Ascension Island Biodiversity Action Plan

PTERIS ADSCENSIONIS

Photo: M. Hamilton

SUMMARY

Taxonomy: Kingdom: Plantae; Phylum: Polypodiophyta; Class: Polypodiopsida; Order: Pteridales; Family: Pteridaceae; Species: *Pteris adscensionis*

Nativeness: Endemic to Ascension Island

Description: *P. adscensionis* is a small to medium-sized fern forming shuttlecock shaped tufts up to 80 cm tall. Generally found growing in rock crevices or on cliffs in sheltered valleys around the foot slopes of Green Mountain.

IUCN Red List status: Critically Endangered CR

Local trend: Unknown

Threats: The major threat to *P. adscensionis* is from competition with invasive plant species; secondary threats include grazing by introduced herbivores and climate change-induced habitat alteration.

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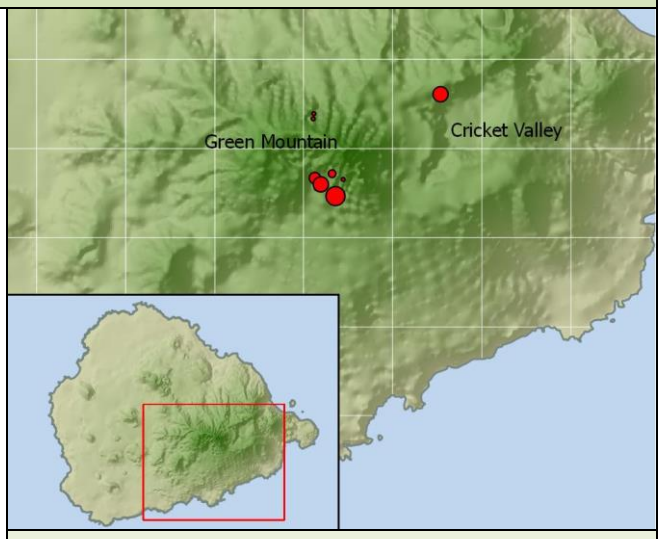
2. Distribution

Global

Pteris adscensionis is endemic to Ascension Island.

Local

The population of *P. adscensionis* is currently highly restricted, being largely confined to a few sheltered valleys on the southern and eastern foot-slopes of Green Mountain, scattered between approximately 370 and 700 m [1]. The three largest centres occur in lower Breakneck Valley, in an adjacent un-named valley approximately 250 m east of Breakneck (known locally as "Valley East"), and in Cricket Valley, a crater 1 km to the southeast. A few individuals, mostly growing from dry rock crevices, can be found erratically between these areas, and one outpost comprising less than 10 plants is located in a deep crevice on the north side of the mountain known locally as Mulberry Ravine. The original range of *P. adscensionis* is not known, but based on descriptions from the mid-1800s it was probably once widely-distributed across the drier, mid-altitude slopes of Green Mountain [1,2], and may even have occurred close to the peak [3].



Distribution of *Pteris adscensionis* in March 2014 (AIG Conservation Department, unpublished data). Symbol sizes are scaled according to total numbers of plants encountered.

3. Status

Population estimate:	600-700 mature individuals	Trend:	Possibly increasing	IUCN status:	Critically Endangered

The population of P. ascensionis has been monitored annually since 2002, although data prior to 2008 are patchy and their reliability is sometimes questionable. At the most recent census in March 2014 there were 691 mature individuals in known wild populations, including at least 73 cultivated plants re-introduced to the lower Breakneck Valley site. The adult population appears to have remained relatively stable since 2010 at 600-700 individuals, and may even have increased over recent decades. Cronk was only able to locate 20 individuals in the Breakneck Valley and Cricket Valley populations in 1976 [3]. Gray et al. estimated the total population to be 150 – 200 individuals in 2005 [4], and Renshaw et al. report approximately 250 mature individuals in 2008/2009 [1]. The discovery of several new sub-populations, including a healthy population located in an inaccessible valley during the 2009 annual census, undoubtedly accounts for some of the apparent increase [1]. However, it seems possible that some natural population growth has also occurred. The reasons for this increase are not apparent at present and should be treated cautiously given the sparseness and unknown quality of historical data. Moreover, it is clear from the information given in [5] and [3] that there has been a severe long-term decline in the abundance of *P. adscensionis* over the past 150 years, largely driven by the spread of introduced vegetation. There is no evidence to suggest that this advance has ceased, and key competitor species are almost certainly continuing to spread to new areas of the mountain.

4. Ecology

Habitat

P. adscensionis occupies the climatically-intermediate, mid-elevation zone around the lower slopes of Green Mountain. It is more desiccation resistant than most native ferns and able to survive the moderately dry conditions that occur periodically in this area. The majority of extant individuals are cliff-dwelling, growing on sparsely-vegetated, vertical cinder banks and trachyte cliffs in sheltered valleys and gullies. However, Lamdbon et al.

speculate that existing localities may represent relicts of secondary habitat and that *P. adscensionis* once formed sparse swards across the open foothills of Green Mountain, potentially forming loose communities with indigenous species such as the grasses *Digitaria ciliaris* and *Polypogon tenius*, the extinct shrub *Oldenlandia adscensionis* and the ferns *Christella dentata*, *Nephrolepis hirsutula* and *Psilotum nudum* [2].

Reproduction & life history

Reproduces sexually via spores which, based on the wide geographical range of occasional outlying plants, are efficiently dispersed by the wind [2]. The high ratio of seedlings to mature plants in some locations suggests that only a small proportion survive to maturity [1]. In moist, shaded locations plants mature at a relatively large size which may take two or three years to attain, whereas in more marginal habitats individuals may produce a few sporangia at a small size and die after one or two years [1]. However, even under optimal conditions sporophytes appear to persist for only a few years, suggesting that the rate of population turnover is high [1,2].

Taxonomy & population structure

P. adscensionis is closely related to *P. dentata*, a native of Africa and St Helena (UK), and island 800 miles to the south east. It is potentially merely a form of this species, although there are some morphological and ecological differences from the St Helenian population [1]. Further work is needed to resolve its true taxonomic status.

4. Threats*

8.1.2 Invasive non-native/alien species/diseases (named species)	**Impact:**	HIGH

Pteris adscensionis is very vulnerable to encroachment by invasive weed species at its remaining localities. The most serious competitors include grasses such as Melinis minutiflora and Sporobolus africanus, which form continuous ground cover and thus remove potential germination sites [1]. Broadleaved weeds such as *Alpinia zerumbet*, *Psidium guajava*, *Lantana camara*, *Juniperus bermudiana* and *Spermacoce verticillata* are responsible for in-filling large areas of suitable habitat, and *Clidemia hirta*, *Rubus rosifolius* and *Begonia hirtella* are also a significant threat as they invade key refuges on banks and rocks [1]. At the higher altitudes, there may be some competition with the maidenhair ferns *Adiantum cappilus-veneris* and *A. raddianum*. Such species have already overwhelmed most of the original suitable habitat areas which once existed on Ascension and have undoubtedly been responsible for an already massive decline. The other major threat is posed by introduced grazing animals, particularly sheep and rabbits. These are very common at mid-altitudes and, whilst ferns such as *Pteris* spp. are not particularly palatable as adults, they are often grazed avidly when young.

11.1 Climate change & severe weather: Habitat shifting and alteration	**Impact:**	UNKNOWN

Pteris adscensionis is able to withstand drier conditions than some of Ascension Island's other native ferns, although gametophytes and sporelings are susceptible to drought, particularly at lower elevations [1,2]. It is difficult to predict long-term changes in precipitation at Ascension Island with any degree of confidence [6]. However, rising air temperatures and a concomitant decrease in available soil moisture caused by increased evapotranspiration may confine *Pteris adscensionis* to ever higher elevations. Indeed, global climate models predict that the altitudinal distributions of many montane species will increase by hundreds of metres during the 21st century [7]. Such range shifts may be problematic for *Pteris adscensionis* as much of the suitable habitat at higher elevations is already saturated with introduced vegetation.

10.3 Avalanches/landslides	**Impact:**	LOW

Bank slippages and rock falls are a potential threat in the cliff habitats occupied by *Pteris adscensionis*, although in most areas these would only impact a small proportion of the population, which is distributed thinly.

*Threats are classified and scored according to the IUCN-CMP Unified Classification of Direct Threats [8]

Relevant policies and legislation

Local

P. adscensionis is protected under the Wildlife Protection Ordinance 2013, which prohibits the damaging, killing or possession of protected species without license.

All known populations are contained within Green Mountain National Park designated under the National Protected Areas Order 2014. The National Protected Areas Regulations 2014 restrict all forms of development within the national park.

Management notes

Given the extremely low numbers present in the wild 20 years ago (perhaps less than 50 mature individuals), substantial progress has been made towards securing the future of this species. Propagation protocols are well developed and large numbers of cultivated plants have been re-introduced to restoration areas in Breakneck Valley (The Pines), Cricket Valley and in a cloud forest clearing near to the summit of Green Mountain. The latter is probably outside of the core, native range of *P. adscensionis* and has proven difficult to manage due to the continuous, rapid encroachment of invasive weeds. Small scale trials suggest that denser planting may improve resistance to invasion, but it is doubtful that self-sustaining populations can ever be induced to develop in this habitat. Future restoration work should therefore focus on drier, mid-elevation habitats adjacent to or similar to those occupied by extant populations. These areas tend to be less densely vegetated than high altitude sites and are therefore easier to maintain. Light management during routine monitoring visits is generally sufficient to suppress weeds around existing populations at present and this should continue to be sustainable unless conditions deteriorate.

Given the highly restricted distribution and apparently precarious recruitment situation of *P. adscensionis*, *ex situ* propagation and restoration will continue to play a pivotal role in the conservation of the species over the short to medium term. Establishing new sub-populations within the natural range of the species is of high priority and should be possible based on current understanding of habitat preferences. Attempting to expand the small satellite population on the northern slopes of Green Mountain may also be worthwhile if sufficient spore can be collected. In all cases, it is essential that accurate re-introduction records are maintained so that it is possible to separate natural population expansion and contraction from artificial population trends. Monitoring the success of previous introductions and conducting further research into the ecological requirements of *P. adscensionis* will also be important to refine restoration practices. In particular, it would be useful to know when and where the gametophytes germinate, under what conditions sporelings are most successful, and what proportion of these survive to adulthood. For example, the clearance of guava scrub from a site in Cricket Valley in 2007 resulted in the rapid proliferation of *Pteris* sporelings, presumably mainly as a result of liberation from shading and a reduction in the deposition of sclerophyllous leaf litter. Suppression of guava in this area should be continued and trialled at adjacent sites to see if results can be replicated.

As with Ascension's other endemic flora, the ultimate objective for *P. adscensionis* must be to support the development of self-sustaining populations, entailing minimal management to control invasive species and with no requirement to re-stock habitats with individuals from cultivated sources [2]. However, it is difficult to envisage how this can be achieved while the original drivers of decline remain. The community zone in which *P. adscensionis* originally occurred has now disappeared and several of the dominant community members have gone extinct, thus ruling out the possibility of broad-scale habitat restoration. Instead, the long-term survival of the species will probably depend on its ability to integrate into the novel communities that have formed around it. Further research into the ecological requirements of *P. adscensionis* and the threats posed by specific species, such as grazing mammals, may help to identify targeted management measures that can ease this transition. For example, it may be necessary to experiment with the inclusion of relatively benign non-native species in restored habitats, either as direct replacements for extinct community members or to supplement the development of stable, mature communities in other ways [2].

References

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