Ecology & Evolution | Jan 21, 2026 | 9 min read | By Bryan White

One Giant, Two Fates: Unmasking Population Outcomes the African Forest & Savanna Elephants

Conservation * Genetics * Animals

Introduction: The Taxonomic Schism and Conservation Reality

For nearly a century, international treaties and conservation frameworks treated Africa's proboscideans as a single monolithic species, Loxodonta africana. While administratively convenient for bodies such as CITES, this single-species model masked profound evolutionary, morphological, and demographic divergences between the elephants roaming East and Southern Africa's arid savannas and those inhabiting Central and West Africa's closed-canopy rainforests. In 2021, the International Union for Conservation of Nature (IUCN) Red List formally dismantled the unified taxonomy, recognizing the African Savanna Elephant (Loxodonta africana) as Endangered and the African Forest Elephant (Loxodonta cyclotis) as Critically Endangered.[1][2]

Previously, relatively robust savanna elephant populations in Southern Africa obscured a catastrophic 86% collapse in forest elephant numbers over a 31-year period driven by poaching and logging road incursion.[3] As both species navigate the Anthropocene, landmark demographic assessments -- specifically the 2024 African Forest Elephant Status Report utilizing non-invasive DNA capture-recapture and the synchronized 2022 Kavango-Zambezi (KAZA) aerial survey -- have redefined our understanding of their populations, ecological engineering roles, and vulnerability to climate change.[4][5]

Genomic Divergence, Speciation, and Reproductive Isolation

Nuclear genetics and molecular clock analyses demonstrate that the ancestral lineages of L. africana and L. cyclotis diverged between 2.5 and 5 million years ago -- nearly as ancient as the split between humans and chimpanzees, and representing 58% of the genetic distance separating African (Loxodonta) from Asian (Elephas) genera.[2][6][7] Although occasional interbreeding occurs along the forest-savanna ecotone, continental sampling across more than 100 localities detected hybrid genotypes at only 14 sites, confirming strong behavioral and ecological reproductive isolation following allopatric speciation.[2]

Morphologically and socially, the two species occupy distinct adaptive peaks. Savanna bulls weigh up to seven metric tons, stand a meter taller at the shoulder, possess outward-curving tusks suited for subterranean water excavation, and form multi-tiered clans exceeding 70 individuals.[6] Conversely, forest elephants are compact, exhibit rounded ears and straight, downward-pointing tusks of dense pinkish ivory that navigate liana thickets without snagging, and travel in small nuclear family units adapted to patchy rainforest fruit resources.[6]

Demographic Assessments: Forest DNA vs. Savanna Aerial Surveys

Counting Loxodonta cyclotis beneath impenetrable rainforest canopies historically relied on indirect dung-pile transect counts, which suffered from high variance due to rainfall-driven dung decay rates. The 2024 IUCN African Elephant Specialist Group (AfESG) report revolutionized monitoring via non-invasive fecal DNA "genetic capture-recapture," genotyping individual elephants across repeated sampling intervals.[4][9] The assessment estimates a mean population of 135,690 forest elephants in surveyed landscapes (95% CI: 99,343-172,297), plus 7,728-10,990 in unsurveyed zones.[4] Rather than indicating biological recovery from the 2016 estimate of ~114,000, this upward revision reflects survey reliability rising from 53% to 94%.[4][8] Central Africa harbors 95-96% of the global population -- led by Gabon (~95,000 individuals, or 66%) and the Republic of the Congo (19%) -- while West African forest populations teeter on extirpation.[4][9] Crucially, because forest females reach sexual maturity late and experience 5-to-6-year inter-calf intervals, recovering from past poaching requires half a century of uninterrupted protection.[9]

In Southern Africa, the synchronized 2022 KAZA Transfrontier Conservation Area aerial survey across Angola, Botswana, Namibia, Zambia, and Zimbabwe recorded 227,900 savanna elephants -- over half of the continental population.[5] Botswana remains the global stronghold with 131,909 individuals, alongside growing populations in Zimbabwe (65,028), Namibia (21,090), and post-conflict Angola (rising from 3,395 to 5,983), offsetting poaching declines in Zambia (dropping from 6,688 to 3,840).[10] However, agricultural expansion, fencing, and human settlements increasingly compress herds into restricted ranges, elevating human-elephant conflict.[5]

| Feature | | African Forest Elephant (Loxodonta cyclotis) | | African Savanna Elephant (Loxodonta africana) |

| IUCN Status | | Critically Endangered (2021) | | Endangered (2021) |

| Primary Habitat | | Dense tropical rainforests (Central/West Africa) | | Savannas, woodlands, deserts (East/Southern Africa) |

| Population Est. | | ~135,690 (2024 Report)[4] | | ~415,000 continental / 227,900 in KAZA[10] |

| Long-Term Trend | | Declined >86% (1984-2015); slow intrinsic recovery[4] | | Decreasing continent-wide; stable in KAZA[12] |

| Primary Threats | | Poaching, logging road fragmentation, slow reproduction | | Human-elephant conflict, range compression, drought |

| Key Stronghold | | Gabon (~66% of global population) | | Botswana (~131,909 individuals in KAZA) |

Ecological Engineering and Trophic Cascades

Both species function as irreplaceable ecosystem engineers and keystone species whose extirpation triggers a severe trophic cascade.[15][16]

In the Congo Basin, forest elephants act as "megagardeners" vital to the global

carbon cycle. Consuming at least 96 species of fruit and transporting seeds across long gut-passage times (>24 hours), they are obligate dispersers for megafaunal tree species such as Tieghemella heckelii.[13][14] By selectively browsing and trampling fast-growing, low-density understory softwoods, forest elephants reduce competition for water and light, enabling slow-growing, high-wood-density canopy trees to dominate. Modeling indicates that the extinction of L. cyclotis would thicken the low-carbon understory and reduce Central African rainforest carbon sequestration capacity by up to 7%.[14]

In arid savannas, L. africana maintains the tree-grass equilibrium by toppling woody vegetation, preventing bush encroachment, and preserving open grassland habitats for grazing ungulates.[15] Hydrologically, savanna elephants excavate dry riverbeds to expose subterranean water tables and expand natural pans via wallowing. Furthermore, their massive dung boluses sustain large-bodied dung beetles that aerate soils and bury nitrogen, phosphorus, and carbon deep into the root zone.[17]

Climatic Vulnerability, Pathogens, Forensics, and Coexistence

Beyond ivory poaching, climate volatility and novel pathogens pose escalating biological threats. Because elephants lack sweat glands over their bodies, they are obligate evaporative coolers that maintain strict thermal homeostasis (~36.6 deg C) via cutaneous water loss and bathing rather than camel-like heterothermy.[20][21] Rising temperatures create a lethal "thermal trap": heightened evaporative water demand binds herds to shrinking waterholes during severe drought, accelerating local forage depletion and disproportionately killing older matriarchs that hold the herd's spatial memory.[22]

In May-June 2020, ~350 elephants died around northern Okavango Delta pans in Botswana after intense rains following the 2019 drought resuspended sediments and triggered toxic blooms of cyanobacteria (blue-green algae) in shrinking waterholes.[18] Months later in Zimbabwe, 35 elephants succumbed to hemorrhagic septicemia caused by Pasteurella bacteria (Bisgaard taxon 45), demonstrating how heat and nutritional stress compromise immune defenses against latent pathogens.[19]

| Year | | Location | | Est. Mortality | | Proximate Cause | | Climatic / Ecological Driver |

| 2020 | | Okavango Delta, Botswana | | ~350 | | Cyanobacterial neurotoxins | | Drought-to-flood nutrient resuspension in shrinking pans[18] |

| 2020 | | Hwange / Victoria Falls, Zimbabwe | | ~35 | | Septicemia (Bisgaard taxon 45) | | Thermal and nutritional stress-mediated bacterial infection[19] |

| 2021-22 | | Tsavo / Amboseli, Kenya | | >100 | | Starvation & dehydration | | Multi-year East African drought depleting forage[11] |

Simultaneously, combatting the illegal ivory trade has been transformed by Dr. Samuel Wasser's geographic DNA assignment maps, which match seized tusks across separate shipments to expose transnational trafficking cartels operating out of the Tridom forest region (Gabon, Congo, Cameroon) and East Africa, complemented by legislative expansions such as the UK Ivory Act's 2024 extension to non-elephant ivory.[23][24] On the frontlines of human-elephant conflict (HEC), long-term trials in Kenya (2014-2023) demonstrate that wire-linked beehive fences deter 86.3% of

crop-raiding herds during peak seasons, though drought-induced bee colony absconding requires pairing bio-fences with olfactory chili-dung briquettes and protected corridor planning.[25][26]

Conclusion: Better Data, Same Emergency

The taxonomic separation of Loxodonta cyclotis and Loxodonta africana and the methodological breakthroughs of fecal DNA capture-recapture have replaced guesswork with high-precision demographic baselines.[1][4] Yet greater statistical clarity only sharpens the urgency of the conservation crisis: forest elephants remain confined to a shrinking Central African refuge with multi-decade reproductive recovery horizons, while savanna elephants face lethal compression between agricultural fences, drought-stressed waterholes, and climate extremes.[4][9][22] Securing both lineages requires pairing DNA-guided anti-trafficking enforcement with transboundary corridor connectivity and climate-resilient coexistence strategies.

Updates... (Nov 22, 2026): Standardized exact publication dates across all 26 cited sources, replaced the undated UW News tag link in Ref. [23] with Wasser et al.'s peer-reviewed ivory-DNA trafficking study (Nature Human Behaviour, February 14, 2022), added exact 2023/2024 publication metadata for WWF Africa's KAZA survey release and Nampindo & Randhir (2024), and normalized update metadata to ISO-8601 UTC (preserving the Nov 14, 2026 bibliographic standardization).

References & Primary Sources

* IUCN. (2021, March 25). African elephant species now Endangered and Critically Endangered - IUCN Red List, https://iucn.org/news/species/202103/african-elephant-species-now-endangered-and-critically-endangered-iucn-red-list

* Gobush, K. S., Edwards, C. T. T., Balfour, D., Wittemyer, G., Maisels, F., & Taylor, R. D. (2020, November 13; Red List 2021-1). Loxodonta africana. The IUCN Red List of Threatened Species, https://doi.org/10.2305/IUCN.UK.2021-1.RLTS.T181008073A181022663.en

* Greenfield, P. (2021, March 25). African elephant recognised as two separate species - both endangered. The Guardian, https://www.theguardian.com/environment/2021/mar/25/african-elephants-now-red-list-two-species-both-nearer-extinction

* IUCN. (2025, November 27). DNA methods help uncover further African Forest Elephants - but species remains critically endangered, https://iucn.org/press-release/202511/dna-methods-help-uncover-further-african-forest-elephants-species-remains

* Hoffner, E. (2024, January 3). Count, connect, conserve: Southern Africa elephant survey points the way (commentary). Mongabay, https://news.mongabay.com/2024/01/count-connect-conserve-southern-africa-elephant-survey-points-the-way-commentary/

* National Geographic. (2010, December 22). African Elephant Really Two Wildly Different Species, https://www.nationalgeographic.com/animals/article/101222-african-elephants-two-species-new-science

* Roca, A. L., Georgiadis, N., Pecon-Slattery, J., & O'Brien, S. J. (2001, August 24). Genetic Evidence for Two Species of Elephant in Africa. Science, https://doi.org/10.1126/science.1059936

* Booth, V. (2026, January 1). Scientists make stunning discovery while studying elephant dung: 'Updated numbers'. The Cool Down, https://www.thecooldown.com/outdoors/african-forest-elephant-population-study/

* Gobush, K. S., Edwards, C. T. T., Maisels, F., Wittemyer, G., Balfour, D., & Taylor, R. D. (2020, November 13; Red List 2021-1). Loxodonta cyclotis. The IUCN Red List of Threatened Species, https://doi.org/10.2305/iucn.uk.2021-1.rlts.t181007989a204404464.en

* WWF Africa. (2023, August 31). KAZA Launches its 2022 KAZA Elephant Survey results, https://africa.panda.org/?45604/KAZA-Launches-its-2022-KAZA-Elephant-Survey-results

* International Fund for Animal Welfare (IFAW). (2025, November 20). The impact of climate change on elephants, https://www.ifaw.org/international/journal/impact-climate-change-elephants

* Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA) Secretariat. (2023, August). The 2022 KAZA Elephant Survey Report, Volume I: Results and Technical Details, https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Afrika/KAZA-Elephant-Survey-Volume-1.pdf

* Blake, S. (2002). The Ecology of Forest Elephant Distribution and its implications for conservation. University of Edinburgh / Save the Elephants, https://www.savetheelephants.org/wp-content/uploads/2016/11/2002ForestElephantDistribution.pdf

* High Meadows Environmental Institute, Princeton University. (2025, November 12). Elephants Shape African Forests By Eating - and Excreting - Seeded Fruits, https://environment.princeton.edu/news/elephants-shape-african-forests-by-eating-and-excreting-seeded-fruits/

* African Wildlife Foundation (AWF). (2018, August 10). Elephants are the pillars of Africa's ecosystems and they need our support, https://www.awf.org/blog/elephants-are-pillars-africas-ecosystems-and-they-need-our-support

* Haller, N. (2025, February 7). How are elephants keystone species? Tsavo Trust, https://tsavotrust.org/how-are-elephants-keystone-species/

* Stanbrook, R., Noriega, J. A., & Wheater, C. P. (2021, February 7). The Effect of Dung Beetle Size on Soil Nutrient Mobilization in an Afrotropical Forest. Insects, 12(2), 141, https://doi.org/10.3390/insects12020141

* King's College London. (2024, November 29). Satellite evidence bolsters case that climate change caused mass elephant die-off, https://www.kcl.ac.uk/news/satellite-evidence-bolsters-mass-elephant-die-off

* Foggin, C. M., Rosen, L. E., Henton, M. M., Buys, A., Floyd, T., Turner, K. E., & Stein, R. (2023, October 25). Pasteurella sp. associated with fatal septicaemia in six African elephants. Nature Communications, https://doi.org/10.1038/s41467-023-41987-z

* Dunkin, R. C., et al. (2013, August 1). Climate influences thermal balance and water use in African and Asian elephants: physiology can predict drivers of elephant distribution. Journal of Experimental Biology, https://doi.org/10.1242/jeb.080218

* Mole, M. A., et al. (2018, July 14). Savanna elephants maintain homeothermy under

African heat. Journal of Comparative Physiology B, https://doi.org/10.1007/s00360-018-1170-5

* Nampindo, S., & Randhir, T. O. (2024, January 31). Dynamic modeling of African elephant populations under changing climate and habitat loss across the Greater Virunga Landscape. PLOS Sustainability and Transformation, https://journals.plos.org/sustainabilitytransformation/article?id=10.1371/journal.pstr.0000094

* Wasser, S. K., Wolock, C. J., Kuhner, M. K., Brown, J. E., et al. (2022, February 14). Elephant genotypes reveal the size and connectivity of transnational ivory traffickers. Nature Human Behaviour, https://doi.org/10.1038/s41562-021-01267-6

* Welsh Government. (2024, May 22). Written Statement: Ivory Act (Meaning of "Ivory" and Miscellaneous Amendments) Regulations 2024, https://www.gov.wales/written-statement-ivory-act-meaning-ivory-and-miscellaneous-amendments-regulations-2024

* King, L. E., Lala, F., Nzumu, H., Mwambingu, E., & Douglas-Hamilton, I. (2024, October 29). Impact of drought and development on the effectiveness of beehive fences as elephant deterrents over 9 years in Kenya. Conservation Science and Practice, https://doi.org/10.1111/csp2.13242

* Pozo, R. A., et al. (2019, January). Chilli-briquettes modify the temporal behaviour of elephants, but not their numbers. Oryx, https://www.cambridge.org/core/journals/oryx/article/chillibriquettes-modify-the-temporal-behaviour-of-elephants-but-not-their-num