Bat Cave Nature Reserve Management Plan 2025-2030



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# Introduction

## Introduction

#### Ascension Island

Ascension Island is a remote overseas territory of the United Kingdom (UKOT) located at the centre of the Atlantic Ocean. Ascension is a young volcanic island 97km<sup>2</sup> in size, lying 1504km from the coast of Africa and 2232km from Brazil.



Though small, Ascension supports globally-important biodiversity including 67 endemic species found nowhere else in the world. It is a nesting site for over half a million seabirds and the second largest turtle rookery in the Atlantic.

Protecting biodiversity is one of the Ascension Island Government (AIG)'s strategic objectives and a commitment under the Convention on Biological Diversity. The island's Protected Areas are central to meeting this commitment and achieving Target 3 of the post-2020 Global Biodiversity Framework. All of the Protected Areas have legal status and are underpinned by management plans. This plan covers the newly designated Bat Cave Nature Reserve. The Bat Cave Nature Reserve (NR) was designated in Feb 2025 under the National Protected Areas (Amendment) Order, 2025. It was created to protect endemic and native invertebrates which are found here in great numbers. All wildlife protected areas on Ascension Island are managed by the Ascension Island Government Conservation and Fisheries Directorate (AIGCFD).



The cave opening is the centre of the Bat Cave Nature Reserve with a radius of 75m from the central cave. Bat

cave NR is situated in the northern part of Ascension Island, laying at the foot of Sisters Peak. Sister's peaks, the cave and surrounding lava flows make up one of the most characteristic landscapes on Ascension.

Bat Cave is an extinct collapsed fumerole with a series of subterranean chambers leading off from the main cave. The main opening leads vertically down into the first chamber with enough daylight from the opening to illuminate the cavern. A narrow passage leads to a darker chamber in which air movement is stifled and vision is impossible without a torch (Ashmole and Ashmole 1997). The entire cave system is around 50m in length and thus fits well within the 150m Protected Area boundary.

Despite its name, Bat Cave does not accommodate any real bats with no mammals native to Ascension (Ashmole and Ashmole 200). The cave's name originates from the plastic bats adorning the cavern ceiling for the amusement of reserve visitors.

Endemic invertebrates are protected in all of the NRs on Ascension however the Bat Cave NR is the first designated solely for their conservation. Several volcanic caves on Ascension accommodate islandendemic subterranean invertebrate species however Bat Cave was recorded to have the highest species richness. The cave booklouse (*Traglotroctes ashmoleorum*) and cave springtail (*Pseudosinella lava*) are abundant in the Bat Cave NR. Additionally, the tiny blind cave spider (*Catonetria caeca*) has only ever been recorded in Bat Cave though it has not been observed since 1995.

## Bat Cave NR

The Bat Cave NR is only accessible on foot and is a popular hiking location on Ascension due to its unique structure. There are no visitor facilities on the reserve however the barren environment and dramatic surrounding landscapes makes for an enjoyable hike.

The cave opening is at approximately 170m in elevation with a raised entrance. The cave sides have not been exposed to the elements and remain very sharp. The cave can be accessed by a ladder supported by a rope. This is not maintained and therefore hikers are advised to enter at their own risk. Those who do enter the cave are rewarded with views of a distinctive geological feature which has remained almost unchanged since the lava stopped flowing here.

Nearby lava flows are dated at just hundreds or thousands of years in age, making up some of the youngest lava flows on island (Preece *et al.* 2018). There is limited vegetation around the NR however seasonal grasses do emerge here (Ashmole and Ashmole, 2000). Introduced flora such as Whistling pine (*Casuarina equisetifolia*) and Mexican thorn (*Neltuma juliflora*) are encroaching the NR from the sides of Sisters Peak. These invasive trees are already altering the aesthetic value of Sisters Peak and left untreated, may influence access to the Bat Cave NR. Additionally the trees help to support rodents which threaten the unique invertebrates found on the NR. Consequently invasive species management is required to protect the biodiversity of the NR.





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# Strategic and Operational Objectives



- Conserve Ascension's endemic subterranean invertebrates inside Bat Cave.
- Endemic invertebrate populations remain stable.

**Encourage** recreational use of the Nature Reserve- compatible with conservation objectives- to promote the health and wellbeing of people of Ascension.

- There is a high level of awareness about the importance of Bat Cave NR for endemic invertebrates.
- The Bat Cave NR is a source of pride for Ascension islanders.



Facilitate natural ecosystem functions and processes within the reserve.

- No non-native shrubs present within the NRs.
- Non-native predators are controlled to a level in which they have no significant impact on the invertebrate populations.

Preserve the paleontological value of Bat Cave for future research on extinct Ascension endemic birds and invertebrates.

Site remains intact with no damage to paleontological remains.



# Natural features of the Nature Reserve

## Species of Bat Cave Nature Reserve

#### Cave booklouse (Troglotroctes ashmoleorum)

*Troglotroctes ashmoleorum* is one of two booklice species (order: *Psocoptera*) endemic to Ascension. The cave booklouse is relatively abundant and widespread in subterranean habitats on the island including Bat Cave, Command Hill Cave, Ravine Cave and Chapel Grotto Cave. It has also been collected from subterranean spaces south of South Gannet Hill and Lower Valley Crater. It is likely distributed around much of the Ascension lowlands (Ashmole and Ashmole 1997, Ashmole and Ashmole 2000)- see map top right for distribution.

The cave booklouse is <2mm in length with relatively elongated long legs and antennae, reduced eyes and weakly developed pigmentation, indicative of it's subterranean lifestyle (see scientific drawing bottom right, Ashmole and Ashmole 2000). Originally believed to be entirely subterranean, individuals have also been trapped in volcanic rubble so it is likely that individuals sometimes come to the surface lava, likely at night (Ashmole and Ashmole 2000).

Little is known about this miniscule species, with currently no data on its diet, breeding behaviour or basic ecological requirements.

In 2024, the cave booklouse was categorized by the International Union for Conservation of Nature (IUCN) Red List of Threatened Species as Vulnerable, with the population described as being stable in its occupancy but nonetheless facing ongoing threats such as encroachment of non-native species which reduces habitat quality at all occupied cave locations.





Above: IUCN distribution map, animated image of cave booklouse (AIGCFD 2024.

Right: Scientific illustration of cave booklouse (Ashmole and Ashmole 2002)



### Species of Bat Cave Nature Reserve

#### Cave springtail (Pseudosinella lava)

There are three Ascension-endemic *Pseudosinella* (Order: *Collembola*) species with the cave springtail dispersal limited due to its subterranean habitat preference (Christiansen 1998). The two other *Pseudosinella* species are contrastingly confined to the Ascension coastline and surface terrain. It shares many features with other Ascension *Pseudosinella* species however its strange foot complex is a strong distinguishing feature. The loss of eyes and exaggeration of the foot complex are parallel but quite different from other cave members of this genus. These adaptations have been attributed to the wet lava conditions of Ascension's caves.

The Ascension cave springtail is probably the easiest of the endemic invertebrates to see in Bat Cave due to its relatively high abundance and active native. It is often spotted running when it is disturbed and occasionally found under rocks. It has an elongated white morphology and like other springtails, it is tiny, reaching a length of only 2-3mm. Identification of this species requires a specialist knowledge in the taxonomy of springtails.

Nothing is known specifically about the life history of the Ascension cave springtail. There is no data on its breeding requirements, behaviour or diet though it likely feeds on fungi or lichen around the Bat Cave structure. In general, springtails tend to lay their eggs in concealed locations and this will be no different for the Ascension cave springtail. Several moults occur prior to this species reaching its adult size however in springtails, no metamorphosis occurs. The juveniles and adults are therefore similar except in their size (Borror and DeLong, 1971).

The Ascension cave springtail has not been assessed using the International Union for Conservation of Nature (IUCN) Red List of Threatened Species criteria. A full assessment is required however its limited distribution would suggest this species may be vulnerable to extinction without conservation measures. The species faces ongoing threats such as encroachment of non-native species which reduces habitat quality and competes for limited



FIGS 16-29. Pseudosinella lava sp. nov.; (16) semidiagrammatic illustration of dorsal macrochaetae and pseudopores (hollow circles); (17) apical dorsal setae of right third antennal segment; (18) apex of fourth antennal segment; (19) dorsal surface of head; (20) labial groove; (21) labial triangle, seen from below; (22) right fourth abdominal segment bothriotrichal complex; (23) second abdominal segment chaetotaxy, right side; (24) anterior setae ventral tube, right side; (25) disto-lateral patch and posterior setae of ventral tube, right side; (26) manubrial plaque; (27) trochanteral organ; (28) apex of dens and mucro; (29) hind foot complex. Figures 17, 18, 20, 24, 25, 27 and 28 of type specimens from locality 7713; other figures of type specimens.



# Historical and recreational use of reserve

# History of Bat Cave NR

#### Stonehouse 1960

The first record of Bat Cave in literature originates from Stonehouse in 1960 when the naturalist visited Ascension to study the seabirds here. In his book, he mentions finding bird fossils of a distinct bird (Ascension Rail, page 13) in an area later described in detail by Packer.

#### Packer 1968

Packer described Ascension Island in detail, producing geological drawings and incorporating historical records to create a concise guide of the island (see map of Sisters Peak area below, note the spatter cones (fumaroles) which make up the Bat Cave NR.

Packer wrote about a number of Ascension features including Bat Cave (once

known as Packers cave):

"Spatter cones or fumaroles... A group occurs immediately to the north of the main peak of Sisters, I stumbled across these in 1956 at which time they did not seem to be well known. An expedition was organized to descend the deep vertical shafts (this required ropes and hard hats) and subsequently a bottle was recovered containing a note written in 1840 by a sailor named Johnson... The largest shaft descends perhaps 50ft vertically then gives access to a series of three or four small domed chambers."





# History of Bat Cave NR

#### James 1985

In 1985, R James produced a manuscript highlighting the caves of Ascension Island. He described Packers Fumaroles (later renamed Bat Cave) in extensive detail (above right), even producing a diagram of his findings to scale, including the entrance holes (below right).

It is not known when the ladder was introduced to the cave entrance however was noted by James and continues to remain until this day.

#### Pavuza and Cech 2014

In 2014, the International Union of Speleology issued a newsletter with papers describing cave structures across the globe. Pavuza and Cech wrote an introduction to the Caves of Ascension Island however explained that deep exploration of Bat Cave was difficult due to the extreme temperatures (>30oC) and humidity.



#### PACKERS FUMAROLES LENGTH 168 FT DEPTH 71 FT

SD 244 694 GRADE 3

This fine set of fumaroles are situated south of Tackers Hole. At first sight they seem to be just two small mounds of klinka, once you have climbed to the tops. It will be seen that there are two decending shafts. Climb down the smaller of the two (rope and ladder useful). At the bottom there are three ways on straight ahead drops down into a large chamber with a number of small passages in the floor. At the end of this chamber is a climb up through a narrow rift. This gives way to a fine closed chamber with a small tight passage in the floor. To the right there is a fine display of lavacicles with gypsum crystals in abundance (care). To the left of the ladder is a route through Klinka blocks into the back of the larger of the two fumaroles shafts. This open roof chamber has very loose klinka walls and should not be free climbed. Straight on in this chamber leads to a small ohoked chamber which probably lead to a small went on the north side of the fumarole mound. To the right of the ladder leads to a route through klinka blocks back into the open roof chamber. At the time of writing there was a ladder in place in the smaller of the two shafts. Next to the main set of fumaroles there is' a small single mound, with a fumarole shaft. This decends to 30 ft, into a blind chamber, the shaft can be free climbed but a rope and ladder are best.



# Bat Cave NR paleontology

Bat cave is unique for the relative abundance of bird bones of an extinct species– the Ascension crake *Mundia elpenor* (Olsen 1971). The remains are likely a result of individuals that fell into the cave network and were unable to escape. Endemic to Ascension, the species lived in the lowlands and primarily ate sooty tern (*Onychoprion fuscatus*) eggs. It is probable that the species became extinct after the introduction of rats in the 18th century but it may even have survived until the introduction of feral cats in 1815. It was officially declared extinct in 1994 which was confirmed by BirdLife International in 2000 and 2004.

Peter Mundy, a 17th century Cornish merchant and traveler gave an account and sketch of the bird when he visited Ascension in June 1656. He noted:

"A strange kind of fowle, much bigger then our sterlings ore stares, collour gray or dapples, white and blacke feathers intermixes, eies red like rubies, wings very imperfitt, such as wherewith they cannot raise themselves from the ground. They were taken running, in which they are exceeding swift, helping themselves a little with their wings (as it is said of the estridge), short billed, clove footed, that can neither fly nor swymme."



The Ascension crake was described and illustrated above by Peter Mundy in 1656 in his journal when visiting Ascension. The genus was later named after Mundy.

#### Packer 1968

Packer collated a range of data on Ascension to create a concise guide on the island. Packer described the bones found in Bat Cave on several occasions:

"Bird bones recovered from one of the shafts were identified by the British Ornithologists Union Expedition as belonging to boobies and gannets which once bred in the area but are now confined to off-shore islets. The skull of a rail was also found".

#### A note from John Packer:

In 1956 I explored the underground caves (furnaroles) N.W. of Sisters Peak (See Part 4, Furnaroles) and noting that they contained many bird bones, mentioned this to the B.O.U. Expedition then camped at Mars Bay. Some of these bones were collected and later identified as belonging to the rail family. It was not until 1970 that Stors Olson of the Smithsonian Institution was able to collect enough material to reconstruct an almost complete skeleton. The bird proved to be a species new to science, *Atlantisia elpenor*. An account by an early this race of flightless birds. Other flightless rails exist, or have existed on St Helena and Tristan da Cunha group, probably derived from a common vagrant stock in days before the birds lost their ability to fly. One wonders whether any of these now extinct Ascension birds before their existence was even recognised. As a result of the finds in the fumaroles, Storrs Olson later visited St Helena and obtained



# Recreational use of the reserve

## Hiking

Ascension Island has 42 designated walks spread across the island with hikers seeking a stamp found in a letterbox at the end of each walk as a reward. Hikers follow guidance provided through the Letterbox Walks book, last updated in 2020, with Bat Cave being a popular route.

Located at the foot of Sisters Peak, the Bat Cave is found in a mix of volcanic lava flows making an interesting hike. Sisters Peak and Bat Cave are often combined hikes and feature frequently in visitors' photographs, making these well known Ascension landmarks.

The cave can be entered using a rope to guide the hiker onto a ladder. This is not for the faint-hearted and those who are claustrophobic or concerned about their fitness are advised against entering. The rope and ladder and not subject to inspection and entering the cave is at your own risk. Once inside, a traditional US letterbox holds a stamp to signal the end of the hike (below).

Infrequently, islanders are known to camp in the open lava flows around the cave, enjoying unrivalled views of the stars with little surrounding light pollution.









# Threats to the Nature Reserve

## Threats to the Bat Cave Nature Reserve

#### Invasive flora

A number of Invasive Non-Native Species (INNS) can be found encroaching towards the Bat Cave NR. INNS out-compete native wildlife for resources such as water, nutrients and available habitat and can also introduce diseases and support other INNS, further exacerbating the threat to native flora and fauna.

Several invasive trees grow on Sisters Peak and are spreading towards Bat Cave NR. The roots of non-native vegetation are capable of breaching the cave roof from above, damaging this unique volcanic structure and altering the temperature and moisture in the cavern.

#### Whistling pine, Casuarina equisetifolia

Whistling pine is an introduced tree with pine-like needles. This environmental engineer modifies the local ecosystem, creating a dense carpet of needles, greatly reducing the available barren habitat preferred by the Ascension-endemic invertebrates. Whistling pine also alters the landscape, turning barren rocky terrain into a forested monoculture.

#### Mexican Thorn, Neltuma juliflora

Mexican thorn is identified as a major threat in Ascension's National Biodiversity Strategy and Action Plan. The pressing need to control thorn is highlighted in a specific Species Action Plan for Mexican thorn, reflecting its widespread impacts on species, habitats and landscapes.

A study by Chin *et al.* 2024 on Ascension found that invasive vegetation facilitates the increased competitive pressure from non-native species such as rats and introduced insects on endemic invertebrates.



Whistling pine is encroaching onto the Nature Reserve from surrounding Sisters Peak where it is spreading downhill (above)

Below: Mexican thorn growing at the base of Sisters Peak, near to the Bat Cave NR



## Threats to the Bat Cave Nature Reserve

#### **Introduced Fauna**

A number of non-native animal species have been introduced to Ascension that are detrimental to the endemic invertebrates found in the Bat Cave NR.

#### Rodents:

Rodents were introduced via passing ships, sometime before 1701. Black rats (*Rattus rattus*) and house mice (*Mus musculus*) can be found throughout the island. These highly adaptable species forage on fruit, seeds, plants and will predate small animals and eggs. Rodents have a high fecundity and short generation times allowing populations to grow rapidly in favourable conditions.

Research by Chin *et al.* 2024 noted a high predation risk by rats on endemic invertebrates in areas with a barren habitat and lower food availability for rats. Rodents may also impact native invertebrate populations through reducing food availability.

Introduced American cockroaches (left) and *Monomorium subopacum* ants (right) are having devastating impacts on the health of Ascension endemic invertebrates populations



#### Non-native invertebrates

The barren cave interior is sensitive to change. Cave invertebrates are sensitive to environmental degradation as they have usually evolved under very stable conditions and have little resilience to change (Mammola *et al.* 2019).

# Introduction of non-native species to cave systems is a significant global threat (Nicolosi *et al.* 2023). Bat Cave has been colonized by American cockroaches (*Periplaneta Americana*) which outcompete for scarce resources and potentially also directly predate endemic invertebrates. It is important to note that although present in Bat Cave, the population here is not as abundant as other Ascension caves. This may be the reason that endemic cave species have persisted so far in Bat Cave.

A number of non-native invertebrate species can be found across the island which are detrimental to Ascension's endemic invertebrates. The tropical house cricket (*Gryllodes sigillatus*) are adaptable generalists and outcompete native species, further fragmenting their populations in marginal native habitat.

Invasive ant species such as *Monomorium subopacum*, *Pheidole megacephala* and *Paratrechina longicornis* are spreading across the island as a result of spreading invasive vegetation (Sharp and Tawatao 2023). Invasive ants are known to predate endemic invertebrates, especially when in close proximity to non-native vegetation (Sharp *et al.* in prep). This further supports the concerns of invasive flora encroachment towards the Bat Cave NR.

## Threats to the Bat Cave Nature Reserve

#### Litter

Discarded rubbish such as cans, bottles and food wrapping left behind by hikers can provide refuge for non-native invertebrates such as the American cockroach. Even small food scraps can represent a comparatively significant resource in a barren habitat, attracting rats from surrounding areas. This may indirectly increase non-native predation on endemic cave invertebrates. Littering also degrades the aesthetic value for visitors.

# **Climate Change**

A shift in the microclimate of a cave represents a significant threat to the sensitive ecosystem found there (Mammola *et al.* 2019). Research in 2023 measured in the dark zone of Bat Cave revealed a constant 1°C increase compared to readings in 1990 (Ashmole and Ashmole 1997). This is roughly consistent with increases in ambient air temperature above ground. This is a significant increase for small bodied species which are adapted to historically stable micro-climes (Mammola *et al.* 2019).

This may be an explanation for concerns of the blind cave spider (*Catonetria caeca*) population which historically was only recorded in this one cave. First discovered in 1990 and then observed again in 1995, this species was not found during extensive search efforts in 2022-2023 as part of the DPLUS135 project to catalogue all of Ascension's invertebrates. In 2024, the species was officially listed as Critically Endangered in the IUCN Red List. Perhaps the species was unable to persist in the warmed cave environment.

## Development

The threat of development near or around the Bat Cave NR is not immediate but has the potential to be catastrophic. Any alteration to the sites physical structure risks collapsing the cave entirely.







Legislation

# Legislation and Policy

The designation and management of Nature Reserves is an important part of Ascension's approach to protecting its biodiversity and meeting its commitments under international agreements and strategies.

#### International agreements and strategies

The Convention on Biological Diversity (CBD) has been extended to Ascension and provides the overarching context for biodiversity protection on the island. Target 3 of the CBD Post-2020 Global Biodiversity Framework reads:

Ensure and enable that by 2030 at least 30 per cent of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well -connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories.

The need for well-managed area-based protection is also a foundation of the UK Overseas Territories Biodiversity Strategy and fulfills Ascension's obligations to protect habitats and species under the Ascension Environmental Charter signed in 2001. The Bat Cave Nature Reserve forms part of a network of protected areas on Ascension. Local legislation provides the legal basis for the establishment and management of the Nature Reserves.

#### Ascension protected areas legislation

The National Protected Areas (Amendment) Ordinance, 2025 provides the Governor with powers to designate Nature Reserves 'protecting native biodiversity and the habitats, ecosystems and natural processes that support it.' It also limits the type of development that can be permitted within a Nature Reserve and allows the restriction of activities that could be harmful to a Nature Reserve. The Ordinance also provides powers to introduce regulations to protect Nature Reserves and to appoint Reserve Wardens to enforce these regulations.

The Bat Cave NR was designated in Feb 2025 under the Natural Protected Areas (Amendment) Order, 2025. The boundary is shown on page 5 of this management plan.

The National Protected Areas (Amendment) Regulations, 2014, prohibits a list of potentially harmful activities on the Nature Reserve without prior permission from the Administrator or Reserve Warden (see overleaf). They also provide powers for the Administrator to close all or part of a nature reserve for the purposes of management, wildlife protection or public safety.

The Biosecurity Ordinance, 2020 introduced import control measures and powers to inspect and treat cargo, vessels and aircraft arriving on Ascension with the aim of reducing the likelihood of introducing new non-native species to the island. This is particularly important with respect to invasive invertebrates.

#### The National Protected Areas Regulations

All or any of the following are prohibited within the Bat Cave Nature Reserve if done without the prior permission of the Administrator or Reserve Warden:

- any development;
- the improving or altering of any existing structure;
- the removal of sand, soil or rock;
- the intentional or reckless disturbance to, or damage or injury to, any protected species;
- the dumping of refuse, chemicals, abandoned vehicles, scrap metal, mining spoils, toxic or other wastes, bilges, oil and other petroleum products, pesticides and other items harmful to animals or plants, or unsightly items;
- the driving or riding of motor vehicles other than on a designated road or track;
- parking a vehicle, except in a signed parking zone;
- the making of fires without a permit other than in a portable stove or grill, or in designated fire pits;
- playing any musical instrument, radio, sound system, television or other item which produces or reproduces music, to the annoyance of other persons;
- the use or possession by any person, other than a Warden acting in the course of his or her duties, of any type of firearm, air gun, cross bow, bow and arrow or slingshot;
- Allowing any dogs or cats within the reserve;

#### Implementation policy

The restrictions are designed to prevent activities that might harm the natural features of the Nature Reserve or reduce people's enjoyment of the areas. There is a presumption against these activities taking place in the Nature Reserve, but the Administrator and Reserve Warden have discretion to permit them on a case by case basis. When deciding whether to permit an activity, the Administrator or Reserve Warden must consult the Director of Conservation and will consider the following:

- Whether an activity is consistent with the objectives of this management plan. The onus will be on the person proposing the activity to demonstrate that it will not conflict with the objectives. Activities that would have a significant negative impact on the Nature Reserve objectives will not be permitted.
- Whether the activity will have a significant and/or long-term impact on the natural features of the Nature Reserve. Activities that would have a significant or long-term impact on the natural features of the Nature Reserve will not be permitted. Decisions of this nature must be referred to the Administrator and cannot be made by a Reserve Warden.
- Whether the activity is necessary for the island's military mission or critical functions. Such activities can be permitted if all other alternatives have been exhausted and all available mitigations have been put in place. Decisions of this nature must be referred to the Administrator and cannot be made by a Reserve Warden.
- Where there is doubt or lack of evidence about an activity's impact, the precautionary principle will be applied and the activity will not be permitted.
- Restrictions on public access to the Nature Reserve will only be authorised by the Administrator where it is necessary to prevent the risk of significant disturbance or trampling of the natural features or where there is a risk to public safety. Restrictions will be in place for the shortest time period and over the minimum area possible.

#### Enforcement

Education and awareness raising are the preferred methods to ensure compliance, and proportionate enforcement action will only be taken when this approach has been exhausted. The maximum penalty for an offence under the National Protected Areas Ordinance or Regulations is a fine of £20,000 or imprisonment for 12 months. All warranted Reserve Wardens, Fishery Protection Officers and Police Officers are able to take enforcement action.



Action Plan

# Action plan

The following section describes a number of ambitious actions which may be feasible for the five year period of this Management Plan. These are designed to be realistic given the limitations of reserve access, while having the greatest impact on protecting the unique biodiversity found on the site.



	Description	Targets	Outcome	Objective addressed
1	Monitor the spread of invasive vegetation reaching reserve boundary.	Remove invasive vegetation on the reserve.	<ul> <li>Preservation of barren habitat preferred by reserve species.</li> <li>Prevention of further spread of non-native invasive species and their impact on the habitat and reserve species.</li> <li>Hiking trails remain accessible for reserve visitors.</li> </ul>	**
2	Monitor the spread of invasive vegetation in a 200m buffer zone around the NR	Remove invasive vegetation in 200m buffer zone around the radius of the NR	• Prevent the encroachment of invasive species onto the NR. This buffer zone is also home to endemic Ascension spurge ( <i>Euphorbia origanoides</i> ) plants so requires action to protect this species too.	**
3	Reduce litter on Bat Cave NR	Organise a litter pick at Bat Cave NR annually	<ul> <li>Reduced artificial accommodation and abundance of rats and introduced invertebrates.</li> <li>Increased enjoyment of the reserve from hikers.</li> </ul>	¥⊀ ₹₹
4	Increase public awareness of the NR and the species found here.	Increase public understanding and NR support through social media and island awareness campaigns. New signage installed at NR.	<ul> <li>Increased support for conservation measures.</li> <li>Increased enjoyment of the NR through appreciation of unique wildlife .</li> <li>Potential increased funding for management/research on the NR.</li> </ul>	Ì Ì



# Monitoring and research

# Monitoring and research

To assess the success of the Nature Reserve and that the species found there are being protected, further monitoring and research is needed. There is little knowledge about the Ascension-endemic invertebrates found here so future research is strongly required. Research effort will be targeted to fill the knowledge gaps identified and priority will be given to research that will help to inform and improve wildlife and reserve management.

Each monitoring and research action is linked to the Management Plan objectives using the objective icons. Monitoring will be delivered by the AIGCFD alongside volunteers and external partners.

	Research field	Details	Suggested actions
A	Species taxonomy	The blind cave spider ( <i>Catonetria caeca</i> ) has no DNA barcode reference and there is no scope to develop one from the museum type material.	<ul> <li>Collect another specimen of <i>Catonetria caeca</i> to be barcoded at the Natural History Museum, London. N.B. This species has not been recorded since 1995 and therefore may be extinct.</li> <li>Swab the cave to collect DNA samples to identify the presence of invertebrates not previously recorded.</li> </ul>
В	Species ecology	<ul> <li>Research the dietary requirements of the cave booklouse and cave springtail.</li> <li>Research the breeding requirements of these cave species.</li> <li>Understand the basic ecology of these species to understand their vulnerability to microclimate change.</li> <li>Research the impacts of invasive invertebrates on the endemic species.</li> </ul>	<ul> <li>Genomic gut content analysis of specimens stored in ethanol. May require additional collection of fresh specimens.</li> <li>Experimental studies on individuals in the laboratory to understand species ecology.</li> <li>Experimental studies on individuals in the cave.</li> </ul>
С	Invasive species 🌋	Is it possible to suppress cockroaches through biocontrol?	Desk study to produce an assessment to control American cockroach
D	Climate change in Bat Cave	<ul> <li>Understand the temperature and humidity levels currently in Bat Cave.</li> <li>Research if Bat Cave is connected to other subterranean spaces which could provide spatial redundancy for species</li> </ul>	<ul> <li>Long term monitoring of air temperature and humidity inside the cavern.</li> <li>Subsurface mapping of the habitat, perhaps through Ground Penetrating Radar (GPR)?</li> </ul>

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