Ascension Island Biodiversity Action Plan

ASCENSION PARSLEY FERN

Photo: AIG Conservation

SUMMARY

Taxonomy: Kingdom: Plantae; Phylum: Polypodiophyta; Class: Polypodiopsida; Order: Pteridales; Family: Adiantaceae; Species: *Anogramma ascensionis*

Nativeness: Endemic to Ascension Island

Description: Tiny fern with small parsley-like fronds averaging 3-6 cm in height. Grows on moderately dry to wet banks and outcrops on the exposed south-facing slopes of Green Mountain where it is often associated with the native thalloid liverwort *Plagiochasma rupestre* (see photo).

IUCN Red List status: Critically Endangered CR

Local trend: Unknown ?

Threats: The major threat to *An. ascensionis* is competition with invasive plant species; secondary threats include landslips and climate change-induced habitat alteration.

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DARWIN INITIATIVE

Distribution

Global

Anogramma ascensionis is endemic to Ascension Island.

Local

Currently known from only 4 locations on the southern slopes of Green Mountain at altitudes of 600 – 750 m [1]. The highest concentration of plants has been recorded on a dry cinder bank at the westernmost end of Elliott's Path, with smaller numbers found on two exposed cliff faces below Elliott's (Phil's Folly and an unnamed site above Breakneck Valley). In 2014 a small population was also established on Stedson's Ledge, an exposed crag below Elliott's Path which is one of the remaining locations of the endemic grass *Sprobolus caespitosus*. The native range of *A. ascensionis* is unknown but its current distribution is likely to be refugial due to displacement by more competitive introduced species [1].

Distribution of *Anogramma ascensionis* in March 2014 (AIG Conservation Department, unpublished data).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

3. Status

Population estimate:	1-40 mature individuals	Trend:	Unknown	IUCN status:	Critically Endangered

A. ascensionis was listed as extinct in the 2003 IUCN Red List of Threatened Species having not been seen in the wild since 1958. A small population was rediscovered in 2009 and the species has now been re-assessed as critically endangered (IUCN 2010). The number of mature individuals in the four known sub-populations has fluctuated between 1 and 40, although the inaccessibility of remaining habitat, the short life span of sporophytes and the cryptic nature of gametophytes make accurate status assessments difficult. The current trend is unknown, but it is clear that numbers have declined precipitously since the Island was settled in the 19th century. Indeed, based on the number of specimens collected by Hooker in 1842 (more than any other endemic) it seems likely that *A. ascensionis* was relatively widespread at that time [1].

4. Ecology

Habitat

All extant populations occur on exposed, sparsely-vegetated, vertical cinder banks above 600m. However, *A. ascensionis* appears to have a lower exposure tolerance than other native inhabitants of the exposed bank community and probably once flourished in more sheltered and shaded parts of Green Mountain before these habitats were invaded by introduced species [1]. Sporophytes (spore-bearing fronds) of wild plants currently achieve a maximum height of 2 – 4 cm, although herbarium specimens suggest that heights in excess of 10cm were once attained [1]. Given its small size and limited competitive ability, *A. ascensionis* has probably always been an ephemeral, colonist species exploiting relatively bare habitat before later successional communities develop [2].

Reproduction & life history

Reproduces sexually [1]. Sporophytes release green spores which must germinate soon after dispersal [2]. The gametophytes are functionally perennial (i.e. persist for several years) whereas sporophytes function as short-lived

annuals, sometimes surviving for just a few months [2]. Like other *Anogramma* species, *A. ascensionis* gametophytes may be able to remain dormant as a vegetative bud, or tubercle, during environmentally stressful periods and regenerate when more favourable conditions resume [1,3].

Taxonomy & population structure

Phylogenetic analyses have indicated a close relationship between *A. ascensionis* and Brazilian populations of *A. chaerophylla,* suggesting a recent colonisation from the neotropics [1]. However, *A. ascensionis* is morphologically and ecologically distinct from all other members of the genus [2,4].

4. Threats*

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

Competition with invasive, introduced weeds was almost certainly the major driver in the decline of *A. ascensionis* in the wild and remains the primary threat to the species' survival today [2,3]. Introduced maidenhair ferns (*Adiantum raddianum* and *Adiantum capillus-veneris*), grasses such as *Sporobolus africanus* and *Paspalum scrobiculatum*, and broadleaved weeds such as *Clidemia hirta* (Koster's curse) and *Begonia hirtella* now occupy most of the moist cinder banks that would formerly have provided habitat [1–3]. The few remaining individuals appear to be confined to exposed, marginal habitats on the edge of the species natural range and are considerably smaller and less fecund than 19th century herbarium specimens [1].

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

Although many *Anogramma* species are able to tolerate periods of dry weather in a vegetative state, sporophytes are only produced under suitably damp conditions [3]. Any reduction in precipitation and/or increase in evapotranspiration on Green Mountain as a result of anthropogenic climate change would therefore pose a potentially serious threat to the remaining populations of *Anogramma ascensionis*, which are already thought to be growing in sub-optimal conditions [1]. It is difficult to predict long-term changes in precipitation at Ascension Island with any degree of certainty [5]. However, many global climate models agree that rising temperatures are likely to lead to a reduction in low-level cloudiness and a gradual drying out of montane cloud forest ecosystems, such as that found on the upper reaches of Green Mountain [6].

10.3 Avalanches/landslides	**Impact:**	MEDIUM

Anogramma ascensionis is only known from four steep and potentially unstable cinder banks and is therefore highly vulnerable to landslips which occur periodically on the upper slopes of Green Mountain and could instantly destroy a large proportion of the world population.

*Threats are classified and scored according to the IUCN-CMP Unified Classification of Direct Threats [7]

Relevant policies and legislation

Local

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

All 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

Since its rediscovery in 2009, significant progress has been made in securing the future of *An. ascensionis*. *In vitro* propagation protocols have been developed at Royal Botanic Gardens Kew with good germination success, sporophyte production and survival rates [1]. A living collection of several thousand plants has also been established and a stock of 150 gametophytes is held in cryopreservation at the Conservation Biotechnology Unit. Since June 2013, 78 clusters of cultivated gametophytes (ca. 1400 individuals) have been repatriated from Kew to Ascension

Island and a number of these have been successfully introduced into wild populations. In 2014, 7 sporophytes and approximately 60 gametophyes from cultivated stock were introduced to an exposed, seep area known locally as 'Stedson's Ledge' and have established well, producing more than 175 sporophytes, 7 of which have reached maturity and produced spore.

Despite this, *A. ascensionis* remains extremely vulnerable to extinction in the wild and efforts to strengthen its precarious situation are urgently needed. Protecting existing localities from encroachment by introduced weeds is of highest priority and should be achievable through frequent, light management. In particular the spread of maidenhair ferns is believed to have been an important contributory factor in the decline of the species and its removal and the maintenance of free areas in these locations is likely to be essential. Bolstering existing wild populations and establishing new populations is also crucial to reduce the species susceptibility to catastrophic events such as landslips and droughts, as well as buffering against stochastic variation in demographic rates that could carry the species into extinction. Achieving this objective will require the establishment of a local cultivation programme on Ascension Island, both as a source of material for restoration efforts and as a source of spore for further propagation work. Sterile micro-propagation facilities are currently being developed on Island and will hopefully enable the replication of horticultural protocols developed at RBG Kew.

Reintroduction trials at Stedson's Ledge demonstrate that cultivated *A. ascensionis* can be successfully restored into wild habitats, provided that suitable sites can be found. In this case, the presence of the closely-associated liverwort *Plagiochasma rupestre* was used as an indicator of habitat suitability and its distribution could be used to identify further reintroduction sites [3]. However, the number of existing, weed-free locations is likely to be rather limited and restricted to drier, more marginal habitat. In the longer term, therefore, the restoration of wetter, seep and drip areas will need to be attempted, probably as part of a wider restoration programme aimed at reinstating the native vascular plant and bryophyte communities of these habitats [3]. Given the limited competitive ability of the native flora, such areas are likely to remain highly susceptible to reinvasion by introduced weeds, so it is vital that on-going management requirements are assessed at a small scale before embarking on a larger programme.

Ultimately, the long term management objective for *Anogramma ascensionis* (and other endemic flora) must be to support the development of self-sustaining populations that are able to survive with little or no human intervention. However, unless the original causes of decline can be addressed it is difficult to envisage how this can be achieved at present. Manually restoring and maintaining extensive areas of native habitat is generally regarded as unfeasible with the resources available within the Territory. Instead, securing the long-term survival of species like *A. ascensionis* may depend upon finding permanent ways of reducing the dominance of key competitors (e.g. through biological control) and/or exploring whether stable, mixed communities of indigenous and introduced species can be encouraged to develop. Careful experimentation and reporting of results will be needed to assess these options.

References

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