# Stellenbosch University's Conservation Ecology and Entomology Department

# Wildlife Free to Roam (WFR) Programme

### Rationale:

Protected areas (PAs) form the cornerstone of nature conservation, but in isolation, are insufficient for conserving biodiversity and absorbing environmental shocks in the face of climate change and habitat loss. Species need to track fluctuating environmental conditions through fragmented and anthropogenic landscapes. Landscape connectivity is consequently an important tool for maintaining resilience to global change. Science has convincingly demonstrated that interconnected protected areas are much more effective than disconnected, human-dominated systems in providing resilient and sustainable ecosystems. The new understanding of the fundamental importance of ecological connectivity is driving a global shift in conservation practice, with Ecological Networks (ENs), rather than individual PAs, seen as essential in reconnecting spatially explicit wildlife populations across large landscapes.

> Member states are
>
> "…encouraged to maintain and enhance connectivity of habitats, including but not limited to those of protected species and those relevant for the provision of ecosystem services, including through increasing the establishment of transboundary protected areas and ecological corridors based on the best available scientific data…".
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> [UN General Assembly, 2021]

Despite remarkable political will to conserve Africa's PAs, key challenges remain: increasing human population growth, human-wildlife conflict, and habitat encroachment are fragmenting natural habitats, disrupting connectivity corridors, and compressing wildlife into isolated parks and reserves. Species declines are driven by food insecurity, poverty, bushmeat poaching and the illegal wildlife trade, all of which have increased due to job losses caused by the current, and persistent, Covid pandemic. In combination, these impacts decrease wildlife numbers, ranges and movement across national and international boundaries, and lead to a reduction in African Nations' natural capital. The reduction in species diversity across landscapes reduces habitat integrity, ecosystem services, food security and compromises wildlife economies. The "emptying" of wildlife habitats has knock-on effects that directly reduces the wildlife-economy generated income, and hence government interest to maintain gazetted PAs for conservation purposes.

### WFR

The Wildlife Free to Roam (WFR) programme aims to provide scientific support to guide conservation management for improving ecological connectivity between protected area habitats. One of our collaborations is with the Peace Parks Foundation, where researchers investigate connectivity corridors at the landscape scale within the Greater Limpopo (GL) and Kavango Zambezi (KAZA) Transfrontier Conservation Areas (TFCAs). These regions support vast amounts of biodiversity, including a number of threatened mammal and numerous endemic plant, bird, reptile and amphibian species. Improving ecological connectivity and allowing animals to move freely within TFCAs is of utmost importance to ensure long term resilience of TFCAs for conserving wildlife and related ecosystem services under global change.

**Vision:**

A world in which key natural habitats in Africa connect by conservation corridors to ensure wildlife persistence and biodiversity resilience for future generations.

**Mission:**

The fundamental principle of WFR's mission is to strengthen the governance of connectivity corridors in multi-use landscapes (TFCAs/production landscapes) in Africa by supporting national governments and key conservation organisations through the generation of scientific data on wildlife corridor positioning, use, functionality, and viability in broader ecological landscape matrices.

## Why corridors?

Wildlife is not restricted to one habitat to complete a lifecycle or to survive. Individuals or populations emigrate, disperse and migrate in response to stochastic climate events, predation, competition, habitat degradation or in search of resources such as preferred forage or mates. Increasingly however, wildlife movements are impeded by human disturbance, creating filters or barriers to movement across the landscape. In the case of southern African TFCAs, human disturbance often includes growing rural settlements, expansion of rural fields, uncontrolled fires, overgrazing and deforestation. These human activities, coupled with climate change, disease and pollution, are threatening species persistence in TFCA landscapes.

## WFR and EN Science

Landscape-scale ENs are interconnected conservation corridors of high-quality habitat used to mitigate the adverse effects of landscape fragmentation and to connect with protected areas (Samways & Pryke, 2016). WFR's programme of research assesses EN corridor structure and function, at both the ecosystem and species level.

**Structural connectivity** scientifically assesses habitat permeability based on the physical features of the landscape, levels of disturbance and the arrangement of habitat patches. Key concepts of ENs are corridors, buffer zones, core areas and stepping stones. In many cases, candidate corridors are modelled in areas of low disturbance with low levels of landscape modification, often along riparian zones.

### PRINCIPLES OF CORRIDORS

1. Ecological corridor are not a substitute for protected areas.
2. Ecological corridors should be identified and established in areas where connectivity is required with the aim of building ecological networks.
3. Each corridor should have specific ecological objectives and be governed to achieve connectivity outcomes.
4. Ecological corridors may consist partly or entirely of natural areas managed primarily for connectivity.
5. Ecological corridors should be differentiated from non-designated areas by the specific uses that are allowed or prohibited within them.
6. To achieve their connectivity objectives, ecological corridors require their own management plans.



**Functional connectivity** described how well genes or individuals move through the landscape. Identifying how individuals make use of a landscape is an effective way of delineating movement corridors. Methods for measuring functional connectivity include GPS collars, identification of use of umbrella/indicator species, and genetic tools for recording population structure and genetic connectivity between populations.

**At the ecosystem level,** WFR evaluates EN's ecosystems & habitat types, and how well ecosystem integrity and diversity is reflected in the structure, function, composition and connectivity.

- Key characteristics for connectivity (least cost path, circuit theory, resistance surface, Boolean mapping)
- Reference conditions for connectivity (historical patterns)
- Ecosystem drivers and stressors (abiotic, biotic factors and socio-ecological drivers)

**At the species level,** WFR focusses on at risk species (e.g. Red List, HWC, wide-ranging species), and species persistence, in view of climate change and increasing habitat fragmentation due to human density increases.

- Target species behaviour & movement (camera traps, ground-truthing, satellite collars)
- Possible barriers (land ownership, topography, forest cover, land development)
- Reference conditions for connectivity (historical connectivity)

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