Ascension Island Biodiversity Action Plan

ASCENSION SPURGE

Photo: AIG Conservation

SUMMARY

Taxonomy: Kingdom: Plantae; Phylum: Tracheophyta; Class: Magnoliopsida; Order: Euphorbiales; Family: Euphorbiaceae; Species: *Euphorbia origanoides*

Nativeness: Endemic to Ascension Island

Description: Perennial, dwarf shrub that forms low hemispherical domes up to 1m diameter. Stems are usually reddish and dichotomously branched with clusters of small creamish-white flowers at the tips. Occurs on arid cinder plains and scoria cones at lower elevations.

IUCN Red List status: Critically Endangered CR

Local trend: Probably declining

Threats: The major threats to *E. origanoides* are from introduced competitors and herbivores; secondary threats include climate change and commercial development.

Citation: Ascension Island Government (2015) *Euphorbia origanoides* species action plan. In: The Ascension Island Biodiversity Action Plan. Ascension Island Government Conservation Department, Georgetown, Ascension Island

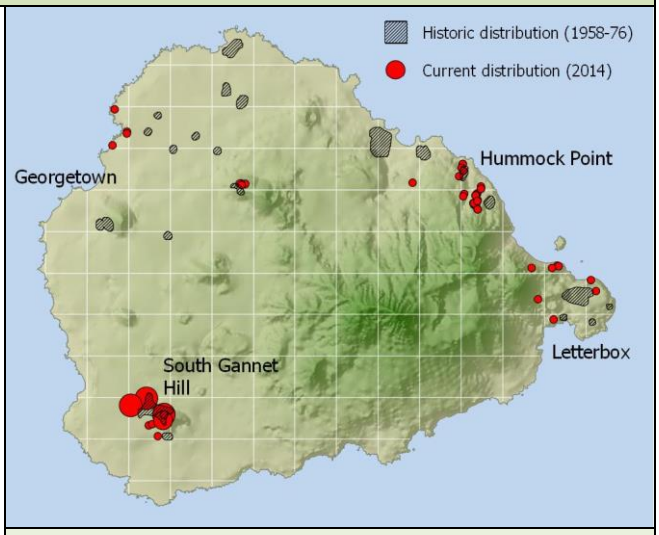
Distribution

Global

Endemic to Ascension Island.

Local

The current distribution of *E. origanoides* is localised and highly fragmented, with most extant sub-populations restricted to a few sparsely-vegetated areas at altitudes between sea level and 150m. Significant population centres are now only found around South Gannet Hill and Cotar Hill in the south west of the Island, the Letterbox Peninsula and Wig Hill in the south east and scattered along the coast from Spire Beach to Hummock Point. Smaller satellite populations comprising of less than 70 individuals are also found in the Comfortless Cove and Sister's Peak areas. However, *E. origanoides* was probably once widespread in low lying areas and may have had a broader altitudinal range [1]. As recently as 1976 the distribution was more extensive and included populations at North East Bay, Cross Hill and English Bay which have since disappeared [1]. The disappearance of the English Bay population appears to have coincided with the development of the BBC Atlantic Relay Station at this site in 1964 [1].



Current and historic distribution of *Euphorbia origanoides*. Distribution for 1958 and 1976 digitised from [2,3]. Current distribution taken from March 2014 census; symbol sizes are scaled according to total number of individuals encountered (AIG Conservation, unpublished data).

3. Status

Population estimate:	1889 – 14900 individuals	Trend:	Probably declining	IUCN status:	Critically Endangered

Determining population trends for *E. origanoides* is challenging due to the substantial variation in its abundance from year to year. Numbers of plants in known populations have fluctuated between 1889 and 14900 individuals since 2008, primarily as a function of varying amounts of rainfall. Indeed, populations appear to be able to persist for long periods as a dormant seed bank, regenerating rapidly when conditions are favourable. Overall trends may therefore be best inferred from long-term changes in distribution, which suggest a 50 % reduction in the area occupied since the 1950s [1].

4. Ecology

Habitat

E. origanoides is a dwarf shrub found on arid, low lying plains of pyroclastic deposits and scoria cones from sea level to an altitude of approximately 300m [1]. Rainfall in these areas is low and episodic and vegetation is sparse. Native associates include *Aristida ascensionis* (grass), *Cyperus appendiculatus* (sedge) and *Portulaca oleracea* (purslane). Mature plants form low hemispherical domes which may extend over 1 m in diameter but seldom attain heights greater than 40 cm [1]. It is often found in small crevices and gullies which probably have lower evapotranspiration rates and increased water availability compared to more exposed sites.

Reproduction & life history

E. origanoides is perennial and flowers year round. Flowers are monoecious (possess both male and female parts) and are insect pollinated, probably by Diptera (flies) and Hemiptera (bugs) [1]. Seed dispersal is predominantly via wind, although water may be an important dispersal agent following heavy deluges [1]. Seeds remain viable for up to 5 years with germination triggered by moisture [1].

Taxonomy & population structure

Some morphological variation between populations is apparent [1] and there is evidence of genetic divergence between east and west coast populations, potentially linked to a dispersal barrier to seeds and pollinators caused by the prevailing south-easterly trade winds [1]. The closest relative is thought to be *E. trinervia* which is native to coastal regions of tropical West Africa [1].

5. Threats*

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

The rapid spread of invasive vegetation across much of the low-lying, ash plain habitat favoured by Ascension spurge represents a major threat to the survival of this species in the wild and has undoubtedly contributed to a continuum of decline. Although the areas occupied by extant populations remain sparsely vegetated, Mexican thorn (*Prosopis juliflora*), tree tobacco (*Nicotiana glauca*), guava (*Psidium guajava*), *Heliotropium curassavicum*, *Casuarina equesitifolia*, wild tomato (*Solanum* sp.) and *Waltheria indica* all have the potential to out-compete Ascension spurge in its native range [4,5]. Mexican thorn in particular is highly efficient at monopolising available resources and now dominates the vegetation across a large swathe of the coastal lowlands, including some former strongholds of Ascension spurge [1]. Grazing by introduced vertebrates and invertebrate pests pose additional and potentially more immediate threats. Six species of introduced mealy bugs and scale insects (*Phenacoccus solani*, *Ferrisia malvastra*, *Planococcus minor*, *Hemiberlesia lataniae*, *Pinnaspis strachani* and *Icerya purchasi*) and one whitefly (*Bemisia tabaci*) are known to attack Ascension spurge, and are having noticeable impacts on plant vigour and survival [6]. Introduced herbivores, particularly rabbits and mice, have also been implicated in population declines [1,4,5] and may be increasing in number due to release from predation by feral cats following their eradication in 2004 [5,7].

1.2 Commercial & industrial development	**Impact:**	LOW

The largest extant population of Ascension spurge at Mars Bay is situated within an area of relatively frequent development and maintenance works associated with Wideawake Airfield and the US Air Force installations at Cotar Hill and South Gannet Hill. Mitigation studies have been conducted previously to lessen the impacts of unavoidable construction works on the spurge population [8] and it is important that this proactive approach continues.

11.2 Climate change & severe weather: Droughts	**Impact:**	UNKNOWN

In the arid habitats occupied by Ascension spurge, rainfall is the principle driver of seedling recruitment and population dynamics. Mass seedling recruitment occurs following episodic periods of heavy rainfall while prolonged periods of drought are associated with significant population declines [5]. It is difficult to predict long term changes in precipitation at Ascension Island with any degree of confidence [9]; however even small reductions in the frequency or quantity of rainfall could have significant impacts on spurge populations growing in already marginal environments.

11.3 Climate change & severe weather: Temperature extremes	**Impact:**	LOW

Temperature is an important controlling factor of evapotranspiration rates and therefore on plant soil-water relations. According to global climate projections, temperatures on Ascension will increase by several degrees over the next 50-100 years [9], threatening to further reduce available soil moisture and increase the risk of heat stress in the already marginal habitats occupied by Ascension spurge [5,9]. Altitudinal range shifts to track changing climate are unlikely to be possible due to the dense coverage of invasive vegetation at higher elevations.

10.3 Avalanches/landslides	**Impact:**	LOW

Several of the extant populations of Ascension spurge occur either partially or wholly on loose, unstable scree slopes and scoria cones, rendering them vulnerable to landslides. In 2013 a landslip completely destroyed the spurge population on Wig Hill which had formerly accounted for 10-15 % of the global population. As of September 2014, no regeneration had yet occurred suggesting that much of the seed bank contained within the topsoil layer may also have been lost.

8.3 Introduced genetic material	**Impact:**	UNKNOWN

Hybridisation with closely related, introduced species may be a pervasive threat to the *E. origanoides* gene pool. Although hybridisation in the subgenus *Chamaesyce* is rare, plants that appear to be intermediate for certain characters have been recorded at the Airhead and Comfortless Cove areas [4]. Further research is needed to

determine whether hybridisation is occurring.
*Threats are classified and scored according to the IUCN-CMP Unified Classification of Direct Threats [10]

Relevant policies and legislation

Local

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

Populations at Letterbox and South Gannet Hill are wholly or partially contained within nature reserves designated under the National Protected Areas Order 2014. The National Protected Areas Regulations 2014 restrict all forms of development within nature reserves.

Management notes

Management for this species is reasonably well-advanced. Propagation protocols are well established and significant numbers of individuals have been successfully cultivated from seed and restored into fenced, semi-natural restoration sites. Grazing exclosures have also been created around important concentrations of wild plants. These measures have been successful in protecting clusters of mature individuals that can help to seed surrounding areas, but are limited in scale and do not offer habitat-level solutions to the threats faced by *E. origanoides*. Indeed, given the significant natural fluctuations in the population size of this species and its tendency to wait out periods of drought as a persistent seed bank, maintaining areas of suitable habitat for regeneration is probably of higher priority than protecting existing plants or restoring cultivated individuals into existing population centres. Further work should focus on controlling invasive species around remaining strongholds and establishing new population centres within the species former range.

Preventing the spread of invasive shrubs and trees such as *Prosopis juliflora*, *Psidium guajava*, *Nicotiana glauca* and *Casuarina equesitifolia* into the remaining strongholds of *E. origanoides* is particularly critical to the long term survival of the species and should be achievable provided that management structures are put in place to ensure sustained action (see *Prosopis juliflora* action plan). Fast-growing annual and perennial weeds such as *Heliotropium curassivicum*, wild tomato (*Solanum* spp.), *Waltheria indica* and *Agremone mexicana* will be more difficult to exclude; however, control should be attempted in a small number of key areas (e.g. Hummock Point and South Gannet Hill) in order to assess on-going management requirements.

Grazing by introduced mammals and invertebrate pests will also be difficult to contain. Fencing has proven to be useful for protecting small numbers of plants from larger mammalian grazers, but is not practical to install or maintain at larger scales. Bell & Boyle [11] assessed various management options for rabbits on Ascension Island, including the feasibility of eradication, and concluded that targeted control using poison baits and traps offered the most tractable solution for reducing their numbers in problematic areas. Regular monitoring of grazing pressure will be needed to assess the magnitude of the threat posed by introduced herbivores and guide management decisions. In terms of invertebrate pests, biological control represents the only viable management option. Indeed, the introduction of the ladybird beetle *Rodolia cardinalis* in 1976 has apparently been effective in controlling a previously serious infestation of cottony cushion scale insect (*Icerya purchasi*) on *E. origanoides* [1,3] and similar biological controls could be explored for other phytophagous pests. A more detailed study of the pest species currently affecting *E. origanoides* and the natural enemies already present on the island would be useful to assess the potential for further biocontrol.

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