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Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

The *ex situ* and *in situ* conservation of the Critically Endangered *Protea roupelliae* sbsp. *hamiltonii* and conservation of the co-occurring endangered *Leucospermum gerrardii* within the Dr. Hamilton Nature Reserve

Two of the legally protected *Protea* species occurring in Mpumulanga are on the verge of extinction. *Protea roupelliae hamiltonii* is Critically Endangered while *Leucospermum gerrardii* is Vulnerable and earmarked as high priority for conservation action. *P. r. hamiltonii* is a highly restricted endemic, presently comprising only one population in the Nelshoogte region of Barberton, Mpumulanga, whereas *L. gerrardii* presently comprises a few populations. Of the three known populations of *P. r. hamiltonii*, two became extinct as a direct consequence of afforestation in Nelshoogte State Forest. Three populations of *L. gerrardii* have also been afforested with pines and consequently are locally extinct. Currently, *P. r. hamiltonii* is now restricted to the Dr Hamilton Nature Reserve within the KLF Nelshoogte State Forest managed by DAFF and is now in imminent danger of extinction.

A census of *P. r. hamiltonii* in 1982 by the then Transvaal Provincial Administration revealed approximately 1090 individuals in the reserve. Annual monitoring of a subsample of 368 plants by DWAF, Forestek and the University of Witwatersrand during the period 1985 to 2000 has revealed that numbers of *P. r. hamiltonii* are undergoing a precipitous decline. At the most recent census (November 2000), the total population of *P. r. hamiltonii* comprised just 172 individuals within the Dr Hamilton Nature Reserve. It was also found that a few hundred *L. gerrardii* plants also occur in the reserve, and this population may be one of the largest surviving remnants of the species.

The remaining *P. r. hamiltonii* plants are under severe physiological stress due to both the dysfunctional landscape and abnormal herbivory pattern. The *P. r. hamiltonii* plants have long ceased flowering and there is no evidence of recruitment. *L. gerrardii*, however, is still flowering, and there is some evidence of recruitment. At the present rate of decline, *P. r. hamiltonii* is predicted to become Extinct in the near future, whereas the co-occurring *L. gerrardii* is considered a high priority species for conservation efforts. Since *ex situ* conservation of *P. r. hamiltonii* has not been maintained, extinction will be total.

Considerable and commendable effort has been expended by the previous Department of Forestry and DAFF in establishing the Dr Hamilton Nature Reserve within a State Forest to protect two rare *Protea* species. The Department in its various manifestations has to in the past extended the proposed reserve boundaries, established long-term monitoring of one *Protea* population, attempted *ex situ* conservation and to rejuvenate the population by planting seedlings. Considerable effort must now be taken to restore the degraded nature reserve, rescue the *Protea spp* from extinction *via* a sustained *ex situ* conservation effort and establish a feasible regime for long-term *in situ* conservation.

This has lead to a project launched in 2002 entailing a *Protea* and reserve rescue programme comprising *ex situ* and *in situ* conservation strategies (the latter including restoration of the Dr Hamilton Nature Reserve), collation of a large amount of historical and current data, population modeling and a long-term management plan. The objectives of the project include:

- To effect the short to medium term *ex situ* conservation of an Mpumulanga endemic *Protea* on the verge of extinction: *Protea roupelliae* ssp. *Hamiltonii*;
- To establish the conservation status and population health of the co-occurring endangered *Protea Leucospermum gerrardii* in the Dr Hamilton Nature Reserve;
- To effect the long-term *in situ* conservation of *Protea roupelliae* ssp. *hamiltonii* and *Leucospermum gerrardii* in the Dr Hamilton Nature Reserve and
- To develop an adoptive management plan for the Dr Hamilton Nature Reserve.

The scope of the work includes:

- To prevent any further degradation of the *P. r. hamiltonii* plants by erection of an antelope-proof fence around remaining plants, and testing of antelope antifeedants;
- To effect the long-term protection of *P. r. hamiltonii* and *L. gerrardii via* restoration of the landscape integrity, and natural hydrological and nutrient-cycling patterns at the Dr Hamilton Nature Reserve in collaboration with Komatiland Forests;
- To undertake a full population census of *P. r. hamiltonii* and *L. gerrardii* in the Dr Hamilton Nature Reserve;
- Compile a description of the biotic, physical and chemical environmental setting of the populations in the Dr Hamilton Nature Reserve, as well as the landscape context;
- Collation and statistical analysis of historical data sets for the region of the Dr Hamilton Nature Reserve in order to provide a biologically meaningful chronology of events preceding, and associated with plant population decline, and to review and report on all existing information collected for both species to date and during the course of this study;
- To access previous localities of *P. r. hamiltonii* in the Nelshoogte region in order to find remnant plants and profile these habitats;
- To secure the existing individuals of *P. r. hamiltonii,* thus preventing total extinction of the species;
- Perform population augmentation to arrest decline and increase attractiveness to pollinators;
- Perform artificial pollination of *P. r. hamiltonii* in the Dr Hamilton Nature Reserve;

- To identify seed germination cues and germination dynamics in *P. r. hamiltonii* and *L. gerrardii*, and maintain an *ex situ* collection of seedlings of *P. r. hamiltonii* for re-introduction to the wild and

- To develop a long-term active management plan for the Dr Hamilton Nature Reserve, incorporating population monitoring of existing and re-introduced plants.

To date, an antelope proof fence was erected and is maintained on a regular basis. The reserve has enlarged to include the whole sub–catchment and entailed the removal of about 3 ha of pine plantation. In order to maintain the pristine state of the area regular removal of invasive aliens is also an ongoing exercise. One full census was completed where the GPS positions of all plants were captures. To date, most historical data has been collated. The historical sites have been visited and searched for remnants of plants but unfortunately no plants have been found thus far.

In October 2008, 282 large *Protea* seedlings which were cultivated at the University of Witwatersrand from seed collected in the known population were re-established within the fenced area. Furthermore, naturally established seedlings were counted in 2009. Thirty two 1 m^2 mini enclosures were sown with *Protea* seeds in set up in October 2008 and. By late march the following year, 104 seedlings were counted. All these seedlings were marked and measured and survival assessed in April 2009, was calculated at 66.3%.

A single dead adult plant was also found in late March 2009. This plant was excavated and the age of the plant will be determined using Carbon 14 dating. This process forms part of a current MSc of Anisha Dayaram, who is carbon dating a number of grassland forbs/shrubs, including another *Protea* sp.

The Department in collaboration with the University of Witwatersrand has committed itself to continue with the research in an aim to protect and revive the threatened *Protea* species. The Department aims to effect the *ex situ* and *in situ* conservation of the critically endangered *Protea roupelliae* sbsp. *hamiltonii* and conservation of the co–occurring endangered *Leucospermum gerrardii* within the Dr. Hamilton Nature Reserve in Nelshoogte State Forest.

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