Vespula vulgaris (Common Wasp) control and its effects on the fringes of the Peaks National Park

March 2025, *Natasha Stevens, Daryl Joshua and Shaun Osborne*

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1. Introduction

The Common wasp *Vespula vulgaris* has been listed as a priority invasive species for the Peaks National Park (PNP), also known as the Cloud Forest, due to its impacts on endemic invertebrates and is a priority invasive species for control. It is also one of the 100 world's worst invasive species, recognised global for its impacts https://www.iucngisd.org/gisd/100_worst.php. Currently, access restrictions are being applied on PNP, due to tree disease control measures, this is preventing any testing of wasp control methods in the Cloud Forest. Therefore, some initial control testing has been carried out on the fringes of the PNP as a first step. This report outlines the control tests and monitoring that have been conducted in the fringes of the PNP and their results.

The Darwin project DPLUS104 had tested and had positive results when trialling a Fipronil-based toxin (active ingredient Fipronil) for the control of the Common wasp. This toxin was chosen because of its success and effective treatment of the target species in New Zealand. After extensive risk assessments, the toxin was found to be very low risk to endemic invertebrates in St Helena. This meant that the toxin could be mixed with a minced chicken lure and then applied using baiting stations within the target areas to facilitate control. As a result of the toxin application the numbers of Common wasps decreased in the target areas (Ellick *et al*. 2023).

Knowledge of the Common wasp's distribution and activity is very limited for St Helena, however call-out records from ANRD, Public Health and a year's worth of wasp monitoring through the DPLUS104, has shown that there are hotspots for this species on the island. These hotspots are the Cloud Forest, Sandy Bay and Levelwood. We assume these areas have a high level of wasp activity due to them being highly vegetated, and with suitable weather and a plenty of food supply. There could also be more footfall in these areas and so people are calling to eradicate wasp nests that are impacting on their daily lives.

With the positive control results from the trial phase, plus an increased understanding of distribution and ecology of the Common wasp on St Helena, means that we are now able to initiate trials for wasp monitoring and control in the Peaks. To test its wider effectiveness to reduce the wasp population in this very different and important habitat type. This will allow us to establish an adaptable control protocol that can be used in a future island-wide eradication programme for the Common wasp.

Through the St Helena Cloud Forest Project, funded by the FCDO, the common wasp control will take place on the fringes of the Peaks National Park (PNP) and in partnership with St Helena Government. In this test phase the toxin will be deployed in the Sandy Bay area where the majority of the government's callouts occur.

The island's steep terrain and limited resources make it hard to find and then remove the Common wasp nests, but this method can help with wasp control in hard-to-reach areas. Wasp activity on St Helena is seasonal, generally being highest in the hotter months (Dec – April). The island's sub-tropical weather prevents the common wasp from hibernating as it does in other countries. This makes the toxin more effective when the wasp is in the protein stage of its life cycle, actively seeking protein to feed their young and the queen, which is more common in the hotter months.



Pictures 1. *Vespula vulgaris* on the Bilberry and on the chicken lure

2. Methods monitoring - understanding the risks of Trappit and chicken lure on non-target invertebrates in the fringes of the Cloud Forest, and initiating wasp activity testing

The fringes of the Cloud Forest are marked by the main road, they consist of pasture lands and areas of New Zealand Flax, and so there are very few endemic invertebrates as the habitat is not very suitable for them. However, there are three small areas of endemic vegetation — the Ginger Patch, Cason gene bank, and George Benjamin arboretum—within these fringes. However, access to these sites is currently restricted due to tree disease. Next to these endemic vegetation areas is a series of sites, these were selected as possible control sites and investigated whether or not any endemic invertebrates are attracted to the chicken lure, and also to assess the presence and absence of Common wasp using Trappit (a wasp attractant).

2.1) Wasp / beer traps for activity monitoring - Trappit (wasp attractant) filled traps were placed along the fringes, where the bycatch to endemic invertebrates is minimal. Wasp traps are recycled 500ml water bottles hang in the trees, which will attract and capture wasps by drowning them in the bottle (see pictures 2). Wasp traps were positioned at a series of fourteen predefined locations for four days of each month at all of the locations before being removed and then placed back in the next month. The locations were: Halley's Mount, Cabbage Tree Road, Wraghams, Perkins Gut, Sandy Bay Ridges (next to Sandy Bay Forest), Casons, Fairyland, Peak Dale, Blue Point, Church Forest (Blue Hill), High Peak Road, Ginger Patch, Donkey sanctuary, and along Blue Hill Road. This was to identify wasp presence and absence, as well as abundance. See map 2.

2) Wasp lure (to be eventually mixed with the toxin) - For the chicken lure (wasp activity and attractiveness to non-target invertebrates) tests; a tablespoon of minced chicken was placed on bottle lids two meters apart and monitored for four hours to observe the invertebrates attracted to it and the number of wasps (see pictures 2). The cafeteria test conducted on DPLUS104 revealed that minced chicken was the most effective attractant for the wasps during their nest expansion phase, when they require protein. Therefore, it is the best lure to attract the wasps and to be mixed with the toxin. Observations were made every 20 minutes from 10am to 2pm, and wasp counts were taken to gauge the average activity per hour each month. These tests were conducted at Perkin Gut, Halley's Mount, Casons, Ginger Patch, and Cabbage Tree Road. Due to limited knowledge of the endemic invertebrates in the aforementioned small endemic sites, trials were conducted in these areas using a concealed netted cage (1cm x 1cm holes) to allow invertebrate access and stop rats and Myna birds removing the chicken. A motion-triggered camera was used to capture images of any invertebrates attracted to the chicken, in order to assess the non-target species risks plus number of wasps attracted (See pictures 2). The cage remained in the environment for 24 hours.

Initial testing concluded that there was a low risk to the endemic non-target invertebrates on the chicken lure and so application of the toxin could go ahead. For the Trappit some Tineidae moths (endemic moths) were found in the Trappit solution initially but they were in low numbers. It was concluded that the risk was minimal therefore we were able to continue with the Trappit monitoring to understand the wasp activity within these areas and used the chicken for the protein base mixed with the toxin on the fringes of the Cloud Forest for control. See appendix 1 and 2. for the bycatch using the trappit and chicken lures in the PNP and on the fringes.

Pictures 2. Concealed netted cage with a camera attached to observe and identify invertebrates drawn to the chicken, Wasp (beer) Trap, Chicken Activity (left to right)

3. Control method

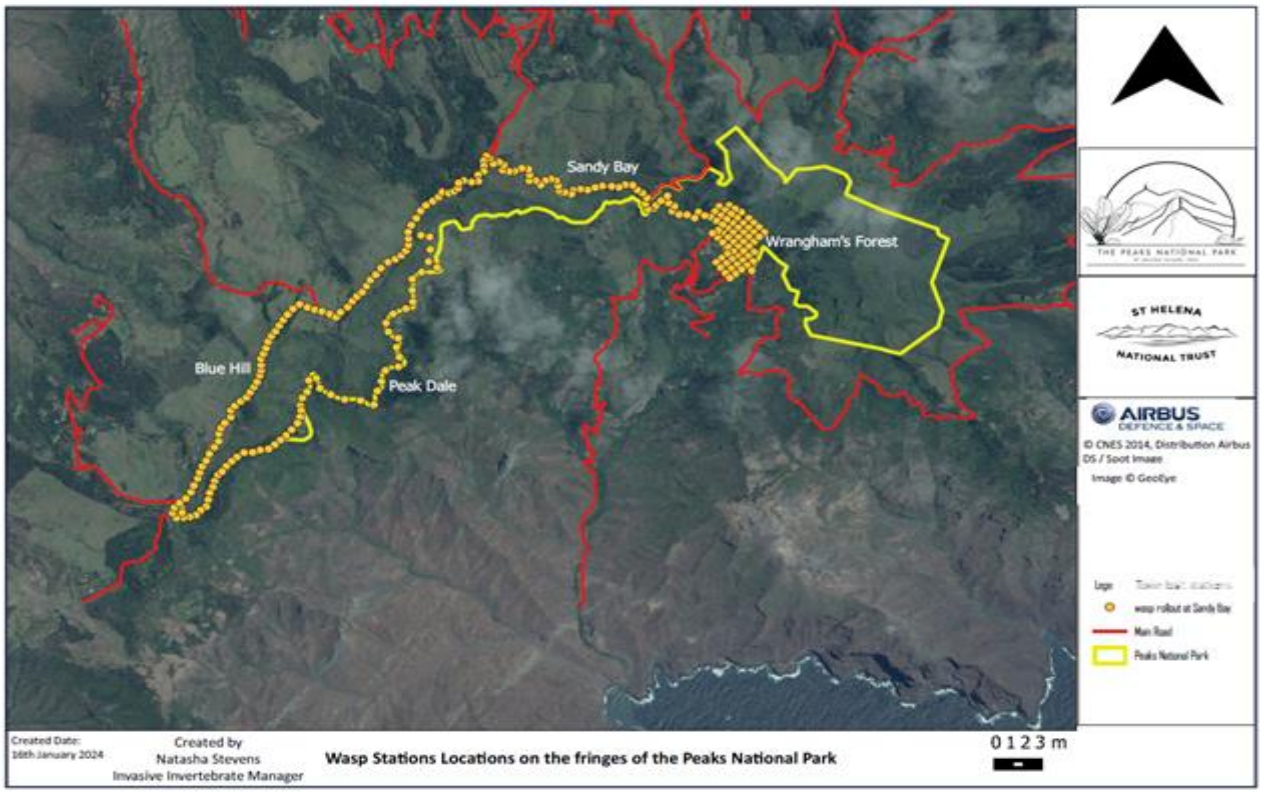
Wrangham's, and on the main road from Blue Hill Church to George Benjamin Arboretum, along the main road of Sandy Bay ridges, Perkins Gut, Sandy Bay Forest and Sandy Bay residential area have been selected for the wasp control (see map 1.). These sites were chosen because the toxin has already been trialled in Wrangham's during the DPLUS104, it has a high wasp activity and it was assessed to have a minimal risk to the endemic invertebrates. Residential areas of Sandy Bay and Perkins gut area were selected because there was very high wasp callout in these areas. The bait stations were place on trees 2 meters above the ground and along the main road as it is away from any endemic sites but still on the fringes of the PNP.

The St Helena National Trust (SHNT) and the St Helena Government (ENRP) also set up over 300 wasp traps for activity monitoring along the edges of PNP and in Sandy Bay, where there have been many wasp nests and activity. Monitoring the wasp activity throughout the year helps identify the best times to deploy the toxin and assess its effectiveness. Wasp activity monitoring occurred monthly at four different sites (Perkin Gut, Cabbage Tree Road, Cason, and the Ginger Patch), the method is described in 2.2. If the wasp activity exceeded 10 wasps or there were numerous wasp callouts in the area, the toxin would be deployed. Monitoring only took place during the warm and dry days, but further studies are needed to determine if wasps are active year-round in different areas. This would involve deploying wasp traps with Trappit every month for 4 days to investigate the presence in different areas for the whole year.

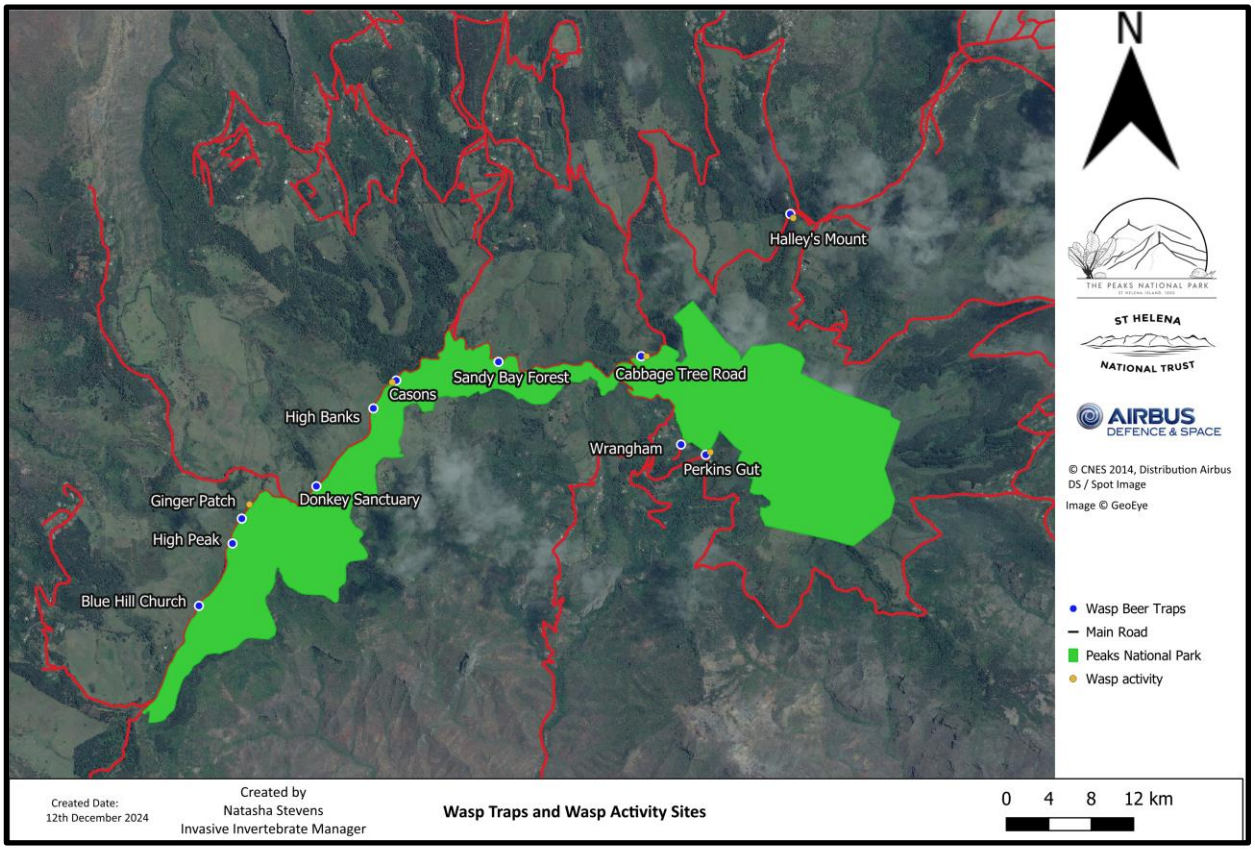
Wasp bait stations for the toxin were placed 2 meters above the ground along Blue Hill and Sandy Bay Road, Sandy Bay Forest, Wrangham's, Perkins Gut, and in residential areas of Sandy Bay. The toxin was placed in yellow bait stations (see Pictures 3) for three days and then removed. To reduce any threats that it might have on the invertebrates, human health or animals in the area.

Monitoring (wasp attractant traps, wasp activity tests) and observation of the wasp continued in these areas after the control took place to determine if the toxin have taken effected or if the toxin would need to be redeployed and these are described below. If the prey is abundant in the area, wasps may occasionally ignore the wasp activity test using chicken lures. Therefore, the observation serves as a useful tool to monitor the wasp population in the area.

Map 1.



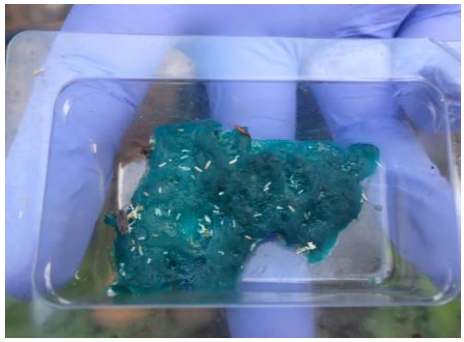
Map 2.





Pictures 3. Installing toxin bait stations in Sandy Bay,





Pictures 4. Deploying the toxin on the fringes, Photo showing the toxin after 72 hours in the environment.

4. Monitoring results

It is very difficult to determine the Common wasp's life cycle on St Helena because of the terrain, sub-tropical climate and micro-climate on the island, which all mean that the Common wasp does not have a hibernation period like other countries. Therefore, we use different monitoring methods to investigate the wasp activity on the island and to determine if Common wasp control is effective. The results of these methods are described below:

- **Wasp activity testing (chicken lures)**

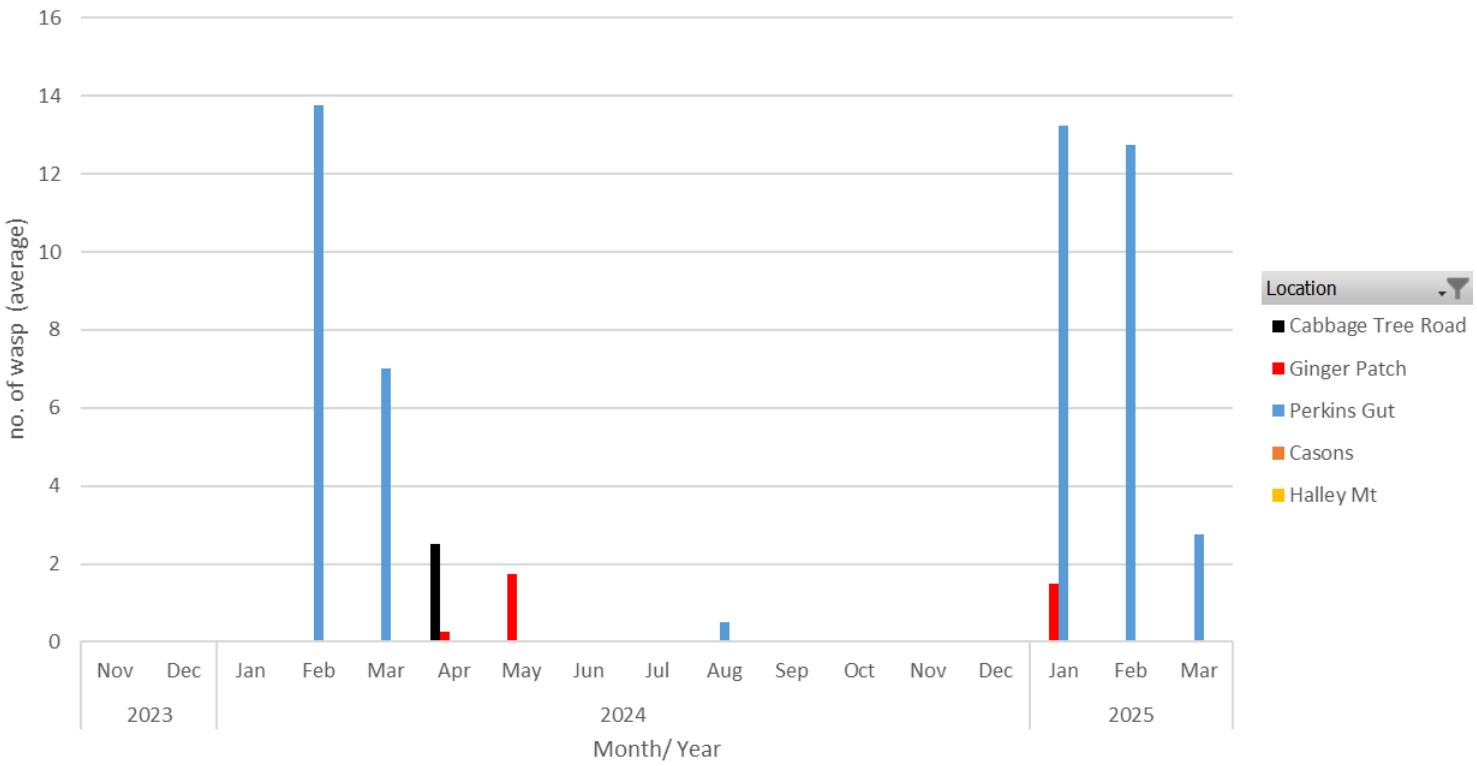
This survey determines when the nest would need protein, which will indicate when it is a good time to deploy the protein bait mixed with toxin. It is not conducted during the colder months, as observations from the DPLUS104 project indicate that wasps avoid the chicken lure during this period. This behaviour is likely due to their reluctance to fly far from the nest, as rain could damage their wings or hinder their ability to return if they travel too far, as well as lower reproduction rates in colder months.

Due to the weather conditions and driving difficulties it made it challenging to complete the full year surveying. Graph 2 represents the average number of wasps come to the chicken every hr from 10am to 2pm. In February 2024, wasp activity in Pekins Gut was notably high, with an average of 14 wasps visiting the chicken each hour. This suggests the presence of one or more wasp nests in the area, likely requiring protein to nourish their young. Through observation this was very noticeably as the wasp was flying around banana trees and going to the chicken lures. The toxin was deployed on

11th March and picked up on the 15th March. While the toxin was present in the environment, we conducted a wasp activity assessment. The graph indicates that the toxin had a noticeable impact on the area, as wasp activity declined from an average of 14 to 7 wasps per hour.

No wasps were attracted to the chicken lure in Sandy Bay and the activity remained low at the Ginger Patch and Cabbage Tree Road after deploying the 1st toxin, suggesting that the wasp nest close to the area had died. However, a second treatment was applied on 6th May, as observations and wasp-related callouts in Sandy Bay suggested that the wasp population remained high, but the wasp activity level. observations at Cabbage Tree were low, as wasps were preferring to scavenge on a dead rat rather than the chicken lures. If the wasps have sufficient protein available in their environment, they may ignore the chicken lure, reducing the likelihood that they will encounter the toxin. Control (application of toxin) will only proceed once there is an average of 7 wasps visiting the chicken, which means the control may be delayed if activity remains low. Therefore, there was a risk that the second toxin deployment would not be as successful, as the wasps were using protein their environment rather than needing the chicken lure. Wasp activity in Perkins Gut began to decrease, indicating that the nest/s in the area had been successfully eradicated after the 1st deployment. At this time Cabbage Tree and Ginger Patch had a low wasp activity on the Chicken and Cason. Additionally, no wasp activity was observed in Halley Mt.

Graph 1. shows average no. of the common wasps going to the chicken lure (wasp activity) by site from Nov 2023 – Mar 2025



Pictures 5. Shows the wasp activity at Cabbage Tree road, Peaks staff monitoring the lures, Chicken lure. (left to right)

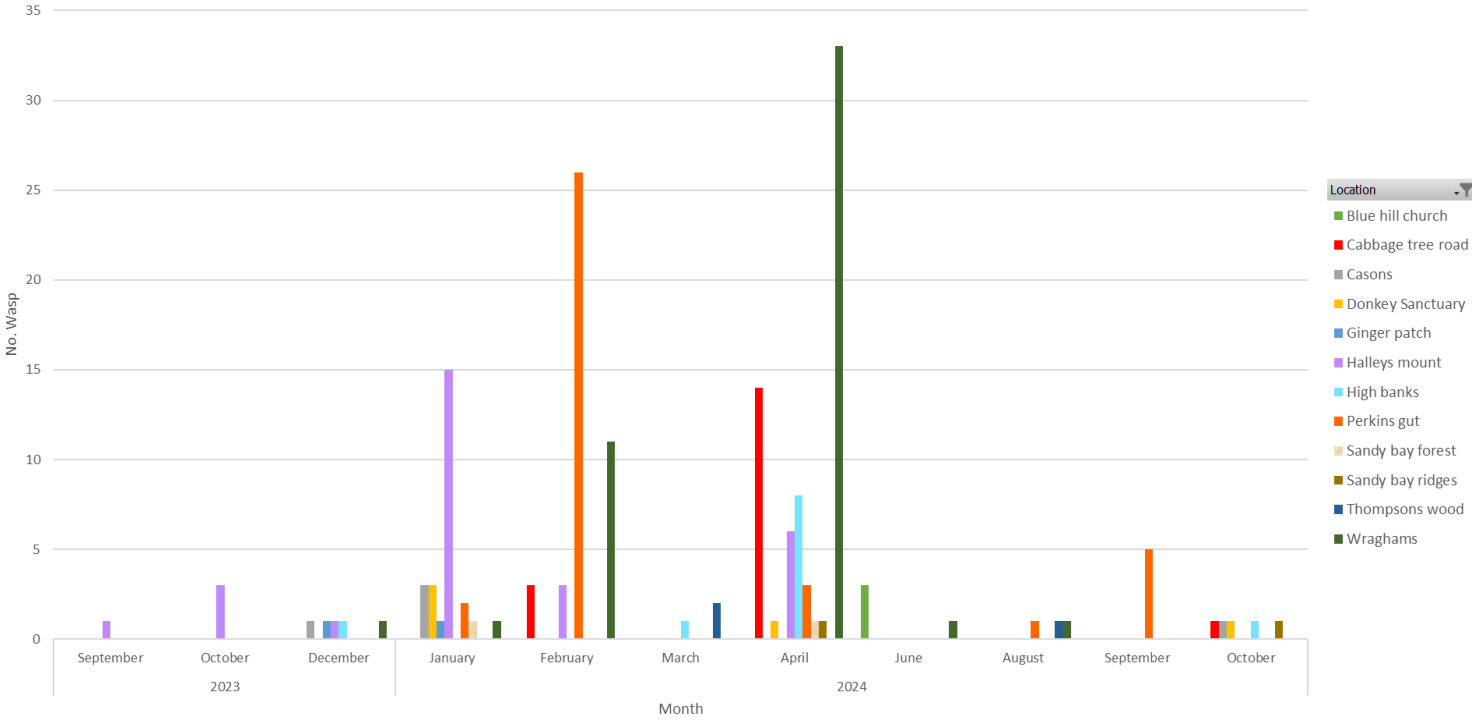
- **Wasp Traps using Trappit solution**

This method helps to identify the presence and activity of wasps in the area and determine their life cycle stages. According to past data from the 'Conserving St Helena's Endemic Invertebrates Through Invasive Invertebrate Control' project (DPLUS104) and SHG callout records, wasps are typically active during the summer months (November to March/April). However, we have observed that some nests continue to thrive during colder months, depending on the micro-climate of the location. Both adult wasps and the queens are attracted to the Trappit solution when they require carbohydrates. Adult wasps feed exclusively on carbohydrates, while the queen consumes carbohydrates before establishing a nest and after the nest dies, she then requires protein to support her reproduction.

During the monitoring on the fringes (see Graph 2), the highest initial activity was at Halley's Mt (locate on the east side of the island) is in January 2024 of 15 wasp collect in the trap however it dropped in Feb 2024. The traps in Sandy Bay district (Cabbage Tree Road, Wraghams, Perkins Gut, Sandy Bay Forest and Ridge) started to increase from Jan (4 wasp collected), Feb (40 wasp collected) and then no more wasps were collected until Aug 2024. The traps in the Blue Hill district (Cason, Blue Point, High Peak, Ginger Patch, Donkey Sanctuary, High Banks) started to increase from Dec 23 with the highest activity in January (7 wasp were collected), and then it started to decline. Based on the data collected, there was significant activity on the fringes in February, prompting the deployment of the toxin in March. Wasp activity then declined that month but increase again in April, necessitating a second round of toxin deployment in May. However, Graph 2 does show the dip in activity in March and June post the application of the toxin, but unfortunately wasps are a very mobile species and so either recolonisation occurred rapidly, or not all existing nests were killed by the first deployment.

Pictures 6. Wasp (beer) traps at Cason's and Halley's Mt

Pictures 7. Beer-based wasp traps placed at Ginger Patch, with a detailed look at a trap in Sandy Bay Forest



Graph 2. Shows the number of the common wasp capture using the wasp traps on the fringes of Peaks National Park

- **SHG wasp callouts**

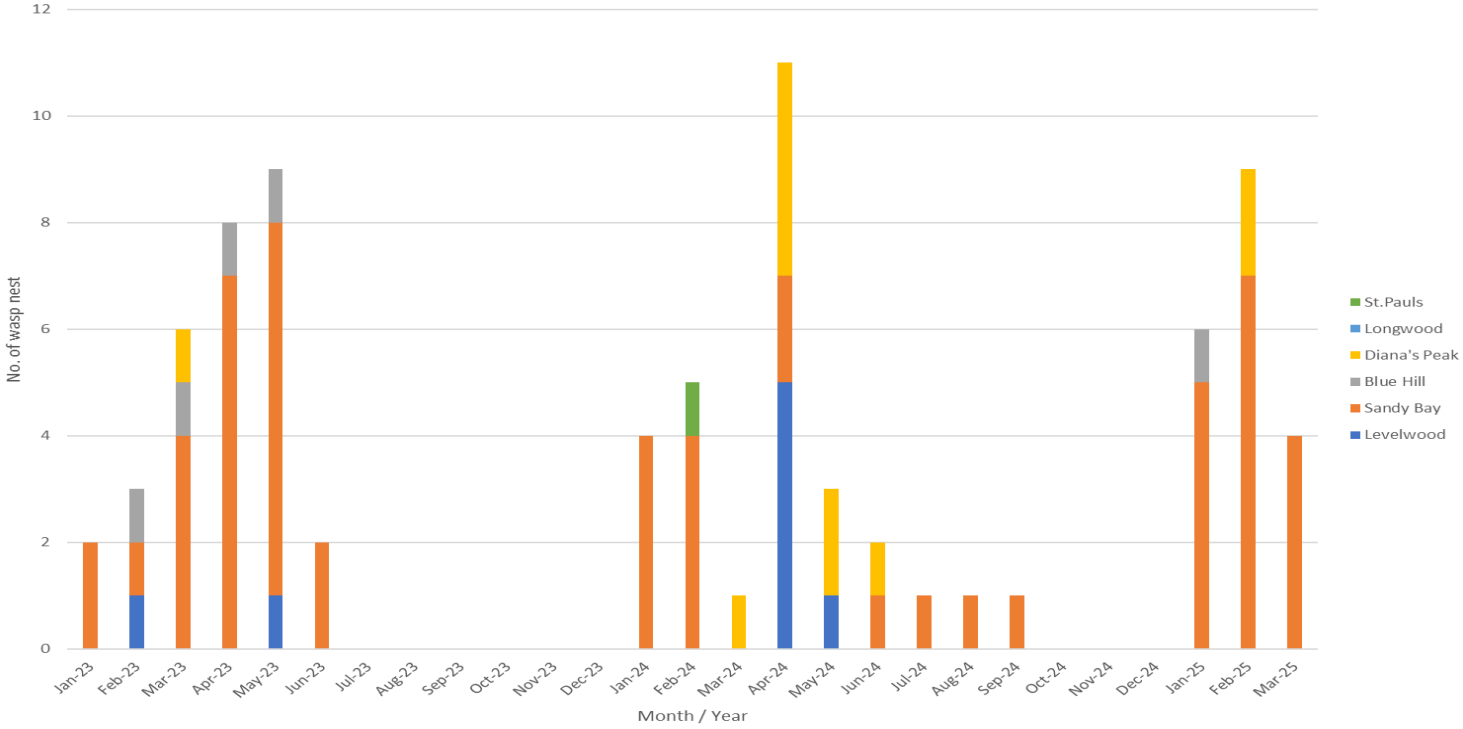
Environment & Natural Resources Directorate (ENRD) provide a wasp nest eradication service to the public where they remove wasp nest from farmlands and outside of people's homes. Graph 3 shows callouts in the fringes of the PNP and in January and February 2024 ENRD recorded a significant number of wasp callouts in the Sandy Bay area, suggesting that this period would be optimal time for deploying the toxin. In March 2024, a toxin was applied along the fringes of the Peaks National

Park (Cabbage Tree Road (below the Peaks) and Blue Hill) and in Sandy Bay. Resulting in a decline in the related call-outs. However, by April, reports started again. Observations conducted by ENRD staff indicated that the two wasps nest eradicated in Sandy Bay were newly established nest, which suggest that they have not fully integrated in the area. For this reason, an additional treatment was deployed on 6th May to ensure that newly established wasp nest on the PNP fringes were treated. From June to Sep 2024 the ENRD team only had 4 call outs which means the toxin had work however late established nest were unaffected.

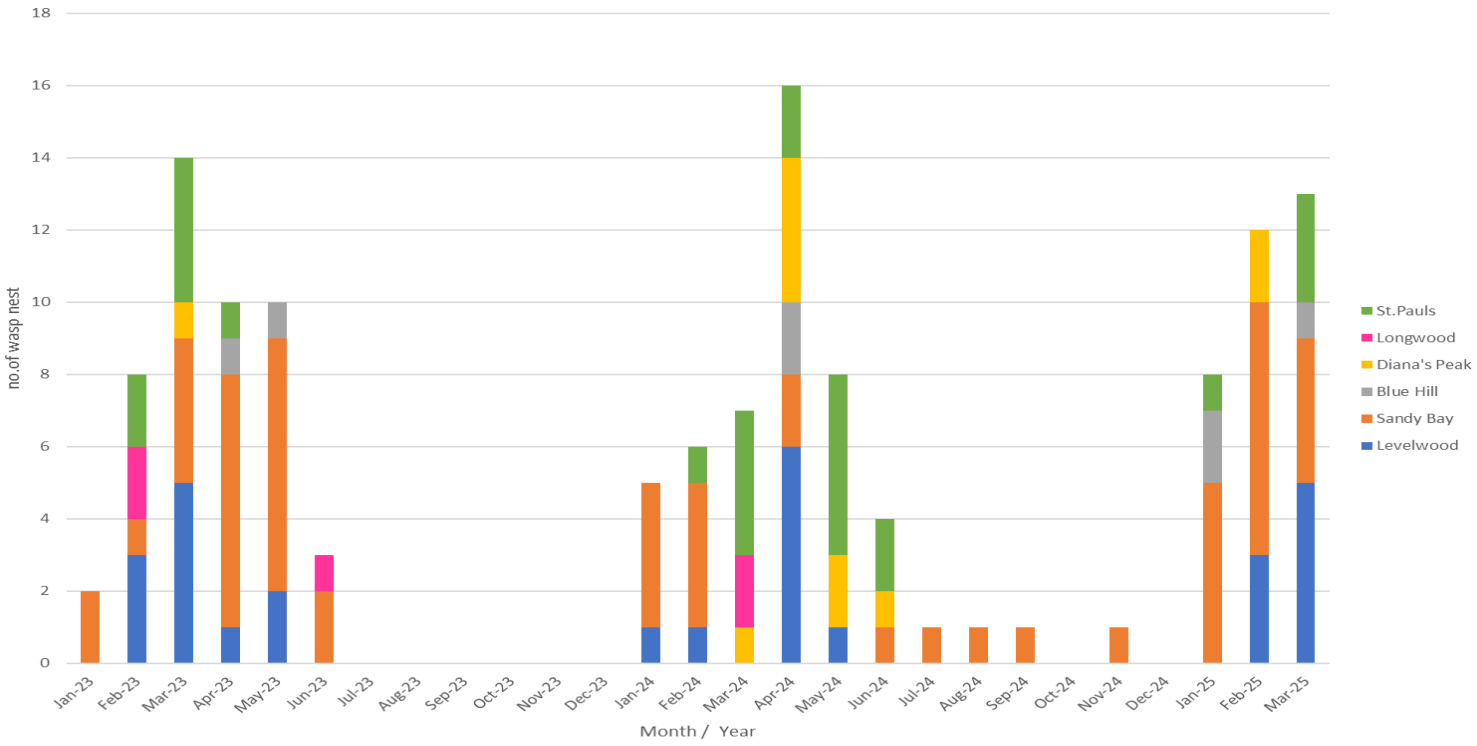
Between March 2024 and June 2024 there were at least 7 wasp nests eradicated in the Peaks. However, due to the restrictions in place on the Peaks, we were unable to pilot the control measure in the Cloud Forest.

Graph 3 shows the number of wasp callouts across the island. ENRD began receiving reports in January and the majority of callouts occurred between February and May, after which the calls began to decline. Majority of the calls are from Sandy Bay then Levelwood and St. Pauls, However, these are nests that have been reported for removal, meaning there is a possibility that additional, unreported nests exist in the area. Graph 3 quite clearly shows the dip wasp in callouts in March 24 post the first toxin deployment in the fringes of the PNP.

Graph 3. shows number of wasp call outs received by Environment & Natural Resources Directorate (ENRD) in / near to the Peaks National Park for January 2023 to March 2025 by District



Graph 4. shows number of wasp call outs received by Environment & Natural Resources Directorate (ENRD) from Jan 2023 to March 2025 across the Island by District



- **Visual observations and public feedback**

Visual observations and public feedback is a good tool to monitor the activity in the area and to determine if wasps are present in the area and if the toxin has any effect on the common wasp, because depending on the availability of the food in the environment, wasps sometimes do not approach the wasp traps or wasp activity tests – giving a limited picture of overall wasp activity. Therefore, using complementary observations is beneficial. For example, during the project high wasp presence was observed at Perkins Gut, this area is abundant in resources, attracting a significant number of wasps. They are frequently observed around the banana trees (Musa acuminata) and the flowers of the chow-chow vine (Sechium edule). At the Ginger Patch we have also observed a high number of wasps flying around the banana trees which suggests they are in the area. Therefore, these two areas were identified as areas for control. Also, at Ginger Patch some wasps were seen collecting chicken from the lures, with some flying north and others heading south. This pattern suggests the presence of two nearby nest in this area, and they were well established as the wasp were coming back and forth frequently. Therefore, this observation serves as a useful indicator for evaluating the effectiveness of the control, as a decline in wasp activity determined through observations would suggest the treatment has worked and also provide an insight into the nest's current stage.

Based on all the results of the above monitoring methods for the Common wasp, it was determined that March 2024 would be an optimal time to deploy the toxin. Although there was an initial decline in wasp numbers in April, subsequent observations and callouts indicated a resurgence, prompting another treatment in May.

5. Cloud Forest scoping phase

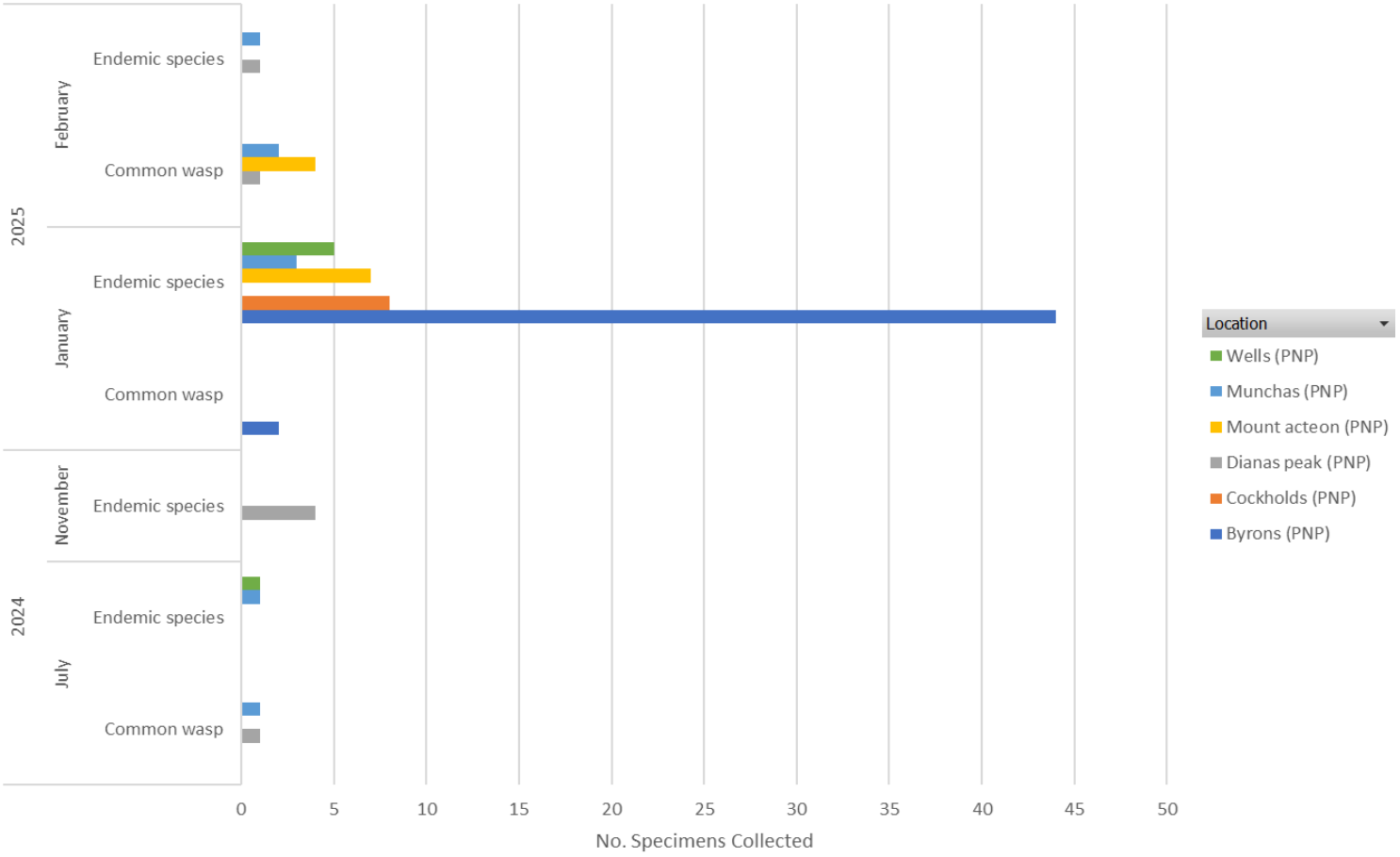
It is unclear if any endemic invertebrates from the Cloud Forest are attracted to the Trappit solution and the chicken lure, therefore we piloted these assessments to assess any impact they may have on the ecosystem. Tree disease management must also be considered in the Cloud Forest, for this reason we will place all traps on PVC pipes and wash traps, equipment thoroughly and reduce our foot fall as much as possible.

During Yr3 of the St Helena Cloud Forest Project we identified 8 locations (Cuckholds Point, Diana's Peak, Mt Acteon, Munchas, Taylors, Warrens, Gene bank and Byrons) where the wasp traps will be deployed to monitor the wasp presents in the Cloud Forest.

On 2nd May 2024, after deploying all wasp traps across the Peaks for one day, we collected one *Opogona* sp. and one *Drosophila immigrans* at the Gene Bank. Unfortunately, we were unable to ID the moth due to the scales being removed whiles in the trappit solution but many Opogona species are endemic. The initial duration was insufficient for the wasps to reach the traps, so we extended the trapping period to three days per month as carried out in the lower lands. From Graph 5 and Table 1. In July and November 2024, endemic bycatch was minimal, with species from the *Thysanoptera* group (thrips) largely collected from Cuckholds Point in July. It is unclear why a high number of thrips were collected as they are mostly plant feeders, however some species feeds on fungi and some are predatory on other invertebrates (Terrestrial & Freshwater Invertebrates of St Helena). Only 2 endemic bycatches in July and they were *Limnophora helenae* and *Tecution mellissi* and 4 endemic bycatches in November they are *Scaptomyza horaeoptera*. *L. helenae* is a common predatory species, while *T. mellissi* is a prowling spider and also predatory. The capture of these two species may have been accidental, as the Trappit solution is unlikely to attract them. *S. horaeoptera* is a leaf-miners or stem borers. There is limited knowledge on the thrips in St Helena and the majority remain unidentified. As a result, it is unclear whether the thrips found in the Trappit are plant or fungi feeders or if they were accidentally caught.

From the four times the trap was deployed only high number of endemic species found in January 2025 and this was the *S. horaeoptera*. This species is classified as vulnerable on the IUCN Red List, for this reason the monitoring assessment must be reviewed. With a high number of endemics in the cloud forest, there is likely to be some accidental by-catch and most caught were more common endemic species. See Appendix 1 to find out what species where capture in the wasp trap on the PNP fringes.

Pictures 8. The cage was deployed in the Peaks to monitor invertebrate attraction to the chicken, Wasp (beer) trap deployed at Diana's Peak.



Graph 5. Shows no. of endemic species and the Common Wasp specimens collected in the wasp traps in the Peaks

Locations in the Peaks	July 2024						November 2024				January 2025					February 2025					
	Common wasp	Endemic species	invasive	Non-endemic	unknown	Total	Endemic species	Non-endemic	unknown	Total	Common wasp	Endemic species	Non-endemic	unknown	Total	Common wasp	Endemic species	invasive	Non-endemic	unknown	Total
Byrons						0				0	2	44	1338	98	1482						0
Cuckholds Point				6	286	292			2	2		8	112	3	123			1	64	3	68
Dianas peak	1		2	4	11	18	4	2	1	7			58	209	267	1	1		106	5	113
Mount Acteon				2		2				0		7	229	21	257	4			134	46	184
Munchas	1	1		4	15	21				0		3	155	37	195	2	1	1	158	5	167
Picnic bench						0		1		1					0						0
Taylors						0			1	1					0						0
Wells		1		2		3		1	3	4		5	98	3	106						0
Total	**2**	**2**	**2**	**18**	**312**	**336**	**4**	**4**	**7**	**15**	**2**	**67**	**1990**	**371**	**2430**	**7**	**2**	**2**	**462**	**59**	**532**

Table 1. Bycatch from the wasp trap deployed in the Peaks over a three-day period.

6. Control results for fringes

The St Helena Trust and the ENRP staff have received good feedback from the public. Post the toxin deployment they noticed a decline in the wasps around their homes and have noticed more bees coming into their area. As a result, other residents outside the control area requested that the team set the toxin in their area. However, due to the limited traps and their area not being in the PNP fringe we were unable to cater their request.

Before the toxin was deployed the team had noticed there were 2 flight pathways from different wasp nests, which were feeding on the chicken lure during the wasp activity survey, but after the toxin was deployed the 2 flight paths had ceased. It is assumed this was due to the toxin killing the nest or migrating to another area; however, this is uncommon as the Common wasp nests are very resilient. Post treatment the team also noticed a decline in the wasp activity on the banana trees at Perkin's Gut, as well as the number of wasps feeding on the chicken lure. However, the team did notice that the wasp numbers started to rise again together with the St Helena Government callouts. For this reason, a 2nd deployment of toxin was carried out in May. From observation, St Helena Government callouts and looking at the wasp activity monitoring survey this has provided evidence that the wasp had been supressed in this area for 2024.

From the wasp traps, wasp activity, observation and feedback gathered, the control of Common wasp in the fringes of the Cloud Forest has shown positive results in the short term. However, due to the Common wasp being resilient and high mobility, they are able to repopulate areas very quickly and so the wasp will repopulate the control area in the following year. Suppressing the Common wasp in target areas would be very difficult as they would need to deploy the toxin every year and, in some areas, twice a year. This would need a long-term management plan, as this would require capacity and resource to support the control. A long-term solution would be to eradicate the Common wasp throughout the whole island rather than continual suppression. An island-wide eradication will take a lot of treatments to eradicate this species over at least 3 / 4 years to achieve a full eradication. In the meantime, ENRP will aim to continue implementing these controls in targeted areas like Sandy Bay to reduce the wasp activity and minimize the number of wasp callouts.

Overall, the wasp control in the cloud forest fringe area was affective at the beginning of the year with the wasp activity and callouts declining immediately after, and the results have been noticeable through survey observations, public feedback, ENRP wasp nest eradication callout. However, due to the mobility of this species recolonisation is rapid, meaning deployment need to occur, annual or biannually – ideally for the long-term an island-wide eradication should be considered.

7. Recommendations

Due to climate change and St Helena's sub-tropical temperature, the Common wasp population is expected to increase significantly, as these species thrive in warm and hot weather. Their growing numbers would negatively impact the native invertebrates, as they would increase their feeding on them. For this reason, it is recommended that an island-wide eradication program be developed and implemented with collaboration form partners on future project.

In the meantime, SHNT should continue to support ENRP in the ongoing wasp treatment, and look at treating new sites like Luffkins. Given that the wasps in this area prey on *Argyrodes mellissi*, Golden Sail Spider where they are found near to this area. Therefore, reducing the wasp population will also aid in the restoration of endemic species in and around this region.

This survey has increased our knowledge in using the control in the PNP fringes demonstrating the potential for safe deployment of targeted toxins in this region. Field observations indicated minimal impact on non-target invertebrate populations and a notable reduction in the Common wasp abundance was recorded. Building upon these results, further research is scheduled for 2025–2026 by the St Helena Trust, with funding support from the Foreign, Commonwealth and Development Office (FCDO). This next phase will focus on the enhancement of monitoring protocols and the refinement of control methodologies to mitigate unintended effects on endemic invertebrates within the Cloud Forest. This is necessary as a substantial number of *Scaptomyza horaeoptera* individuals recorded as bycatch in the wasp trap (Trappit).

8. Acknowledgements

This Cloud Forest Project '*Restoring St Helena's Internationally Important Cloud Forest for Wildlife, Water Security & People*' was funded by the UK Foreign, Commonwealth & Development Office (FCDO), and managed by the Royal Society for the Protection of Birds (RSPB), working in collaboration with local, and international partners. The local partners are the St Helena Government's (SHG) Environmental Management Division (EMD), Sustainable Development and Education departments and the St Helena Research Institute (SHRI), Connect St Helena and the Bottom Woods Met Office. The international partners are Arctium, the UK Centre for Ecology and Hydrology (CEH), the Royal Botanic Gardens Kew and Dr Quentin Cronk from the University of British Columbia (UBC).

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9. References

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Key R., Fowler Liza., Pryce D. (2021) Terrestrial & Freshwater Invertebrates of St Helena.

10. Appendix

Appendix 1. Wasp (beer) traps bycatch from Peaks National Park and the Fringes

Location	Common name	Scientific name	Status
Fringes	European honey bee	Apis mellifera	cultivated species
	Prowling spiders	Tecution planum	Endemic genus and species
	Fruit flies	Scaptomyza horaeoptera	Endemic species
	Moths	Opogona sp	Endemic species
	bonaparte wasp	Ichneumon helenanomalon bonapartei	Endemic subspecies
	Ichneumon wasps	Echthromorpha agrestoria	Endemic subspecies
	Australasian cockroach	Periplaneta australasiae	invasive
	Big headed ant	Pheidole megacephala	invasive
	False stable fly	Muscina stabulans	Invasive
	Fuller rose beetle	Naupactus cervinus	Invasive
	Ghost cockroach	Balta longicercata	invasive
	Med fly	Ceratitis capitata	Invasive
	Surinam cockroach	Pycnoscelus surinamensis	invasive
	Ants	Formicidae indet	invasive
	African cone-head bush-cricket	Ruspolia differens	Non-endemic
	Black scavenger midges	Coboldia fuscipes	Non-endemic
	blue lance fly	Lonchaea choreoides	Non-endemic
	Bluebottle	Calliphora croceipalpis	Non-endemic
	Copper-tailed blowfly	Chrysomya chloropyga	Non-endemic
	Emerald cockroach wasp	Ampulex Compressa	Non-endemic
	Flax Weevil	Sciobius tottus	Non-endemic
	Fruit flies	Drosophila punctatonervosa	Non-endemic
	Fruit flies	Zaprionus vittiger	Non-endemic
	Fruit flies	Drosophila immigrans	Non-endemic
	Fruit flies	Drosophila simulans	Non-endemic
	Fruit flies	Drosophila repleta	Non-endemic
	Fruit flies	Zaprionus spp	Non-endemic
	Fungus gnats	Leia arsona	Non-endemic
	Grass webworm moth	Herpetogramma licarsisalis	Non-endemic
	Green cluster fly	Dasyphora Cyanella	Non-endemic
	Green drab	Ophiusa tirhaca	Non-endemic

	Greenbottle fly	Lucilia sericata	Non-endemic
	Lance flies	Lonchaea choreoides	Non-endemic
	Snout & underwing moths	Ophiusa tirhaca	Non-endemic
	Wasps	Leptopilina heterotoma	Non-endemic
	Window gnat	Sylvicola cinctus	Non-endemic
	Yellow dung fly	Scathophaga soror	Non-endemic
	Beetles	Coleoptera Indet	unknown
	Bethylid wasps	Bethylidae sp	unknown
	Biting or no-see-um midges	Forcipomyia sp	unknown
	Biting or no-see-um midges	Ceratopogonidae sp	unknown
	Biting or no-see-um midges	Calliphoridae sp	unknown
	Blowflies, greenbottles & bluebottles	Calliphoridae sp	unknown
	blue lance fly	Lonchaeidae indet	unknown
	Centipedes, millipedes & their allies	Myriapoda indet	unknown
	drone fly	Syrphidae indet	unknown
	Flesh flies	Sarcophagidae	unknown
	Flies	Diptera indet	unknown
	Fruit flies	Zaprionus sp	unknown
	Fruit flies	Drosophila indet	unknown
	Fruit flies	Drosphila indet	unknown
	Fruit flies	Drosophila sp	unknown
	Grass & pearl moths	Helenoscoparia indet	unknown
	Grass & pearl moths	Crambidae sp	unknown
	hooded beetles/minute fungus beetles	Corylophidae sp	unknown
	Jumping Spider	Salticidae sp	unknown
	lacewing	Neuroptera indet	unknown
	land shrimp	Amphipoda indet	unknown
	Landhoppers & beach-hoppers	Talitridae	unknown
	Midges	Ceratopogonidae sp	unknown
	Moth Flies	Psychodidae sp	unknown
	Moths	Tineidae indet	unknown
	Noctuas or owlet moths	Noctuidae indet	unknown
	Non bitting midges	Chiromidae indet	unknown
	orange shrimp	Amphipoda indet	unknown
	parasitic wasp	Parasitica indet	unknown
	Parasitic wasps	Apocrita indet	unknown
	Peat flies or black fungus midges	Sciaridae	unknown
	Ribbon-worms	Nemertea indet	unknown
	rove beetle	Staphylinidae indet	unknown
	shrimp	Amphipoda indet	unknown
	Spiders	Aranae indet	unknown

	Springtail	Collembola indet	unknown
	True bug	Lygaeidae indet	unknown
	True weevils & dark beetles	Curculionidae indet	unknown
	Wasps	Figitidae indet	unknown
	Woodlice & slaters	Isopoda indet	unknown
	Yellow dung fly	Scathophagidae	unknown

Peaks National Park	European honey bee	Apis mellifera	cultivated species
	Prowling spiders	Tecution planum	Endemic genus and species
	Bristly flies	Limnophora helenae	Endemic species
	Prowling spiders	Tecution mellissi	Endemic species
	Fruit flies	Scaptomyza horaeoptera	Endemic species
	Big-headed ant	Pheidole megacephala	invasive
	Face fly	Musca autumnalis	Invasive
	Ants	Formicidae indet	invasive
	Fruit flies	Drosophila immigrans	Non-endemic
	Window gnat	Sylvicola cinctus	Non-endemic
	Picture-winged flies	Tephritidae sp	Non-endemic
	Fruit flies	Drosophila repleta	Non-endemic
	Fruit flies	Drosophila punctatonervosa	Non-endemic
	Fruit flies	Drosophila simulans	Non-endemic
	Fruit flies	Zaprionus vittiger	Non-endemic
	Yellow dung fly	Scathophaga soror	Non-endemic
	Green cluster fly	Dasyphora cyanella	Non-endemic
	African latrine blowfly	Chrysomya putoria	Non-endemic
	Copper-tailed blowfly	Chrysomya chloropyga	Non-endemic
	Common green bottle	Lucilia sericata	Non-endemic
	African blowfly or bluebottle	Calliphora croceipalpis	Non-endemic
	Fruit flies	Zaprionus spp	Non-endemic
	Moths	Lepidoptera indet	unknown
	Jumping Spider	Salticidae sp	unknown
	Woodlice & slaters	Isopoda indet	unknown
	Thrips	Thysanoptera indet	unknown
	Flower bugs	Anthocoridae sp	unknown
	Blowflies, greenbottles & bluebottles	Calliphoridae sp	unknown
	Blackflies	Simuliidae sp	unknown
	Rove beetles	Staphylindae spp	unknown
	Flies	diptera indet	unknown
	Doli fly	Dolichopodidae indet	unknown
	Fungus weevils	Anthribidae indet	unknown
	Biting or no-see-um midges	Ceratopogonidae sp	unknown
	Blowflies, greenbottles & bluebottles	Calliphoridae indet	unknown

	Flesh flies	Sarcophaga sp.	Unknown
		Parasitica indet	unknown
		Chironomidae indet	unknown
		Scathophaga sp	unknown
		Drosophila indet	unknown

Appendix 2. Invertebrates attracted to the chicken in the Peaks National Park and on the Fringes

Common name	Scientific name	Status
Robust Crazy Ant	Nylanderia bourbonica	Invasive
African blowfly or bluebottle	Calliphora croceipalpis	Non-endemic
Cabbage leaf-miner	Liriomyza brassicae	Invasive
Snail and Slug	Molluscs	unknown
Ants	Formicidae indet	Invasive