Darwin Plus: Final Report

To be completed with reference to the "Project Reporting Information Note": *(https://darwinplus.org.uk/resources/information-notes/).*

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes.

Submission Deadline: no later than 3 months after agreed end date.

Submit to: BCF-Reports@niras.com including your project ref in the subject line.

Darwin Plus Project Information

Project reference	DPLUS134
Project title	Repelling the Invader: turning the tide on Ascension's Mexican thorn
Territory(ies)	Ascension Island
Lead Organisation	Ascension Island Government Conservation & Fisheries Directorate (AIGCFD)
Project partner(s)	Centre for Agriculture and Bioscience International (CABI)
Darwin Plus Grant value	£ 184, 191
Start/end date of project	01/09/2021 – 31/03/2024
Project Leader name	Dr Tiffany [redacted]
Project website/Twitter/blog etc.	www.ascension.gov.ac
Report author(s) and date	Chrisna [redacted], Tiffany [redacted], Jolene [redacted] Norbert [redacted] and Corin [redacted] 31/07/2024

1 Project Summary

The Mexican thorn (*Neltuma juliflora*) is a highly damaging invasive species on Ascension Island, thriving in arid environments and impacting local biodiversity and infrastructure despite previous control attempts. It continues to spread and severely impacts the local environment, biodiversity, and infrastructure. This project has taken a strategic and integrated approach to controlling Mexican thorn, including assessing biocontrol methods and improving chemical and mechanical treatments, resulting in an Integrated Control Plan and a Monitoring & Evaluation Plan.

Local capacity has been built to implement effective control methods. The outcome has been a step change in our ability to control the Mexican thorn and is on track to long-term result in a contraction of its range and the restoration of habitats. Controlling this tough plant often requires multiple interventions, making mechanical and chemical methods labour-intensive and costly. Biocontrol using the *Evippe* sp. #1 moth has been introduced and is establishing itself, aiming to provide significant control as part of the integrated strategy, potentially reducing the need for other methods.

2 Project Partnerships

Lead Organisation: Ascension Island Government Conservation & Fisheries Directorate (AIGCFD)

The project was developed in response to priorities identified in the Conservation Management Plans. The Directorate will take responsibility for:

- Overall project management
- Delivery and public engagement
- Project budgeting and ordering (with support from AIG's Financial and Procurement team)

Project Partnership:

Main Partner: CABI

With a long history of implementing biological control programmes globally (including the release of the seed-eating beetles on Ascension), CABI was responsible for all aspects of the project relating to the new biological control agent *Evippe* sp. #1.

Collaborative Role:

1) Research outputs (host range testing; *Evippe* Risk Assessment)
2) Support with import and releases of *Evippe* on Ascension
3) Regular coordination meetings
4) Co-authored project reports

Responsibilities:

- Culturing of *Evippe* sp. 1#
- Conducting host specificity testing
- Conducting Risk Assessment
- Release and initial post-release monitoring

Specialist Collaborators:

In addition to the formal partnership with CABI, the project has also engaged with several specialist collaborators to ensure its success. This includes the Centre of Biological Control (Rhodes University) which shared information on the *Evippe* moth rearing programme in South Africa and Invader Plant Specialists® Pty Ltd who helped support further research on Mexican thorn and possible treatment methods and herbicides to use on Ascension.

Centre of Biological Control (Rhodes University)

Links have been established with representatives from the Centre for Biological Control, Rhodes University, South Africa. *Evippe sp. 1#* was released as a biocontrol agent for Mexican thorn (*Neltuma sp.*) in Meerkat National Park, South Africa in March 2021 and their experiences will help to inform the Ascension Risk Assessment and public engagement campaign.

Contributions:

- Written information and or website links on *Evippe* moth
- Photographs of *Evippe* moth, impact at release sites and culture facilities

- Stakeholder engagement information (supportive local communities, interviews, questionnaires)

Invader Plant Specialists® Pty Ltd

Contributions:

- Consultation on the Integrated Mexican thorn Control Plan and Monitoring and Evaluation Plan
- Recommendations on herbicides for Mexican thorn Project and other local initiatives

Local stakeholders
Organisations involved: AIG, MITIE, Yang Enterprises Inc., Babcock, Encompass, Sure, and MET Office.

Responsibilities:

- Prioritising clearance efforts based on their current need.
- Developing monitoring objectives and plans to ensure continuous control of Mexican thorn.
- Maintaining work areas free of Mexican thorn and preventing encroachment on infrastructure.

Community Engagement:

Communication methods:

- Public meetings
- Updates in local press and social media
- Information on the Ascension Island Government website

Community response:

- Interest and support for management actions to control Mexican thorn

3 Project Achievements

3.1 Outputs

Output 1. *Risk assess the use of Evippe sp. as a biocontrol agent on Ascension following CABI risk assessment protocol.*

This output has been fully achieved. The comprehensive Risk Assessment (RA) for *Evippe* sp. #1 has been completed, using a DEFRA template (**Annex 1**) and independently reviewed by FERA (**Annex 2**).

Host range tests in Australia and South Africa confirmed that *Evippe* sp. #1 exclusively targets *Neltuma* species from Central and South America, with no impact on African native species. Following its successful establishment in Continental Africa, further testing on Ascension Island flora reaffirmed the host-specific nature of *Evippe* sp. #1, with no susceptibility detected in any test plants, including the invasive *Leucaena leucocephala* which in rare cases during previous test regimes showed the development of initial leaf mines caused by the first instar caterpillars. This species is also introduced to Ascension and regarded here to be invasive. Detailed results are in Annex 1.

The RA also evaluated indirect side effects and the likelihood of successful establishment and spread. *Evippe* sp. #1 completes its life cycle solely on Mexican thorn leaves, with larvae causing significant damage. The moth has a rapid development cycle of 35 days from egg to adult and does not feed on pollen or nectar, minimizing its impact on other plants. In Australia, *Evippe* sp. #1 caused high defoliation, reducing seed production and growth rates, and causing tree death, which could similarly benefit Ascension Island's habitats and endemic species. This includes reducing invasive species like rats, mice, rabbits, and myna birds (**Annex 1**).

In summary, the RA deemed the release of *Evippe* sp. #1 on Ascension Island safe and likely to bring significant environmental and economic benefits. However, some uncertainty remains regarding its successful establishment and spread due to Ascension Island's different climate and the parthenogenetic nature of the culture used.

Output 2. *Best practice methods of chemical and mechanical control identified and people on Ascension trained to undertake these techniques.*

This output is achieved. The following methods were identified to include in the trials through a desk-based review process (**Annex 5**): cut stump, ring barking, bark stripping, chemical frilling, foliar application, and basal stem application.

Cut stump treatment with Turbodor® 29 mpa delivered good results with little to no regrowth on treated trees. The herbicide was applied to the cut surface and around the base of the stump.

Basal stem treatment with Turbodor® 29 mpa also showed good results on all trees tested, with signs of dieback occurring within the first 14 days. The test trees, ranging from small to large, showed signs of distress and lost their leaves. However, five trees did not respond well to treatment due to water/bleach residue in the lance and knapsack from a previous session, which has since been corrected.

Foliar application with Sendero® herbicide resulted in browning and loss of leaves during the first month, but regrowth has occurred on most treated trees. The clopyralid ingredient in Sendero® is slow-acting, remaining in the plant and continuing to kill the tree for up to a year.

Through this trial, the methods showing good results and suitable for Ascension’s conditions are cut stump, foliar spray, and basal stem application. Identifying these methods and appropriate herbicides ensures cost and time-effective control of Mexican thorn on Ascension. These protocols have been published as the Integrated Control Plan and Monitoring and Evaluation Plan (**Annex 3 & 4**).

Three Youth Trainees and 14 Conservation Interns were trained during the project, assisting the Project Officer and Conservation Fieldworker with regular tree removal and gaining exposure to Mexican thorn treatment and control. The Mexican thorn Control Project Officer presented the findings from the Integrated Control Plan and M&E Plan to all island stakeholders. Since its implementation in 2021, 151 volunteers have worked with the Mexican thorn project, learning to use tools like loppers and silky saws safely and appropriately (**Annex 6**).

Output 3. *Improved public understanding of the impact of Mexican thorn on Ascension and shared ownership of the solutions.*

This output is achieved. The project achieved its communication and engagement objectives through a series of public meetings and active distribution of information.

Four public meetings (**Annex 7**) took place during the duration of this project as set out in the Logframe. Two meetings were held in April and May 2022 to provide information on the DPLUS134 project outputs. One meeting took place in April 2023 which was focused on presenting the host range test findings from CABI and other relevant information about the biocontrol agent, *Evippe* sp. 1#. The final meeting in July 2024 (**Annex 9**) presented the findings from the DPLUS134 project and discussed future strategies for controlling the Mexican thorn on Ascension. Additionally, hard copies of the Integrated Control Plan and Monitoring & Evaluation Plan were distributed.

Council engagement:

- Information Council meetings: The Project Officer attended several informal meetings to discuss the release of the biocontrol agent, *Evippe sp. 1#* moth.
- Consultation period: Held from 10th to 31st May 2023, culminating in a meeting with Councillors on 1st June 2023. The Directorate addressed questions and concerns through the Government Response to Consultation document (https://www.ascension.gov.ac/project/government-response-to-consultation-consultation-on-the-potential-introduction-of-the-evippe-moth-to-control-mexican-thorn-on-ascension-island) and the consultation meeting notes.
- January 2024 meeting: Council members were informed of AIGCFD's application to the Governor to request permission for the release of the *Evippe* moth as a biocontrol agent.

Community engagement:

- Social media and local newspaper (**Annex 8**): Posts on Facebook and articles in the Islander generated interest within the community.
- Email distribution: All articles and posters were emailed to stakeholders on the island, ensuring wide dissemination of information.

The project maintained a consistent and transparent communication strategy, engaging with both official bodies and the wider community to ensure all stakeholders were informed and involved in the project's progress and future plans.

Output 4. *Integrated control strategy for Mexican thorn on Ascension*

Both activities under this output are achieved. The Integrated Mexican thorn Control Plan and Monitoring & Evaluation Plan **(Annex 3 & 4)** were published on the AIG website and hardcopies were distributed to all stakeholders during the final public meeting (**Annex 9**).

Output 5. *Control strategy actions delivered as part of AIGCFD work plans and best practice methods used by all organisations controlling thorn on Ascension.*

This output has been achieved as planned. The culture facility for the *Evippe* sp. #1 was built in October 2023 well in advance of its arrival on the island (Figure 1). The Project also managed to

secure a building next door for storage of equipment and to use if extreme temperatures are experienced which may influence the success of its survival.

Figure 1: A culture facility (left) was built at One Boat. A close-up photo (right) of the *Evippe* sp. 1# moth © A. Weir and B. Cowie

Figure 2: The moth was released at two sites, Donkey Plain and St Mary's Grotto in sleeves (left) or polystyrene boxes (right) © M. Morgan

The first culture of the *Evippe* sp. 1# moth was released in April 2024 (Figure 2). Two further releases took place in June and July 2024. CABI provided the necessary support and training to AIGCFD staff who are responsible for the cultivation, release, and monitoring of the *Evippe* sp. #1 population on the island. New leaf mining and leaf ties are visible at the release sites at St Mary's Grotto and Donkey Plain. Predators such as the endemic spider *Hibana ascensionensis* and geckos have been observed in Donkey Plain around the release sites, possibly explaining the initial failure of establishment at one of the first release sites at Donkey Plain (**Annex 10**). Further releases in this area have been too recent to show any results yet. In contrast, the earliest release conducted at St Mary's Grotto has been very successful so far. The moth has spread from its initial release site inside a Mexican thorn tree and new leaf ties containing living caterpillars and viable pupae have become visible over large parts of the 'release' tree and infestation has also spread to neighbouring trees (see Figures 3 and 4).

Figure 3: Leaf ties made by *Evippe* sp.#1 at the St Mary's Grotto release site in Ascension Island, July 2024 © N. Maczey

Figure 4: Caterpillar (left) and pupa (right) off *Evippe* sp.#1 at the St Mary's Grotto release site in Ascension Island, July 2024 © N. Maczey

Ladybirds of the species *Olla v-nigrum* have been seen in high numbers around these sites as well, hiding in leaf ties made by the endemic spider *Hibana ascensionensis* that look very similar to those formed by *Evippe* sp. 1#. At this stage, it is difficult to determine if any of these species will impact negatively on the moths' establishment. At least in the case of *O. v-nigrum* this seems to be unlikely as this species is known to be primarily a feeder of psyllids in tropical climates (**Annex 10**).

The DPL00084 BELEAF - Biocontrol: Evaluating Leaf-folding *Evippe* Activity on Flora project is currently in place to implement the Integrated Control Plan as well as the Monitoring & Evaluation Plan. Its main objective is to ensure that the presence and impact of the moths are being monitored as set out by the approved Logframe.

The new and improved methods as identified in the Integrated Control Plan and Monitoring & Evaluation Plan used by the AIGCFD and other Ascension-based organisations affected by Mexican thorn. Volunteers are also familiar with new procedures as it has been implemented while they assisted with clearance efforts in our Nature Reserves (**Annex 6**).

3.2 Outcome

An integrated approach to Mexican thorn control implemented on Ascension that uses all appropriate techniques, has strong public support, and is sustainable within current resource availability.

The project has achieved its intended outcome of producing an integrated approach to Mexican thorn control on Ascension and is published as the Integrated Mexican thorn Control Plan (**Annex 3**). The chemical and mechanical trials demonstrated promising results for some of the methods trialled, and scope for improvement of others. The Integrated Mexican thorn Control Plan

recommending all appropriate techniques, as well as the Monitoring & Evaluation Plan (**Annex 4**) guiding monitoring success has been published on the AIG website and presented at the final public meeting (**Annex 9**).

The *Evippe* Risk Assessment was published on the AIG website and received support from the independent reviewer, FERA (**Annex 1 & 2**). Subsequently, the AIG approved the use of *Evippe* for the control of Mexican thorn and altogether three releases were conducted towards the end of the project. At the time of writing the control agent is well on its way to becoming established and is expected to exert significant control within the next two years. The process will be monitored through funding secured through a Darwin local project until early 2025 and includes the option to follow up with additional releases should this be required.

The project has maintained transparency and gained public support through channels like Public Notices, articles in the local newspaper (the Islander), AIG Conservation's social media (Twitter and Facebook), detailed updates on the Government Website, and Community Meetings/Council sessions. Public attendance and volunteering at events indicate a strong interest in enhancing control methods on Ascension (**Annex 6, 7 & 8**).

The AIGCFD has adopted strategic objectives in the management plans for Ascension's Nature Reserves and Green Mountain (https://www.ascension.gov.ac/conservation/projects?wpv_aux_current_post_id=11638&wpv_aux_parent_post_id=11638&wpv_view_count=11660&wpv_paged=2). Over the next five years, actions will protect these areas by addressing identified threats and gaining community support. AIGCFD will lead these efforts, collaborating with other organizations and volunteers. Targets ensure timely completion within the plan's lifespan, with progress integrated into core AIG work plans.

3.3 Monitoring of assumptions

Assumption 1: There is scope for improving on current control techniques without jeopardising native species or public support.

This assumption has held. Before the DPLUS134 project, only cut stump application and heavy machinery were used to remove Mexican thorn. Two new methods—foliar spray and basal stem treatment—are now considered feasible within Ascension's capabilities. Improvements include cutting stumps at ankle height and applying herbicide to the entire cut surface and base of the stem (**Annex 3**). Regular walk-throughs and foliar spraying for regrowth will enhance control alongside heavy machinery. Monitoring weather conditions like rain and wind is crucial to prevent herbicide leaching or drifting, which could harm native or endemic plant and invertebrate species. Turbodor® 29 mpa, a new Ready-To-Use (RTU) herbicide, promises better control without the need for mixing, reducing human error.

Assumption 2: Public engagement activities are successful in creating interest and ownership of the problem.

This assumption has held. During the implementation of the project, a total of 135 people volunteered with Mexican thorn and beach clearing efforts. Public meetings were well attended with a total of 38 people for all meetings combined. The project also had regular meetings with the Island Council about the introduction of the biocontrol agent, the *Evippe* moth (**Annex 6 & 7**).

The project used the following Communication channels to reach its local and international audience:

1) Public Notices: distributed via emails.
2) Local press: updates shared in the Islander newspaper
3) Social media: regular updates and informational posts on the official AIG Twitter (X) page and amplified by the AIG Conservation Twitter and Facebook pages (**Annex 8**).
4) Community Meetings / Council sessions: Open forums for residents to receive information and ask questions.
5) Government Website: Detailed information/ FAQs and regular updates.

Mexican thorn-related social media posts were able to generate significant public interest as seen in Table 1.

Table 1: Social media interaction with Mexican thorn-related posts

Total likes	Total comments	Total shares
497	53	30

Assumption 3: Host range testing requires availability of Evippe sp. from Australia and samples of Ascension plants from Kew.

This assumption came only indirectly into play. *Evippe* sp. #1 specimens cultured for release on Ascension Island were provided by the Agricultural Research Council (ARC) in South Africa, which was much more cost-effective than sourcing the species from Australia, where the species is not kept under culture anymore. The population in South Africa itself originates from Australia where a control programme for *Neltuma* using *Evippe* sp. #1 was conducted some years ago. Specimens used in Australia originated from Argentina, which is part of the natural range of the agent. Before the import of *Evippe*, legality regarding Access and Benefit Sharing (ABS) and in particular the Nagoya protocol was checked for all involved countries. The shipment was imported into the UK under the DEFRA Plant Health licence no 51073/212997-5, but no additional licensing to keep the species in culture in the UK was required. This has been confirmed through consultation with the Animal and Plant Health Agency (APHA).

Since an extensive range of plants had already tested for susceptibility to *Evippe* sp. #1 during the programmes conducted in Australia and South Africa (**Annex 1**) only seeds and spores of seven endemic or valued plant species and *N. juliflora* from Ascension Island were sent to CABI to propagate plants for host range testing. This was supplemented by a selection of species cultivated horticulturally or for ornamental purposes on Ascension Island, for which seeds are commercially available within the UK.

Assumption 4: Sufficient empirical evidence from Evippe sp. releases in other countries to make robust predictions of impact on thorn and non-target species on Ascension.

This assumption has held and evidence from previous control projects in Australia and South Africa informed the risk assessment for releasing *Evippe* sp. #1 on Ascension Island (**Annex 1**). This moth has established populations in Australia and is becoming established in South Africa. It thrives in warm to hot climates (mean average monthly temperature 19.8 to 30.1°C). Ascension Island's stable, dry, tropical climate is expected to support the moth's establishment.

Evippe sp. #1 disperses effectively, spreading 1.3 to 3.6 km/year, and in one instance, 115 km within three years and over 1,300 km between isolated mesquite populations, likely aided by wind. It can rapidly re-establish on surviving or regenerating plants post-control. Based on spread rates from Australia, it is predicted to reach all parts of Ascension within two years of release.

The moth has been effective in suppressing *Neltuma* populations in Australia and is expected to do the same in South Africa and Ascension Island. Although it won't kill all *Neltuma* trees, it will cause frequent defoliation, making canopies less dense, similar to drought conditions observed on Ascension. Non-native plants may colonize areas where Mexican thorn recedes, but this process could take many years. While Ascension's lowlands won't revert to their natural barren state, they will become less green in the short term.

During the extensive host range tests conducted for releases in Australia, South Africa, and for this RA, *Evippe* sp. #1 has turned out to be very host-specific to the genus *Neltuma*., of which only *N. juliflora* occurs on Ascension Island. None of the test plants showed any susceptibility to any life stage of the control agent. The persistence of the *Evippe* sp. #1 on Ascension Island will solely depend on the availability of Mexican thorn.

Assumption 5: There is scope to improve on current methods being undertaken.

This assumption has held. The Mexican Thorn Control Project developed an Integrated Control Plan (**Annex 3 & 4**) combining mechanical, chemical, and biological methods. Mexican thorn is a robust plant and necessitates multiple interventions per tree. Mechanical and chemical control is usually physically demanding, labour intensive, slow, and therefore costly. The addition of biocontrol should continue to keep the problem species in check with no further effort if the release is successful. Integrating chemical, mechanical, and biological control methods will deliver the best results for controlling Mexican thorn in the long term.

New methods like foliar spray and basal stem treatment were introduced, enhancing effectiveness in diverse conditions. Foliar spray is recommended for use in areas where it would be too labour-intensive to gain access to the tree stump by cutting away all the dense foliage. Ensure the knapsack and lance are clean and dry. Spray all the leaves of the trees to the point at which the herbicide starts to run off the leaves. Basal stem treatment is recommended, but ensure that the knapsack and lance are clean and clear of any trace amounts of bleach or water as this will dilute the RTU herbicide and prevent it from working effectively. Take weather conditions such as wind (speed and direction) and rain into account for both methods to prevent spray drift and leaching of herbicides into the soil.

Improvements, such as optimizing the cut stump method, were made to existing techniques. To ensure optimal success, the stump has to be cut to at least ankle height and a registered herbicide should be applied directly to the cut surface and around the base of the stem as soon as possible after cutting.

Uprooting should preferably only be considered and done on seedlings or where the whole root system of the tree can be removed. If some roots break off in the removal process, it must be treated with a registered herbicide. This is also only recommended where the plants are small enough to be successfully pulled out with the roots intact. The application of mattocks may also provide the necessary leverage.

Mechanical clearance continues, now integrated with herbicide application to manage regrowth. Any exposed or broken-off roots must be treated with a registered herbicide. Any regrowth from these clearance efforts must be treated with foliar application as soon as regrowth is visible.

Improvements to current and new control methods ensures cost-effective solutions within operational capabilities. Using herbicides with different modes of action expands control options. The term mode of action refers to the overall manner in which an herbicide affects a plant at the tissue or cellular level; therefore, herbicides with the same mode of action will have the same translocation (movement) pattern and produce similar injury symptoms.

Assumption 6: Other organisations and volunteers are willing to participate in training.

This assumption has held. Stakeholders have consistently recognized the value of participating in public meetings and adopting the enhanced methodologies outlined in the Integrated Mexican Thorn Control Plan and M&E Plan. Since the project's inception, various stakeholders have sought assistance in addressing Mexican thorn issues (**Annex 7**).

Numerous volunteers have contributed to Mexican thorn clearance efforts (**Annex 6**). Upon signing up for Conservation Department activities, volunteers undergo comprehensive training in the safe use of tools such as loppers and silky saws. Volunteering opportunities, promoted through articles, social media, and posters, have successfully attracted volunteers from diverse sectors across the island.

Assumption 7: Willingness amongst public to engage with project and ability to undertake scenario assessment

This assumption has held. Public engagement with the project via social media was positive (**Annex 8**). The Integrated Mexican thorn Control Plan and M&E Plan are readily available on the AIG website. In a small island community like Ascension, while many feels more comfortable approaching the Project Officer at social events, some are less likely to voice opinions during public meetings.

Assumption 8: Level of control required to protect key biodiversity sites is within the resource capabilities of AIG or potential external funding streams.

The assumption partially held. As seen in many cases across the world, managing invasive species requires sustained effort and funding. AIG currently controls Mexican thorn locally around settlements and key areas like nature reserves, but broader management around important infrastructure relies on limited resources.

Improved methods and herbicides from the project aim to enhance overall control efficiency. *Evippe* sp. #1 shows promise for long-term control, potentially making other methods more feasible within current island capacities. However, transient employment limits expertise retention, prompting the need to explore additional funding for expanded control options.

Assumption 9: Risk assessment and public engagement strands indicate biocontrol is appropriate for Ascension.

This assumption has held. The independent reviewer, FERA, fully supported the *Evippe* Risk Assessment, finding it detailed and comprehensive with full agreement on its conclusions (**Annex 1 & 2).** Evidence presented in the assessment strongly favours releasing *Evippe* sp. #1 to manage the invasive weed *Neltuma juliflora* on Ascension Island as it far outweighs the risk or any anticipated negative indirect effects.

A public consultation period from 10 – 31 May 2023, included outreach via the Islander, public notices, and social media. Meetings were held on 10 May 2023 (11 attendees) and 2 June 2023 (27 AIG Operations Directorate members) at Saints Club. International stakeholders were informed through AIG Conservation's social media channels. Refer to Output 3 for supporting information and a link to the Government Response document.

Several responses were received:

Sources	Type of response	Number
Ascension-based individuals	Social media	1
	Oral (at public or AIG Operations meetings and information conversations with the Mexican thorn Control Project Officer)	14
	Written (email)	2
International individuals (Bermuda, Ulverston, South Africa, Wiltshire, Royal Tunbridge Wells, USA, St Helena, Ascension Island, Other)	Social media	13
Ascension Island Councillors	Ascension community provided additional comments through the Ascension Island Councillors. It was discussed at a meeting with AIG on 1 June 2023.	12

Assumption 10: There is scope for improvement in control methods and a willingness amongst organisations to adopt them.

This assumption has held with AIGCFD and stakeholders adopting new and improved control methods and herbicides in their Mexican thorn clearance efforts.

Assumption 11: Volunteers can be recruited.

The project recruited 151 volunteers since its implementation in 2021 (**Annex 6**).

Assumption 12: Evippe can be easily cultured on Ascension and – as climate data suggests – readily establishes on the island.

This assumption has held. *Evippe* sp. 1# can be effectively cultured and released on Ascension Island as shown by successful experiences in Egham, UK, and the Centre of Biological Control in South Africa. Suitable rearing facilities were made available (at One Boat) and temporarily used to maintain a culture. This was only terminated when a decision was made that a better and more rapid establishment of the moth could achieved by transferring specimens imported from the UK directly to suitable release sites and monitoring establishment by releasing some of the specimens into sleeved branches of Mexican thorn.

The first three releases could only be made towards the end of the project between April and July 2024 but initial observations from regular monitoring at the release sites suggest that the species is well on its way to becoming fully established in the coming months. Evidence of leaf-mining and leaf ties and/or pupae are visible at some of the release sites already and particularly pronounced at St Mary's Grotto where the species has already spread to neighbouring trees.

We expect the climate on Ascension Island to fully support the successful establishment of *Evippe* sp. #1 (**Annex 1**). The climate on Ascension is generally dry, tropical, and oceanic, with relatively constant temperatures and little change to the weather during seasons. There are, however, two climatic factors, which could potentially impact negatively on a successful establishment. The first one is how well *Evippe* sp.#1 can cope with a low variation of day length throughout the year as the species needs to have comparably long hours of daylight to develop and not enter or remain in a diapause. The second is the on average high relative humidity on Ascension Island, which is on average higher compared with the natural range of the control agent. Despite some uncertainty regarding some of the climatic conditions, it is expected that *Evippe* sp. #1 will be established anywhere on Ascension Island where the target host *N. juliflora* exists.

The DPL00084 BELEAF – Biocontrol: Evaluating Leaf-folding *Evippe* Activity on Flora project is actively implementing an Integrated Control Plan and Monitoring & Evaluation Plan to track the presence and impact of the moths, ensuring adherence to the approved Logframe.

4 Contribution to Darwin Plus Programme Objectives

4.1 Project support to environmental and/or climate outcomes in the UKOTs

The project supports Ascension's and the UK Government's commitments under Article 8 of the Convention on Biological Diversity to control alien species that threaten ecosystems, habitats, or species. Mexican thorn is a major threat identified in both Ascension's Biodiversity Strategy and Action Plan and listed as a high-priority non-native species in the Ascension Island Government's Biodiversity Strategy.

It endangers green turtle nesting beaches, breeding seabirds, native plants, and invertebrates by encroaching on habitats and fostering non-native pests like rodents. No endemic invertebrates and few native invertebrates can persist in areas where Mexican thorn is present, probably as a result of the non-native predatory invertebrates the plant harbours. The spread of Mexican thorn into coastal areas could threaten populations of endemic crickets (*Discophallus* spp.) and pseudoscorpions. Its rapid spread alters landscapes, affecting hydrology, soil, and microclimate, and complicates infrastructure maintenance with significant costs. It also threatens to obscure

the volcanic nature of the island which was identified by the local community as capturing the 'essence' of Ascension.

Biocontrol efforts from past releases have likely slowed Mexican thorn's spread but not reduced its cover. Introducing *Evippe* sp. #1 aims to improve control by reducing seed production and growth rates. The project also developed more effective mechanical and chemical control methods, promising long-term cost-effectiveness. These approaches could be replicated in other Overseas Territories (OTs), supported by available online resources like the *Evippe* Risk Assessment.

4.2 Gender Equality and Social Inclusion (GESI)

Please quantify the proportion of women on the Project Board[1].	AIGCFD – 2 females (67%)
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women[2].	AIGCFD – Female Director CABI – 44%

GESI Scale	Description	Put X where you think your project is on the scale
Not yet sensitive	The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach	
Sensitive	The GESI context has been considered and project activities take this into account in their design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities.	
Empowering	The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to assets, resources, and capabilities for women and marginalised groups	X
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	

The Mexican thorn impacts all residents of Ascension, affecting all genders. With 65% of the AIGCFD being female, women lead the project, including early to mid-career scientists and technical and management staff. This is significant on an island where two-thirds of the population and many senior managers are male. Most people (volunteers and staff) involved with clearance efforts were female. All chainsaw operations (which is usually a male-dominated industry) were done by trained females who attended the relevant training and have certificates.

[1] A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

[2] Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

The project ensures inclusivity by organizing events at accessible times and locations, using diverse communication methods, and ensuring no discrimination based on gender, religion, sexual orientation, or disability.

5 Monitoring and Evaluation

The internal M&E was managed by Project Leader, Tiffany Simpson and the Mexican Thorn Control Project Officer, with continuous support from CABI. Coordination occurred through regular meetings to monitor Logframe indicators, identify risks, and adapt accordingly.

The project, initiated in September 2021, faced disruptions from the COVID-19 pandemic, including the suspension of direct international flights to Ascension Island, which delayed fieldwork by overseas consultants. A change request in June 2021 was approved in August 2021, rescheduling the consultant's visit to when flights from South Africa via St Helena and the UK resumed. Meanwhile, the consultant provided online support and training sessions, and the Project Officer received additional training in South Africa in 2023.

Ongoing M&E led to several minor modifications in the Logframe. For instance, the AIG drone's malfunction hindered the proposed mapping of Mexican thorn distribution (**Output 1, Activity 1.1**). However, this was resolved using satellite imagery and ground-truthing by the Project Officer, Conservation Fieldworker, and volunteers. Historic images were collected and replicated to show the change over time across the island landscape. The drone was repaired and returned before the output deadline.

The *Evippe* Risk Assessment (**Output 1, Activity 1.4**) included a request to test lettuce for potential impacts. Tests were conducted at CABI quarantine facilities from 1 September to 23 October 2023. Adult moths were released into each of the test cages. During that time, all plants were inspected for signs of all life stages of *Evippe*. No signs of development (eggs, leaf mines, leaf ties, pupa, or adults of a next-generation) were observed on any of the lettuce plants at any time. However, on the Mexican thorn control plants leaf mines could be seen within the first four weeks. Altogether more than 25 leaf ties were counted on the controls and the adults began reproducing. There were no signs of *Evippe* development on lettuce, while Mexican thorn control plants exhibited typical signs of infestation. This confirmed no risk to lettuce crops from *Evippe's* introduction.

The Risk Assessment (**Annex 1**), finalized using a modified DEFRA UK form for the Invertebrate Biological Control Agents (IBCA) release, was reviewed by an independent FERA Science expert (**Annex 2**). The review deemed the RA detailed, and comprehensive and concluded that the benefits of releasing *Evippe* to control Mexican thorn on Ascension Island far outweigh any risks or anticipated negative effects.

6 Lessons learnt

Many of the technical learnings from the project are described in detail in the annexed Integrated Mexican thorn Control Plan **(Annex 3),** M&E Plan **(Annex 4),** and independently reviewed *Evippe* Risk Assessment **(Annex 1).** From an overall project management perspective, the following lessons can be summarised:

1. Relying on a single drone shared across the Conservation Department is not feasible to achieve set targets.
2. Refinement of new and existing treatment methods is important to achieve optimal success. The use of the correct nozzle and the necessary adjustments of the nozzle sizes, knapsack, and herbicide mixture are important. Ensure that knapsack and lances have no residual water present after cleaning as this will interfere with the chemical formulations of herbicides, but especially the Ready-To-Use (RTU) herbicide, Turbodor®29 mpa.
3. Throughout this project, strengths included efficient administration, effective management, thorough monitoring, and diligent preparation. Efficient administration ensured timely

preparation of Purchase Requisitions, facilitating early order placements. Effective management guided inexperienced team members and volunteers to perform tasks safely and correctly, enabling widespread Mexican thorn clearance. Successful monitoring allowed for accurate and reliable data collection. Early training for the team is essential to maintain knowledge and skills despite staff changes. Public engagement through volunteers, social media, and news articles raises community awareness about the importance of conservation.

4. If this project were repeated, a different approach would be taken to:
    - **Finances**: Budgeting would include UK customs, delivery charges, increased transport costs, PPE, and communication equipment (e.g., radios).
    - **Equipment**: Appropriate tools (chainsaws with appropriate PPE, handsaws, loppers, etc.) and a dedicated vehicle would be procured before the project commenced as the Project Officer could only do infield work when a vehicle was not used by other staff members.
    - **Recruitment**: More staff members would be employed as the responsibility of clearing Mexican thorn on Ascension effectively rested on 1 – 2 individuals (the Project Officer and Conservation Fieldworker, who is also responsible for other tasks and assisting other projects). This project always required the help of more team members (Conservation Interns and volunteers) which put strain on other staff members and their projects. It took time to source and train volunteers who realistically only work with the Department a couple of times.
5. Collaborations with different institutions and scientists proved to be beneficial to this Project's success.
6. Adaptations to continuing COVID-related travel disruption in the early stages of the project have also helped to reinforce that, while site visits by overseas partners are desirable, considerable progress can nevertheless be achieved through remote collaborations. Certain outcomes within the Project could be achieved thanks to the AIG Conservation Internship Program, which has provided the local capacity needed to implement the work combined with remote support from partners who have extensive site knowledge.
7. Future projects could look to capitalise further on remote collaborations between overseas technical experts – who possess specialist knowledge but are often time-limited – and interns who are looking to gain career-relevant experience and can commit to longer periods of fieldwork.

7 Actions taken in response to Annual Report reviews

The project addresses the reviewer's questions as set out in the Annual Review Report dated May 2023. The questions are taken directly out of the document:

1. The Project comments briefly on a query raised in the first annual review concerning drone surveys. The project could indicate the altitude and image resolution, and what the image overlap is. The reviewer is not an expert on drone software but wonders whether the photo stitch images are scale accurate, thus allowing accurate measurements of areas and whether the project considered orthomosaic software to improve geospatial accuracy.

The initial drone survey was accomplished using AIGFD's DJI Matice 200 flying at 400m with a side overlap of 40% and a frontal overlap of 50%. This provided an accuracy of 11.67cm per pixel (enough to distinguish Mexican thorn trees from other species). However, the low image overlaps and the limited capabilities of the stitching software may have reduced its scale accuracy. Future flights will have a side overlap of 70%, and a frontal overlap of 80% at a height of 300m, and the stitching software will be considerably more advanced (PIX 4D) allowing for pinpoint geospatial accuracy.

2. The Project has engaged with the local community through public meetings and volunteer events and confirms interest in thorn control, but has not yet indicated whether the extent of this interest equates to the 66% target in its Outcome.

Ascension Island has a population of approximately 800 residents. In total of 173 people (this includes volunteers of the Project, and people attending the Public Consultation), showed interest in the Project since its implementation in 2021. This equates to 21.63% which shows that the target of 66% in its Outcome is not achieved. Public meeting attendance is poor for all projects, so it is not an isolated case in terms of the Mexican thorn Control Project. However, the Project was greatly supported on all AIG social media platforms with interest shown by international stakeholders as well. The Project is also supported by the Island Council which represents the island community.

3. The Project could elaborate on queries raised in the previous annual review concerning whether intervention might be required to control other opportunistic invasive plants, whether habitat restoration might be considered, and whether there are any risks to frigate birds.

The *Evippe* Risk Assessment (**Annex 1**) anticipates that introducing the biocontrol agent *Evippe* sp. #1 to combat *Neltuma* on Ascension Island might lead to the rise of other non-native plants like tree tobacco (*Nicotiana glauca*) and yellow boy (*Tecoma stans*). These species are easier and more cost-effective to manage than *Neltuma* due to their smaller root systems. While they are invasive, their impact is less severe, and they can offer benefits like providing habitat for native invertebrates and contributing to dust suppression and erosion control. Other acacia species, such as *Leucaena leucocephala,* may replace *N. juliflora* once the Mexican thorn is removed. Although the extent of this replacement is uncertain, the overall environmental and economic outcomes are expected to be beneficial.

The Darwin Local project, DPLR1024 – 'Can biocontrol halt the tsunami of non-native species on Ascension'? identified potential biocontrol agents for invasive plants and invertebrates on Ascension, aligning with the Ascension Biosecurity Strategy and the forthcoming Endemic Plant Restoration Plan.

The release of *Evippe* sp. #1 is expected to gradually defoliate *Neltuma* trees, exposing open ground and potentially increasing dust levels and soil erosion. However, the trees' roots will still bind the soil, reducing immediate erosion risks. Engineering solutions at priority sites are suggested to protect infrastructure from erosion and heavy rainfall impacts more effectively than relying on Mexican thorn.

N. juliflora, a pioneer species, contributes to early soil development in barren landscapes. Reducing its cover might slow soil development, hindering other invasive species. Ascension's native species, such as land crabs and invertebrates, evolved without *Neltuma* and do not require it for survival. Although land crabs might lose some shade during their spawning migration, alternative shading sources and artificial shading could mitigate this. This will also be balanced by the reduction in cover for non-native predators/competitors such as rats. The psocid (*Indiopsocus mendeli*) and some native invertebrate fauna, such as very generalist species of barkfly are loosely associated with *Neltuma* and not reliant on it for survival. The only invertebrate species that show a strong association with *Neltuma* are abundant non-native ants, webspinners, and sac spiders.

The Ascension Island frigate bird population and the Critically Endangered Ascension spurge (*Euphorbia origanoides*) are found in the Letterbox Peninsula, where Mexican thorn is absent and the Conservation Department is dedicated to keeping the buffer clear to prevent any accidental introductions. However, other invasive plants like Wild tomato, Guava, Tree tobacco, Casuarina, Mexican poppy, Lantana spp., and Swamp flat-sedge are present. These invasives can outcompete native plants, introduce diseases, and support non-native species that threaten seabirds. Control efforts prioritize key areas to protect critical habitats, though complete eradication is financially unfeasible for the Ascension Island Government.

8 Sustainability and Legacy

The legacy of the project has been secured in five main ways:

1. The lead partner, AIG, will continue to carry out Mexican thorn clearance on the Island, so the recommendations resulting from this project will improve or replace current treatment methods. The ultimate goal is for all stakeholders to adopt these new and improved control methods and implement them into their daily operations.
2. It is the first time a project of this scale has been done in OTs. The outcome of the project could inform future projects and can be used in other OTs on similar invasive plants.
3. Updated drone images for Ascension's Nature Reserves have been incorporated into the five different AIG Management Plans.
4. This project allowed for the complete clearance of the South West Bay (Pan Am) Nature Reserve with the help of trained staff, Conservation Interns, and volunteers. The buffer zone of Mars Bay Nature Reserve, an important stronghold for sooty terns and the critically endangered Ascension spurge was also cleared of Mexican thorn between 2021 and 2024.
5. The Project Officer was able to facilitate multiple beach clean-up opportunities and volunteer sessions to remove Mexican thorn from areas of conservation importance.
6. The Project Officer provided training and support to long-term AIG staff members such as the Conservation Fieldworker position which is appointed on renewable contracts which ensures the retainment of knowledge and information.
7. The publication of the *Evippe* Risk Assessment will allow AIGCFD to release the *Evippe* moth to control the spread of Mexican thorn. Publications of the Integrated Mexican thorn Control Plan and M&E Plan allow for information to remain within the Department. This will help to ensure that key project learnings and best practices are preserved for the future.
8. Follow-up projects that directly build on current existing outputs. The Darwin Local (DPLR1024 - 'Can biocontrol halt the tsunami of non-native species on Ascension?) is identifying possible biocontrol agents for some of the invasive plants listed above and for the invertebrates found on Ascension. The DPLR3\1068 BELEAF - Biocontrol: Evaluating Leaf-folding *Evippe* Activity on Flora will follow outcomes from DPLUS134, and take an integrated approach to controlling thorn on Ascension by releasing the biocontrol agent, the *Evippe* sp. #1 moth at additional sites and monitor establishment, spread and impact on Ascension Island.
9. Long-term partner collaborations have been established with different stakeholders internationally. This project extends a longstanding collaboration between AIGCFD, CABI UK, Invader Plant Specialists (Pty) Ltd, and the CBC in South Africa. These stakeholders have given their time in kind to support project activities and will continue to do so after the project ends.

9 Darwin Plus Identity

The Darwin Initiative has been the principal external funder of conservation work on Ascension Island over the past decade and its identity and brand are already well known in the Territory.

The project featured in a presentation titled 'Dealing with invasive species on the South Atlantic UKOTs using biological control: an update on recent activities' given at: 'Terrestrial Restoration and Invasive Non-Native Species in the UK Overseas Territories and Crown Dependencies, 6th & 7th March 2023, webinar organised by UK Overseas Territories Conservation Forum'. It has also featured in all on-island publicity around the project including public meeting presentations and press articles.

The Darwin logo is displayed on presentations used during public meetings and recognition is given on the Ascension Island social media platforms such as Facebook, Instagram, and Twitter (X).

10 Risk Management

No new risks were encountered during the reporting period. Please see the Risk Framework attached to this report as a separate document.

11 Safeguarding

No safeguarding issues or changes in the safeguarding policies of the lead and partner organisations have arisen in the past year of the project. All project team members have updated any mandatory safeguarding training as required by their employers.

Has your Safeguarding Policy been updated in the past 12 months?	No
Have any concerns been investigated in the past 12 months	No
Does your project have a Safeguarding focal point?	Yes, [redacted]
Has the focal point attended any formal training in the last 12 months?	Yes. Safeguarding training received in 2023. Training at a higher frequency than this is not possible in an Ascension context.
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 67% [2] Planned: 0% [0]
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses. No	
Please describe any community sensitisation that has taken place over the lifetime of the project; include topics covered and number of participants. N/A	
Have there been any concerns around Health, Safety and Security of your staff over the lifetime of the project? If yes, please outline how this was resolved. No	

12 Finance and administration

12.1 Project expenditure

Project spend (indicative since last Annual Report	2023/24 Grant (£)	2023/24 Total actual Darwin Plus Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	[redacted]			Project Officer position slightly increased due to inflation
Consultancy costs				
Overhead Costs				[redacted] yet to be charged to audit
Travel and subsistence				
Operating Costs				
Capital items				
Others				
TOTAL	58,977	58,738		

Staff employed (Name and position)	Cost (£)
Chrisna Visser, Mexican Thorn Control Project Officer	[redacted]
Norbert Maczey, Biocontrol Coordinator (CABI)	
Corin Pratt, Biocontrol Scientist (CABI)	
Anita Kopera, Technician (CABI)	
TOTAL	**32,833**

Consultancy – description and breakdown of costs	Other items – cost (£)
Biocontrol consultant in Australia to collect *Evippe*	1500
TOTAL	1500

Capital items – description	Capital items – cost (£)
TOTAL	0
Other items – description	**Other items – cost (£)**

CABI Consumables (pesticides for trials) CABI Biocontrol facilities including quarantine CABI Shipment of biocontrol agent	[redacted]
TOTAL	4520

12.2 Additional funds or in-kind contributions secured

Matched funding leveraged by the partners to deliver the project	**Total**
Ascension Island Government (AIG in-kind staff, overheads, line management, office, accommodation, and M&E costs)	[redacted]
CABI Overheads	
TOTAL	**13,764**

Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project	**Total (£)**
DPL00084 - BELEAF: Biocontrol: Evaluating Leaf-folding *Evippe* Activity on Flora	[redacted]
TOTAL	

12.3 Value for Money

The primary costs of this project were for host range testing and developing a comprehensive Risk Assessment of the *Evippe* moth at the CABI quarantine facility in Egham, UK. This required external expertise and additional capacity for adaptation actions. Salaries, based on institutional pay scales, were aligned with local and national norms. Project partners contributed considerable staff time in-kind, highlighting the project's importance.

Travel and subsistence costs were initially high due to the COVID-19 pandemic, which necessitated multiple connecting flights between South Africa, the UK, and Ascension Island due to suspended direct flights. Remote meetings were mostly effective, but in-person visits were deemed essential for staff to gain island knowledge and for AIGCFD staff to share project results.

13 Other comments on progress not covered elsewhere

N/A

14 OPTIONAL: Outstanding achievements of your project (300-400 words maximum). This section may be used for publicity purposes.

I agree for the Biodiversity Challenge Funds Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

N/A

File Type (Image / Video / Graphic)	File Name or File Location	Caption, country, and credit	Online accounts to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)

Annex 1 Report of progress and achievements against logframe for the life of the project

Project summary	Progress and achievements
Impact The spread of Mexican thorn on Ascension will be initially slowed and then reversed, making effective control possible and allowing the habitats of endemic species to be protected in perpetuity.	A comprehensive host range testing process took place to identify any possible risks associated with the release of the biocontrol agent, *Evippe* sp. #1. Additionally, testing of lettuce took place to address concerns raised by the community. The project developed and published a comprehensive *Evippe* Risk Assessment with the help and support of CABI UK (**Annex 1**). The RA was reviewed by an independent expert from FERA Science and found to be detailed and comprehensive and clearly shows that the benefits of releasing the *Evippe* moth to manage Mexican thorn in Ascension Island will far outweigh the risks or any anticipated negative indirect effects (**Annex 2**). The project improved current methods or replaced old control methods for Mexican thorn. New herbicides were also tested as part of this trial. This led to the development and publication of the Integrated Mexican thorn Control Plan and M&E Plan which is distributed to all stakeholders on the island (**Annex 3 & 4**). The project facilitated the release of *Evippe* sp. #1 on Ascension Island with support from CABI UK. Continuous monitoring needs to take place to confirm the establishment and efficacy of this agent as well as its possible impact on the environment.
Outcome *An integrated approach to Mexican thorn control implemented on Ascension that uses all appropriate techniques, has strong public support, and is sustainable within current resource availability.*	
Outcome indicator 0.1 Integrated control strategy produced by Y3 Q2 and implemented by Y3 Q4.	The project was able to develop and publish an Integrated Mexican thorn Control Plan, as well as the Monitoring and Evaluation Plan in March 2024 (**Annex 3 & 4**). Section 4 of the Integrated Mexican thorn Control Plan provides recommendations on improved and new Mexican thorn control methods as well as herbicides to incorporate in operations. Comprehensive host range testing took place to identify possible risks associated with the release of *Evippe* sp. #1. This led to the development of an all-inclusive *Evippe* Risk Assessment by AIGCFD with the help and support of CABI UK (**Annex 1**).
Outcome indicator 0.2	There has been good participation in volunteering events since the Project's implementation in 2021. The attendance at public meetings also demonstrated that

Support of at least 66% of the public who respond to engagement activities and participation of at least ten volunteers in control strategy by Y3 Q3.	there was interest in using improved control methods and herbicides on Ascension (**Annex 6 & 7**). Ascension Island has a population of approximately 800 residents. In total of 173 people (this includes volunteers of the Project, and people attending the Public Consultation), showed interest in the Project since its implementation in 2021. This equates to 21.63% which shows that the target of 66% in its Outcome is not achieved. However, the Project was greatly supported on all AIG social media platforms with interest shown by international stakeholders as well (**Annex 8**). The Project is also supported by the Island Council which represents the island community.
Output 1 Risk assess the use of *Evippe* sp. as a biocontrol agent on Ascension following CABI risk assessment protocol.	
Output indicator 1.1 Current distribution of thorn mapped over 3000ha of the island and predicted impact of *Evippe* sp. release on distribution, vigour, and appearance assessed by Y2 Q2.	The current distribution of Mexican thorn was mapped using the AIGCFD drone to take aerial imagery across the island. Certain sites had to be assessed by foot as the flying operations of drones are not allowed in the Ascension Island territorial airspace. Historic images were collected from the museum and social media pages to inform what Ascension Island looked like before or shortly after the introduction of Mexican thorn. This helps to show how fast spread has occurred since its establishment. A map was generated that predicts how fast *Evippe* sp. #1 will spread from its point of release across the island in three-monthly intervals. Calculations were based on monitoring and experience of *Evippe sp*. #1 releases in the Pilbara region of Australia.
Output indicator 1.2 Host range testing conducted on at least five native or valued ornamental plant species by Y2 Q3.	Seeds from seven plant species of concern for AIGCFD were sent to CABI and included in the host range testing procedure. A comprehensive plant list from Australia and South Africa also informed the Ascension *Evippe* RA. Most test plant species could readily be propagated and grew well under the controlled temperature conditions of the quarantine facility in the UK. The only plant species CABI repeatedly failed to germinate was guava, an invasive species to Ascension which is also regarded as an unimportant test plant. It was eventually taken off the list of plants to test as guava is not closely related to *Neltuma*. There was a request to add lettuce to the host range tests to ensure that the introduction of the *Evippe* moth would not threaten hydroponic lettuce crops. A test was set up within the CABI quarantine facilities and included lettuce plants of four different varieties as well as Mexican thorn plants as controls. The test demonstrated

	that there will be no impact on lettuce with the introduction of the *Evippe* moth (for details see RA in **Annex 1**).
Output indicator 1.3 Potential interactions between *Evippe* sp. and native invertebrates and other non-native pest species assessed by Y2 Q3.	The Project anticipates that other non-native plant species such as tree tobacco (*Nicotiana glauca*) and yellow boy (*Tecoma stans*) may replace *Neltuma* in at least part of its range in the presence of the IBCA, *Evippe* sp. #1. These plants are less invasive and can be managed more easily and cost-effectively as they have smaller root systems and are more susceptible to mechanical and chemical control methods. Some of these invasives will also be less severe in their negative impacts such as providing a habitat for rats or even might exert some benefits as providing habitat and/or shelter for some of the native or endemic invertebrates and contributing to dust suppression and erosion control. Ascension's endemic species, including the land crabs and endemic invertebrates, became established on the island and evolved in the absence of *Neltuma*. They, therefore, do not require it for their survival. Land crabs may suffer some negative effects through the loss of shade on their spawning migration routes, but this will be balanced by the reduction in cover for non-native predators/competitors such as rats. There are other sources of shade for land crabs to use and if climate change or other factors result in high mortality of land crabs due to desiccation, then artificial shading could be considered on key migration routes. The only endemic invertebrate that may be affected by the loss of *Neltuma* cover is the psocid (*Indiopsocus mendeli)*, which has been found in areas of *Neltuma*, though it has also been recorded from other plant species and so *Neltuma* is unlikely to be significant for its survival. Of the native invertebrate fauna, only very generalist species such as two species of barkfly, have a loose association with *Neltuma*. They will all have established and survived on Ascension in the absence of *Neltuma* and so will not be reliant on it. The only invertebrate species that show a strong association with *Neltuma* are abundant non-native ants, webspinners, and sac spiders (for details see RA in **Annex 1**).
Output indicator 1.4 Full *Evippe* risk assessment completed by Y2 Q3 and independently assessed by DEFRA and FERA by Y2 Q4.	The *Evippe* Risk Assessment was finalised using a modified version of the Defra UK form for the application to license the release of an invertebrate biological control agent (IBCA) in England (**Annex 1**). This document was reviewed by an independent expert from FERA Science and found to be detailed and comprehensive and clearly shows that the benefits of releasing the *Evippe* moth to manage Mexican thorn in Ascension Island will far outweigh the risks or any anticipated negative indirect effects (**Annex 2**).
Output 2. Best practice methods of chemical and mechanical control identified and people on Ascension trained to undertake these techniques.	

Output indicator 2.1. Assessment of all relevant chemical and mechanical control options undertaken by Mexican thorn specialist by Y3 Q2.	The project trialled six different control methods and three different types of herbicides, each with a different mode of action (this is the overall manner in which an herbicide affects a plant at the tissue and cellular level) (**Annex 5**). The newly recommended control methods and herbicides are discussed in Section 4 of the Integrated Mexican thorn Control Plan **(Annex 3**).
Output indicator 2.2. Ten people working for AIGCFD, other organisations, or volunteers trained and received a qualification in the use of chemical and mechanical control methods by Y3 Q2.	The Project Officer discussed all new recommended control methods and safe herbicide use during the final public meeting (**Annex 9**) for the project. The Conservation Fieldworker, Conservation Interns, and volunteers received informal training while doing Mexican thorn removal with the Mexican thorn Control Project Officer who is registered as a Pest Control Officer in South Africa under the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947.
Output indicator 2.3 Trials of proposed new methods initiated at four sites covering 4 ha by Y3 Q2.	Potential control methods were summarised in a desk study (**Annex 5**). Ring barking, bark stripping, chemical frilling, and foliar application were identified as methods that had shown promising results elsewhere and should translate well to Ascension's conditions. Cut stump application has previously been used on Ascension and the success of this method was assessed in the review. It will also be included in the trials for comparison. Basal stem treatment shows promising results thus far and seems to work on trees ranging from small to large in size. A site of approximately 60.70 ha near Long Beach Nature Reserve was identified where ring barking, bark stripping, and chemical frilling applications are currently being trialled. 60 trees (20 trees per method) are included in the trials. Sendero® herbicide was applied to each tree using paint brushes after the method was applied. Cut stump application is being trialled at Long Beach and Waterside Nature Reserve. Garlon®Ultra and Sendero® herbicides are included in the trials to determine which will work more effectively for the treatment of Mexican thorn. Foliar application is being tested in Waterside Nature Reserve on 95 trees. The area is approximately 181.29 ha in size. Sendero® herbicide was applied by pressurized knapsack sprayers. Three different nozzles (jet, fan, and cone) were included in the trials to determine which would work best for the treatment of Mexican thorn. Basal bark treatment is being trialled at Long Beach and Mars Bay Nature Reserve. The herbicide, Turbudor® 29 MPA, is a ready-to-use (RTU) herbicide that is sprayed on the bark of the tree trunk approximately from knee height down to soil level (for details see the ICP and M&E Plan - **Annex 3 & 4**).
Output 3. Improved public understanding of the impact of Mexican thorn on Ascension and shared ownership of the solutions.	

Output indicator 3.1 At least 20 people attend the initial public meeting organised to set out the impacts of Mexican thorn and introduce project aims by Y1 Q4. 60 attend the three subsequent meetings organised to present the different control options and their predicted impacts and allow discussion of options by Y3 Q1.	The Project was able to organise four public meetings during its lifetime (**Annex 7**). Public meetings are usually not well attended by the island community so the target of 60 people in attendance is an unrealistic figure. Multiple stakeholders attended these sessions, but the total number attended does not equate to 60 people. Better participation and feedback are received through the Department's social media platforms (**Annex 8**). The Project is also supported by the Island Council which represents the island community.
Output indicator 3.2 People attending meetings report improved understanding of Mexican thorn impact. Increased awareness of negative impact of Mexican thorn in the general public.	Stakeholders see the benefit of using new and improved control methods for Mexican thorn clearance. Public meetings are usually not well attended by the island community so it is not an isolated problem. Since the project's implementation, different stakeholders reached out for assistance in treating Mexican thorn. AIGCFD also offered their assistance with chainsaw operations and herbicide at communal areas where large Mexican thorn trees encroached on infrastructure such as the Two Boats pool and MUGA. Community members feel comfortable enough to approach the Project Officer after hours during social events but there will always be a group that will not voice their opinions during a public meeting platform as expected.
Output indicator 3.3 Two press and two social media articles produced that detail the impact of Mexican thorn and invite comments from members of the public on the outline control scenarios by Y3 Q1.	Social media posts on Facebook and articles in the local newspaper, the Islander, created interest within the community and followers of Ascension Island's social media pages (**Annex 8**). Articles were accompanied by social media posts published on the AIG Conservation Facebook page. All articles and posters were distributed by email to all stakeholders on the island. An update on the Project's process was posted on the AIG Website. Members of the public engaged positively with the project through social media.
Output 4. Integrated control strategy for Mexican thorn on Ascension	
Output indicator 4.1 Integrated control strategy produced following results of other project strands by Y3 Q4.	The project developed and published an Integrated Mexican thorn Control Plan (**Annex 3**) for Ascension which is available to all stakeholders on the island. Section 4 of this Plan provides recommendations on new and improved control methods as well as herbicides to incorporate into clearance operations. This Plan considers mechanical, chemical, and biological control options and provides detailed descriptions with clear images.
Output indicator 4.2 Monitoring and evaluation plan devised to be deliverable within current staff resource of AIGCFD by Y3 Q4.	The project developed and published an M&E Plan (**Annex 4**) relating to Mexican thorn clearance efforts on Ascension. This Plan outlines clear and deliverable targets within the current capacity of AIG.

Output 5. Control strategy actions delivered as part of AIGCFD workplans and best practice methods used by all organisations controlling thorn on Ascension.	
5.1 Subject to results of the risk assessment, *Evippe* sp. cultured and released on Ascension by AIGCFD under the guidance of CABI and St Helena ANRD by Y3 Q2.	The project was able to complete the Risk Assessment (**Annex 1**) by December 2023 and seek independent review from FERA Science in January 2024 (**Annex 2**). *Evippe* sp. #1 specimens were hand-carried by CABI through the UK Airbridge and released on Ascension between April and July 2024. CABI provided training to the Mexican thorn Control Project Officer and Conservation Fieldworker in the rearing and release of the IBCA. The Centre of Biological Control (Rhodes University) also provided useful information and guidance on the handling and rearing of the moth.
5.2 Establishment and initial impact of released control agent monitored by Y3 Q4.	The project was able to set the initial monitoring guidelines and publish them in the published M&E Plan (**Annex 4**). AIGCFD will use the drone to monitor environmental change over time and ground-truth these images to determine the moths' establishment and efficacy.
5.3 Improved methods of chemical and mechanical control used by all relevant organisations on Ascension covering at least 10ha per year by Y3 Q4.	The project was able to propose new and improved mechanical and chemical methods to successfully treat and control Mexican thorn on Ascension. The Integrated Mexican thorn Control Plan (**Annex 3**) is published on the AIG website. These methods are implemented over 10ha of the island by all different stakeholders.
5.4 At least ten volunteers were involved in regular thorn control activities by Y3 Q4.	The project was able to recruit more than 151 volunteers by March 2024 and they can implement the new or improved control methods and herbicides during clearance efforts (**Annex 6**).

Annex 2 Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: The spread of Mexican thorn on Ascension will be initially slowed and then reversed, making effective control possible and allowing the habitats of endemic species to be protected in perpetuity.			
Outcome: An integrated approach to Mexican thorn control implemented on Ascension that uses all appropriate techniques, has strong public support and is sustainable within current resource availability.	1. Integrated control strategy produced by Y3 Q2 and implemented by Y3 Q4. 2. Support of at least 66% of the public who respond to engagement activities and participation of at least ten volunteers in control strategy by Y3 Q3.	1. Copy of strategy incorporation into AIG work plan. 2. Record of public engagement events. Record of participation in volunteer events.	There is scope for improving on current control techniques without jeopardising native species or public support. **Mitigation:** Expertise will be sought from other countries with more developed thorn control strategies. Public engagement activities are successful in creating interest and ownership of the problem. **Mitigation**: Information will be presented in an accessible form through multiple channels and discussions will be initiated about potential future scenarios.
Output 1 Risk assess the use of *Evippe* sp. as a biocontrol agent on Ascension following CABI risk assessment protocol.	1.1 Current distribution of thorn mapped over 3000ha of the island and predicted impact of *Evippe* sp. release on distribution, vigour and appearance assessed by Y2 Q2. 1.2 Host range testing conducted on at least five native or valued ornamental plant species by Y2 Q3. 1.3 Potential interactions between *Evippe* sp. and native invertebrates and other non-native pest species assessed by Y2 Q3. 1.4 Full *Evippe* risk assessment completed by Y2 Q3 and independently	1.1 Map of current and predicted future distribution. 1.2 Results of host range testing included in Risk Assessment Report. 1.3 Interactions assessment included in Risk Assessment Report. 1.4 *Evippe* risk assessment and DEFRA review published on AIG website.	Host range testing requires availability of *Evippe sp*. from Australia and samples of Ascension plants from Kew. **Mitigation:** CABI has existing contacts with these organisations and experience of conducting trials. Sufficient empirical evidence from *Evippe* sp. releases in other countries to make robust predictions of impact on thorn and non-target species on Ascension. **Mitigation:** Direct contacts with managers in other countries will enable

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	assessed by DEFRA and FERA by Y2 Q4.		access to the grey literature and personal observations.
Output 2 Best practice methods of chemical and mechanical control identified and people on Ascension trained to undertake these techniques.	2.1 Assessment of all relevant chemical and mechanical control options undertaken by Mexican thorn specialist by Y3 Q2. 2.2 Ten people working for AIGCFD, other organisations or volunteers trained and receive qualification in the use of chemical and mechanical control methods by Y3 Q2. 2.3 Trials of proposed new methods initiated at four sites covering 4 ha by Y3 Q2.	2.1 Report produced by specialist. 2.2 Training attendance records. Results of skill assessment after training completed for all participants by instructor. 2.3 Trial protocols and monitoring plan.	There is scope to improve on current methods being undertaken. **Mitigation**: Expertise will be sought from other countries with more developed thorn control strategies. Other organisations and volunteers are willing to participate in training. **Mitigation**: Organisations have already sought advice from AIGCFD on thorn control and are keen to improve on current methods. They will be involved from the beginning of the project to ensure its outputs will be relevant to them.
Output 3 Improved public understanding of the impact of Mexican thorn on Ascension and shared ownership of the solutions.	3.1 At least 20 people attend the initial public meeting organised to set out the impacts of Mexican thorn and introduce project aims by Y1 Q4. 60 attend the three subsequent meetings organised to present the different control options and their predicted impacts and allow discussion of options by Y3 Q1. 3.2 People attending meetings report improved understanding of Mexican thorn impact. Increased awareness of negative impact of Mexican thorn in the general public. 3.3 Two press and two social media articles produced that detail the impact of Mexican thorn and invite comments from	3.1 Record of meetings including photographs. 3.2 Results of feedback forms distributed at the public meetings. Results of questionnaires distributed on Ascension. 3.3 Copies of articles.	Willingness amongst public to engage with project and ability to undertake scenario assessment. **Mitigation**: Significant time and resource will be devoted to public engagement. Information will be presented in an accessible form through multiple channels.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	members of the public on the outline control scenarios by Y3 Q1.		
Output 4 Integrated control strategy for Mexican thorn on Ascension.	4.1 Integrated control strategy produced following results of other project strands by Y3 Q4. 4.2 Monitoring and evaluation plan devised to be deliverable within current staff resource of AIGCFD by Y3 Q4.	4.1 Strategy Report. 4.2 Monitoring plan included in Strategy Report.	Level of control required to protect key biodiversity sites is within the resource capabilities of AIG or potential external funding streams. **Mitigation**: Expertise will be sought from other countries and trials carried out on Ascension to ensure best possible options are identified.
Output 5 Control strategy actions delivered as part of AIGCFD workplans and best practice methods used by all organisations controlling thorn on Ascension.	5.1 Subject to results of the risk assessment, *Evippe* sp. cultured and released on Ascension by AIGCFD under the guidance of CABI and St Helena ANRD by Y3 Q2. 5.2 Establishment and initial impact of released control agent monitored by Y3 Q4. 5.3 Improved methods of chemical and mechanical control used by all relevant organisations on Ascension covering at least 10ha per year by Y3 Q4. 5.4 At least ten volunteers involved in regular thorn control activities by Y3 Q4.	5.1 Records of releases and photographs of culture facilities. 5.2 Results of monitoring 5.3 Records of treatment activities and before and after photographs. 5.4 Register of volunteers and photographs of work parties.	Risk assessment and public engagement strands indicate biocontrol is appropriate for Ascension. **Mitigation**: Risk assessment will be rigorous and if it indicated the risk of biocontrol exceeds the potential benefit, then it should be excluded from the strategy and the focus placed on other methods. There is scope for improvement in control methods and a willingness amongst organisations to adopt them. **Mitigation**: Expertise will be sought from other countries and trials carried out on Ascension to ensure best possible options are identified. Organisations have already sought advice from AIGCFD on thorn control and are keen to improve on current methods. They will be involved from the beginning of the project to ensure its outputs will be relevant to them. Volunteers can be recruited.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
			Mitigation: Public engagement activities will emphasise the benefit to the community of controlling thorn. AIGCFD will draw on its existing pool of volunteers and its expertise to make the volunteer events enjoyable group activities that will be well publicised. *Evippe* can be easily cultured on Ascension and – as climate data suggests – readily establishes on the island. **Mitigation**: If the initial attempt for the release and establishment of *Evippe* during lifetime fails, follow up activities are set in place to continue low cost activities after the termination of the project.

Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)

1.1 Use aerial imagery and AIGCFD drone to map the distribution of Mexican thorn across 3000ha of suitable habitat on Ascension. Train volunteers to ground truth results over at least 10% of the survey area.

1.2 Based on the results of *Evippe* releases in Australia, create maps showing potential impact of *Evippe* on Ascension.

1.3 Transport five endemic and valued plant species from Ascension and *Evippe* from culture sites in South Africa to CABI's UK quarantine facilities to provide Ascension-specific host range testing to supplement *Evippe* testing already carried out.

1.4 Conduct full risk assessment of *Evippe* as a biocontrol agent on Ascension using PRA method developed through DPLUS074 and following advice on the scope of the assessment form DEFRA.

1.5 Seek independent evaluation of risk assessment process from DEFRA. Address any concerns DEFRA have and provide final recommendations on the use of *Evippe* on Ascension.

2.1 Carry out desk-based review of potential chemical and mechanical methods of Mexican thorn control including evidence of efficacy, resource requirement and applicability to Ascension. Recommend most appropriate methods for Ascension.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
2.2 Deliver training courses on Ascension for employees from AIGCFD and other organisations and volunteers. Training to cover methods recommended in review and result in qualification in herbicide application. 2.3 Design and conduct trials of recommended treatment methods on Ascension comparing the results and resource input of each method and control sites. 3.1 Organise four public meetings to introduce the project and outline control options. Produce written material to support meetings and encourage involvement 3.2 Create articles for the local press and social media to publicise and describe project. Use as a platform to seek views of the community and recruit volunteers. 4.1 Produce Integrated Mexican thorn Control Plan 4.2 Produce Monitoring and Evaluation Plan 5.1 If biocontrol recommended, construct *Evippe* culturing facilities on Ascension 5.2 Import *Evippe* form South Africa and culture on Ascension with support from CABI 5.3 Release *Evippe* on Ascension with support from CABI 5.4 Monitor presence of *Evippe* in the wild and impact on Mexican thorn following the protocols established in the Monitoring and Evaluation Strategy 5.5. AIGCFD and other Ascension organisations carry out Mexican thorn control using new methods 5.6 Organise and deliver volunteer control activities using new treatment methods			

Annex 3 Standard Indicators

Table 1 Project Standard Indicators

DPLUS Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total achieved	Total planned
DPLUS-A01	Number of people from key national and local stakeholders completing structured and relevant training	People	Women Men	10	15	20	10 staff from other organisations 151 volunteers	10
DPLUS-A03	Number of local/national organisations with improved capability and capacity as a result of project.	Organisations		0	2	4	2	3
DPLUS-B01	Number of new/improved habitat management plans available and endorsed.	Number		0	0	2	0	2
DPLUS-C01	Number of best practice guides and knowledge products published and endorsed.	Number		0	0	2	0	2
DPLUS-D01	Hectares of habitat under sustainable management practices	Hectares		10	15	20	10	10

Table 2 Publications

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
Ascension *Evippe* Risk Assessment	Risk Assessment	Norbert Maczey, Corin Pratt and Chrisna Visser, June 2023	Male	German	Ascension Island Government	www.ascension.gov.ac
Integrated Mexican thorn Control Plan	Control Plan	Chrisna Visser, 2023	Female	South African	Ascension Island Government	www.ascension.gov.ac
Mexican thorn Monitoring & Evaluation Plan	M&E Plan	Chrisna Visser, 2023	Female	South African	Ascension Island Government	www.ascension.gov.ac

Checklist for submission

	Check
Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the **correct template** (checking fund, type of report (i.e. Annual or Final), and year) and **deleted the blue guidance text** before submission?	X
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	X
Is your report more than 10MB? If so, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line. All supporting material should be submitted in a way that can be accessed and downloaded as one complete package.	N/A
If you are submitting photos for publicity purposes, **do these meet the outlined requirements (see section 14)?**	X
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	X
Have you involved your partners in preparation of the report and named the main contributors	X
Have you completed the Project Expenditure table fully?	X
Do not include claim forms or other communications with this report.	