population size, has increased by at least 25%, all genetically distinct populations are maintained, and genetically depleted or vulnerable populations are identified, stabilised, and when possible are receiving active intervention, with long-term genetic conservation strategies in place.”</i>	This milestone has more specificity for Parties reporting, and can be measured by the Headline Indicator A.0.4 on effective size (below) and indicators included in the draft 0.5 on maintaining populations, and on monitoring, (and proposed additional indicators below), see Hoban et al 2020.
Action Target 4. Ensure active management actions to enable the recovery and conservation of species and the genetic diversity of wild and domesticated species, including through ex situ conservation, and effectively manage human-wildlife interactions to avoid or reduce human-wildlife conflict.	<i>“Ensure active management actions to enable the recovery and conservation of species and that the genetic diversity of wild and domestic populations is protected, maintained, managed, and monitored, via scientifically sound strategies, at levels ensuring adaptive potential [including when appropriate enhancing genetic diversity via gene flow]...”</i>	This wording specifies distinct actions urgently needed to safeguard genetic diversity (protection, maintenance, management and monitoring) and is connected to Headline Indicators A.0.4, Component Indicator A.8.1, Complementary Indicator a.48 (CBD/WG2020/3/INF/2). Ambition must be high, see Diaz et al 2020.
Text of 1st draft WG2020/3/3/Add.1	Suggested formulation from ConGen Coalition (changes in bold)	Comment
Headline Indicator A.0.4. “The proportion of populations within species with a genetically effective population size > 500”	We fully support Headline Indicator A.0.4. as proposed, for reporting on Goal A and Target 4.	This is a science-based indicator. Maintaining populations’ effective size >500 will maintain 97% of genetic diversity, as in Goal A, for which there is wide support among conservation geneticists. This indicator is already being compiled in several

		countries. It is measurable and well developed- see INF document from GEO BON , Hoban et al 2021 , Laikre et al 2021 , Thurfjell et al in prep.
	<p><u>We suggest Component indicator A.8.1: “The proportion of genetically distinct populations maintained within species.” should be elevated to a Headline indicator, for reporting on Goal A, Milestone A.3, and Target 4, to assure between population genetic diversity.</u></p> <p><u>We propose that Complementary indicator a.48 (CBD/WG2020/3/INF/2) “Genetic scorecard for wild species” is elevated to a Component indicator as it has been successfully deployed and it is accessible to all signatory nations.</u></p>	<p>This is necessary to monitor progress towards the Goal. Loss of distinct populations will result in large losses of genetic diversity within species including loss of local adaptations. This indicator is highly measurable. Among population and within population genetic diversity are both essential. See Hoban et al 2020 and Hollingsworth et al 2020.</p>
	<p><u>An additional indicator proposed by Hoban et al (2020) should be added as a Complementary indicator: “The number of populations and species in which genetic diversity is being monitored using DNA methods”</u></p>	<p>Monitoring using DNA methods is feasible for many countries, and contributes to sound management of genetic diversity, see Hoban et al 2021, Andersson et al. 2021</p>
<p>Glossary: We also suggest that several terms be added to the new Glossary, including ‘effective population size’, ‘appropriate genetic exchange’, ‘genetic conservation strategies’ and ‘ensuring adaptive potential’.</p>		

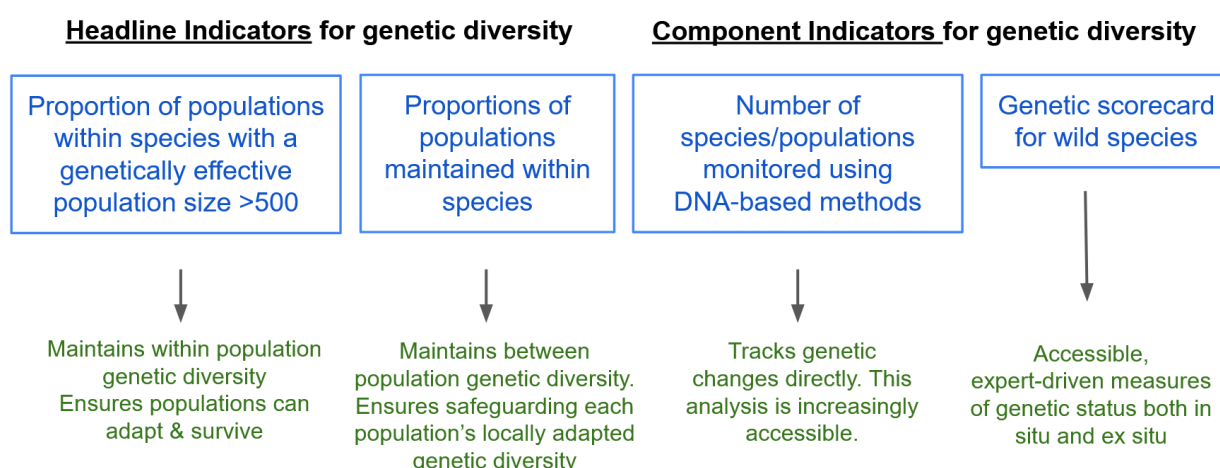


Figure 1. Indicators proposed for monitoring of genetic diversity in the CBD post-2020 Global Biodiversity Framework

These recommendations are scientifically based and have been peer reviewed (links below). A policy brief on the importance of genetic diversity translated in more than 25 languages is available [here](#) from the G-BIKE network.

A webinar providing an overview on this topic was presented jointly by GEO BON, the CBD Secretariat, UNEP WCMC, and the UN Statistics Division. You can view this webinar here: <https://geobon.org/geo-bon-webinars-on-supporting-implementation-of-post-2020-global-biodiversity-framework/> and watch it on youtube here: https://www.youtube.com/watch?v=Oku8eTqH_hE).

Frequently Asked Questions on the genetic diversity indicators

- Question:** Are the Goal and indicators SMART?

Answer: Yes, Hoban et al 2021 Table 2 details how each is SMART, especially how each is Specific, Measurable, Achievable, Relevant, and Time Bound
- Question:** Do genetic diversity indicators involve submitting or sharing Digital Sequence Information (DSI)?

Answer: No. The first two genetic diversity indicators are counts of populations meeting a criterion (effective size threshold or being extant). Only the counts and proportions would be reported. No DSI is submitted. The indicator on counts of genetic diversity studies produced for conservation purposes (e.g. genetic studies of threatened species) is simply a count of studies and no DSI is shared.
- Question:** Why are there multiple suggested headline indicators- maintaining an effective size (N_e) of 500 within populations, and maintaining all populations?

Answer: Genetic diversity *within* populations allows sufficient variation within each population to adapt to local conditions over time and to avoid inbreeding consequences. Genetic diversity *among* populations ensures the whole species can maintain enough adaptation for changing environments. Both are essential for species survival and for supporting resilient ecosystems.
- Question:** What does the phrase “genetically depleted populations are under restoration” mean?

Answer: Genetically depleted populations have undergone substantial loss of genetic diversity but can be rescued by translocating individuals from other populations (if available), active management to increase population size, habitat connectivity and other means. This may not fully restore genetic diversity but it can partially restore it and prevent further losses.
- Question:** What does it mean to “ensure adaptive potential”?

Answer: This means that the facilitation/ management of conditions suitable to adaptive evolution: populations must be kept large, natural levels of connectivity maintained, and natural levels of reproduction occur.
- Question:** Do the two suggested headline indicators require using DNA-based techniques?

Answer: No. Genetic data/ molecular techniques are not required. The indicators can be reported using only census counts of individuals and field observations, which many national biodiversity programs have. When genetic data is available for some species, it can be used to directly measure effective population size (N_e), and/or to help define populations. (Even if it is used for these tasks, genetic data is not reported in reporting these indicators- again, DSI is not submitted in reporting.)
- Question:** Is guidance in place to start applying the two suggested headline indicators?

Answer: Several countries are already compiling data for these indicators. Supporting materials are being produced to support all countries in reporting on these indicators in a reliable, robust manner, and will be available in 2022.
- Question:** Is any country using the genetic indicators now?

Answer: Several nations are committed to applying the genetic indicators and several are starting work to compile them and develop guidance documents for their use. A recent example from Sweden is [here](#).

References

- Andersson** et al. 2021. Mapping and monitoring genetic diversity of an alpine freshwater top predator by applying newly proposed indicators. Authorea. December 08, 2021.
DOI:10.22541/au.163900315.52745564/v1
<https://www.authorea.com/doi/full/10.22541/au.163900315.52745564/v1>
- Allendorf** FW, Ryman N 2002. The role of genetics in population viability analysis. In: Beissinger SR, McCullough DR (eds) Population Viability Analysis. University of Chicago Press: Chicago, IL, USA. pp 50–85. <https://press.uchicago.edu/ucp/books/book/chicago/P/bo3637258.html>
- Coalition for Conservation Genetics**, “Statement on genetic diversity in CBD, December 2020” General comment submitted to CBD Secretariat
<https://attachments.cbd.int/341b6bf4f8d6c15231897915ef7d4336/GenDivCoalition.pdf>
- Díaz** et al 2020 in Science: <https://science.sciencemag.org/content/370/6515/411>
- GEO BON GCWG** “Inclusion of genetic diversity in the post-2020 global biodiversity framework: scientific and technical knowledge” SBSTTA 24 INF Doc
<https://www.cbd.int/doc/c/e412/2a57/9b80a568456cfad443180ea5/sbstta-24-item3-geobon-monitor-genetic-diversity-en.pdf>
- Hoban**, S., et al., 2020. Genetic diversity targets and indicators in the CBD post-2020 Global Biodiversity Framework must be improved. Biol Cons, 248, p.108654.
<https://www.sciencedirect.com/science/article/pii/S0006320720307126>
- Hoban**, S., et al., 2021. Effective population size remains a suitable, pragmatic indicator of genetic diversity for all species, including forest trees. Biol Cons, 253, p.108906.
<https://www.sciencedirect.com/science/article/pii/S0006320720309642>
- Hoban**, S., et al., 2021. Genetic diversity is considered important but interpreted narrowly in country reports to the Convention on Biological Diversity: Current actions and indicators are insufficient. Biol Cons, 261, p.109233. <https://www.sciencedirect.com/science/article/pii/S0006320721002858>
- Hoban**, S., et al., 2021. Global commitments to conserving and monitoring genetic diversity are now necessary and feasible. BioScience. <https://doi.org/10.1093/biosci/biab054>
- Hollingsworth**, P.M., et al. 2020. Scotland’s Biodiversity Progress to 2020 Aichi Targets: Conserving Genetic Diversity – Development of a national approach for addressing Aichi Biodiversity Target 13 that includes wild species. Inverness, Scottish Natural Heritage <https://www.nature.scot/scotland-world-first-genetic-diversity>
- Hollingsworth**, P.M., O'Brien, D., et al, 2020. Scotland’s biodiversity progress to 2020 Aichi targets: Conserving genetic diversity—Development of a national approach for addressing Aichi Biodiversity Target 13 that includes wild species. <http://nora.nerc.ac.uk/id/eprint/526707/>
- Laikre**, L., et al., 2020. Post-2020 goals overlook genetic diversity. Science, 367(6482), pp.1083-2.
<https://science.sciencemag.org/content/367/6482/1083.2>
- Laikre**, L., et al., 2021. Authors’ Reply to Letter to the Editor: Continued improvement to genetic diversity indicator for CBD. Cons Gen, pp.1-4. <https://link.springer.com/article/10.1007/s10592-021-01359-w>
- Policy brief in 25 languages** available at: <https://g-bikegenetics.eu/en/pubs-policy-briefs/policy-briefs>