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Research Article

Conservation gap analysis for *Erica* (Ericaceae)

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Abstract

The flowering plant genus *Erica* (Ericaceae) includes well over 800 species and numerous formally described subspecies and varieties. Many of these are threatened in the wild. The Global Conservation Consortium (GCC) for *Erica* was established under Botanic Gardens Conservation International (BGCI) in order to collaboratively prevent species extinctions. To target this work, we need fundamental information on species distributions, conservation status in the wild, and representation in *ex situ* collections. In large, complex groups like *Erica*, such data are not necessarily available or easily accessible. Here, we document the current state of *ex situ* and *in situ*

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conservation of threatened *Erica* species, identify knowledge and resource gaps, and set out priorities for future work.

We further developed and consolidated the large body of data on *Erica* nomenclature, taxonomy, and diversity now openly accessible as a result of collaborative efforts, in particular through the World Flora Online (WFO), the e-Flora of South Africa, and contributors to the Global Biodiversity Information Facility (GBIF). We obtained accessions data for living plant collections from BGCI's PlantSearch and from botanic gardens directly, and wild distribution data from GBIF. We linked and summarised data in an updated version (4.03) of the openly available *Erica* Identification Aid to assist in prioritising work. Through discussions in thematic working groups of GCC *Erica* we identified further priorities for conservation action.

The volume of openly available, georeferenced records for species has increased dramatically in recent years. Although fewer than half of threatened *Erica* taxa are in *ex situ* conservation collections, many more botanic gardens hold African/Cape species and could contribute to distributed meta-collections. The most urgent research gaps include undescribed and poorly understood diversity (particularly in South Africa and Madagascar) and shortfalls in up-to-date threat assessments. Between *ex situ* sites we need to establish accession-level comparisons of data and sharing of conservation grade material. We must improve knowledge of seed longevity and techniques for effective cultivation. We should secure species and collect data through collaboration with landowners and the public. Priority action *in situ* should include clearance of invasive alien plants as well as habitat restoration and reintroduction.

Key statistics for *Erica* species: 1) Total: 830 species (excluding hybrids; plus 364 subspecies and varieties). South Africa: 747 species; Madagascar/Mascarenes: 41; Tropical Africa: 25; Europe/Mediterranean: 21. 2) 45% species revised taxonomically since 1965. 3) 77% species recorded on GBIF in the last 10 years. 4) 90% species threat assessed (38% in the last 10 years). 5) 46 Critically Endangered (CR), 48 Endangered (EN), 95 Vulnerable (VU) (23% threatened). 6) 47% of threatened species in ex situ collections.

Key words: Botanic gardens, conservation, Ericaceae, taxonomy, threat status

Introduction

The Convention on Biological Diversity (CBD; Secretariat of the Convention on Biological Diversity 2020) placed milestones for progress towards addressing the ongoing biodiversity crisis. These include halting or reversing extinction rates and reducing the proportion of species under threat of extinction. Botanic gardens have an important role to play in achieving these goals, both as safe sites for *ex situ* conservation and through supporting *in situ* conservation (Smith 2016, 2019; Mounce et al. 2017; Westwood et al. 2021).

Effective action to prevent species extinctions is dependent on specialist knowledge and resources. To focus efforts on particular priority plant groups, Botanic Gardens Conservation International (BGCI) initiated the Global Conservation Consortia (GCC). GCC *Erica* (Pirie et al. 2022), is one of 12 GCCs as of October 2025. It targets the around 830 species of heaths or heathers, genus *Erica* L., of the flowering plant family Ericaceae – the second largest number of species after GCC *Rhododendron*.

The heaths are distributed from northern Europe south through the Mediterranean, the high mountains of tropical Africa, Madagascar and the Mascarenes, and southern Africa with a centre of diversity in South Africa's Cape Floristic Region (Fig. 1). They are woody shrubs to small trees typically bearing

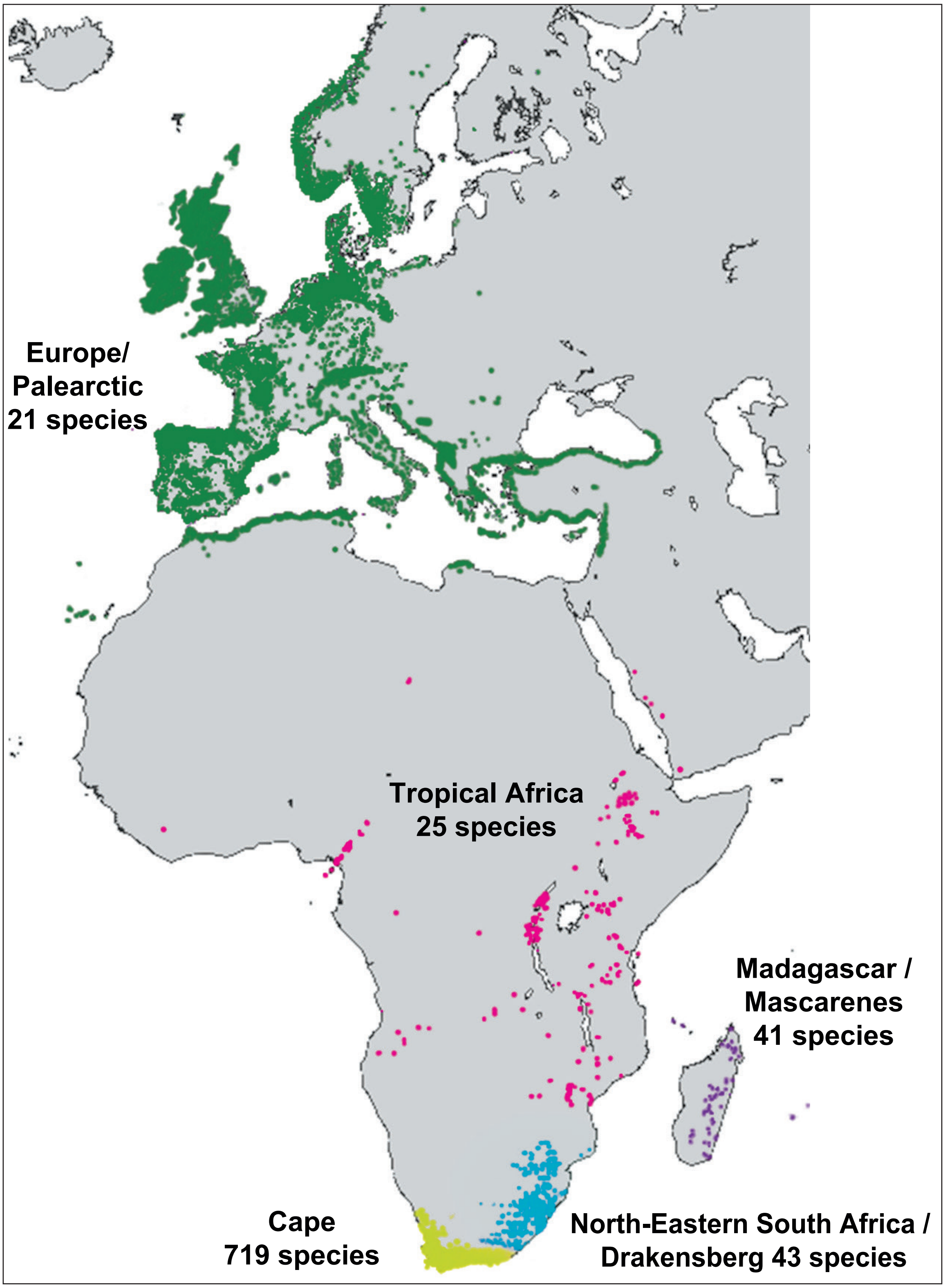

Figure 1. Distribution of *Erica* with regional species numbers. Adapted with current statistics from Pirie et al. (2016). Species numbers for the Cape region include the Karoo Mountains to the east, following the regional coding in the *Erica* ID aid.

in-rolled, needle-like leaves and persistent fused corollas. Variation between - and within - species is most obvious in the flowers, epitomised by several strikingly different pollination 'syndromes' (Rebelo et al. 1985; Turner et al. 2011; Lombardi et al. 2021; Fig. 2). Other adaptive features such as fire sur-

Figure 2. Floral morphological diversity of *Erica*. Syndromes exhibited by *Erica* species include pollination by sunbirds, e.g. **a.** *Nectarinia famosa* in *E. plukenetii* L. ssp. *plukenetii*; **b.** By moths, e.g. *Helicoverpa armigera* in *E. plukenetii* ssp. *breviflora* (Dulfer) E.G.H.Oliv. & I.M.Oliv. (van der Niet et al. 2014); **c.** Long proboscid flies in *E. aristata* Andrews (Lombardi et al. 2021); **d.** Rodents in *E. lanuginosa* Andrews (Lombardi et al. 2017) as well as more generalised insect-pollinated forms, such as **e.** *E. plumosa* Thumb., and wind-pollinated ones, such as **f.** *E. madida* E.G.H.Oliv.. Photos: **a, b:** Timo van der Niet; **c, d:** Sam McCarren; **e, f:** RDH.

vival strategy (Ojeda 1998) and wood anatomy (Akinlabi et al. 2023) also differ both between and within species. Numerous studies have documented the phytochemistry and potential pharmacological applications of *Erica* species (reviewed in Adu-Amankwaah et al. 2025), but to date the work has been limited to a few common, mostly European species.

As one of just 86 'big' plant genera (500–1000 species; Moonlight et al. 2024) *Erica* is a priority for taxonomic work. The last comprehensive revision of the genus (Dulfer 1964, 1965) predates the description of many new species (particularly by the South African botanists E.G.H. and I.M. Oliver; Nelson et al. 2024). Both taxonomy and threat status of Malagasy species are particularly poorly understood (Hackel et al. 2025), whilst many South African species are naturally rare, many of which are threatened with extinction in the wild (Raimondo et al. 2009).

Through coordinated action, GCCs can protect species more effectively, particularly by developing distributed *ex situ* metacollections that can better represent and secure diversity than individual collections (Griffith et al. 2019). To target such work, we need fundamental information on species diversity, distributions, and conservation status in the wild, as well as on the representation of that diversity in *ex situ* collections. Such data are not necessarily available or easily accessible, particularly in large, complex groups such as *Erica*.

In the lead-up to this report, members of GCC *Erica* were involved in synthesising and extending the state of knowledge in key areas of research such as nomenclature, taxonomy, and threat status of *Erica* species. Several research papers and reviews were prepared and published in a topical collection "Systematics, natural history, and conservation of *Erica* (Ericaceae)" of the open access botanical journal PhytoKeys (Pirie et al. 2025), placing the resulting data in the public domain following FAIR principles (Wilkinson et al. 2016).

The aim of this Conservation Gap Analysis is to summarise the current state of *ex situ* and *in situ* conservation of threatened *Erica* species, identify knowledge and resource gaps, and set out priorities for future work.

Methods

We apply the general approach described in Maxted et al. (2008) for gap analysis applied in GCC *Magnolia* (Linsky et al. 2022), GCC oaks (Beckman et al. 2019), and GCC *Nothofagus* (Steed-Mundin et al. 2024), and palms (Griffith et al. 2021).

Abbreviations

BGCI: Botanic Gardens Conservation International; **CBD:** Convention on Biological Diversity; **GCC:** Global Conservation Consortia; **IUCN:** International Union for Conservation of Nature; **MSBP:** Millennium Seed Bank Partnership; **SANBI:** South African National Biodiversity Institute; **TEN:** Taxonomic Expert Network; **WFO:** World Flora Online.

Names data

Names data were consolidated from available resources in the World Flora Online (WFO; Borsch et al. 2020) as part of the ongoing efforts of the WFO Taxonomic Expert Network (TEN) for Ericaceae (Elliott et al. 2024). To unambiguously associate online resources, permanent WFO identifiers were linked to those for the South African National Biodiversity Institute (SANBI)'s South African National Plant Checklist (official yearly release. https://opus.sanbi.org/items/fc8fbd6d-52b0-4342-b78d-49ff1a7c0d46, accessed 3 Sep 2025) and e-Flora of South Africa (le Roux et al. 2017); the South African Red List; and to the Global Biodiversity Information Facility (GBIF; https://www.gbif.org/).

These identifiers and comprehensive synonymy data from WFO were incorporated within the openly available *Erica* Identification Aid (*Erica* ID aid; Oliver et al. 2024; https://doi.org/10.5281/zenodo.10407033; Fig. 3).

A new feature of the *Erica* ID aid was introduced in version 4.01 to openly archive and present summaries of current knowledge ('research data'). This facilitates cross-checking and filtering e.g. for measures of availability and recency of information relating to individual taxa, such as whether descriptions are available through the e-Flora of South Africa, and the year last revised (via taxonomic reference on WFO).

As of version 4.02, all currently accepted subspecific taxa (both explicitly accepted or not explicitly synonymised) are represented individually in the *Erica* ID aid. Each species that is represented by two or more subspecific taxa is also individually represented as an 'inclusive' species (e.g., *Erica grandiflora* L.f., *E. grandiflora* ssp. *grandiflora* and *E. grandiflora* ssp. *perfoliosa* (E.G.H.Oliv. & I.M.Oliv.)

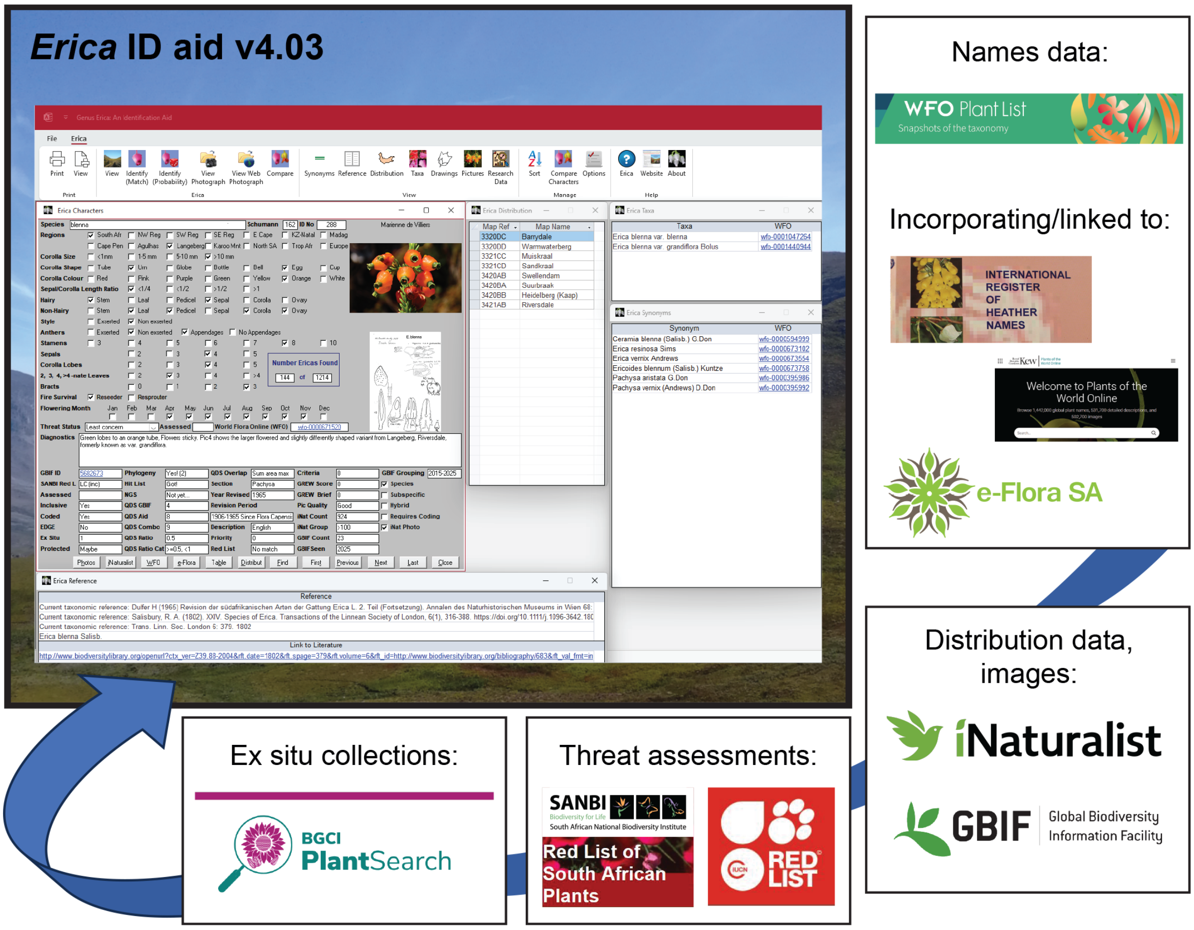

Figure 3. Data incorporated into the *Erica* ID aid. As well as including character coding that helps identify *Erica* species, the openly accessible *Erica* ID aid incorporates and links back to various sources of data, enabling both their use and targeted improvement.

E.G.H.Oliv. & Pirie are all represented individually). This allows us to summarise accession-level information despite differences in precision of determinations or opinions on recognition of subspecific taxa. Version 4.03 includes updated and expanded research data documenting results presented in this paper.

Occurrence data

Distribution data was obtained from GBIF using the linked identifiers (Suppl. material 2; GBIF Occurrence Download https://doi.org/10.15468/dl.zxj7pd accessed via GBIF.org on 2025-09-03). Several of the contributors to this report record and identify observations using iNaturalist and we have archived occurrence records as datasets produced for research papers (Pirie et al. 2024: https://doi.org/10.15468/tae99n; Hoekstra et al. 2025: https://doi.org/10.15468/abecqd; Pasta et al. 2025: https://doi.org/10.15468/8dk2qz). In each case, the information is placed in the public domain and can be accessed through GBIF. We filtered the data in three steps: Filter level 1 retained observations and preserved specimens (excluding e.g. living specimens and fossils) and records of presence (versus absence). Filter level 2 excluded records lacking coordinates, or with coordinates that were invalid, zero, or equal (latitude and longitude the same - presumably erroneously) using the CoordinateCleaner R package v.3.01 (https://github.com/ropensci/CoordinateCleaner, accessed 14 Sep 2025, Zizka et al. 2019). Additionally, we excluded those corresponding to centroids of countries and of capitals (with a minimal buffer of 10 m); to natural history museums and zoos (also buffered) and anything falling in the sea, and duplicates based on identical latitude/longitude plus datasetKey or eventDate. Georeferencing of herbarium specimens could help improve such historical records and be useful for locating rare species; we did not attempt this here. Filter level 3 was for precision and accuracy of location data: excluding those with coordinates of < 3 decimal places and those with precision recorded as > 100 m; we filtered records of taxa known to be exclusively found in fynbos versus extra-Cape biomes (using the vector geospatial dataset of South African National Biodiversity Institute 2012) to exclude those placed in the wrong biome (assuming this is due to errors in names or georeferencing).

This resulted in three nested datasets of increasingly precisely geolocated, dated, occurrences for *Erica* taxa. The most precise filtered dataset is incorporated within the *Erica* ID aid from which individual records of taxa, including those identified to subspecific taxa and inclusive species, can be projected with metadata to localities using Google Earth. For South African taxa, it can also be compared to distributions summarised to Quarter Degree Squares (QDS; Leistner and Morris 1976) in PRECIS (Russell and Arnold 1989) data as presented in earlier versions of the *Erica* ID aid.

Numbers of photos documented on iNaturalist per *Erica* taxon were queried using the API access point and then linked to the classification system based on WFO.

Protected areas

We compared distribution ranges of taxa with coverage by protected areas in South Africa using GIS approaches (R scripts by NMN in Suppl. material 2).

Outside of South Africa this was not always possible, e.g. for *Erica sicula* Guss. and other species occurring in the Southern and Eastern Mediterranean area due to lack of updated information on protected areas or species occurrences.

Species of conservation concern

We adopted threat status from Raimondo et al. (2009) for South African taxa (representing the majority of the available threat status data) and subsequent updates documented in the Red List of South African plants (South African National Biodiversity Institute 2024) and the IUCN Red List (IUCN 2025) where available. The South African assessments represent *Erica* taxa to the lowest subspecific level, to the exclusion of the respective inclusive species. This approach is usefully granular. However, a consequence is that records and data not unambiguously attributed to subspecific taxa (including to autonyms resulting from the description of subspecific taxa) may be difficult to interpret: they may implicitly represent the common/nominative form, or any part of the variation within a more inclusive concept of the species.

We summarised the South African Red List data to make it directly comparable with IUCN, both for threat categories (Table 1) and inclusive species. The latter is possible without a separate assessment in the following cases: a) where one or more subspecific taxa are assessed as Least Concern (LC), Rare or Critically Rare (the latter two representing special cases of LC in the South African system) the inclusive species can be regarded as LC. In such cases, individual populations or subspecific taxa may still be threatened, but the species as a whole is not. b) Where all subspecific taxa are Extinct (EX) the inclusive species is EX (e.g. *Erica pyramidalis* Sol.). c) Where all subspecific taxa are Extinct in the Wild (EW), or at least one is EW and all others EX, the inclusive species would be EW. d) Where they are all Data Deficient (DD), Data Deficient – Taxonomically Problematic (DDT), or both, the inclusive species is DD. e) Where one or more subspecific taxa are EX/EW and a single surviving taxon is threatened, e.g. Vulnerable (VU), that status represents the threat

Table 1. IUCN and South African Red List categories. Adapted from https://redlist.sanbi.org/redcat.php.

Degree of concern (in descending order)	IUCN Red List categories	South African Red List categories
Extinct	Extinct (EX)	Extinct (EX)
	Extinct in the Wild (EW)	Extinct in the Wild (EW)
	Regionally Extinct (RE)	Regionally Extinct (RE)
Endangered		Critically Endangered, Possibly Extinct (CR PE)
	Critically Endangered (CR)	Critically Endangered (CR)
	Endangered (EN)	Endangered (EN)
	Vulnerable (VU)	Vulnerable (VU)
Potentially endangered	Near Threatened (NT)	Near Threatened (NT)
		Critically Rare
		Rare
		Declining
	Data Deficient (DD)	Data Deficient – Insufficient Information (DDD)
Not endangered		Data Deficient – Taxonomically Problematic (DDT)
	Least Concern (LC)	Least Concern (LC)
Unknown	Not Evaluated (NE)	

status of the species as a whole. Where species are represented by two or more threatened taxa a separate assessment is needed to obtain the area and extent of occurrence, without which the status remains Not Evaluated (NE).

We archived this data with links to the online resources and summarised several aspects and metrics of conservation concern/priority as follows for easy reference within the *Erica* ID aid research data (Fig. 3).

We employed two further prioritisation metrics: 'EDGE' and 'GREW': The 'EDGE' approach used the results of Pirie et al. (2024) combining information on phylogenetic diversity (PD) and threat status using the Evolutionarily Distinct and Globally Endangered (EDGE) approach (Isaac et al. 2007; Gumbs et al. 2023). Lists of EDGE species (threatened taxa with EDGE score greater than the median EDGE score of all species with 95% confidence) and EDGE research species (same as EDGE species but for which the threat status is unknown) were incorporated into the *Erica* ID aid research data. Representation, or not, of taxa in phylogenetic analyses (without which they will not feature on either EDGE lists) was also incorporated into the research data.

'GREW' is the informal name used by SANBI for a species recovery prioritisation approach based on IUCN Red List data (IE, AGR et al. in prep.). The aim is to produce a single metric to rank taxa within broader threat categories and particularly to identify the highest priorities for urgent conservation action within a larger pool of Critically Endangered (CR) taxa. Because data on *Erica* species are sparse, especially data useful for search and rescue programmes, the SANBI species recovery team decided to prioritise species based on the nested IUCN Red List criteria data (which are the data most consistently available for most species in South Africa). We calculated a GREW score first from the Red List Status (weighted CR=8*10^10; EN=7*10^10; VU=6*10^10; NT=5*10^10; other status=0). To this score, a lower weighting of the four IUCN Red List criteria was added: (A) 'Rapid Population Decline', (B) 'Small Range & Decline', (C) 'Small Population Size & Decline' and (D) 'Very Small Population Size / or Range' whereby species with all four criteria triggered scored 4*10^9.0 (i.e. an order of magnitude lower than the status score), with scores decreasing with fewer flagged criteria. For species flagged with only a single criterion, a lower score was added based on combinations of sub-criteria, with 'Small Population Size & Decline' plus 'Single Locality' scoring highest (1*10^6.0), and 'Single Locality' and 'Severe Fragmentation' individually scoring lower (documented in Suppl. material 3). This resulted in a priority score for all species in the country.

Ex situ collections: PlantSearch data

Data was obtained from BGCI PlantSearch (available at https://plantsearch.bgci.org) in 2023, which was taxon- rather than accession-level, with additional data provided by individual collections separately. The data were summarised, and *ex situ* collections were mapped using Flourish data visualization software (https://flourish.studio).

GCC *Erica* working group and plenary discussions

In March 2025, GCC *Erica* hosted a meeting to discuss issues contributing to the conservation gap analysis. The working groups divided themselves between '*in situ*', '*ex situ*', and 'research' for group discussions with the aim to identify a) key outcomes; b) the obstacles faced; c) actions required; and d) measures of success. The results were summarised and discussed in plenary thereafter.

Results

Names data

Progress in documenting names data on WFO is summarised in Table 2.

The number of accepted taxa has remained largely the same between the December 2024 and June 2025 WFO Plant List and Data releases, with minor changes including three newly described species and several hybrid taxa reassessed as horticultural in origin. The number of synonyms has increased by 23 with additional historic names being incorporated from IPNI. The current number of accepted species includes 830 non-hybrid and 20 non-horticultural hybrid names.

We documented the most recent taxonomic treatments for each accepted taxon on WFO (only permitted where DOIs are available) and in the *Erica* ID aid (for all names, even where papers are not currently available online). From the latter we summarised recency of revisions (Table 3).

As of version 4.02 (June 2025) all accepted subspecific taxa are included in the *Erica* ID aid but 220 (all South African) are not character coded. English descriptions are documented in the e-Flora of South Africa, based on the South African National Plant Checklist (as of October 2025) for 723 species (incl. 2 uncertain), 82 subspecies and 145 varieties; Latin only: 14 species (incl. 1 uncertain), one subspecies and 19 varieties; none: seven species (incl. three hybrids), three subspecies (incl. two autonyms) and 81 varieties (incl. 56 autonyms).

Occurrence data

A summary of the number of GBIF records and taxa they represent that remained after the filtering stages is presented in Table 4. Filtering to retain the most precisely geolocated records reduced the dataset by 32% of records, 7% of species and 13% of taxa.

The numbers of precisely geolocated records (filter level 3) per species for the 20 most recorded species are presented in Fig. 4a, and for all species through time in Fig. 4b.

A summary of recency of records of species including those without new and precisely located data within the last 10 years is presented in Suppl. material 2. Of non-hybrid taxa represented on GBIF, seven species (61 taxa) are not documented at all; for a further 10 species (25 taxa) the most recent record

Table 2. *Erica* names documented in the World Flora Online (WFO). The summary from the December 2024 update to WFO documented in Elliott et al. (2024) and WFO Consortium et al. (2024) is compared to the subsequent WFO public release (WFO Consortium et al. 2025).

WFO Plant List version	Species	Sub-species	Varieties	Synonyms	Unplaced names
December 2024	852	111	247	2826	584
June 2025	850	112	244	2849	485

Table 3. Recency of revision of *Erica* taxa. Summarising for currently accepted taxa, this is the date of the most recent revision as opposed to the original publication of the name (unless there has been no subsequent revisionary work, in which case the reference and date are the same). The time periods are defined by a number of key publications that revised numerous species: Andrews (1802, 1845), Guthrie and Bolus (1905) in Flora Capensis, the complete revision of Dulfer (1964, 1965), and partial revisions of Oliver (2000) and Oliver and Oliver (2002, 2005). The total number of taxa includes subspecific taxa and inclusive species, following WFO consortium et al. (2025).

Period	Number of (non- hybrid) species	Number of taxa
1760–1845 (including Andrews)	10	10
1846–1905 (including Flora Capensis)	3	9
1906–1965 (including Dulfer)	446	681
1966–1999 (prior to Oliver revisions)	137	157
2000–2025 (Oliver revisions onwards)	234	357
Total	830	1214

Table 4. Number of GBIF records and taxa (including wild hybrids; following WFO taxonomy) remaining after the filtering stages.

	Filter level 1	Filter level 2	Filter level 3 (100 m)
Number of species (incl. hybrids; WFO)	845	829	782
Mean occ. per sp.	666.8	672.1	496.7
Median occ. per sp.	28	24	15
Number of taxa	1174	1131	1026
Mean occ. per taxon	479.9	492.7	378.6
Median occ. per taxon	20	17	12
Total occurrences	572990	564560	388411

was prior to 1900 (of which seven species, 23 taxa without any precise localities); a further 61 species (133 taxa) date to before 2000 (of which 28 species, 71 taxa without precise locality), and a further 95 (136 taxa) are not documented within the last 10 years (of which 11 species, 12 taxa imprecise). A total of 656 species (77%) have been recorded within the last 10 years.

We summarised species distributions by numbers of Quarter Degree Squares (QDS), documenting this per taxon (subspecific taxa separately and merged within inclusive species) in the *Erica* ID research data. We compared QDS lists from the *Erica* ID aid version 3.00 with those represented in the GBIF data (illustrated in Fig. 5) to assess the degree of coverage of previously summarised distributions with openly available, precisely geolocated occurrences. Of the 836 taxa populated with QDS data in the *Erica* ID aid version 3.00, 789 are represented in the filtered GBIF data (1035 in total). Of those, 154 taxa share the same number of QDS between distribution data sets of which only 97 fully overlap; 434 are documented in more QDS in the *Erica* ID data (197 with twice the number or more and 38 with four times the number or more), and 201 with more QDS in the GBIF data (96 with twice the number or more and 23 with four times the number or more; distributions of 378 taxa were not documented in versions 3.00 and earlier of the *Erica* ID aid). The number of QDS for these 789 taxa is strongly correlated between the two datasets (Pearson's $r = 0.859$, $p < 0.001$). The combined number of QDS occupied per taxon across the two distribution datasets was greater than the maximum from either dataset for 409 taxa. There were 136 taxa represented in just a single

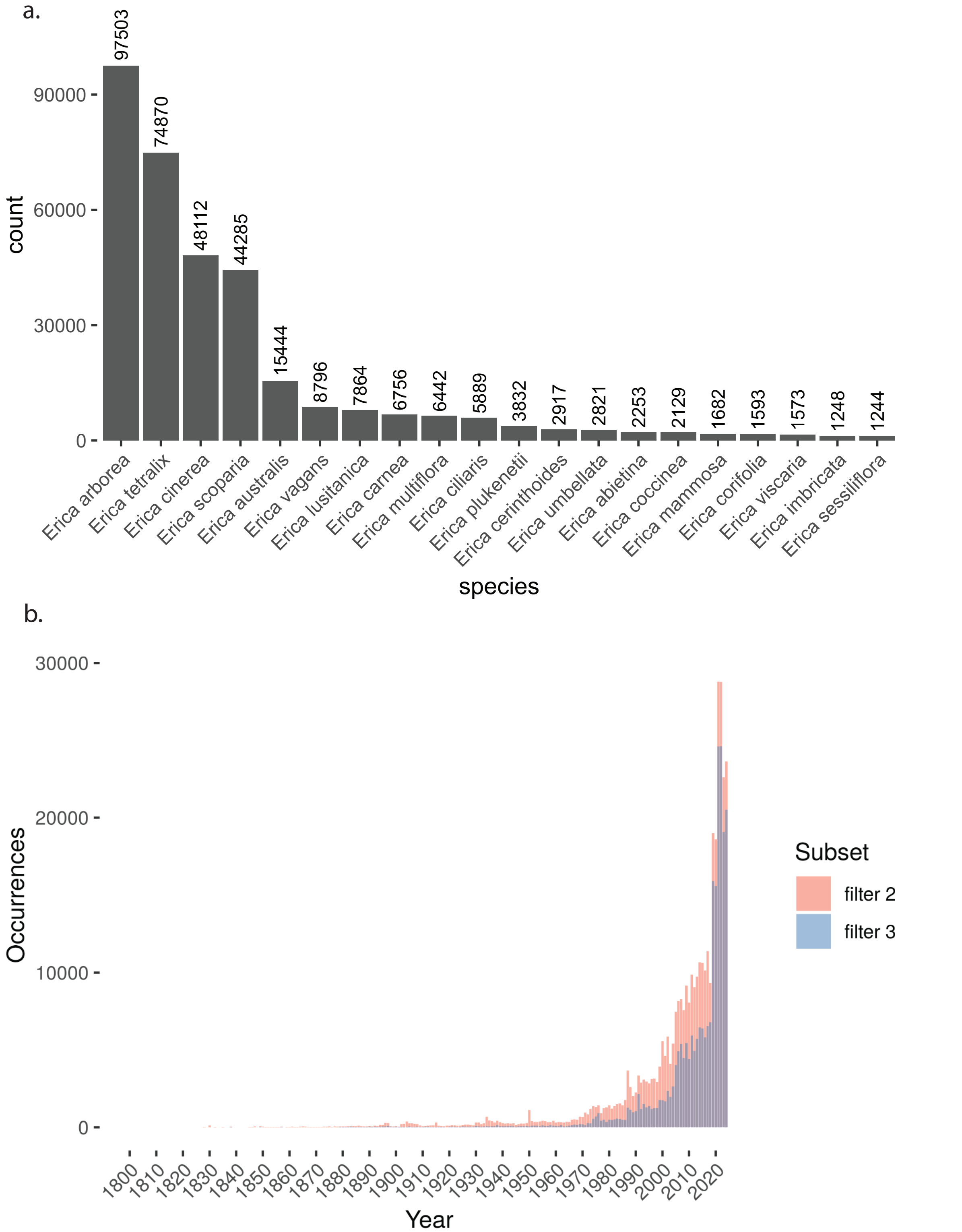

Figure 4. Occurrence records per species and through time. **a.** Number of records per species (at filter level 3 – precisely georeferenced) for the 20 most recorded species; **b.** Number of records through time (filter level 2, including less precisely georeferenced records, and filter level 3) for all taxa.

QDS across both datasets, and 150 represented in just two. Twelve species and one subspecific taxon are represented in 100 or more QDS (*E. afra* L., *E. arborea* L., *E. australis* L., *E. carnea* L., *E. cerinthoides* L., *E. cerinthoides* L. var. *cerinthoides*,

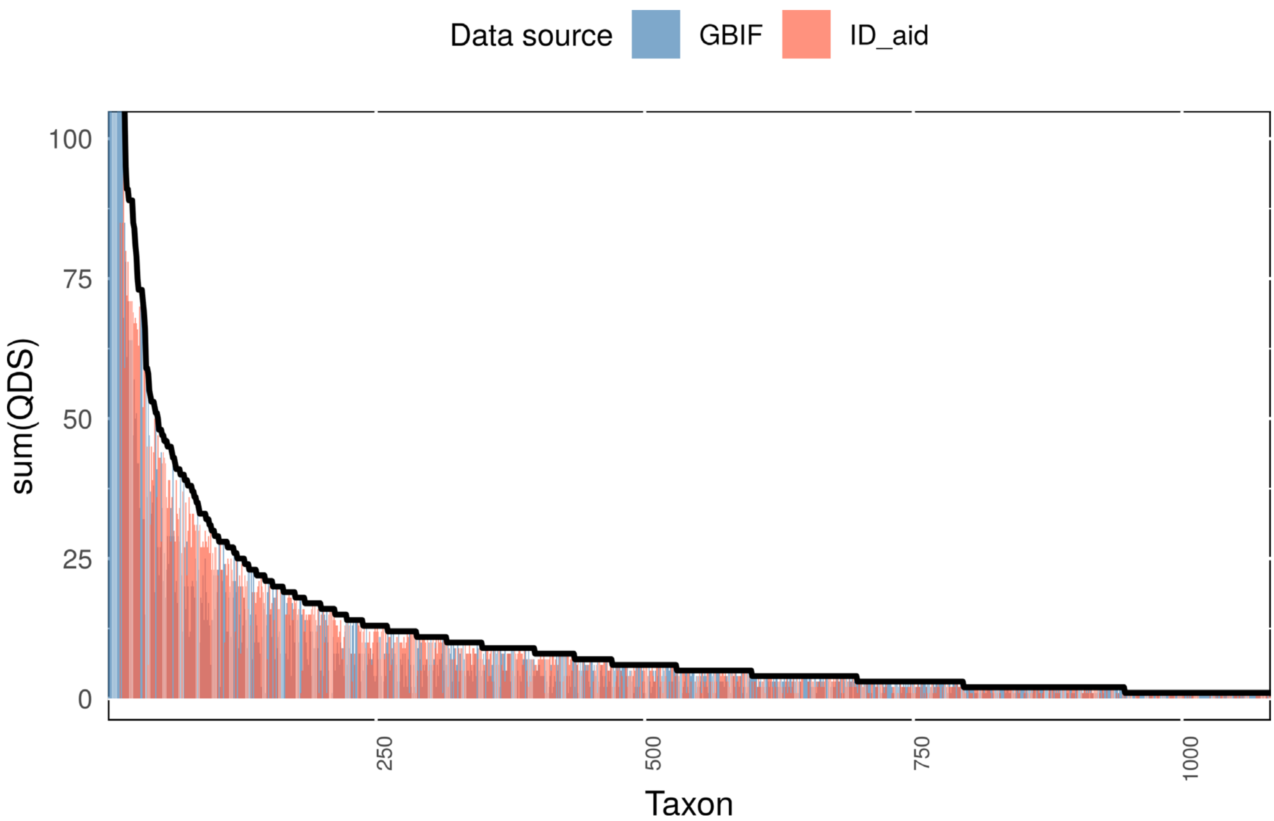

Figure 5. Number of Quarter Degree Squares (QDS) occupied per taxon. Numbers are truncated at 100 for 16 most widespread taxa.

E. ciliaris L., *E. cinerea* L., *E. curviflora* L., *E. lusitanica* Rudolphi, *E. manipuliflora* Salisb., *E. multiflora* L., *E. scoparia* L., *E. tetralix* L., *E. umbellata* L., and *E. vagans* L.).

The numbers of photos of *Erica* taxa on iNaturalist range from 0 to > 15,000 (*Erica cinerea*). The frequency distribution is plotted in Fig. 6 and data is archived in Suppl. material 4. Although we are contributing to updating taxonomy on iNaturalist, it is not formally synchronised with WFO, and numbers do not correspond exactly. There are photos available on the platform of 944 (research grade: 883) taxa. A total of 566 species (404 taxa; research grade: 353) are represented with more than 100 photos. The ratio of photos to observations shows a greater spread amongst more rarely observed taxa: observers appear to be taking more photos of (some) rare taxa.

Protected areas

Erica occurrence data for South Africa and overlap with protected areas is summarised from GBIF data as of 2023 (Table 5).

Species of conservation concern

Numbers of taxa assessed by threat category (combining both IUCN and South African Red List categories) are listed in Table 6. Around 90% of species (91% of non-inclusive taxa) have been assessed, but 53 species (6%) were DD and 518 (62%) were not assessed within the last 10 years.

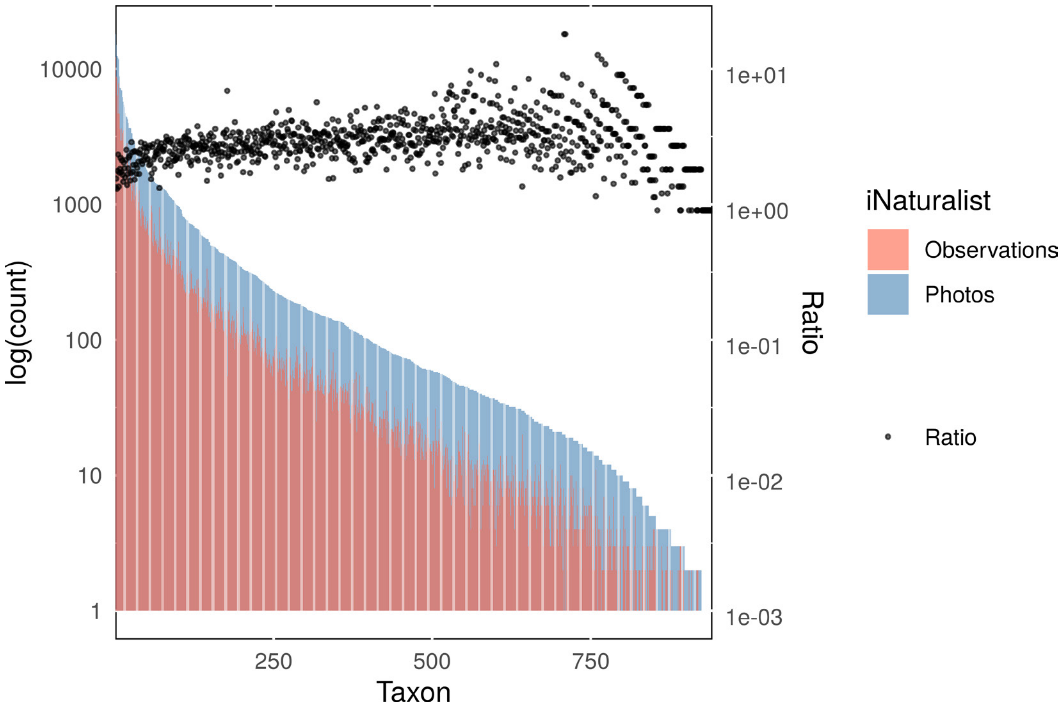

Figure 6. Frequency distribution of number of photos available per taxon on iNaturalist. The threshold at which species can feature in the automated identification results is 100 photos from at least 60 research-grade observations (using a maximum of five photos per observation). Numbers of observations (red bars)/photos (blue bars) are truncated at zero (c. 280 taxa [23%] are not represented). The ratio of photos to observations (black dots) is never lower than 1 given that all (and all research grade) observations are documented by at least one image but is presented with a scale including lower values which avoids overlap with the other data.

Table 5. Overlap of *Erica* taxa distributions with protected areas. Percentages are of total numbers of species/taxa, excluding those for which no data is available. Those found in protected areas often have wider (unprotected) distributions and those not found in protected areas may have wider undocumented distributions that extend into protected areas.

Erica	n	percent
Species total (830)	779	94
Taxa total (1194)	888	74
Species not in protected areas	126	15
Taxa not in protected areas	158	13
Species in protected areas	653	79
Taxa in protected areas	730	61

Table 6. Number of *Erica* taxa and their threat assessments.

Assessment	Taxa	Species
EX	4	1
EW	3	2
CR	51	46
EN	66	48
VU	104	95
NT	13	12
LC	558	490
NE	134	83
DD	133	53

Of 148 inclusive species, 112 are LC; 16 inclusive species include exclusively threatened or unassessed subspecific taxa and are therefore NE; two (*E. laevigata* Bartl. and *E. zitzikammensis* Dulfer) are exclusively DDD/DDT and are therefore DD. One (*E. foliacea* Andrews) is EN; two (*E. alexandri* Guthrie & Bolus and *E. bolusiae* T.M.Salter) are CR; one (*E. pyramidalis* Sol.) is EX.

The numbers of most recent assessments per taxon through time are presented in Fig. 7.

Of 39 'EDGE species', 37 are South African, one European and one from Tropical East Africa. Of South African taxa, 220 score ≥ 5 according to the GREW prioritisation, 43 of which scored ≥ 8, including twelve EDGE species (Table 7). All of those are CR. Details in Suppl. material 5.

Ex situ collections: PlantSearch data

We summarised representation of taxa in *ex situ* collections and incorporated the data into the *Erica* ID aid research data. A map of *ex situ* collection sites visualised using Flourish (https://flourish.studio) is presented in Fig. 8. The more densely clustered European collections are expanded out (inset) in Fig. 8, but both maps and numbers of accessions per collection can be viewed interactively online (https://public.flourish.studio/visualisation/25746326/: worldwide; and https://public.flourish.studio/visualisation/25760852/: Europe). Of 830 species, 209 are held at the Millennium Seed Bank; 230 are represented in two or more *ex situ* collections (seed bank or botanic gardens); 187 are represented in just one; and 413 are not known to be in any (Suppl. material 5).

Non-threatened northern/European species are widely cultivated, representing the top 10 most frequent *Erica* taxa in our data, 13 of the 22 shared across

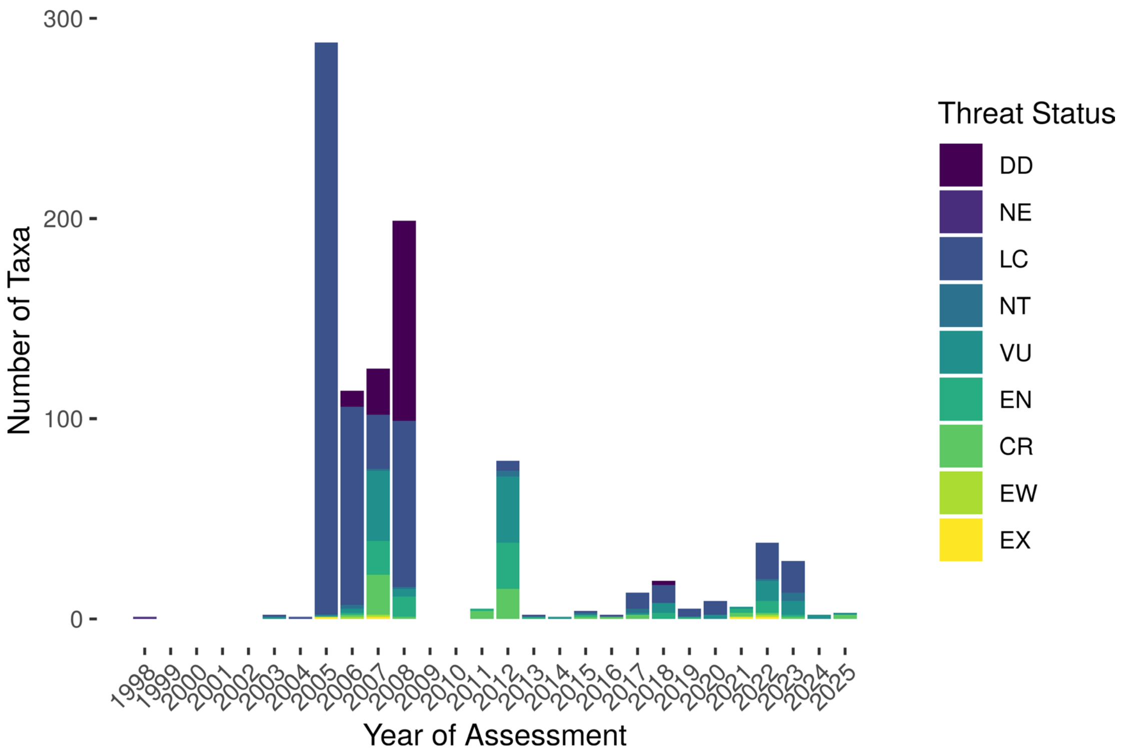

Figure 7. *Erica* threat status assessments through time. Assessments prior to 2010 include a proportion of automatic assignments of LC status (including 287 in 2005).

Table 7. South African priority taxa following GREW and EDGE metrics. The definitions of regions follow Goldblatt and Manning (2000) as used in the *Erica* ID aid: SW stands for 'South Western'; EC for Eastern Cape.

Taxon	Region	Threat status	GBIF last recorded
Erica alexandri Guthrie & Bolus subsp. *alexandri*	SW	CR (2012)	2025
Erica bolusiae T.M.Salter var. *bolusiae*	SW	CR (2006)	2025
Erica cabernetea E.G.H.Oliv.	SW	CR (2012)	2018
Erica extrusa Compton	SW	CR (2012)	2025
Erica gracilipes Guthrie & Bolus	Agulhas	CR (2011)	2024
Erica hansfordii E.G.H.Oliv.	SW	CR (2012)	2003
Erica hillburttii (E.G.H.Oliv.) E.G.H.Oliv.	EC	CR (2007)	2006
Erica jasminiflora Salisb.	SW	CR (2011)	2022
Erica karwyderi E.G.H.Oliv.	SW	CR (2007)	2025
Erica perplexa E.G.H.Oliv.	SW	CR (2007)	2012
Erica sociorum L.Bolus	Cape Peninsula	CR (2007)	2025
Erica ustulescens Guthrie & Bolus	SW	CR (2012)	2021

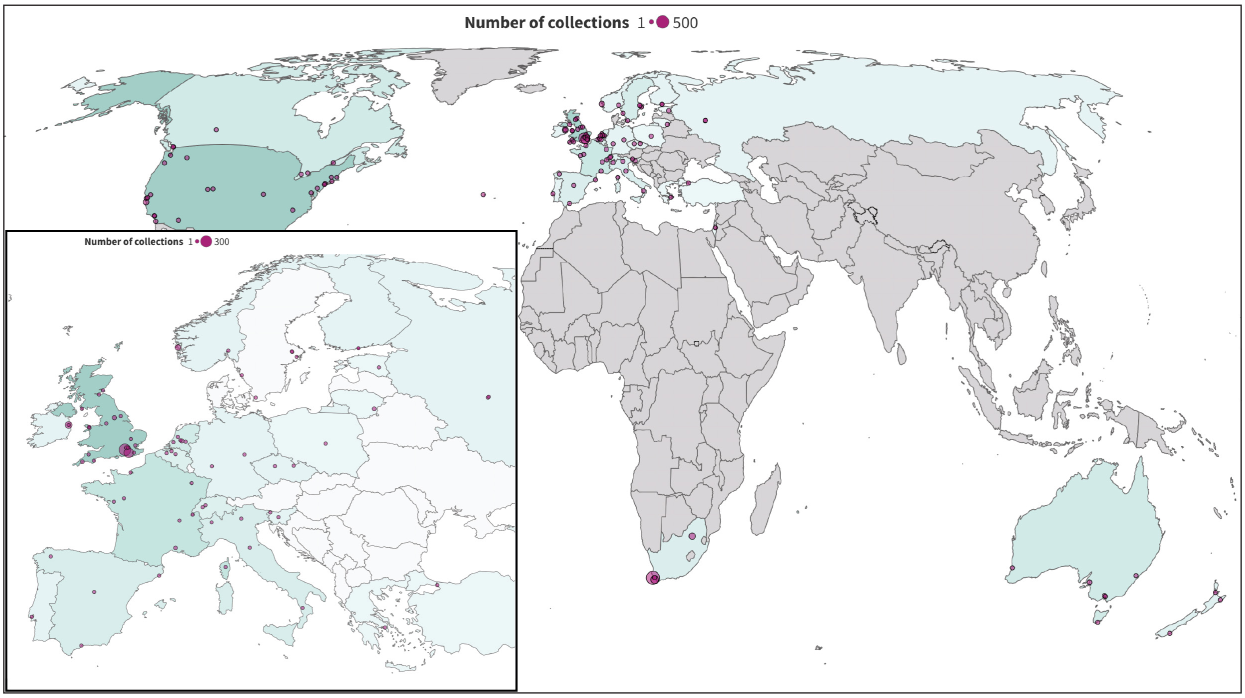

Figure 8. Distribution of *ex situ* collections of *Erica*. Worldwide and (inset) in Europe visualised using Flourish with countries coloured according to numbers of collections.

20 or more collections, and 15 of the 42 in 10 or more collections (Suppl. material 5). Cape/Afrotemperate taxa are reported in 81 collections but CR and EN taxa in only 18 (Fig. 9).

Of 46 CR species (51 non-inclusive taxa), 24 (26) are not known to be represented in any *ex situ* collections and a further nine (10) are only known from a single collection. In total, 32 of 48 EN species and 44 of 95 VU species are not in *ex situ* conservation. Of 189 threatened species, 89 (47%) are in one or more *ex situ* collections.

Most known accessions of threatened taxa are held by the botanic gardens of SANBI (Kirstenbosch, Harold Porter, and Pretoria National Botanical Gardens) and the Millennium Seed Bank, including 88 of the 109 accessions of CR and EN taxa in *ex situ* collections.

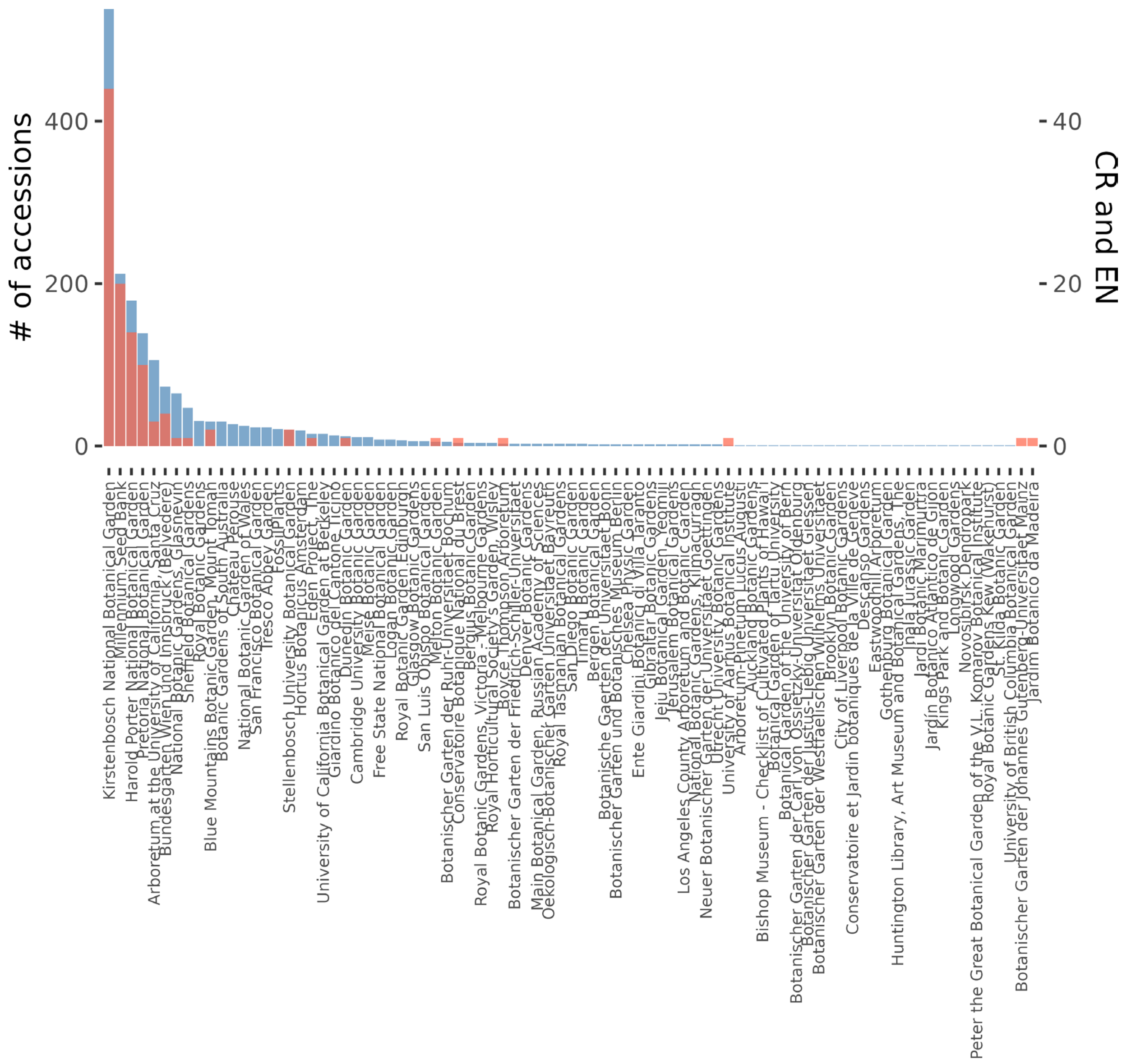

Figure 9. Number of Cape/Tropical African *Erica* accessions per collection, for collections holding at least one non-European species. Blue bars represent numbers of accessions (scale to the left) and red bars EN/CR taxa (scale to the right).

GCC *Erica* working group and plenary discussions

Notes from the discussion sessions are summarised in Suppl. material 6 and details incorporated into the Discussion. Obstacles that apply across all target outcomes include limitations in funding and human resources, and the large numbers of species involved. Space in living collections is limited.

Discussion

In our paper introducing GCC *Erica* (Pirie et al. 2022) we summarised five general challenges in *Erica* conservation:

1. Unequal distribution of species richness (and hence conservation needs) internationally, with particular concentration in South Africa

2. Limitations in fundamental knowledge (including undescribed diversity)
3. Lack of resources for work *in situ*
4. Knowledge gaps for effective work *ex situ*
5. An urgent need to communicate the intrinsic value of threatened diversity that few members of the public are likely to encounter directly.

The GCCs (Linsky et al. 2024) are generally organised geographically with local responsibility for endemic threatened species. The first challenge for GCC *Erica* — the concentration of endemic species richness in South Africa — made such an approach impractical. Instead, we adopted thematic working groups (WGs), summarised in Fig. 10 (reproduced from Pirie et al. 2022).

Since 2022, we have focussed on addressing fundamental knowledge gaps, particularly through WGs 1, 2 and 5. This gap analysis extends on those results to highlight remaining research needs, to present the state of knowledge for *ex situ* conservation, and to communicate the need for specific *in situ* conservation action.

Research needs: taxonomy and threat status

We now have several shared, open resources that can facilitate collaborative work to advance knowledge of species diversity: a consensus taxonomy under the WFO (Elliott et al. 2024); the *Erica* ID aid (Oliver et al. 2024) and the e-Flora of South Africa (le Roux et al. 2026) for descriptive and other linked data; IUCN (2025) and the

Figure 10. The working groups of GCC *Erica* (reproduced from Pirie et al. 2022 [CC-BY]): Threat status and conservation prioritisation; *In situ* conservation, collection and monitoring; Plant care and propagation; Seed research, conservation and supply; Taxonomy and phylogenomics; Outreach.

SANBI Red List for threat status; and iNaturalist and GBIF for repository of observation and collection data. One important gap in open accessibility is with regard to type specimens, which are crucial for disambiguating names.

Based on the figures from the South African National Plant Checklist (Klopper and Winter 2025), almost all of the outstanding descriptive data needed to populate the e-Flora of South Africa corresponds to taxa at subspecific or varietal level, more than half of which are autonyms. Autonyms often lack explicit definition, but many have nevertheless been threat assessed, and most as LC (i.e. interpreted as common forms). Next, descriptive data collation should continue to fill the gaps but where descriptions are absent, formal circumscription is required. Of 15 species that lack (English) description data, seven also lack recent occurrence data but only two (*E. pearsoniana* L.Bolus; *E. viscidiflora* Esterh.) are of DDT threat status. Those flagged as DDT are obvious priorities, but the numbers are large: 111 taxa, of which 71 are not recorded on GBIF, which will need to be compared with a wider pool of similar taxa and close relatives. Some are flagged as potential wild hybrids in the literature (e.g. Nelson and Small 2004), which may be possible to test. Targeted fieldwork will be required where limited specimens are available in collections.

Arguably more pressing knowledge gaps include undescribed species diversity (Hoekstra et al. 2025); undescribed diversity within species (e.g. in *E. mammosa* L.; Turner et al. 2023) and unclear species/subspecific boundaries within species complexes (such as in the *E. viscaria* L. clade, Musker et al. 2024; or *E. imbricata* L. clade, Kadlec et al. 2017). Many species, particularly in the Cape, are morphologically variable (Ojeda et al. 2019; Turner et al. 2023) and molecular data is useful to test (e.g. in *E. plukenetii* L.; van der Niet et al. 2014) or redefine (e.g. in *E. abietina* L.; Pirie et al. 2017) species concepts and help in interpretation of intra-specific variation. Around a third of *Erica* species do not have any DNA sequence data available and therefore cannot be reliably included in phylogenetic analyses, which limits our ability to identify them as EDGE species (Pirie et al. 2025) or as close relatives of putative novelties (Hoekstra et al. 2025). Using imputation methods to include missing species in phylogenetic trees (as used in Pirie et al. 2025) and extinction risk predictions (Bachman et al. 2024) could help mitigate these gaps, at least for the compilation of EDGE scores, but is a poor substitute for hard data: filling these knowledge gaps should be a priority.

Current threat assessments for South African taxa are based on those of Raimondo et al. (2009) and although there has been subsequent work most date back more than 10 years and need updating (Fig. 7). Many taxa not highlighted as of potential conservation concern were not subject to detailed assessment and instead given an automated status of LC (Raimondo et al. 2013b). These should be revisited, as some have subsequently proved to be threatened. Most species outside South Africa, including almost all Madagascan *Erica* (Hackel et al. 2025), lack assessments altogether. Automated solutions (Ralimanana et al. 2022; Zizka et al. 2022) suggest that five Malagasy taxa may be CR and a further two EN.

To support threat assessment, we need to provide resources to enable identifications and/or target the limitations of existing tools. This includes further developing the *Erica* ID aid and ideally making it more easily available in the form of a cross-platform app or website rather than exclusively for Windows PCs (Oliver et al. 2024). There has been a dramatic increase in observations documented on iNaturalist in recent years (Fig. 6), making it an increasingly important source of current information for species distributions. However, available data is strongly skewed to relatively few common species (both on iNaturalist: Fig. 6, and GBIF: Fig. 4). The proportion of species represented by fewer than 100 images, which therefore cannot feature in automated image recognition results, is still well over half (c. 480, 58%; Suppl. material 3). Targeted collection of data for the remaining species – and more photos per observation of the rarest taxa – would reduce this further. Efforts to highlight the species that are both rarely observed and little photographed could accelerate this process. An assessment of the performance of automated image recognition in such a large and complex genus as *Erica* would be timely.

Recent increases in available species observation data open further possibilities, such as improving knowledge of phenology including potential shifts in flowering events through time. Differences in species distributions according to current data versus those previously summarised for the *Erica* ID aid can point to various phenomena in need of further investigation, not limited to lack of recent, or precisely geolocated, data for particular species or to simple error. For example, *Erica baccans* L. is documented as endemic to the Cape Peninsula (Oliver and Oliver 2000) but recent observation data over many more QDS show where it has been introduced in isolated localities elsewhere. Given the unique patterns of species endemism in the Cape, this may be a cause for concern.

Ex situ conservation collections

Although species of *Erica* are held in at least 227 *ex situ* collections, these are dominated by non-threatened northern/European species. The current (minimum estimate) coverage of threatened taxa (47%) is greater than the (also minimum) 41% reported for threatened plants in general by Mounce et al. (2017). However, this falls short of targets under the CBD adopted Global Strategy for Plant Conservation (i.e. 75%). Only 18 collections hold any CR or EN taxa; most are only at SANBI gardens or the Millenium Seed Bank (MSBP). A total of 241 taxa are represented only at single sites, of which 12 are CR or EW: these are clearly vulnerable. Botanic gardens collections are subject to limitations both of capacity and in sourcing wild-origin material, and they are not expanding (Cano et al. 2025). However, within a coordinated network of specialist collections we can prioritise effort, spread risk, and improve representation of diversity across multiple sites (Griffith et al. 2019). Cape/Afrotemperate taxa are reported in 81 collections so there is potential for improving the current situation by distributing priority taxa to sites currently holding similar but arguably less important material.

We used BGCI's PlantSearch tool in a version that summarised data at taxon level only. We need better means to compare accession-level data to assess representation of distributions by wild-origin plants (Pearce et al. 2020; Brockington et al. 2026) and to thereby establish metacollections representing genetic diversity. Analysis of much better represented *Amorphophallus titanum* (Becc.) Becc. (Murrell et al. 2025) suggests that such data can be incomplete and hard to compare and that coordinated action is needed to avoid redundancy of genetic diversity, such as achieved through the global metacollection of *Wollemia nobilis* W.G.Jones, K.D.Hill & J.M.Allen (Offord and Zimmer 2025). Further examples of the importance of assessing representativeness of *ex situ* collections include Christe et al. (2014) who found contrasting results comparing two *Zelkova* Spach species (Ulmaceae), and Backs et al. (2021) who found that a diverse *ex situ* collection of *Quercus hinckleyi* C.H.Mull. nevertheless represented limited *in situ* diversity. The scale of the challenge for GCC *Erica* is large: one initial approach could be to focus on priority taxa, using ecogeographical representation as a proxy for genetic diversity (as applied in *Rhododendron* L. for instance; Hu et al. 2024)

For *ex situ* collections to provide the means to re-establish threatened species in the wild, we need to improve and share knowledge relevant to both keeping long term seed collections and growing plants in *ex situ* collections. A review of Ericaceae seed ecology worldwide, including not only horticultural findings, but also field work *in situ*, heathland management, etc., is needed for better understanding of horticultural limitations and needs. Research potential may, for instance, extend to testing for phylogenetic signal in seed viability. Living plant collections also represent an important reality check for seed banked collections. These themes should also be addressed in future iterations of conservation gap analyses.

Conservation prioritisation

We have summarised several different factors and metrics that can be used to prioritise action for particular *Erica* taxa. Beyond threat status and representation in *ex situ* collections, we can focus on taxa that are subject to particular nature of threat (GREW prioritisation) or those for which extinction would prune more evolutionary history from the *Erica* phylogenetic tree (EDGE species).

Because of the large number of species there are unlikely to be resources to address even the most urgent CR species, let alone EN and VU ones. In South Africa, 43 species of *Erica* are CR, but only 20 of those make it into the national top 200 GREW score for species of plants that require urgent conservation action (AR/IE unpublished data). It is therefore crucial that resources are used where they are needed most.

By summarising all these data in the *Erica* ID aid, anyone can keep an overview of this detailed information and use it to filter taxa to prioritise their own activities, be that field observations, research or curation of collections. For example, focusing on priority taxa that are in *ex situ* conservation but need to be distributed more widely (Fig. 11a), or those that need to be collected for *ex situ* conservation and/or research (Fig. 11b). They can also contribute to updating and improving the *Erica* ID aid, both through contributing to open resources such as iNaturalist and by suggesting updates to coding of particular taxa (contact the authors to get involved).

In situ conservation action

The most important means to prevent species extinctions is to conserve species in the full complexity of their native habitats, including often understudied or unknown aspects of ecosystem function that may be critical for persistence.

For example, the relationship between endemic plant species and their pollinators is complex (Monteiro et al. 2025). Threatened plants tend to be pollen limited (Lin et al. 2025), and pollinator diversity is important for plant reproductive success (Artamendi et al. 2024). Evidence thus far indicates that *Erica* species are strongly dependent on pollinators for reproduction, with most

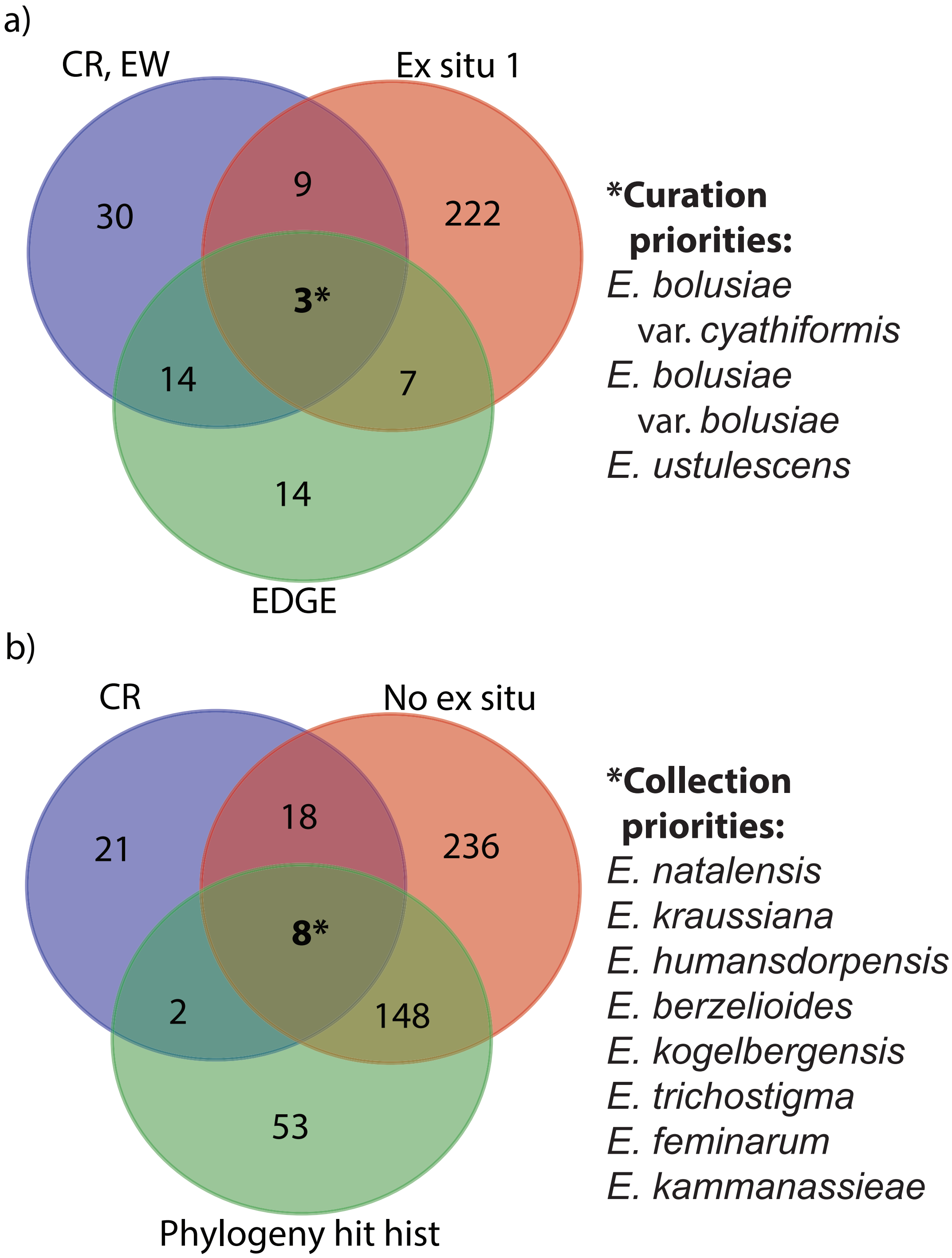

Figure 11. Prioritisation using research data in the *Erica* ID aid. The taxa can be filtered on different combinations of criteria in 'identify' mode. Here we show Venn diagrams (produced using https://bioinformatics.psb.ugent.be/webtools/Venn/) of *Erica* taxa **a.** That are CR/EW, represented in a single *ex situ* collection, and EDGE species (e.g. for securing existing *ex situ* collections); and **b.** Those that are CR, not in *ex situ*, and the 'phylogeny hit-list' of taxa not yet included in phylogenetic analyses (e.g. for targeting collection).

species being incapable of resprouting after fire (Oliver 1991) or of self-pollination (Angoh et al. 2017; Coetzee et al. 2020; Arendse et al. 2021). Despite their importance, pollinators have been identified for only 1.8% of all *Erica* species (van der Niet 2021). Progress has been made in *Erica* research (e.g. Turner et al. 2011; Coetzee et al. 2021; van der Niet and Cozien 2022, 2024; McCarren et al.

2024), but many species and their pollinators remain understudied. The same is true of other potentially important factors, such as symbiotic soil microbiota. Most *Erica* species are thought to regenerate from seed after fire (Oliver 1991). However, the conditions that optimise *Erica* recruitment after fire is unknown since seed longevity, seed dispersal ability and germination requirements are poorly studied. This kind of fundamental ecological knowledge is important for effective *in situ* conservation and restoration.

Threats to wild populations include invasive alien species; changes to fire regimes; destruction of habitats, and combinations of these factors (van Wilgen 2013; Skowno et al. 2021; van Wilgen et al. 2025), further compounded by the impact of climate change including projected intensification of droughts (Mbana and Simatele 2026).

Progress has been made in tackling invasive species in South Africa (Roy et al. 2023), but funding for action is decreasing (van Wilgen et al. 2025). Current conservation activities and priority conservation action include wild collecting, particularly through SANBI and its Custodians of Rare and Endangered Wildflowers programme (CREW; Raimondo et al. 2013a; Ebrahim 2025) and the MSBP. Critically Endangered species held in *ex situ* curation include *E. recurvata* Andrews (Fig. 12b.; Raimondo et al. 2013a). Species have been reintroduced, e.g. *E. verticillata* P.J.Bergius (Fig. 12d.; Hitchcock and Rebelo 2017; Hitchcock 2020) and *E. turgida* Salisb. (Fig. 12c.; Raimondo et al. 2013a; Hitchcock et al. 2020). Populations of *E. turgida* at Tokai have now been burned (first of three fire cycles needed to classify as restored and thus not EW), but at the time of writing it is too early to determine if any seedlings have emerged. *Erica verticillata* has regenerated and flowered at Prinskasteel Wetland (and Rondevlei), but the largest populations at Tokai have not yet burned. *In situ* conservation efforts for *E. jasminiflora* Salisb. (Fig. 12a), for instance, have focussed on greater land protection (Raimondo et al. 2013a).

Openly available data on GBIF shows that many taxa — including threatened ones — are found within protected areas. We need to confirm species only found on private property (e.g. using GIS-based approaches), especially those not part of stewardship programmes. Individual Critically Endangered species may require specific conservation action plans, such as those prepared for endangered *Magnolia* species (e.g. Berryhill et al. 2023 onward).

In South Africa, government actions are often focussed on water security, which may be combined with conservation action, e.g. where removal of alien vegetation serves both purposes (van Wilgen and Wannenburgh 2016). There may also be potential for combining biodiversity data and carbon offsetting to prioritise restoration projects (Silvestro and Pimiento 2025). The future impact of climate change should be assessed using niche modelling of individual species (Zhigila et al. 2023).

Even common and widespread species, such as *E. arborea* ranging from tropical Africa to Europe and the Canary Islands, may be in decline as a result of habitat transformation (Berhe et al. 2024) and should be considered when prioritising areas for conservation action.

Whilst few species in Europe are formally threatened, they represent relatively high phylogenetic diversity and can be of concern. The most striking case is of *Erica maderensis* (Benth.) Bornm., the highest scoring EDGE species in *Erica* (Pirie et al. 2024).

Figure 12. Critically Endangered and Extinct in the Wild Cape *Erica*. As profiled in 'Plants in peril' (Raimondo et al. 2013a): **a.** *E. jasminiflora* (linkie: CC BY; https://www.inaturalist.org/observations/39275964); **b.** *E. recurvata* (Bionerds: CC BY-NC; https://www.inaturalist.org/photos/227117321); **c.** *E. turgida* (NF: CC BY-NC; https://www.inaturalist.org/observations/65579690), and **d.** *E. verticillata* (Callum Evans: CC BY-NC; https://www.inaturalist.org/photos/15674463).

A less obvious example is *Erica sicula* Guss. (Fig. 13; Pasta et al. 2025), which includes two subspecies, subsp. *sicula* and subsp. *bocquetii* (Peșmen) E.C.Nelson, currently represented by 31 and eight populations, respectively. The species occurs in a severely fragmented range distributed across five central and eastern Mediterranean countries (Italy, Libya, Cyprus, Türkiye and Lebanon). Improving conservation strategies requires the collaboration of specialists from all involved countries, making it crucial to maintain networks of experts across the Mediterranean Basin. Based on a recent overview on the available information on both subspecies, Pasta et al. (2025) evaluated *E. sicula* s.l. as LC at the global level, even though each subspecies and subpopulation are nationally EN. In fact, 19 locations of *E. sicula* subsp. *sicula* were not confirmed recently, and this subspecies should be considered as CR in Italy and VU in Lebanon, Cyprus, Türkiye and Libya. *Erica sicula*

Figure 13. *Erica sicula* from Mt. Cofano (NW Sicily). Cliff habitat and (inset) flowers. Photo: Dario Salemi.

subsp. *bocquetii*, recently found at lower altitudes in several new locations, is also assessed as VU. Further fieldwork is recommended to better assess the conservation status and the demographic trends of the wild populations, most of which are locally subject to multiple threats (mostly fire in Sicily, overgrazing in Cyprus and Türkiye, quarrying in Lebanon, all the above-mentioned disturbances in Libya) inducing continuous regression.

A further European species of concern is *Erica andevalensis* Cabezudo & J.Rivera (Fig. 14; Rodríguez-Buján et al. 2024), which occurs on the Iberian Pyritic Belt, a geological enclave in the South-West of the Iberian Peninsula, characterised by a Hercynian granitic bedrock with high levels of metals such as copper. Historical mining of the area may have started as early as 5000 B.P. and became industrial with the arrival of the Romans (Tornos et al. 2000). The main rivers that have carved the bedrock are highly polluted with heavy metals such as Fe, Cu, Pb, Zn, Mn, Cd, Co, Ni, As, Sb, and Al. Andevalo's heather (*E. andevalensis*), named after the Andévalo region in Huelva, SW Spain, thrives in this restrictive environment. This heather belongs to the *E. tetralix-ciliaris* clade, a group of species that occur in wetlands. *Erica andevalensis* was only discovered in 1980, previously misidentified as *E. tetralix* but closer to the northern Iberian *E. mackayana* Bab.. With the limited distribution area of *E. andevalensis*, mainly the Odiel and Tinto River basins, and its highly restrictive habitat in the polluted riverbanks, it qualifies as an Endangered species that merits protection.

Figure 14. *Erica andevalensis*. Habitat and (inset) flowers. Photo: JF.

Conclusions

Although both a fully sampled and resolved phylogenetic tree and a modern taxonomic revision of *Erica* are overdue, there is substantial open and accessible data on *Erica* nomenclature, taxonomy, and diversity available particularly through WFO, the e-Flora of South Africa, GBIF, and iNaturalist. Specific research gaps include undescribed diversity, both within species complexes and poorly understood taxa, and particularly infraspecific taxa and their distinction from more common subspecies or varieties. Threat assessment updates are needed, especially for rare and (likely) threatened taxa. Data for Malagasy diversity is generally thin. This information needs to feed into more widely accessible tools for effective species identification, such as a cross-platform version of the *Erica* ID aid.

The current state of *ex situ* conservation of threatened *Erica* taxa is behind target, but there are achievable steps for improving the situation. There is potential for substantial increase in effective protection of threatened taxa across collections currently holding common African/Cape species. Beyond ground-truthing of the current status of priority taxa in individual collections, we need accession-level comparison of data and sharing of material across distributed metacollections with focus on conservation grade material including representative genetic diversity/coverage of wild distributions and variability. Data on pollination ecology, seed longevity and techniques for effective cultivation are also needed.

Needs for *in situ* conservation action include updated data on priority species (including population-level monitoring), habitats (including ecological factors), and threats. Collaboration with both private landowners and the public will be crucial for securing species and collecting data. In South Africa, clearance of invasive alien plants is particularly important.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

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Use of AI

No use of AI was reported.

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Author contributions

Curated data: SPB, ACE, NF, RRK, MDP, MMlR, TR; analysed data: MK, IQ, NMN, SPi, TR; discussions and preliminary meetings: MDP, RB-M, AC, DC, IE, NMN, JO, SPa, IQ, AGR, PR, MMlR, MS, VW; GCC Erica steering committee: MDP, RB-M, IE, FF, RK, NMN, JO, DR, VW; CREW: IE, TR; WFO Ericaceae TEN: ACE, RRK, MDP; drafted ms.: MDP; reviewed ms.: all authors. Contributing institutions: GCC *Erica* is an initiative of BGCI led at UiB in collaboration with international partners including SANBI, the MSBP and WFO.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

List of contributing collections

Authors: Michael D. Pirie, Stoffel P. Bester, Robbie Blackhall-Miles, Anina Coetzee, Dan Crowley, Ismail Ebrahim, Alan C. Elliott, Jaime Fagúndez, Félix Forest, Nigel Forshaw, Rendert D. Hoekstra, Martha Kandziora, Ronell R. Klopper, Rupert Koopman, Seth D. Musker, Nicolai M. Nürk, Jo Osborne, Salvatore Pasta, Sebastian Pipins, Itxaso Quintana, Anthony G. Rebelo, Paul Rees, Daniel Rohrauer, M. Marianne le Roux, Martin Smit, Victoria Wilman

Data type: zip

Link: https://doi.org/10.3897/natureconservation.63.175466.suppl1

Supplementary material 2

Occurrence data. Methods: filtering of GBIF data; overlap with protected areas. Summaries of data

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Data type: zip

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Supplementary material 3

Prioritisation: Selection process for species of conservation concern: GREW. Detailed results

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Supplementary material 4

iNaturalist documentation and script for extracting data

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Supplementary material 5

Ex situ collections: Details from PlantSearch

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Supplementary material 6

GCC _Erica_ working group and plenary discussions

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