St Helena's Terrestrial Invertebrate Conservation Strategy 2023-2028

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Contents

Photos (Spiky yellow woodlouse *Pseudolaureola atlantica*, Blushing snail *Succinea sanctaehelenae* and Golden Sail Spider *Argyrodes mellissi*) credits: St Helena National Trust, Liza Fowler and Roger Key

Introduction

St. Helena holds over a third of the total unique biodiversity of the UK and the Overseas Territories: a substantial biological legacy and responsibility. Most of that biodiversity is the island's invertebrate fauna. The island has over 1400 terrestrial invertebrate species and a staggering 420 are endemics (found only on St Helena). Of the endemics, 146 have had a Red List assessment completed and have demonstrated high extinct and threat levels. Currently, 21 species are listed as Extinct, of these 19 are snails, as well as the legendary Giant Earwig *Labidura hurculeana* and the St Helena Darter *Sympetrum dilatatum*. With 41 species Critically Endangered including the iconic Spiky yellow woodlouse *Pseudolaureola atlantica*; as well as 36 species Endangered, 18 species Vulnerable, 8 species Near Threatened, and 21 species Least Concern. Within the central Peaks of the island, cloud forest habitat is found and this, is also where the highest level of invertebrate endemism is found. However, other unique habitats are also incredibly rich and important, particularly the gumwoods and dryland habitats (scrubwood, semi-desert). The key threats to invertebrates on-island are the loss, degradation and fragmentation of key habitats such as the cloud forest; also invasive species causing habitat change, predation and competition; as well as disease, development due to space constraints; and climate change.

To address the complexity of endemic invertebrate conservation on the island a multi-species conservation plan was developed. In 2016 the IUCN worked with local and international stakeholders and helped to run a workshopthat was held both on island and in the UK. This first all island plan was a five-year plan running from 2016 to 2021. In 2021/22 a process began to revise the plan, through the UK government Darwin Initiative funded project DPLUS 104 'Conserving St Helena's endemic invertebrates through invasive invertebrate control'. This document provides an overview of the progress of the last strategy, as well as describing existing habitats and threats to St Helena's invertebrates; and then it goes on to outline the workshop process and presents the resulting outputs, including the Vision, Goals and Action Tables.

Progress of the St Helena Invertebrate Conservation Strategy 2016 to 2021

This section outlines the progress in delivery of goals and associated objectives from the last strategy, to understand successes and shortcomings of the previous strategy.

Goal 1: Habitats

GOAL 1 – Halt and reverse habitat loss and fragmentation, through expanding habitat area, quality and connectivity

Some of the habitat actions and objectives from the previous plan were focused around developing management plans for key sites Central Peaks, Peak Dale, Man and Horse, Blue Point, Millennium Forest and Prosperous Bay Plain, plus documents on invertebrate habitat restoration techniques. There are overarching or general plans for most of these sites but not invertebrate specific ones. Therefore, it is important that invertebrates are flagged during future revisions and development. There has been general habitat work in the cloud forest via a series of projects including the FCDO funded Cloud Forest Project, which will also help with some of these actions. For more information on relevant projects see table 1. Apart from some Spiky Yellow Woodlouse (SYW) work (planting, invasive control and part of the landownership secured) there hasn't been specific endemic invertebrate focused restoration and management in these habitats, and so the plans and documents are still to be developed.

Table 1 of relevant projects

Project Title plus lead organisation	Project Summary
DPLUS099 – Fragmented cloud forest habitat rehabilitation through invasive plant management. (SHG)	The project will expand fragments of important native biodiversity and link these via native vegetation corridors through managing invasive vegetation. Knowledge gained during this process will enhance our understanding of the applied ecology of the important endemic biodiversity hotspots, and better quantify invasive vegetation management required to conserve St Helena's endemic fauna and flora sustainably
DPLUS029 – Securing St Helena's rare Cloud Forest trees and associated invertebrates. (SHG)	Secure the existence of four endangered/critical endangered keystone endemic tree species and their associated invertebrate fauna of the Peaks National Park. Achieved by establishing seed-orchards using clones from the remaining trees. Critical data

	will be collected to enable informed management of these trees and their associated fauna and flora
DPLUS040 – Securing the future for St Helena's endemic invertebrates (2015 – 2017) (St Helena National Trust)	An assessment of the success of conservation work for endemic terrestrial invertebrates and a baseline survey in natural and restored habitats against which future changes can be measured. A high-resolution record of conservation work undertaken and endemic species regeneration so that spatial changes can be monitored accurately in the future
FDCO funded - Restoring St Helena's Internationally important Cloud forest for wildlife, water security and people.	The project will establish the frameworks and mechanisms needed to scale up forest conservation across the Peaks National Park on St Helena through the implementation of the first year of the Peaks Management Plan
BEST 2.0+ Establishing a St Helena Biological Record System	Establishing a biological recording system for the island that will also collate and encourage invertebrate recording
DPLUS157 Managing the pathogens threatening St Helena's biodiversity and food security	St Helena's endemic trees, insects as well as crops are threatened by unidentified introduced pathogens, or changes to endemic pathogens through climate change. This project surveys and identifies, as well as build capacity in diagnostics and management

The action to prioritise endemic invertebrate species for targeted conservation (i.e. additional flagships). This prioritisation has happened for the FCDO Cloud Forest Project but is still worth progressing for other habitats.

A long-term invertebrate monitoring programme is starting in the cloud forest but has not been established for other habitats. Some surveys were done under other Darwin projects for the Spiky Yellow Woodlouse (SYW) and wider invertebrates, also through the Biosecurity team, and so there is learning and ongoing work that can be built upon. However, there are still ongoing issues around availability of appropriate identification literature on St Helena's invertebrates, as well as skills and capacity on island in terms of invertebrate identification, all of which need to be addressed to support ongoing monitoring work.

Propagation of native plants relevant to invertebrate habitat restoration is being achieved for the Peaks via the nursery and there has been an increase in propagation dryland species due to the LEMP, and the Terrestrial Conservation and Endemic Nurseries.

There was a previous action on access control and awareness in relation to recreation and tourism, in order to stop damage to habitats through public access. This is being covered in the Peaks National Park through existing works by the ENRP Terrestrial Conservation 'Peaks team' and *The Peaks National Park Conservation Management Plan 2019 -2024*. It needs to be clarified if this is a risk in other habitats beyond the Peaks National Park.

Goal 2: Existing invasive species

GOAL 2 – Take action to contain the spread of invasive plants and animals, and reverse their damage through conventional and innovative measures based on priority endemic species and sites

In terms of identifying which invasive plants and animals are most significantly impacting endemic invertebrates, the report 'Non-indigenous Animal Taxa on St Helena: likely effects on endemic and indigenous invertebrates and their habitats and possible control measures' (Key 2014) needs to be updated. However, risk assessments for invasive invertebrates are being produced as part of the FCDO Cloud Forest Project (2021-2025). The production of a list of invasive plants and their likely effects on invertebrates also hasn't been completed but is still an important piece of work. Also, not complete is a matrix of invasive species versus vulnerabilities for habitat qualities and species present.

Regarding feasibility of control methods for invasive species plus reduction strategies, there has been work on invasive invertebrates through the current Darwin project that is applying strategies for the Common wasp *Vespula vulgaris* and the Big-headed ant *Pheidole megacephala* and exploring possibilities for the Springbok mantis *Miomantis caffra.* In regards, to efforts to reduce other invasive species threats to endemic invertebrates on-island. There have been invasive plant projects, for example DPLUS059 Project Summary: Island capacity to manage invasive plants at the landscape level improved, enabling restoration of endemic habitats to safeguard the endemic wildlife of St Helena, and to support food security. This type of project also benefits endemic invertebrates but there have been no specific projects with a focus on specific plants/sites in relation to invertebrate benefits.

Pathogenic fungal, bacteria and oomycete species affecting endemic trees are becoming an increasing problem and there is a specific focus on this by SHG, plus there is a new PhD and DPLUS157 'Managing the pathogens threatening St Helena's biodiversity and food security'.

Goal 3: NEW INVASIVE SPECIES

GOAL 3 – Ensure no more invasive plants and animals arrive through training, protocols and biosecurity measures

Biosecurity have been ongoing to look at key biosecurity issues at entry points with continual improvements. From DPLUS074 'Improving biosecurity in the South Atlantic UKOTs through Pest Risk Assessments and regular updated Horizon Scanning' has resulted in outputs, such as PRA procedures, guidance, and PRA templates, which are all important tools. Regarding monitoring by biosecurity there is continual checking of imported goods like fruit for invasive invertebrates, please see link for more information https://www.sainthelena.gov.sh/portfolios/environment-natural-resources-planning/biosecurity/ There are also posters on impact on arrivals of invasives at the airport and it would be good to expand these. There continues to be training for SHG Biosecurity on invasive invertebrates and their protocols.

Goal 4: Development issues

GOAL 4 – Identify emerging issues arising from infrastructure development and their likely impacts, and alert decision makers as they affect endemic invertebrates and their habitats.

Maintain and update invertebrate database, Roger Key has been updating the island species list, but the individual species location records have not been updated, however the new BEST project which is developing St Helena iRecord, will do with this and take over these actions. This project will also train conservation workers in the management and use of the database, linking the database to existing data and being able to produce maps.

The action to conduct a desk study to review the potential impacts of ordinance and policies on invertebrates, including Land Development Control Plan 2012 and deliver recommendations for change to Legislative Council - this is still to be completed.

The objective that invertebrates are included in an environmental check list for Environmental Impact Assessments (EIAs), the SHNT now ensures that invertebrate needs are highlighted during EIA reviews. SHNT does this via two avenues: maintaining a watching brief of all developments that could affect St Helena's natural heritage, and by supplying the specialist information through site assessments/surveys to help inform EIAs. Another action was to produce guidelines for EIA practitioners on how to include invertebrates in the EIA process, this has yet to be completed; and evidence that the Environmental Protection Ordinance 2016 (EPO) is enforced for protected endemic invertebrates and their habitats also still needs to be collated. The list of invertebrates protected under the EPO also needs reviewing.

Goal 5: Climate change and water

GOAL 5 – Establish research and adequate monitoring for climate change and hydrology and establish the most prudent approaches to adaptation and mitigation.

Identifying climate monitoring needs for invertebrates and include them in future climate monitoring, is still outstanding; and so is climate change monitoring, assessment of risk and implementing mitigation in relation to priority endemic invertebrates and sites. However, SHG recently published a water resources strategy which considers how to supply the island with water for the next few decades. Darwin project DPLUS103 examined hydrology in the Peaks National Park and how it links to water security and native habitats, and the large-scale FCDO Cloud Forest Project will expand on this. This project also has a strong climate change element to it.

The two research projects on effects of woody vegetation on climate and hydrology plus effects of climate and vegetation change on aquatic invertebrates, are not complete; and neither is the resulting workshop.

However, the national climate change policy has been completed and is in place, the action plan is still in draft see link https://www.sainthelena.gov.sh/wp-content/uploads/2012/08/Climate-Change-Policy-for-St-Helena-1.pdf

Goal 6: Resources and awareness

GOAL 6 – Increase the number of diverse sources of funding of adequate duration and overcome limitations of training and on island employment opportunities; at the same time increase international awareness and so stimulate international partnerships, with an overall long-term aim of greater self-sufficiency for environmental conservation.

On a wider scale there has been efforts to increase UKOT funding, there is a funding pot through the Environmental Funder Network that the John Ellerman Fund released in 2021 and funding increased through Darwin Plus. The valuation of the benefits of endemic invertebrates to the island hasn't been done. The coordination of funding to make the most of funding cycles in relation to delivering the strategy wasn't initiated.

There has been ongoing public awareness of endemic invertebrates by the SHNT and SHG continually reiterating the importance of endemic invertebrates and resources have been increasing. Visiting researchers via St Helena Research Institute are encouraged to give presentations when they are on island.

In regard, to the action for a desk study on HR limitation and skills need in relation to delivering the Invertebrate Conservation Strategy. This translated into budgets and project of EMD and SHNT, plus annual

training of staff and recruitment of volunteers with invertebrate skills. Although the desk study wasn't specifically undertaken the number of people to increase skills is slowly increasing, invert team at SHNT has now grown to 5 people but these roles are dependent on grant funding and have not yet become core funded.

Strengthening local and international link to facilitate research, funding and so increase the number of invertebrate projects. There have been several scientific journal articles published and a few popular articles. SHNT has improved its international reach with invertebrate articles in newsletters and social media. There are also now better links between JNCC and St Helena, and the new St Helena Research Institute is strengthening research links. There has been wider international engagement for example New Zealand and South African support on the Invasive Invertebrate Project. However, there are likely to be more opportunities for funding and partnerships internationally. The idea of 'Green tax' and using this with increasing tourism to increase international interest, still needs to be explored.

Endemic invertebrate habitats on St Helena (adapted from Key, Fowler and Pyrce 2021)

As it is impossible to describe the habitats of all invertebrate species relevant to this plan and so the habitat section of the St Helena Invertebrate Guide (Key, Fowler and Pyrce 2021) has been adapted. As this provides an overview of the island's habitats from an invertebrate perspective.

The dry zones

These areas are heavily eroded areas that are mainly on the coastal; the sea cliff faces and tops, and some of the inland screes and cliffs are also very arid and barren. They have sparse seasonal vegetation and much exposed rock, resulting from low rainfall, porous soils and erosion. Native vegetation is of fleshy, waxy or crystalline xerophytic plants, including the endemic Babies' toes, Salad plant, Boneseed, French grass and various lichens. Other native xerophytes of African origin are present, including the dwarf shrubby Samphire, which is an important invertebrate foodplant that supports several endemic species. A similar but sparser plant community exists on the extensive very arid area of Prosperous Bay Plain, a former caldera lakebed of around 2.25km^2 of soft, very free draining sands and silts. Sometimes regarded as the smallest desert on the planet, it is an important centre of endemism of the island's invertebrates, including the iconic wolf spider species. It is surrounded by the Eastern Arid Area, a large barren rocky area which shares some of its scarce invertebrate fauna.

These unpromising looking drier areas support a surprisingly high diversity of endemic invertebrates. Important microhabitats are the firm but friable soils and sediments, into which detritivorous and predatory species burrow; and embedded rocks, under which other species take refuge. Some of the endemic and native herbs, grasses, mosses and lichens support a few specialist invertebrates that feed directly on them, but more species utilise the dry litter that accumulates beneath them.

The few wetter areas in the deserts include the lower reaches of intermittently flowing streams with small, damp 'flood-plains', and some highly mineralised springs and seepages, flowing into very warm shallow pools dominated by algal and bacterial films. These support a small, specialised fauna, including shore- and doli-flies, and an endemic seed-shrimp. Surrounding these, samphire shrub grows more luxuriantly than in drier areas and seems to support a greater abundance of the associated endemic species.

The coast

Most of the coast is of sheer cliffs and there are very few beaches around the island, most of which have been heavily modified. Important habitats for invertebrates are, the cover provided by dryland plants, and the strandline accumulations of seaweed, driftwood, and plant litter brought down from the interior by winds and streams. There is a small but specialised coastal fauna, from which probably evolved some of the endemic terrestrial species that are very closely related to overseas coastal ones. None of the beaches have a natural transition to other vegetation, most are truncated by military defensive walls dating from Napoleonic times. The nearest to a natural transition is at Prosperous Bay, although this grassy hinterland is dominated mainly by invasive plant species.

Scrublands

The arid coastal areas merge into low scrubby vegetation, interspersed with native grasses. The main scrubland species now are Scrubwood, St Helena tea plant, St Helena rosemary and Samphire; and in the past Boxwood (of which very few survive) and Dwarf ebony. These scrubby species support specialised endemic phytophagous invertebrates, which feed on their leaves, burrow into their stems, and live in their decaying wood and dry leaf litter.

Forests

Formerly, the scrubland plant community would have gradually merged into a low altitude dry forest type, the nature of which we can only speculate, as the forest and its associated invertebrates have now all been destroyed. It is likely that this forest was dominated by the extinct St Helena ebony tree along with Gumwood; and it would have merged with increasing altitude and moisture, first into dry Gumwood forest, and then into a more diverse moist Gumwood forest.

The remaining Gumwoods support a much wider diversity of phytophagous invertebrates than the scrublands. The great structural diversity of the trees, the variability of decay conditions in dead wood and the cover of epiphytic mosses and lichens, all provide a wide range of niches for a great diversity of specialist invertebrates.

Above this, from about 700m upwards, is the true cloud forest zone. Here the tree canopy is a diverse mixture of endemic drought-intolerant trees: Black, He and She cabbage trees, Whitewood, and St Helena dogwood, olive and redwood. The St Helena tree fern is abundant and can form extensive thickets on its own. These trees have a luxuriant covering of epiphytic bryophytes, lichens and ferns, which creates ‘nurseries’ for seed regeneration and provides microhabitats for numerous endemic invertebrates. This forest also has a naturally lush and diverse ground layer, with a moss carpet and undergrowth of various ferns and herbs, including the endemic Bellflowers, Jellicos, Lobelia, sedges and grasses. There is an abundance of dead wood as well as leaf litter, which slowly decays to form peaty soil into which some invertebrate species burrow. Here the richness and diversity of the invertebrate niches and their associated species is at its peak, with almost half of St Helena’s endemic species found in this habitat.

Wetlands

Interspersed amongst all of these vegetation types is a network of watercourses and wetlands. These vary from flushes, springs and seepages, to temporary and permanent streams, waterfalls, and a couple of larger wetlands associated with permanent stream valleys. Very little is known about the original vegetation of permanent marshlands, as they have been totally converted to pasture. The only natural permanent freshwater bodies are the plunge pools of three intermittent waterfalls. A wetland microhabitat of particular value to some invertebrates is wet bare mud or organic sediment beside water. Like most remote islands, St Helena has very few truly freshwater invertebrate species, and most are now very rare or possibly extinct.

Caves and subterranean habitats

St Helena has a few ancient lava tubes and wind-eroded caves on exposed outcrops. A limited cave fauna has been discovered, including a unique eyeless psocid and an undescribed eyeless springtail, suggesting very ancient evolution from surface-living species. Surveys that have sampled interstitial cavities in soils and rocks, have found a small number of minute subterranean spider species in pipe traps sunk into dry ground. It is difficult to imagine how such species colonised the island, but related species have been found on other remote Atlantic islands.

Endemic invertebrate threats on St Helena

This section is again modified and added to, but it is based on the St Helena Invertebrate Guide (Key, Fowler and Pyrce 2021) threat section. Providing an overview of the key threats to endemic invertebrates.

Small and fragmented habitats

By far the most significant factor in the decline of St Helena's invertebrates has been the destruction of nearly all of the island's endemic vegetation. Through direct clearance by man for firewood, cropland, pasture and forestry, especially in the central midaltitude areas of the island. Domestic livestock were imported and released or escaped; and non-native plants were introduced, either accidentally or deliberately as crops or ornamentals. All native vegetation types and their associated invertebrates now exist only as tiny remnants.

A result of these changes to the island's vegetation is that most of St Helena's endemic invertebrates are now very rare and their populations geographically fragmented, restricted only to tiny pockets of native vegetation, often separated by large areas of hostile terrain. This limits gene-flow between once-continuous populations, potentially leading to inbreeding and loss of fitness. Occasionally, however, some very rare species can still be surprisingly abundant; small pockets of habitat, even isolated individual trees, can sometimes still support a surprising diversity of invertebrates. There is hope for the future if such areas can be reconnected.

More insidious have been gross or subtle changes in habitats that has left them less able to support their associated invertebrates. Lowered humidity regimes in the cloud forests caused by interruption of the tree canopy; clearings, paths and other edges, have all increased drying by wind and sunshine. This also alters the decay cycle of dead wood and leaf litter, leading to declines in saprophagous invertebrates. Changes in streams through water abstraction, bunded reservoirs, and a reduction in rainfall and mist condensation in the cloud forest, probably helped eliminate the endemic dragonfly. The disturbance of desert surface crusts and embedded stones by grazing animals and human access has probably impacted some desert species, and attraction to outside lights at night has probably badly affected night-flying insects.

Development

While most of this destruction and change was historic, some loss, damage and change has continued until the present. Until very recently, fallen timber was cut up and removed from remaining areas of Gumwood forest and in 2011 a big drainage channel was dug into the island's largest wetland. Motorbikes and quadbikes using the designated mountain bike trail cut into important wetland habitat. Construction of the airport destroyed and damaged areas of desert and infilled most of Dry Gut, and invertebrate habitats have also been lost to port and industrial developments in Rupert's Valley.

Invasive plants

A host of deliberately or accidentally introduced and highly competitive invasive plants have infiltrated and supplanted native vegetation. In the worst cases these now form large monocultures. One of the most pernicious is New Zealand flax for which large areas of cloud and Gumwood forest were cleared and, it has now spread into the edges of the forest remnants. Flax-fields blanket even the steepest cliffs of the Central Ridge, leaving only a crest of cloud forest along the summit. Very few invertebrates feed on the flax itself, although the endemic Blushing snail *Succinea sanctaehelenae* is often seen on its blades.

Another pernicious invader is Wild mango, able to colonise both dry and wet habitats. It has completely replaced native vegetation along many of the watercourses, creating dark tunnels over streams, particularly along their lower reaches. It also threatens the remaining open wetlands and grasslands in the Bilberry/Mulberry Gut area and at Prosperous Bay and has begun to infiltrate the Gumwood forest at Peak Dale. The upland reaches of the streams are choked with dense beds of Yam, Arum lily and Yellow ginger, and their lower reaches and the wetlands are smothered by introduced grasses, especially Thatching grass. Exposed waterside mineral sediments or peat, vital to some riparian species such as the endemic shore bug, have been totally covered with invasive vegetation.

Other invasives with significant deleterious effects in the uplands, including in the cloud forest, are Buddleia, Bilberry tree, Fuchsia and Kikuyu grass. In some forests the original ground flora, moss carpets and litter layers have been displaced by blanketing Tallow vine; and the epiphytic mosses and lichens on trees are being supplanted by Pheasant-tail fern, whose runners can encircle and ultimately strangle the trees. Drier areas and pastures have been extensively colonised by Furze and various other unpalatable scrub species, such as Tungi cactus, Aloe and Creeper.

Paradoxically, a few species of invasive plant have proved acceptable to some endemic invertebrates, which remain more widespread than their fussier cousins. Particularly valuable is the large and very fast-growing Thorn tree, which is the main hedgerow tree of the pastures and roadsides; it often has abundant rot-holes, hollows and dead/decaying wood, which provide refuge for a number of endemic dead-wood species. The decaying dead wood of Norfolk Island pine, Cape yew, and surprisingly, the dead twigs and branches of Furze are also used by some endemics. The endemic Golden sail spider *Argyrodes mellissi* has also been found in sheltered banana plantations under a canopy of non-native trees, and the litter that accumulates beneath the invasive Creeper in the drylands supports some endemic desert detritivores.

Invasive animal species

St Helena had its own natural predators of invertebrates, which co-evolved and produced balance or cycles between predator and prey. Many of these predatory species are now extinct and have been replaced by invasive predators of invertebrates with hunting strategies different from anything encountered before on the island, which the island's endemic invertebrate species have not evolved to cope with.

Most of the non-native species of bird, along with rats, mice and geckos, are predators of invertebrates, and almost certainly played a part in the extinction of species, such as the Giant earwig and the Giant ground beetle. Recent observations of the Java gecko showed a distinct negative correlation between the presence of geckos and endemic invertebrates under stones in arid places. The African grass frog and South American guppies are predators of freshwater and waterside invertebrates, and probably helped eliminate the endemic dragonfly and shore bug.

A large number of invasive predatory and parasitoid invertebrates have taken their toll on St Helena's endemic invertebrate fauna by increasing the predator load. These include: the giant Red-headed and other centipedes, many species of spiders, ground and rove beetles, a few cockroaches and predatory

bugs, as well as many ichneumonid and other parasitoid wasps and the Yellow dung fly. More recent arrivals are the Springbok mantis, European social and paper wasps and the Harlequin ladybird.

The 15 species of invasive ants are likely to have a devastating effect on the fauna as, with no native species of ants on the island, the endemic invertebrates evolved without having to cope with these highly efficient social predators. A number of ant species build their nests in microhabitats that are important to the endemic invertebrates, in particular in both standing and fallen dead wood in forests and in scrub, under stones, and amongst plant litter in dry places.

Competition from invasive invertebrates may be significant, effecting endemic land hoppers, woodlice and saproxylic beetles, all of which may be successfully out-competed by their invasive counterparts, especially in forests. The actual direct effects of predators and competitors are notoriously very difficult to research and prove, but their effects are likely to exacerbate the combined effects of habitat destruction and deterioration. Almost by definition invasive invertebrate species are highly successful colonists and achieving control has proved very difficult, and so tested control methods are limited.

Some invertebrates actively change habitats through their feeding activities. Phenomenal densities of introduced invasive woodlice, land hoppers, millipedes and earthworms now dominate the leaf and fern litter, as well as soil and dead wood habitats. These no doubt considerably modify the decay dynamics of these endemic-rich microhabitats in moist forests. This has almost certainly impacted one of the most seriously threatened communities of invertebrates on the island, the small ground beetles *Bembidion* spp. that inhabited the litter of the cloud forest and tree fern thicket, many of which are probably now extinct.

Pesticides

A wide range of invertebrate pests of agricultural and horticultural crops, forestry, and structural timber have had a severe economic impact on St Helena, and so pesticides have been used to control them, including several broad-spectrum and highly toxic insecticides. It is unknown what effects pesticide use has had on the endemic invertebrates, but both direct and indirect effects are likely.

Now the island is adopting Integrated Pest Management, that aims at long-term prevention of pest damage by combining methods such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed, and pest control methods are selected to minimise risks to human health, beneficial and non-target organisms and the environment.

Introduced and native fungal diseases of invertebrates and the plants that support them

Fungal diseases have been observed on both endemic and invasive invertebrates on the island, and probably include non-native, native and perhaps even endemic species. Non-native fungal species have been deliberately introduced as biocontrol agents, as well as unintentionally along with their hosts. Diseases of invertebrates, have not, however, ever been systematically studied on the island. Recently, pathogenic fungi, bacteria and oomycetes have started to kill vitally important endemic tree and shrub species and threaten whole habitats.

Climate change and wider environmental change

Climate change will inevitably affect St Helena's invertebrates, even if only by altering the endemic vegetation. There is some evidence that the climate of St Helena may already be changing, with decreased and more unpredictable precipitation, and a greater frequency of thunderstorms. How these changes will affect the invertebrate fauna is still unknown, but this issue should be incorporated into future research.

Over-collecting

For most species it is vital that specimens are examined with a microscope and voucher specimens retained to allow identification. However, caution is needed in the numbers of specimens taken, particularly given the extreme scarcity of many species. Some collecting and trapping methods are likely to collect very large numbers of individuals in a short time. While even the extremely rare species can sometimes be locally very abundant, their entire populations may also be highly localised.

Potentially even more harmful may be incidental damage done to habitats while surveying for invertebrates. Especially sensitive is the dead wood that is so important to many of the endemic species, and also the disturbance of settled or embedded stones in desert or wetland areas. Even sweep netting may damage vegetation if it is swept too vigorously.

There is also an international and sometimes illegal market in large, rare insects, including protected species, and large scarabaeoid and carabid beetles can attract high prices (£500+). While commercial invertebrate collecting has not been known on St Helena, should either the earwig or the ground beetle – ever be rediscovered, then vigilance will be needed to ensure these protected species are not targeted by unscrupulous collectors or dealers.

Resources

To sustain and enable invertebrate conservation on St Helena, there needs to be adequate resources in terms of skills and knowledge for invertebrate identification and ecology, as well as conservation management at both a specialist level, as well as more generally. Long-term resources are also needed, including funding for both invertebrate research and conservation, either via funded projects either invertebrate focused or embedded in broader initiatives, as well as financial resources for invertebrate related roles. There is a need for systems and facilities that will sustain the work long-term, for example new technologies such as DNA barcoding provides an opportunity to increase capacity for invertebrate identification; however, it should complement specialist skills and not replace them. Therefore, this needs to go hand in hand with training of both specialist and generalist skills on invertebrates, as well as important knowledge gaps filled such as invertebrate keys.

A limited level of understanding

The rich-endemic invertebrate fauna is still very poorly understood, we have island invertebrate species lists and a series of single one-off surveys but still lack detailed understand of species and assemblage ecology, as well as distribution, population monitoring and genetics, as well as long-term monitoring studies. All these remaining knowledge gaps make it difficult to accurately manage habitat and threats in the relation to threatened endemic species recovery.

Awareness (local and global)

There is increasing awareness on island of the endemic invertebrates and most projects have some communication or engagement element within them. This general overall increase in awareness, although it is not monitored, it is likely having beneficial impacts. However, there is still a risk of damage and loss of habitats due to ignorance. The global profile of St Helena's endemic invertebrates is also important, as a low profile means it can be harder to bring in funds for conservation work, as well as engage important international partners to facilitate research and conservation work. There has been profile raising done by international partners over the year through communication work, publications, plus red listing, but more work could be done to enhance this.

Workshop process

This Strategy is the product of a 2-day workshop involving key international and St Helenian stakeholders (see Appendix 1 for the attendance list), as part of the Darwin-Plus DPLUS104 funded Invasive Invertebrate Project. The core objective of the workshop was to produce a practical strategy for conserving St. Helena's terrestrial invertebrates for the 5 year period from 2023 to 2028.

The workshop was held over two days in November 2021. It was split between the UK and international participants, with one group of participants working on St. Helena and another group working simultaneously on zoom. The workshop was hosted on St Helena by Natasha Stevens for the St Helena National Trust and on zoom by Vicky Wilkins from the Species Recovery Trust. The two groups communicated through zoom and worked independently on different sections of the strategy, but regularly came together online to hold joint discussions and check through ideas. Sessions were held to develop a vision, a series of goals, objectives and related actions. Below is outlined the vision and the goals that were agreed.

Vision and Goals

The vision is:

St. Helena's unique invertebrates and their habitats are secure, connected and healthy and are locally and globally valued, understood and celebrated by future generations.

A framework of seven goals is used to provide the basis for establishing how to achieve this vision over the next five years. These seven goals are as follows:

Goal 1 – Research and monitoring

Increased understanding through approved research and monitoring trends using standardized methods and best practice for endemic invertebrates

Goal 2 – Habitats

Reduce habitat loss and fragmentation for priority endemic invertebrates by expanding habitat area, quality and connectivity

Goal 3 – Existing invasive species (plants, invertebrates, vertebrates, and diseases)

Reduce the negative impact of invasive species on priority habitats and endemic species, through existing and innovative measures

Goal 4 – New invasive species

Minimise the arrival and establishment of new invasive species, through improved biosecurity, horizon scanning and monitoring

Goal 5 – Development

Responsible and sustainable development that minimises loss and maximises opportunity to enhance endemic invertebrate habitat

Goal 6 – Resources

Improved resources for St. Helena's endemic invertebrates through strong partnerships to develop and support local capacity building, local research, and conservation action

Goal 7 – Communication, education and awareness

A raised profile of St Helena's invertebrate fauna and stimulate support for invertebrate conservation

Action Tables

The following tables contain the detail of St. Helena's Terrestrial Invertebrate Conservation Strategy 2023-2027. With the support of key stakeholders and implementing parties, this represents the best chance of saving St. Helena's immensely valuable invertebrate fauna for generations to come.

Goal 1 – Research and monitoring

Increased understanding through approved research and monitoring trends using standardized methods and best practice for endemic invertebrates

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Objective 1.1 Develop general invertebrate habitat management principles for St Helena habitats							

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Action 1.1.1 Develop a new set of St Helena habitat management protocols, using existing templates (e.g. Kirby, Habitat Management for Invertebrates and other similar islands)	1	**MAIISG**, SHNT, SHG (EMD)	2023	Develop protocols	Cloud forest project plus volunteer time for other habitats	Protocols drafted	Protocols ready for testing
Action 1.1.2 Test St Helena habitat management protocols to ensure applicability to St Helena habitats, revise and circulate	2	**SHNT**, SHG (EMD), MAIISG	2024	Test protocols and revise	Staff time	Finalised protocols	Protocols being implemented
Objective 1.2 Making sure that endemic invertebrate research needs are St Helena-led and with a clear legacy, prioritised and properly coordinated							
Action 1.2.1 Work with the St Helena Research Institute to produce a list of practicable invertebrate research (based on main habitat types on island and the expected characteristic invertebrate species (groups)) needs/issues that are prioritised and co-ordinated through the Invertebrate Forum	2	**SHG (SHRI)**, SHNT, SHG (ENRP), MAIISG	2023	List of invertebrate research needs developed	Volunteer time	List of practicable invert research needs	List available online

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Action 1.2.2 Ensure research results are available in central online repository and is applied into management	3	**SHG (SHRI)**	2024	On/offline repository developed	Staff time	Repository developed and evidence of application	Repository accessible, searchable and being used
Objective 1.3 Monitor priority groups/species for different niches and in a range of different habitat types to understand impacts, changes and recovery							
Action 1.3.1 Establish invertebrate monitoring needs and aims for Cloud forest and dryland habitats	1	**SHNT**, MAIISG, SHG (EMD)	2023	St Helena invertebrate monitoring document written	Existing project time and volunteer time	St Helena invertebrate monitoring document	St Helena invertebrate monitoring document being used
Action 1.3.2 Define priority Invertebrate habitats and niches and identify appropriate priority species/groups, for both cloud forest (via CFP) and dryland habitats.	1	**SHNT**, MAIISG, SHG (EMD), Invertebrate Forum	2023-2025	Priority list complete	Existing project time and volunteer time and wider habitats projects	Priority list	Application of priority list into monitoring methods
Action 1.3.3 Develop and utilise novel monitoring methods and technologies as appropriate for long-term monitoring e.g. field	1	**SHNT**, MAIISG	2024	Monitoring methods being explored	New projects	New monitoring methods increasing the efficiency and capacity on island	New monitoring methods being utilised

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
techniques, DNA barcoding etc and build capacity on island							
Action 1.3.4 Ensure monitoring and survey protocols are proportionate to risk and do not oversample populations of endemic invertebrate nor spread plant diseases, while still facilitating high-quality data collection	1	**SHNT**, MAIISG, Invertebrate Forum	2023	Embed into monitoring document	Existing project time	Invertebrate oversampling and disease spread mitigation	Invertebrate oversampling and disease spread mitigation being applied
Action 1.3.5 Undertake appropriate monitoring using practical standardised and flexible protocols, repeated at regular intervals, with results fed back into management	1	**SHNT**, MAIISG, SHG (EMD)	2023/24	Monitoring result reports	Existing project time and volunteer time	Monitoring	Results being utilised to inform management
Action 1.3.6 Invertebrate habitat quality assessment developed and being applied to facilitate management in all habitat types	2	**SHNT**, MAIISG, SHG (EMD)	2024	Habitat assessments embedded in monitoring	Existing project time and volunteer time	St Helena invertebrate habitat assessments	Invertebrate habitat assessments being applied
Objective 1.4. Research the ecology of representative invertebrate species/groups and their role in functionality in different niches and habitat types							

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
1.4.1 Identify target invertebrate species/and ecological groups of species – e.g. using IUCN Red List assessments	2	**SHG (SHRI)**, SHNT, MAIISG	2025	Create list of target species and groups and what they represent	Volunteer time & Academic expertise	List of target species and groups + what they represent	List available online
1.4.2 Identify research questions and best research field techniques for understanding the ecology and functionality of target invertebrates	3	**SHG (SHRI)**, SHNT, MAIISG, SHG (EMD)	2027	Target list with associated methods	Academic expertise and Volunteer time	Target list with associated methods	List available online
1.4.3 Utilise expertise of external partners to maximise research and their impact	2	**SHG (SHRI)**, SHNT, MAIISG	2025	Develop project outlines	University projects/ academic institution project	Project outlines	Projects active
Objective 1.5. Understand possible climatic impacts on endemic invertebrates and apply resilience and mitigation actions							
1.5.1 Understand vulnerability of key invertebrate species and habitats, identifying invertebrate species' needs and mitigation	3	**SHNT**, MAIISG	2024	Invertebrate habitat climate change vulnerabilities assessed	Volunteer time	Vulnerabilities assessment written	Assessment available online

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
1.5.2 Use potential learning from other islands for climate change impacts on invertebrates and develop network of relevant contacts	3	**MAIISG**, SHNT	2024	Learning report written	Volunteer time	Learning report	Learning report available online
1.5.3 Perform endemic species distribution modelling using ecological and climatic data to understand species vulnerabilities	3	**SHG (SHRI)**, SHNT, MAIISG, Universities	2025	Modelling conducted for species with enough data	University/academic institution project	Modelling papers	Modelling papers published
1.5.4 Integration of endemic invertebrate needs into climate change mitigation work	3	**SHG (EMD)**	2026	Mitigation integrated	Staff time	Mitigation integrated	Mitigation being applied

Goal 2 – Habitats

Reduce habitat loss and fragmentation for priority endemic invertebrates by expanding habitat area, quality and connectivity

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Objective 2.1 Continue habitat improvement for endemic invertebrates, ensuring integration with other conservation priorities							
Action 2.1.1 Prioritize sites through spatial mapping, plus expert advice and use data to define habitat management works	1	**SHNT**, SHG	2024	Site prioritisation	Staff time	Maps of priority sites with document on habitat works for each site	Map and associated document available online
Action 2.1.2 Define invertebrate habitat quality measurements and implement monitoring and analysis	2	**SHNT**	2023	Monitoring of management work	Staff time	Habitat monitoring results	Monitoring implemented. Results and analysis feeding back into management
Action 2.1.3 Embed St Helena principles of habitat management for invertebrates (as in 1.1.1) into site management plans and associated actions	1	**SHG (ENRP)**	2024	Embedding in plan	Staff time	Plans with general principles of habitat management for invertebrates embedded	Plans being implemented

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Action 2.1.4 Project on 'forgotten invertebrate habitats/sites' e.g.: drylands, streams, seepages, guts etc etc	2	**SHNT,** MAIISG	2024	Project fundraised for	Staff time	Project application	Project active and working on habitats
Objective 2.2 Reduce habitat fragmentation and increase connectivity							
Action 2.2.1 Using mapping in 2.1.1 to identifying connectivity opportunities to link sites creating corridors for endemic invertebrates for cloud forest and other sites e.g. drylands	2	**SHG (GIS)**, SHNT	2023	Connectivity mapping	Staff time	Invertebrate connectivity maps	Works being implemented based on mapping
Action 2.2.2 Embed connectivity/corridor opportunities into projects and existing work/projects, dependent on 2.2.1 to identify specific sites	2	**SHG**, SHNT	2024 and ongoing	Connectivity implementation	Staff time	Connectivity for invertebrates clearly in projects and wider work	Connectivity increasing
Objective 2.3 Improve effectivity of habitat management and increase functionality through invertebrate services							
Action 2.3.1 Using materials developed in Objective 1.1, implement invertebrate habitat protocols and monitor results of management Objective 8.1	1	**SHG**, SHNT	2025	Habitat management for invertebrates improved	Existing work	Habitat management methods being applied	Habitat quality improved

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Action 2.3.2 Apply research findings on invertebrate ecosystem services Objective 1.4	3	**SHG**, SHNT	2027	Services being utilised to defined habitat management	Staff time	Habitat functionality improvement methods being applied	Habitat functionality improved
Objective 2.4 Further developing supporting service i.e. ID, nursery etc.							
Action 2.4.1 Sufficient nursery stock of key endemic plants for invertebrate structure and food to enable ongoing habitat creation and restoration for priority invertebrate sites/corridors	2	**SHG (EMD)**	2026	Nursery capacity increased	Nursery resourcing	Nursery resources improved	More habitat restoration
Action 2.4.2 Prioritisation of invertebrate groups where improved identification material is needed and identify ways to increase opportunities for identification	1	**SHNT**	2025	Identification capacity increased	Identification services resources	Identification resources improved	More identification facilitated

Goal 3 – Existing invasive species (plants, invertebrates, vertebrates, and diseases)

Reduce the negative impact of invasive species on priority habitats and endemic species, through existing and innovative measures

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Objective 3.1 Improved understanding of the relationship between invertebrates of conservation concern and non-native species identifying those that are harmful beneficial or neutral.							
Action 3.1.1 Collate and map distribution info of inverts (before system research), of both invasives and natives plus invasive plants, working with St Helena iRecord. Cross-cutting other objectives.	1	**SHNT**, SHG (EMD)	2023 to start and then ongoing	GIS work using data within the new biological record system	Staff time	Maps of invasives and endemics showing overlap	Maps being used to inform control work
Action 3.1.2 Prioritise and conduct assessment for individual non-native species of plant, animal and diseases; and rank according to their impact on endemic invertebrates, based on research and expert judgement	1	**SHNT**, SHG (EMD), with support from CEH, CABI and GB Non-Native Species Secretariat	2024	Environmental Impact Classification for Alien Taxa (EICAT) https://portals.iucn.org/library/sites/library/files/documents/2020-026-En.pdf	Staff time	Prioritisation exercise that reflects the needs of invertebrate conservation – a ranked list of species and associated impact classification	Evidence-based list that is disseminated to all relevant stakeholders
Action 3.1.3 Identify and prioritise ecological research needed to integrate management of	1	**SHNT**, SHG	2025	Questionnaire and research list formed	Staff time	Short paper	Research community takes note and research

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
invasive plant and animal species as well as diseases into wider projects, as well as understanding impacts (feeding into Action 3.1.2).							integrated
Objective 3.2 Identify priorities for intervention against invasive species of plant, animals, fungus and diseases to benefit invertebrate conservation and complete feasibility work and operation planning for management, control and containment of priority invasive species							
Action 3.2.1 Prioritisation for control of existing invasive species, through updating of Non-native Animal Taxa on St. Helena: Likely Effects on Endemic and Native Invertebrates & Their Habitats and Possible Control Measures (2014) or similar.	2	**SHNT,** MAIISG, CEH, CABI (partly through Cloud Forest Project)	2023	Risk assessments and used to develop a prioritisation	Staff and/or volunteer time	Impacts on endemic invertebrates' priority invasive species list	Priority list available online and being used
Action 3.2.2 Feasibility studies for priority invasive species interventions relative to invertebrate conservation, looking at each habitat type	2	**SHNT**, MAIISG, CEH, CABI (partly through Cloud Forest Project)	2025	Feasibility plans written	Staff time	A set of feasibility studies	Feasibility studies available online and being used
Action 3.2.3 Complete the operational plans for those priorities in each habitat type	2	**SHNT**, MAIISG, CEH, CABI (partly through Cloud Forest Project)	2026	Operational plans written	Staff time	A set of operational plans	Operational plans available online and implementation started

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
Action 3.2.4 Instigate pilot studies in habitats for invasive species of plant or animal where there is no established procedure and feasible and practicable control measures could be conceived	2	**SHNT**, MAIISG, CEH, CABI (partly through Cloud Forest Project)	2027	Pilot studies developed	Project/s	Pilot studies funded	Pilot studies are active for a series of priority invasives
Objective 3.3 3. Integrate non-native species management (at an appropriate spatial scale) to benefit endemic invertebrates into site based and zonal habitat management plans							
Action 3.3.1 Develop control strategies where necessary, including resource planning and making partnerships	3	**SHG (ENRP)**, SHNT	2026	Control strategies written	Staff time	Control strategies for a series of high priority invasives are produced	Control strategies available online and implemente d
Action 3.3.2 Implement and integrate priority strategies for invasive species management, which could include eradication and long-term management.	3	**SHG (ENRP)**, SHNT	2027	Control strategies being embedded into existing work programmes	Staff time	Control strategies embedded in plans	Evidence of implementat ion
Action 3.3.3 Explore partnerships with worldwide organizations involved in biocontrol of invasive species that are present and problematic on St Helena and develop and promote	1	**SHG (ENRP)**, SHNT	2023	Partnership being developed	Staff time	Partnership established and projects identified	Evidence of new biocontrol opportunitie s being explored

Goal 4 – New invasive species

Minimise the arrival and establishment of new invasive species, through improved biosecurity, horizon scanning and monitoring

Action wording	**Priority (1-urgent, 3 low)**	**Who is responsible (lead organisation in BOLD)**	**When**	**How**	**What resources needed**	**Output(s)**	**Indicator of success**
Objective 4.1 The risk to inverts from novel non-native species introductions is reduced to a low level through effective pre-border biosecurity measures including horizon scanning and risk alert processes							
Action 4.1.1 Undertaking horizon-scanning on a regular basis	1	**SHG (ENRP)** with support from CEH, NNS, CABI	Every 5 years, with ongoing rapid scan	Looking at risk species	Staff time	Horizon scanning list	Horizon scanning data available and being used
Action 4.1.2 Working with international partners to ensure that risks are identified, and alerts issued, as well as coordinating with other OTs and relevant areas to relay warning of threats of arriving invasives.	2	**SHG (ENRP)** with support from CEH, NNS, CABI	Ongoing	Regular comms on invasives species risks	Staff time	Comms on invasives species	Comms being issued and acted on
Objective 4.2 The risk to inverts from novel non-native species introductions is reduced to a low level through effective border biosecurity including pathway action plans and pest risk assessments							
Action 4.2.1 Periodic review of biosecurity methods to ensure that they are up-to-date, and confirming that pathway action plans meet the needs of invertebrate conservation by reducing the risk of introducing harmful species – with enough	2	**SHG (ENRP)** with support from CEH, NNS, CABI	Every 2 Years	Review implemented	Staff time	Review report	Report recommendations acted on

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
capacity.							
Objective 4.3 The risk to inverts from novel non-native species establishment is reduced to a low level by post border monitoring and effective rapid response and contingency planning							
Action 4.3.1 Support post-border monitoring initiatives to ensure invertebrate conservation needs are included	3	**SHG (ENRP)** and SHNT with support from CEH, NNS, CABI	Ongoing	Monitoring updated	Staff time	Additional (revised/new) monitoring methods developed and quantity increased	New monitoring methods being applied
Action 4.3.2 Support developing rapid response and contingency plans for new introductions likely to impact on endemic invertebrates	3	**SHG (ENRP)** and SHNT with support from CEH, NNS, CABI	2025	Rapid response and contingency plans developed	Staff time	Rapid response and contingency plans	Rapid response and contingency plans available online

Goal 5 – Development

Responsible and sustainable development that minimises loss and maximises opportunity to enhance endemic invertebrate habitat

Action Wording	**Priority (1-urgent, 3 low)**	**Who is responsible (lead organisation in BOLD)**	**When**	**How**	**What resources needed**	**Output(s)**	**Indicator of success**
Objective: 5.1 To have high quality planning processes that minimizes invertebrate habitat losses and maximizes opportunities							
5.1.1 Provide information via Environmental Impact Assessments and endemic invertebrate information to developers so they know what must be taken into consideration	1	**SHG (Planning and EMD)**, plus assistance from SHNT	2025	Guidance written	Staff time	Guidance documents	Guidelines readily available online and being used by developers
5.1.2 Ensure that the EPO 2016 is enforced with regards to protection of endemic invertebrates and their habitats	1	**SHG (Planning and EMD)**	Ongoing	Enforcement capacity and skills enhanced Environmental design into planning	Staff time	Enforcement records	No breaches of regulations
5.1.3 Legislative framework for planning and procedures are fit for purpose	1	**SHG** (**ENRP with support from Legal)** and partners (Buglife and others)	2025	External assessment of legislative framework	Legal advice independent/ contractor consultant	Revised planning procedures	Identifying what needs to be updated - EPO
5.1.4 Review of existing Environmental Protection Ordinance, to refine schedule of endemic invertebrate species to be fit for purpose	1	**SHG (ENRP)** in consultation with partners (Buglife and others)	2024	Consultation exercise on EPO list with informed responses provided	Staff time	Revised EPO	List fit for purpose with species protected but no barriers to conservation

Action Wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
							due to inappropriate listings
Objectives 5.2 Embedding invertebrate priority areas and their associated ecosystem services costings into planning process							
5.2.1 Ensure that NCAs are updated and reviewed/protected and have management plans with invertebrates fully embedded	2	**SHG ENRP (through Darwin funded NCA Project)**	2026	NCA review	Staff time	Revised documents with invertebrates embedded	Management plans by end of NCA Project, feeding into LDCP and invertebrate needs delivered
5.2.2 Research the feasibility of integrating environmental economics for invertebrates into current planning system	3	**SHG (Sustainable Development** and SHRI)	2027	Planning review	Environmental economist	Feasibility assessed	Embedding considered

Goal 6 – Resources

Improved resources for St. Helena's endemic invertebrates through strong partnerships to develop and support local capacity building, local research, and conservation action

Action wording	**Priority (1-urgent, 3 low)**	**Who is responsible (lead organisation in BOLD)**	**When**	**How**	**What resources needed**	**Output(s)**	**Indicator of success**
Objective 6.1. Identifying funding opportunities for different types of existing partners: research, conservation action, as well as new partners for different funding opportunities							
Action 6.1.1 Use networks and funding experts to identify funding needs and opportunities sponsorship, philanthropists, partnerships, commercial enterprises (tourism, sales), apply for grants	1	**Invertebrate forum** (multi-stakeholder)	2024	Funding opportunities researched	Volunteer time	Funding opportunities increased	Funding secured
Action 6.1.2 Invertebrate needs embedded into funding applications and included in fundraising strategies of partners	2	**Invertebrate forum** (multi-stakeholder)	2023 and ongoing	Applications and fundraising strategies	Staff time	Fundraising strategies updated and applications submitted	Applications submitted and funding secured
6.2 Encourage more specialists to the island based on needs, and to engage with the island connections with Pan-African and international invertebrate specialists to get them to adopt St Helena to increase the specialist 'pool'							
Action 6.2.1 Create network of taxonomists and specialists incorporating St Helena's invertebrates into their work	3	**Invertebrate forum** (multi-stakeholder)	2024 and ongoing	List of specialists	Volunteer time	List of specialists	More specialists engaged

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
6.2.2 Identify funding to facilitate appropriate specialists visiting St Helena	2	**MAIISG**, SHNT, SHG (SHRI)	2024	MAIISG and others look into funding	Volunteer time	Visits scheduled	Visits happen
6.2.3 Ensure all visiting specialists provide training while on St Helena	2	**SHG (SHRI)**	2023	SHRI revise or update guidance	Existing time	Training opportunities provided	More people trained via international specialists
6.3 Skills and resources are available on island to deliver the invertebrate strategy							
6.3.1 Terrestrial Conservation Officer in post and providing support and links within SHG	1	**SHG (ENRP)**	2023	TCO post filled and invertebrates in remit	Part of an existing recruitment process	TCO in post	TCO and wider SHG (via TCO) engaging with invertebrate strategy
6.3.2 Undertaking a needs analysis to implement the invert conservation strategy, including, funding (feeding into 5.2), training and retaining staff to be able to deliver invertebrate conservation	1	**SHNT**, SHG (ENRP)	2023	Needs analysis complete	Staff time	Needs analysis report	Needs analysis report

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What resources needed	Output(s)	Indicator of success
6.3.3 Retain skilled staff through upskilling and development of staff based on needs analysis	1	**SHNT**, SHG (ENRP)	Ongoing	Training taking place	Specialist training and funds for development	Training sessions	Skills and capacity increased
Objective 6.4 Ensure coordination of invertebrate work of all kind is coordinated on the island.							
Action 6.4.1 Regular meetings of an invertebrate forum	1	**SHNT** and SHG (ENRP) but supported by MAIISG	2023	Regular meetings	Volunteer time	Meetings held regularly	Minutes of meetings
Action 6.4.2 Communication plan for the forum	2	**Invert forum**	2023	Plan developed	Staff time	Communication plan	Communication plan being implemented
6.5 Sustain the invertebrate forum with on-island and international expertise							
6.5.1 Secure funding for forum as needed	2	**SHNT**, MAIISG and All	2023	Forum set up	Staff time	Forum active	Sponsorship funding secured and funding staff time

Goal 7 – Communication, Education and awareness

A raised profile of St Helena's invertebrate fauna and stimulate support for invertebrate conservation

Action wording	**Priority (1-urgent, 3 low)**	**Who is responsible (lead organisation in BOLD)**	**When**	**How**	**What Resources Needed**	**Output(s)**	**Indicator of success**
7.1 Establish a St Helena invertebrate education program							
7.1.1 Gap and opportunity analysis for education on invertebrates in current curriculum	1	**SHNT**, SHG and local teachers	2026	Curriculum assessment	Staff time	Report	Gap analysis report written
7.1.2 Collaborate with a trainer/teacher to develop materials to fill in gaps	1	**SHNT**, SHG and local teachers	2027	Contracting specialist	Funding for specialist staff time	Specialist contract	Funding secured, staff time secured
7.1.3 Materials for curriculum written and communicate/share/promote	1	**SHNT**, SHG and local teachers	2027	Materials being developed	Funding for specialist staff time	Educational materials	Educational materials available online and being implemented in schools
7.2 Formal education opportunities increased on island, through partnerships and exchanges providing field experiences on island plus off-island exposure; and tailored so skills can be used on island with follow-on opportunities							
7.2.1 To create summer schools/ field training courses	2	**SHNT**, SHG (Education)	2025	Course being designed and run	Staff time	Courses active	Courses feedback

Action wording	Priority (1-urgent, 3 low)	Who is responsible (lead organisation in BOLD)	When	How	What Resources Needed	Output(s)	Indicator of success
7.2.2 Identify opportunities (both online and in-person) for further formal education that will support invertebrate conservation and working with relevant project opportunities	1	**MAIISG**, SHG (Education)	2024	Formal education opportunities	Volunteer time	Education activities active	List of course opportunities available
7.2.3 Ensure a research bursary is available to support invertebrate conservation	3	**SHG (SHRI)**	2027	Bursary designed and funded	Funds for bursary	Bursary established	Research bursary available and funding students
Objective 7.3. Communicate the importance of Invertebrate Conservation to people on St Helena and internationally, using iconic species with engaging stories, stats and photos							
Action 7.3.1 Build and manage a library of high-quality macro photos and make these accessible online	3	**SHNT**, MAIISG, iRecord St Helena	2024	Support from Roger Key	Staff and volunteer time	Online photo library	Photo library accessible online and being used
Action wording	**Priority (1-urgent, 3 low)**	**Who is responsible (lead organization in BOLD)**	**When**	**How**	**What Resources Needed**	**Output(s)**	**Indicator of success**

Action 7.3.2 Engage local artists to produce invertebrate art/sculptures etc	3	**SHNT**	2027	Local artists identified and commissioned	Funding	Sculptures	Sculptures in-situ
7.3.3 Develop good content TV, films, radio, news and social media pages (based on a simple invertebrate media plan with key messages)	2	**SHNT**, SHG	Ongoing	Media plan	Staff time	Media articles etc	Content available online
7.3.4 Open days and outreach events	1	**SHNT**, Beekeeper Association, SHG	2024	Events plan	Staff time and equipment	Events running	Log of events and people reached
7.3.5 Have a standard acknowledgement on St Helena recognition for all visiting scientists to use in presentations etc. and to report back on details of audiences and reach.	3	**SHG (SHRI)**	2023	Acknowledgement text agreed	Small amount of staff time	Presentations, publications etc.	Log of presentations and reach
7.4 Run citizen science programs to engage the community in gathering data on invertebrates							
7.4.1 Hold regular awareness events (pop-ups stalls) that gather information from local	3	**SHNT**, SHG (EMD)	2023 ongoing	Events plan	Staff time	Pop-up stalls and CS activities	Invertebrate records from members of the
Action Wording	**Priority (1-urgent, 3 low)**	**Who is responsible (lead organisation in BOLD)**	**When**	**How**	**What resources needed**	**Output(s)**	**Indicator of success**
community, through informal citizen science							public gathered and being used

7.4.2 Link up with international bug citizen science programs, for example bug survey or bee watch	3	**SHNT,** iRecord St Helena, MAIISG	2024	Events plan	Staff time	Citizen activities established	St Helena records being fed into bigger citizen science projects

Appendix 1 – Attendance list

St Helena

Liza Fowler – Cloud Forest Invertebrate Specialist – SHNT

Isabel Peters – Chief Environmental Officer – SHG (ENRP)

Darren Duncan – Portfolio Director, Environment, Natural Resources and Planning Portfolio – SHG (ENRP)

Vanessa Thomas-Williams – Nursery Officer – SHG (ENRP)

Perry Leo – Nursery Worker – SHG (ENRP)

Karen Williams – Conservation Worker – SHG (ENRP)

Andrew Darlow – Independent – n/a

Selene Gough – Best Project Officer – SHG (SHRI)

Myra Young – Forestry Officer – SHG (ENRP)

Stedson Stroud – Representative - Bee Keepers Association

Gary Stevens – Farmers – n/a

Shayla Ellick – St Helena Cloud Forest Project Co-ordinator – RSPB

Julie Balchin – Biosecurity Officer - SHG (ENRP)Martina Peters – Head of Conservation – SHNT

Graham Leo – Conservation Worker – SHG (ENRP)

Darrell Leo – Conservation Worker – SHG (ENRP)

Andy Timm – Agriculture Development Officer – SHG (ENRP)

Nicholas Stevens – Biosecurity Assistant – SHG (ENRP)

Lourens Malan – Independent – n/a

Daryl Joshua – Invasive Invertebrate Project Officer – SHNT

Sheena Benjamin – Outreach and Education – SHNT

Natasha Stevens – Manager Invasive Invertebrate Project – SHNT

Christy-Jo Scipio O'Dean – Invasive Invertebrate Project Officer – SHNT

Mike Jervois – Director – SHNT

Rebecca Cairns-Wick – Co-ordinator - St Helena Research Institute SHG (SHRI)

Earl Henry – Manager/ Secretary – St Helena Growers/ Beekeeping Association

Aidan Plato – Apprentice - SHNT

Colby Richards – Apprentice - SHNT

International (zoom)

Vicky Wilkins – Programme Manager – Species Recovery Trust

Norbert Maczey - Ecologist/ Entomologist - Higher Scientific Officer - CABI

Adam Sharp – Invertebrate Project Officer – Ascension Island Government

Eva Freegard – Volunteer – Species Recovery Trust

Amy-Jayne Dutton – Independent – n/a

Roger Key - Independent – n/a

Sarah Havery - Senior Species Recovery Officer - RSPB

Helen Roy – Ecologist/Professor - UKCEH

James Millet – Non-native species secretariat

Andrew Whitehouse – Head of Operations - Buglife

Alan Gray – Plant Ecologist - UKCEH

Axel Hochkirch – Professor of Conservation Biology - Trier University

Paul Borges – Professor of Ecology – University of Azores

Timm Karisch – Entomologist – Museum für Naturkunde und Vorgeschichte (Contributed comments remotely)