

BioSCape: Vegetation Composition at Plots with Woody Invasives, CFR, South Africa

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Summary

This dataset contains vegetation plot data collected across the Cape Floristic Region (CFR) of South Africa as part of the BioSCape (Biodiversity Survey of the Cape) project. It holds field-based measurements of vegetation composition, structure, and cover across the region's Fynbos and associated plant communities. Variables include plot center coordinates, percent cover, canopy diameter, and abundance by species. Plots were distributed across multiple reserves and land units spanning the CFR, with field data collection occurring between September and December 2023. These data follow the protocols for environmentally stratified BioSCape vegetation surveys but differ in that they targeted locations near existing BioSCape plots, in similar surrounding vegetation to the extent possible, that also contained woody invasive species cover of approximately 20-80%. These data provide ground-truth observations for calibrating and validating airborne and satellite remote sensing data products across the CFR's diverse and threatened plant communities. The data are provided in comma separated values (CSV) format.

This dataset holds one file in comma separated values (CSV) format.

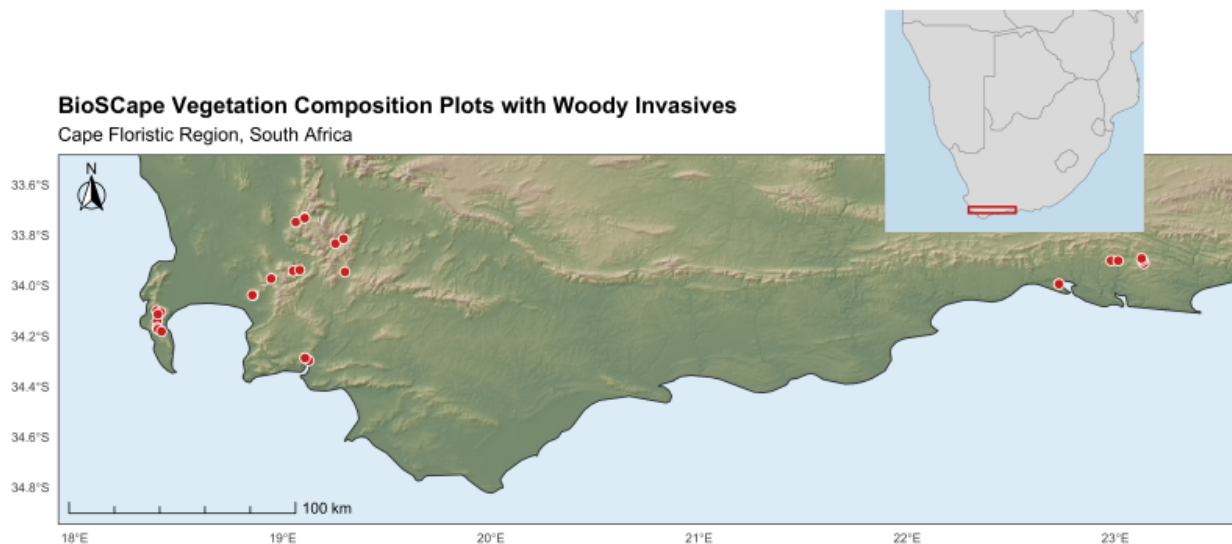


Figure 1. Locations of BioSCape vegetation composition plots containing woody invasive species (red points; $n = 28$) across the Cape Floristic Region, Western Cape Province, South Africa. Plots were surveyed September-December 2023 as part of the BioSCape airborne campaign and were sited near existing environmentally stratified BioSCape vegetation survey plots in areas with woody invasive cover of approximately 20-80%. Each circular plot (10 m transect radius) recorded line-intercept canopy cover and quadrant-based species percent cover.

Citation

Fitzpatrick, M.C., D. Spalink, A.J. Elmore, J. Measey, and S. Kritzinger-Klopper. 2026. BioSCape: Vegetation Composition at Plots with Woody Invasives, CFR, South Africa. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/2511>

Table of Contents

- [1. Dataset Overview](#)
- [2. Data Characteristics](#)
- [3. Application and Derivation](#)
- [4. Quality Assessment](#)
- [5. Data Acquisition, Materials, and Methods](#)
- [6. References](#)

1. Dataset Overview

This dataset contains vegetation plot data collected across the Cape Floristic Region (CFR) of South Africa as part of the BioSCape (Biodiversity Survey of the Cape) project. It holds field-based measurements of vegetation composition, structure, and cover across the region's Fynbos and associated plant communities. Variables include plot center coordinates, percent cover, canopy diameter, and abundance by species. Plots were distributed across multiple reserves and land units spanning the CFR, with field data collection occurring between September and December 2023. These data follow the protocols for environmentally stratified BioSCape vegetation surveys but differ in that they targeted locations near existing BioSCape plots, in similar surrounding vegetation to the extent possible, that also contained woody invasive species cover of approximately 20–80%.

These data provide ground-truth observations for calibrating and validating airborne and satellite remote sensing data products across the CFR's diverse and threatened plant communities (Cardoso et al., 2025).

Project: Biodiversity Survey of the Cape ([BioSCape](#))

The Biodiversity Survey of the Cape (BioSCape) is a research project that uses remote sensing and field data to understand the distribution, function, and importance of biodiversity on land and in the water around the Greater Cape Floristic Region (GCFR). Located in southwestern South Africa along the Atlantic coast, the GCFR is one of the world's 36 biodiversity hotspots. BioSCape is a collaboration between the US and South Africa. The team conducted an integrated field and airborne campaign in the hyperdiverse region in 2023. Researchers collected laser altimetry LiDAR data and UV/visible to short wavelength infrared (UVSWIR) and thermal imaging spectroscopy data over terrestrial and aquatic targets using four airborne instruments: [AVIRIS-NG](#), [PRISM](#), [LVIS](#), and [HyTES](#). This airborne dataset is unique in its size and scope and unprecedented in its instrument combination and level of detail. These airborne data are accompanied by a range of biodiversity-related field observations.

Acknowledgments:

This research was supported by NASA's Biological Diversity and Ecosystem Conservation Program (grant 80NSSC22K1034).

2. Data Characteristics

Spatial Coverage: Cape Floristic Region, Western Cape Province, South Africa

Spatial Resolution: circular plots with 10-m diameter

Temporal Coverage: 2023-09-06 to 2023-12-16

Temporal Resolution: One time sample

Site Boundaries: Latitude and longitude are given in decimal degrees.

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Western Cape Province, South Africa	18.3939	23.1364	-33.7301	-34.2974

Data File Information

This dataset holds one file in comma separated values format: *Bioscape_veg_plots_woodyinvasives.csv*.

Missing data are indicated by -9999 for numeric variables.

Table 1. Variables in *Bioscape_veg_plots_woodyinvasives.csv*.

Variable	Units	Description
id	-	Unique record identifier
siteCode	-	Site name
plot	-	Plot number
surveyDate	YYYY-MM-DD	Date of field survey
longitude	degrees east	Plot center longitude in decimal degrees (WGS84 datum)
latitude	degrees north	Plot center latitude in decimal degrees (WGS84 datum)
originalSpeciesName	-	Full species name as recorded in the field
originalGenus	-	Genus as recorded in the field
originalSpecies	-	Species epithet as recorded in the field
originalSubspecies	-	Subspecies as recorded in the field, if applicable
canopyDiameter_cm	cm	Canopy diameter of individual
abundance	1	Count of individuals recorded. A value of 1 is used for transect-based measurements; counts are provided for quadrat-based measurements.
percentCover	percent	Estimated percent cover of species within plot
observationType	-	Method used to record observation (e.g., line-intercept, quadrat)
acceptedName	-	Taxonomically verified species name

3. Application and Derivation

These data were collected to support the development and evaluation of a biodiversity mapping pipeline that integrates field-based vegetation observations with airborne remote sensing to predict plant community composition across the Cape Floristic Region. Specifically, these data provide ground-truth observations of vegetation composition, structure, and cover — including woody invasive species — that can be used to train and evaluate statistical models for quantifying and mapping spatial turnover in taxonomic, phylogenetic, and functional beta-diversity as a function of optical, thermal, and LiDAR remote sensing signals from the BioScape airborne campaign (Cardoso et al., 2025). More broadly, these data contribute to efforts to develop scalable biodiversity monitoring systems using current and anticipated spaceborne imaging spectroscopy missions.

4. Quality Assessment

Plant species identifications were made by trained botanists and reviewed post-fieldwork.

5. Data Acquisition, Materials, and Methods

Vegetation data were collected between September and December 2023 at plots distributed across the Cape Floristic Region of South Africa as part of the BioScape airborne campaign. Plot locations were selected near existing environmentally stratified BioScape vegetation survey plots, targeting areas with woody invasive species cover of approximately 20–80% in otherwise similar surrounding vegetation to the extent possible.

At each circular plot, two 10-m transect lines were established crossing at the plot center in north-south and west-east orientations (Figure 2). Vegetation data were collected using line-intercept surveys along these transects, recording canopy species within 10 cm of each side of the transect rope. Species-level percent cover was estimated by quadrant. Plot centers were geolocated using GPS and permanently marked with a buried magnet. Data were entered into pre-configured spreadsheet templates in the field then reviewed and synchronized to cloud storage each evening. Taxonomic names were verified against an accepted taxonomic authority and accepted names are provided alongside the original field names.



Figure 2. Photograph of plot 301 in the Cape Floristic Region, Western Cape Province, South Africa, showing fynbos shrubland invaded by the woody invasive *Pinus radiata*. The two perpendicular line-intercept transects cross at the plot centroid, marked with candy-striped flagging tape.

6. References

Cardoso, A.W., E.L. Hestir, J.A. Slingsby, C.J. Forbes, G.R. Moncrieff, W. Turner, A.L. Skowno, J. Nesslage, P.G. Brodrick, K.D. Gaddis, and A.M. Wilson. 2025. The biodiversity survey of the Cape (BioScape), integrating remote sensing with biodiversity science. *npj biodiversity* 4:2. <https://doi.org/10.1038/s44185-024-00071-5>