Prioritising the management of established invasive non-native species in Anguilla: eradication and spread prevention

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Executive summary

- Invasive non-native species threaten Anguilla's unique biodiversity, its economy and public health. Preventing new invasive non-native species (INNS) from establishing is a key priority that has previously been addressed by horizon scanning and pathway action plans. This report addresses potential priorities for species that are already established in Anguilla.

- Elicitation and consensus building techniques were used by experts from Anguilla alongside visiting experts to assess:
    a. The feasibility of eradicating established invasive species completely from Anguilla;
    b. The threat posed by established species to islands in Anguilla that they have not yet invaded.

- Nine established invasive non-native species were identified for which complete eradication was considered highly feasible. The highest feasibility of eradication was for Brazilian jasmine (*Jasminum fluminense*) a woody vine frequently planted within hotel landscapes that could be relatively easily eradicated from the limited populations in which it is currently found on Anguilla.

- Other species with high eradication feasibility included the vervet monkey (*Chlorocebus aethiops*), house sparrow (*Passer domesticus*) and diamond-back moth (*Plutella xylostella*) (among others). These are likely to spread rapidly in coming years and so rapid eradication action would likely prevent more serious and intractable problems developing in future.

- Further investigation into the eradication of these species is recommended, with a particular focus on confirming their distribution, which was uncertain in many cases.

- In terms of preventing spread to other islands within the territory, the number one threat was from green iguana (*Iguana iguana*) to Prickly Pear Cays, which was considered very likely to arrive and likely to establish in the next ten years. If it did, the impact on native species, including the endemic Lesser Antillean iguana (*Iguana delicatisima*), which was recently reintroduced from mainland Anguilla to Prickly Pear Cays for conservation purposes, could be catastrophic.

- Other threats were grouped into the top 25, 40 and 75 species by island combinations, with priorities including preventing rodents and some ant species spreading to Prickly Pear, Dog, Scrub and Sombrero Island, as well as false puncture-vine (*Tribulus cistoides*) which could dramatically alter habitats.

- Biosecurity enhancements, awareness raising, early detection and rapid response procedures are needed in order to reduce the risk from these threats. Prickly Pear and Dog Islands were highlighted as particularly important islands on which to focus these activities.

- This work provides an initial review of potential risks and management priorities for established INNS in Anguilla. Important areas for further investigation are highlighted, including the eradication of a limited short list of species and the need for biosecurity to better protect islands at threat from established INNS.

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1. Introduction

Invasive non-native species (INNS) are one of the main threats to biodiversity worldwide and a serious threat to people and livelihoods (IPBES 2019). They disproportionately affect small islands, which are exceptionally important biodiversity hotspots containing unique species found nowhere else in the world (Vitousek, 1988).

In Anguilla, invasive non-native species threaten endemic species and habitats. These endemic species and habitats are not only important in their own right, but provide key ecosystem services and a source of income with Anguilla's unique biodiversity encouraging tourism. INNS also cause direct impacts to people and livelihoods, for example by damaging crops (e.g. Giant African land snail), threatening human health (e.g. mosquitos) and becoming a serious nuisance (e.g. Cuban tree frog). Unfortunately, without decisive action these problems are only likely to get worse as established INNS continue to spread across and between islands, and new invasive species arrive.

With limited resources and numerous threats it is important to prioritise how best to allocate resources in order to limit the impacts of INNS. The UK Government has provided support for INNS prioritisation in all UK OTs, including Anguilla, through a biosecurity project funded by the Conflict, Security and Stability Fund. The main focus of this work has been to help identify and prevent the introduction of new INNS, through horizon scanning and pathway management (Key, 2018). However, it is also important to address INNS that are currently established on the islands.

This report details the results of an expert elicitation and consensus building exercise used to help experts in Anguilla review and identify potential management priorities for established INNS. The aim of this work was both to help identify a short list of potential management priorities as well as provide and document evidence that could be used to support a case for action.

1.1. Objectives

While there are many different potential management options for established INNS, this work focussed specifically on two strategically important objectives:

1. To assess the feasibility of eradicating established INNS entirely from the territory.

2. To rank established INNS based on the threat they pose to islands within Anguilla where they are not currently established.

1.2. Scope

Only established terrestrial INNS in Anguilla were considered, i.e. those with self-sustaining populations somewhere on the territory. Marine and freshwater species were not included at this stage.

2. Methods

An expert elicitation approach was used to (i) assess feasibility of eradication using the method of Booy *et al.* (2017) and (ii) rank species based on their threat to islands following methods adapted from Roy *et al.* (2014). Such expert elicitation and consensus approaches are an important tool used worldwide to support prioritisation of INNS and are increasingly being used in the field of conservation biology. Experts from Anguilla (Annex 1) and experts from the UK, mainland Europe and the USA (Annex 2) worked together using these methods to score species, following the steps briefly outlined below.

2.1. Initial list, screening and species data

A long list of all established (i.e. self-sustaining populations) non-native species in Anguilla (Churchyard *et al.*, 2014) was screened by Anguillan experts to produce a short list of invasive, or potentially invasive species, to carry forward for assessment. For each of these species data were compiled based on where they were established, the approximate number of separate populations and the approximate total area occupied by each species in Anguilla (see Annex 3 for further details).

2.2. Preliminary scoring

Using this short list, experts remotely (by email) provided preliminary scores for both feasibility of eradication (Box 1) and the risk posed by species spreading to new islands within the territory (Box 2). International experts provided the majority of the preliminary scores, with Anguillan experts providing scores for likelihood of arrival as part of the assessment of species threats to islands. Preliminary scores were produced as a starting point, but were expected to change considerably once more knowledge from Anguillan experts was taken into account. Confidence in all scores was recorded (Annex 5).

Box 1. Brief overview of scheme to assess eradication feasibility (full details Annex 3)

Step 1. For each species the situation was defined. This was the current extent of the species in the territory to the best knowledge of the experts involved. Confidence in the context was recorded (from low to high).

Step 2. An eradication strategy was then described with the aim of complete eradication of the species from the territory, based on the defined context. This could be a combination of methods, such as manual and herbicidal removal for a plant.

Step 3. The eradication strategy was then assessed using five key criteria scored on a scale of 1-5:

- *Effectiveness – would the strategy work if it could be used?*
- *Practicality – could you deploy the strategy?*
- *Cost – what is the direct cost of deploying eradication strategy?*
- *Impact – would the strategy cause adverse impacts on people, environment or economy?*
- *Acceptability – would the public or stakeholders accept the use of the strategy?*

Step 4. Two more key variables were assessed:

- *Window of opportunity – how quickly would the strategy need to be deployed?*
- *Likelihood of reinvasion – if complete eradication were successful, how likely is the species to re-invade?*

Step 5. Finally, an overall score for feasibility of eradication was provided, taking all other information into account.

2.3. Consensus workshop

The preliminary scores informed the consensus building within the workshops held over three days in Anguilla. During these workshops, visiting experts worked with Anguillan experts to review, refine, re-score and eventually agree the final scores for all species. In total, 22 Anguillan experts attended the workshop together with seven visiting experts (at least two in each taxonomic group) and three workshop facilitators (OB, HR, JK).

At the start of the workshops, the experts worked within three groups: vertebrates, invertebrates and plants. The aim of these break-out sessions was to review and update the preliminary list of species and provide initial data on establishment, number of populations and total area to ensure this reflected the best knowledge from the territory.

Breakout group modifying scores

Once the base-line information for the relevant invasive non-native species had been documented, both workshops followed a similar sequence, outlined below:

All participants discussing scores in plenary

1. Introductory presentations to provide a common understanding of the guidance and background on native and INNS in the territory.

2. Breakout sessions with all experts divided into taxonomic groups (terrestrial plants, terrestrial vertebrates and terrestrial invertebrates) to review, refine and re-score preliminary scores. This was particularly important as preliminary scores provided a starting point, but required considerable modification, particularly where basic data on number of populations, area and islands where established had been updated.

3. The final stage of the scoring process was to agree the refined scores by consensus with all participants. Collated scores were presented in plenary by two facilitators (OB and HR), with participants encouraged to discuss, challenge and finally agree the scores collaboratively.

The outcome of these workshops were two lists of INNS, the first grouped by feasibility of eradication and the second ranked by the risk species pose to specific islands belonging to Anguilla.

Box 2. Brief overview of scheme to rank species based on risk to islands (full details Annex 4)

Step 1. For each established invasive species in Anguilla, islands were listed that were believed to have not yet been invaded. This generated a list of invasive species that pose a threat to 'recipient' islands.

Step 2. Likelihood of arrival (A) on the recipient island was scored using a scale from very unlikely to very likely (1-5), taking into account potential pathways between islands within the territory.

Step 3. Likelihood of establishment (B) within 10 years was then assessed from very unlikely to very likely (1-5), assuming arrival and taking into account factors such as the ecological priorities of both the target species and the community being invaded.

Step 4. Finally the potential biodiversity impact (C) of the species was scored, assuming arrival and establishment. Only biodiversity impacts were scored, using a five point scale:

1. *Minimal*. None or negligible biodiversity impact.
2. *Minor*. Reductions in the performance of individuals in the native biota, but no declines in native population sizes
3. *Moderate*. Declines in the population size of at least one native taxon (not of particular conservation importance). Not extinction.
4. *Major*. Population extinction of at least one native taxon or population declines in a native taxon of particular conservation importance
5. *Massive*. Irreversible population or global extinction of at least one native taxon

The product of arrival, establishment and impact scores (A*B*C) was initially used to order species based on overall risk. The resulting position of species was then discussed and reviewed by the group, with species moved up or down in rank order by consensus. The final rank position of species / island combinations were agreed by the group, along with appropriate cut off points (such as top 10, top 20, etc).

3. Results

Of the identified 112 non-native species established in Anguilla, 40 were short-listed for assessment, divided between terrestrial plants (n=17), terrestrial vertebrates (n=12) and terrestrial invertebrates (n=11).

All of the short-listed species were considered to be established on the main island of Anguilla, with few also established on the offshore islands. This was partly because of previous eradication efforts, for example rats have been eradicated from Prickly Pear and Dog Island. The number of discrete populations and total area covered was estimated for each species (Table 1). Confidence was low or medium for more than half of these assessments, with confidence in the vertebrate assessments generally high, invertebrates mainly medium and plants a mix of low and high confidence (Table 2).

Table 1. Total number of populations and total area covered by the short-listed species, based on expert knowledge.

Number of populations	Total area					
	<1ha	1-10ha	10ha-1km^2	1-10km^2	10-100km^2	>100km^2
1-3	4	0	0	1	9	0
4-10	5	4	0	4	0	1
10-50	0	2	0	0	2	0
+50	0	0	0	1	7	0

Table 2. Confidence in context assessment

	Confidence		
Expert group	Low	Medium	High
Plants	6	2	8
Invertebrates	3	7	1
Vertebrates	2	3	8

3.1. Feasibility of eradication

The feasibility of eradicating all 40 species was assessed (Annex 6). The majority of species (65%) were rated as low (n=21) or very low feasibility (n=5) of eradication (Figure 1), reflecting the widespread nature of many species in the territory and the complexities of achieving complete eradication. However, 23% of species were considered high (n=8) or very high (n=1) feasibility of eradication (Table 3).

Brazilian jasmine (*Jasminum fluminense*) was ranked highest for feasibility of eradication. This is a woody vine used in landscaping in hotel gardens that could be relatively easily eradicated from the limited populations in which it is thought to be present (Box 3). The remaining eight species rated as high feasibility of eradication included two plants (Madagascar Rubbervine *Cryptostegia madagascariensis* and False Puncture Vine *Tribulus cistoides*), four invertebrates (Little Fire Ant *Wasmannia auropunctata*, Diamond-Back Moth *Plutella xylostella,* Lime Swallowtail *Papilio demoleus,* and Citrus Psylid *Diaphorina citri*) and two vertebrates (House Sparrow *Passer domesticus* and Vervet Monkey *Chlorocebus aethiops*) (see Boxes 4-7 for case studies of example species).

The window of opportunity for most of these species was relatively short (2 months to 1 year for one species, 1-3 years for six species, and 4-10 years for the Brazilian jasmine), suggesting rapid action would be needed to prevent these species spreading and becoming intractable problems. Likelihood of reinvasion post-eradication was also flagged as an issue for many species, which would have to be taken into consideration and included as part of any eradication plan. The scores for feasibility of eradication were based on the current known situation for each species; however, in many cases there were considerable uncertainties around this and so species distributions would need to be confirmed as part of any follow up action.

Four species were highlighted for which complete eradication from the territory was unlikely to be feasible, but eradication from some islands could be a potential priority (brown rat *Rattus norvegicus*, black rat *Rattus rattus,* house mouse *Mus musculus*, and feral goat *Capra hircus*). Six species were highlighted for which other forms of long term management, such as population control, may be a potential priority (feral dog *Canis lupus*, feral cat *Felis catus*, coral vine *Antigonon leptopus*, Cuban tree frog *Osteopilus septentrionalis*, green iguana *Iguana iguana*, and the giant African land snail *Lissachatina fulica*).

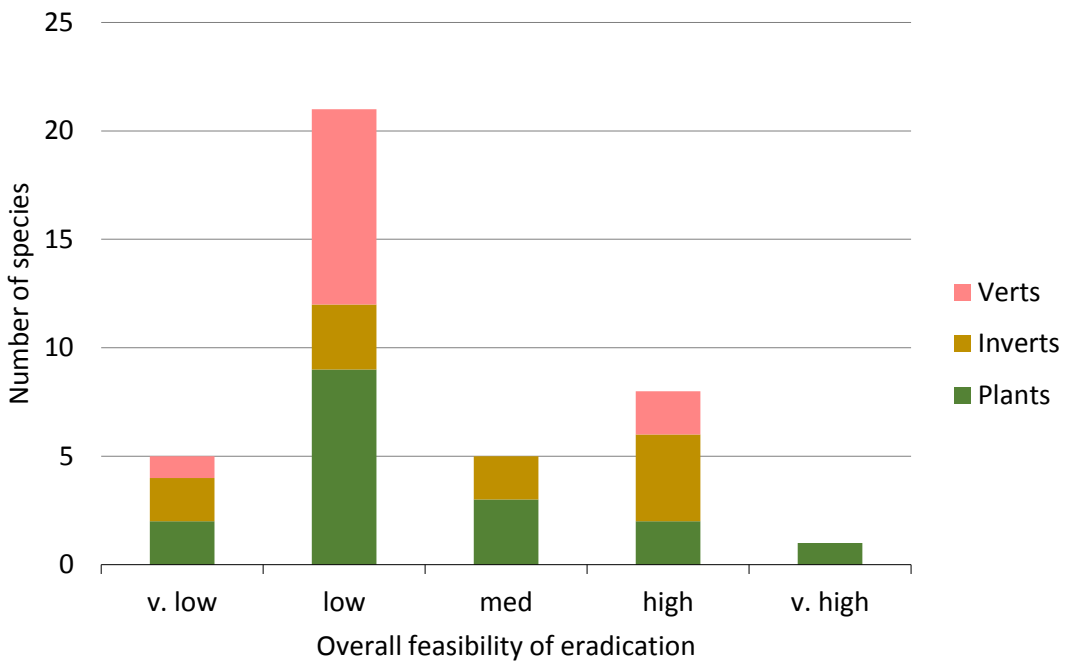


Figure 1. The number of species in each of the five overall categories of eradication feasibility.

Table 3. Summary table for the nine established invasive non-native species in Anguilla that received 'high' and 'very high' scores for eradication (for all species refer to Annex 6). Summary information is presented for the situation, eradication strategy and seven assessment criteria, as well as the overall score and overall confidence. Expert group, V(ertebrate), I(nvertebrate) and P(lant), is indicated by column G. For full details, including all comments and confidence scores refer to the accompanying spreadsheet (file TBC).

G	Scientific name	English name	Situation	Eradication strategy	Effect.	Pract.	Cost	Impact	Accept.	Window	Reinv.	Overall	Conf.
P	*Jasminum fluminense*	Brazilian Jasmine	1 island 5-10 popns <1 ha	Manual and herbicidal treatment	high	high	<$50k	minor	high	4-10 yrs	med	v. high	med
I	*Wasmannia auropunctata*	Little Fire Ant	1 island 1-3 popns <1ha	Chemical control	high	med	<$50k	minimal	v. high	1 – 3 yrs	med	high	med
I	*Plutella xylostella*	Diamond-Back Moth	1 island 5-10 popns 1-10km^2	Chemical control	v. high	v. high	$50-200k	minimal	v. high	2 mo - 1 yr	med	high	med
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	1 island 10-50 popns 1-10ha	Manual and herbicidal treatment	high	high	$200k-1M	minimal	high	1 – 3 yrs	med	high	med
P	*Tribulus cistoides*	False Puncture Vine	1 island 1-3 popns <1ha	Manual removal	med	high	$50-200k	minor	high	1 – 3 yrs	high	high	med
V	*Passer domesticus*	House Sparrow	1 island 1-3 popns <1ha	Trapping and netting	high	high	<$50k	minor	med	2 mo - 1 yr	high	high	med
I	*Papilio demoleus*	Lime Swallowtail	1 island 5-10 popns 1-10km^2	Chemical control	v. high	high	<$50k	minimal	med	1 – 3 yrs	med	high	med
I	*Diaphorina citri*	Citrus Psylid	1 island 5-10 popns 1-10km^2	Chemical control	v. high	high	$50-200k	minimal	high	1 – 3 yrs	med	high	low
V	*Chlorocebus aethiops*	Vervet Monkey	1 island 1-3 popns 1-10km^2	Trapping, shooting	high	high	$200k-1M	minor	v. low	1 – 3 yrs	low	high	high

Box 3. Brazilian jasmine (*Jasminum fluminense*)

Overall feasibility of eradication = very high (medium confidence)

A woody vine, used for horticulture, most likely imported for planting around hotels. Known to be highly invasive in the tropics and can smother native vegetation, modifying ecosystems and reducing plant diveristy.

Situation: Currently thought to occur only in a small number of populations (5-10) and small total area (<1ha) on the main island of Anguilla, probably associated with hotels. However, the exact distribution of the species is not known and there is low confidence in the situation assessment for this species.

Eradication strategy: Seedlings and small plants can be removed by hand, while larger plants can be cut at ground level and stump treated. Follow up treatments and repeated applications will likely be necessary. Given the assumed restricted distribution of this species, hotels would need to agree to remove the plant as well as any plants being removed from the wild.

Feasibility assessment (confidence in brackets):

- Effectiveness = high (medium)
- Practicality = high (medium)
- Cost = <$50,000 (medium)
- Impact = minor (high)
- Acceptability = high (medium)
- Window of opportunity = 4 to 10 years (medium)
- Likelihood of re-invasion = medium (medium)

Remarks: Eradication is thought to be very feasible, given the current situation and relative ease and effectivenss of methods. However, confidence in the situation assessment is low and so the species distribution should be confirmed. There is a substantial risk of reinvasion post eradication and so regulation may be required to prevent further import / use of this plant.

Box 4. Little Fire Ant (*v*)

Overall feasibility of eradication = high (medium confidence)

A small ant, golden brown in colour, that is highly invasive worldwide, particulatly on pacific islands. It forms 'super colonies' and has been responsible for reducing species diversity in many places where it is invasive, including impacts on vertebrates (e.g. turles and breeding birds) and invertebrates (e.g. tree dwelling insects and arachnids). It also causes a painful sting and could become a substantial nuisance for people and tourism.

Situation: In 2006, J.K. Wetterer, MCZ reported only one region in Anguilla where a dense population of this species was found, in the closed canopy forest of Katouche Valley. Known to be established in St. Martin.

Eradication strategy: Ants, including this species, have been eradicated in similar situations (e.g. Santa Fe and Marchema, see the CABI Invasive Species Compendium for more detail). Formicidal chemicals can be used, but potential non-target impacts would need to be assessed.

Feasibility assessment (confidence in brackets):

- Effectiveness = high (medium)
- Practicality = medium (low)
- Cost = <$50,000 (medium)
- Impact = minimal (medium)
- Acceptability = very high (medium)
- Window of opportunity = 1 to 3 years (low)
- Likelihood of re-invasion = medium (low)

Remarks: This species currently appears to be isolated to a relatively small part of Anguilla and immediate eradication could prevent substantial problems in the future for both biodiversity and tourism. Ants can be difficult to detect and identify and so surveillance would be necessary to ensure they are not already more widely established than currently suspected. Eradication should be highly feasible; however, given the suspected location of this species in the Katouche Valley, access to the land may be difficult (hence only medium score for practicality). As this species is known to be established in St. Martin there would be a likely risk of reinvasion post eradication, for which biosecurity would need to be implemented.

Image: Michael Branstetter / © AntWeb.org / CC-BY-SA-3.0

Box 5. Vervet Monkey (C*hlorocebus aethiops*)

Overall feasibility of eradication = high (high confidence)

Vervet monkeys are recently established in Anguilla, probably as a result of escaped or released pets. If left unmanaged, populations are likely to expand rapidly and cause human-wildlife conflict, including damage to crops, nuisance and human health issues.

Situation: Opinions differed on where and how many monkeys were established in Anguilla; however, the number of populations is likely to be small (1-3) dispersed across a relatively large area (1-10km^2), possibly including between 50-150 individuals.

Eradication strategy: Combined methods include live trapping, lethal and non-lethal control. There is scope to learn from St Kitts given their experience with this species.

Feasibility assessment (confidence was not assessed in this case):

- Effectiveness = high
- Practicality = high
- Cost = $200,000 to $1million
- Impact = minor
- Acceptability = very low
- Window of opportunity = 1 to 3 years
- Likelihood of re-invasion = low

Remarks: Given the early stage of establishment and presumed low numbers, there is an opportunity to remove this species from Anguilla now, before it becomes a much more substantial and difficult to manage problem. Actions to take at this stage include developing a more accurate picture of where this species is distributed and in what numbers, as well as a more detailed feasibility assessment into the range of potential management options. Welfare concerns would clearly need to be considered as part of any management strategy (hence very low acceptability score).

Image: Paul Bolstad, University of Minnesota, Bugwood.org

Box 6. House Sparrow (*Passer domesticus*)

Overall feasibility of eradication = high (medium confidence)

If this species were to become widely established on the islands it could be a significant nuisance to people and farmers as well as a potential biodiversity threat to native species.

Situation: Experts estimated that populations are few (1-3) over a small area (<1ha); however, this species was not well known and distribution needs further investigation.

Eradication strategy: Small populations can be removed by trapping and mist netting, for which there is extensive experience.

Feasibility assessment (confidence in brackets):

- Effectiveness = high (medium)
- Practicality = high (medium)
- Cost = <$50,000 (medium)
- Impact = minor (medium)
- Acceptability = medium (medium)
- Window of opportunity = 2 months to 1 year (high)
- Likelihood of re-invasion = high (medium)

Remarks: This species presented an interesting case for Anguilla, where relatively little was known about its distribution, despite being a common invader elsewhere in the world. If the situation described is correct, eradication would be relatively straightforward for this species, but would need to be delivered quickly in order to prevent the population expanding and having negative impacts. However, further work on the distribution of this species in Anguilla would be essential before considering management.

Image: Adamo, CCA 2.0

Box 7. Diamondback Moth (*Plutella xylostella*)

Overall feasibility of eradication = high (confidence)

A major agricultural pest around the world, primarily of cruciferous vegetables (e.g. cabbages, broccoli and cauliflowers) and oilseed crops (e.g. canola and mustard).

Situation: Thought to be localised, with few populations (5-10) over an area 1-10km^2.

Eradication strategy: Management of this species has been extensively studied worldwide. An integrated pest management (IPM) approach combining chemical control with follow up using pheromone traps to monitor is likely to provide the best chance of eradication. It may also be possible to consider a voluntary moratorium on planting crucifers.

Feasibility assessment (confidence in brackets):

- Effectiveness = very high (high)
- Practicality = very high (medium)
- Cost = $50,000 - $200,000 (high)
- Impact = minimal (high)
- Acceptability = very high (high)
- Window of opportunity = 2 months to 1 year (medium)
- Likelihood of re-invasion = medium (medium)

Remarks: A well-known and widely managed agricultural pest, for which eradication is likely to be feasible given low level of establishment; however, action would be needed quickly to prevent further spread (reflected in short window of opportunity). Reinvasion could occur, most likely as a result of contaminated produce, and would need to be controlled.

3.2. Risk of spread to new islands

To facilitate assessment some of Anguilla's islands were grouped, based on proximity and bio/geophysical similarity. Prickly Pear East and West were grouped with Seal / Sail Island (referred to as Prickly Pear +), the small islands around Dog Island were included with Dog Island; however, Little Scrub Island and Scrub Island were assessed separately.

In total, 308 different species / island threats were assessed and eventually ranked by consensus into the top 1, 25, 40 and 75 threats (Annex 7). All other combinations were generally considered low risk. Vertebrates were prominent within the higher ranking threats, although a number of invertebrates and some plants were still considered a high risk (Table 4). Plants species were more prominent in the top 75 threats. Summary information is provided for the top 25 threats (Table 5).

Table 4. Proportion of plants, invertebrate and vertebrates in each of the top 1, 25, 40 and 75 ranked threats to islands. Beyond the 75th position of species / island combinations were considered low risk.

	Plants	Invertebrates	Vertebrates
Top 1	0	0	1
Top 25	3	7	14
Top 40	5	3	7
Top 75	21	8	6
Low	99	70	64

The top threat identified was from green iguana spreading to Prickly Pear + (Box 8). Within the next 25 threats, rodents (black rat, brown rat and house mouse) stood out as a particular threat to Prickly Pear+, Dog, Little Scrub and Sombrero Islands (Box 9); as did a number of ant species that threaten Prickly Pear+ and Dog Island (longhorn crazy ant, little fire ant, red imported fire ant, longhorn crazy ant, big-headed ant) (Box 10). The main plant threat within the top 25 was from false puncture vine to Prickly Pear+, Dog Island and Scrub Island. Feral cat was also considered a particular risk to Prickly Pear+ and Dog Island.

In terms of islands, Prickly Pear + and Dog Island were considered particularly at risk from spreading invasive species (Figure 2), partly because of the conservation importance of these islands, but also because arrival was more likely for many species (Boxes 11-12). Little Scrub, Scrub and Sombrero also stood out as important islands to protect (see Boxes 13-14 for case studies on Scrub and Sombrero Islands). Relatively few species were considered likely to threaten Anguillita, Scilly Cay or Sandy Island; this was generally because establishment on these islands was likely to be low and impacts relatively small.

Table 5. Top 25 established invasive species in Anguilla that pose a biodiversity threat to islands where they are not currently established. Arrival (A) and establishment (B) scored very unlikely to very likely (1-5); biodiversity impact (C) scored from minimal to massive (1-5); with associated confidence scores.

G	Scientific name	English name	Island	Arr. (A)	Conf.	Est. (B)	Conf.	Imp. (C)	Conf.	A*B*C	Rank
V	*Iguana iguana*	Green Iguana	Prickly Pear+	5	High	5	high	5	high	125	Top 1
V	*Rattus rattus*	Black Rat	Dog	5	High	5	high	5	high	125	Top 25
V	*Mus musculus*	House Mouse	Dog	5	High	5	high	5	high	125	Top 25
V	*Rattus norvegicus*	Brown Rat	Dog	5	High	5	med	5	med	125	Top 25
V	*Mus musculus*	House Mouse	Little Scrub	4	High	5	high	5	high	100	Top 25
V	*Rattus rattus*	Black Rat	Little Scrub	4	High	5	high	5	high	100	Top 25
V	*Rattus norvegicus*	Brown Rat	Little Scrub	4	High	5	med	5	med	100	Top 25
V	*Mus musculus*	House Mouse	Scrub	5	High	5	high	4	high	100	Top 25
P	*Tribulus cistoides*	False Puncture Vine	Dog	5	High	5	high	4	high	100	Top 25
P	*Tribulus cistoides*	False Puncture Vine	Prickly Pear+	5	High	5	high	4	high	100	Top 25
P	*Tribulus cistoides*	False Puncture Vine	Scrub	5	High	5	high	4	high	100	Top 25
V	*Rattus norvegicus*	Brown Rat	Prickly Pear+	4	High	4	med	5	med	80	Top 25
V	*Rattus rattus*	Black Rat	Prickly Pear+	4	High	4	med	5	med	80	Top 25
I	*Solenopsis invicta*	Red Imported Fire Ant	Prickly Pear+	5	High	4	med	4	med	80	Top 25
I	*Pheidole megacephala*	Big-Headed Ant	Prickly Pear+	5	High	4	med	4	med	80	Top 25
V	*Rattus rattus*	Black Rat	Sombrero	3	High	5	high	5	high	75	Top 25
V	*Mus musculus*	House Mouse	Sombrero	3	High	5	high	5	high	75	Top 25
V	*Rattus norvegicus*	Brown Rat	Sombrero	3	High	5	med	5	low	75	Top 25
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Prickly Pear+	4	High	4	med	5	med	80	Top 25
I	*Wasmannia auropunctata*	Little Fire Ant	Dog	3	Low	4	high	5	med	60	Top 25
I	*Solenopsis invicta*	Red Imported Fire Ant	Dog	3	Low	4	med	5	med	60	Top 25
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Dog	3	Low	4	med	5	med	60	Top 25
I	*Pheidole megacephala*	Big-Headed Ant	Dog	3	Low	4	med	5	med	60	Top 25
V	*Felis catus*	Feral Cat	Dog	4	High	3	high	5	high	60	Top 25
V	*Felis catus*	Feral Cat	Prickly Pear+	4	High	3	med	4	high	48	Top 25

Box 8. Green Iguana (*Iguana iguana*) threat to Prickly Pear+

The green iguana first established in Anguilla in the 1990s and is now widespread on the main island, although populations have not yet reached the density of neighbouring islands such as St. Martin/St. Maarten. It is not yet present on any of Anguilla's smaller islands.

It poses a threat to the existence of the critically endangered Lesser Antillean iguana (*Iguana delicatissima*) which is endemic to Anguilla and a small number of other islands in this region.

In an effort to protect the native iguana a translocation project has been underway to move native iguanas from the main island to Prickly Pear Cays (led by the Anguillan National Trust, with support from other partners and BEST funding). It is therefore essential to prevent green iguanas from establishing on these islands.

Threat assessment (confidence in brackets):

- Arrival = very likely (high)
- Establishment = likely (high)
- Biodiversity impact = massive (high)

The main pathways by which green iguana is likely to arrive on Prickly Pear Cays over the next 10 years is by hitchhiking on floating logs and possibly by swimming, although it may also hitchhike on vessels, so contingency plans supported by early detection is needed.

Image: https://www.pets4homes.co.uk/

Box 9. Rodents to Prickly Pear+, Dog Island, Little Scrub and Sombrero Island

Brown rats, black rats and house mouse are well established across Anguilla. They are primarily established on the main island, having been eradicated from Dog Island in 2014 and Prickly Pear Cays in 2018.

They pose a substantial threat to the smaller islands of Anguilla, where they would prey on breeding bird chicks and eggs, disrupt food webs and potentially affect endemic reptiles. They could also act as vectors of disease. The substantial potential impacts of these species and the likelihood of them arriving on a range of islands is reflected in the fact that they occupy 12 of the top 25 threats to islands in Anguilla.

Threat assessment (confidence in brackets):

- Arrival = moderately to very likely (high)
- Establishment = very likely (medium to high)
- Biodiversity impact = major to massive (medium to high)

The most likely pathway by which these species could arrive on the islands of Anguilla is among equipment and bags of visitors to the islands, as well as hitchhiking on their vessels. It is also possible that rodents could hitchhike on wrack or floating logs to a number of islands, including Little Scrub, Prickly Pear+ and Dog Island, in which case contingency plans supported by early detection is likely to be needed.

Image: AnemoneProjectors, CCA 2.0

Box 10. Ants to Prickly Pear+ and Dog Island

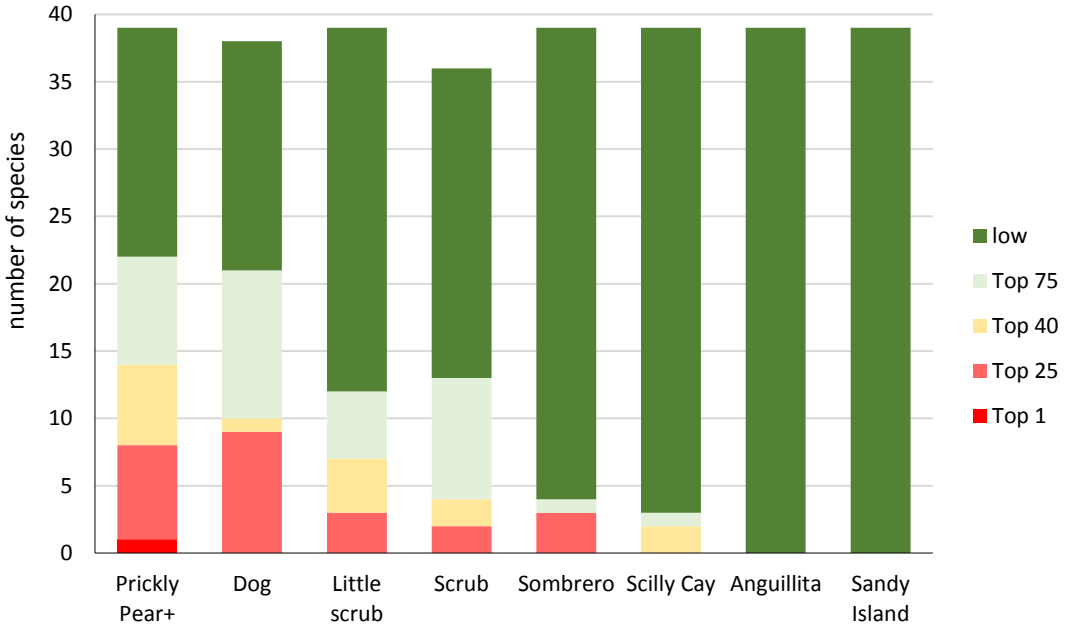
Invasive ants can cause massive declines in species diversity as well as becoming a nuisance for people. In Anguilla, ant species pose a particular threat of spreading from the main island to Prickly Pear+ and Dog Island, where they could cause serious impacts on the breeding birds, endemic lizards and breeding turtles found there.

Threat assessment (confidence in brackets):

- Arrival = moderate to very likely (low to high)
- Establishment = likely (medium to high)
- Biodiversity impact = likely to very likely (medium)

Important pathways of spread from the main island to Prickly Pear+ and Dog Island include as hitchhikers in the backpacks of visitors, with general supplies taken over to service the restaurants, and in camping equipment and provisions by researchers and campers.

a. Heat map of islands at most threat from invasive species established elsewhere in Anguilla, red = most and green = least at threat (note island size and position is illustrative and not-to-scale).



b. Number of species in each rank (top 1, 25, etc.) threatening different islands. The ranks represent species x island combinations.

Figure 2. Threat posed to the islands of Anguilla by the spread of invasive non-native species established elsewhere in the territory. Threat is represented as **(a)** heat map for each island, with overall risk scores (A*B*C) used to determine the colour of each island; and, **(b)** the number of species in each rank that could spread and pose a threat to the islands.

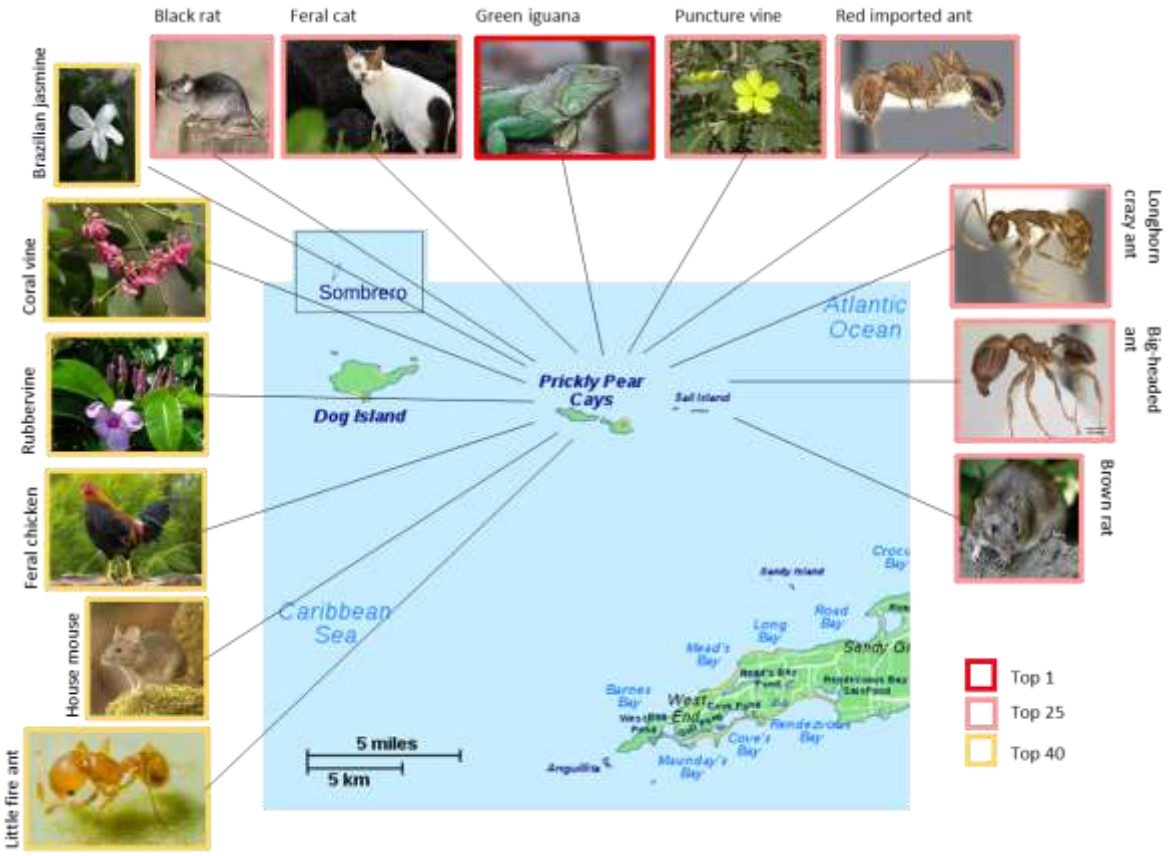
Box 11. Threat of species spreading to Prickly Pear Cays and Seal / Sail Island

These islands are at particular threat from the spread of invasive species. Many species are very likely to arrive on the islands due partly to their proximity (9.7km from the main island), but also because they are regularly visited by people (several hundred per day, including visitors direct from St. Martin). Boat landing is mostly on Prickly Pear East (West is less accessible). There are also two restaurants / cafés on the islands, which import fresh produce as well as other goods to service the visitors.

If invasive species do arrive, many of them are likely to establish and cause serious biodiversity impacts. Conservation concern is high on the islands, particularly for breeding birds, endemic lizards and the Lesser Antillean iguana and there has been considerable conservation effort already to protect them, including eradicating rats and translocating the endemic Lesser Antillean iguana (*Iguana delicatisima*) from mainland Anguilla to Prickly Pear Cays for conservation purposes. There is also an important native tree, *Lignum vitae*.

The main pathways of likely introduction to these islands include:

- **Hitchhiking on drift wood**, wrack, etc.
- **Tourist** visits, including boats, contaminant footwear, etc.
- **Café / restaurant**, goods brought in could introduce species (e.g. rodents, ants), the owners may also have an interest in keeping some animals (e.g. cats).
- **Researchers and other practitioners**, contaminants could accidentally be brought in with those studying / working on the islands (e.g. on footwear, equipment, vessels, etc).
- **Natural dispersal**, there is potential for the green iguana to swim to these islands.

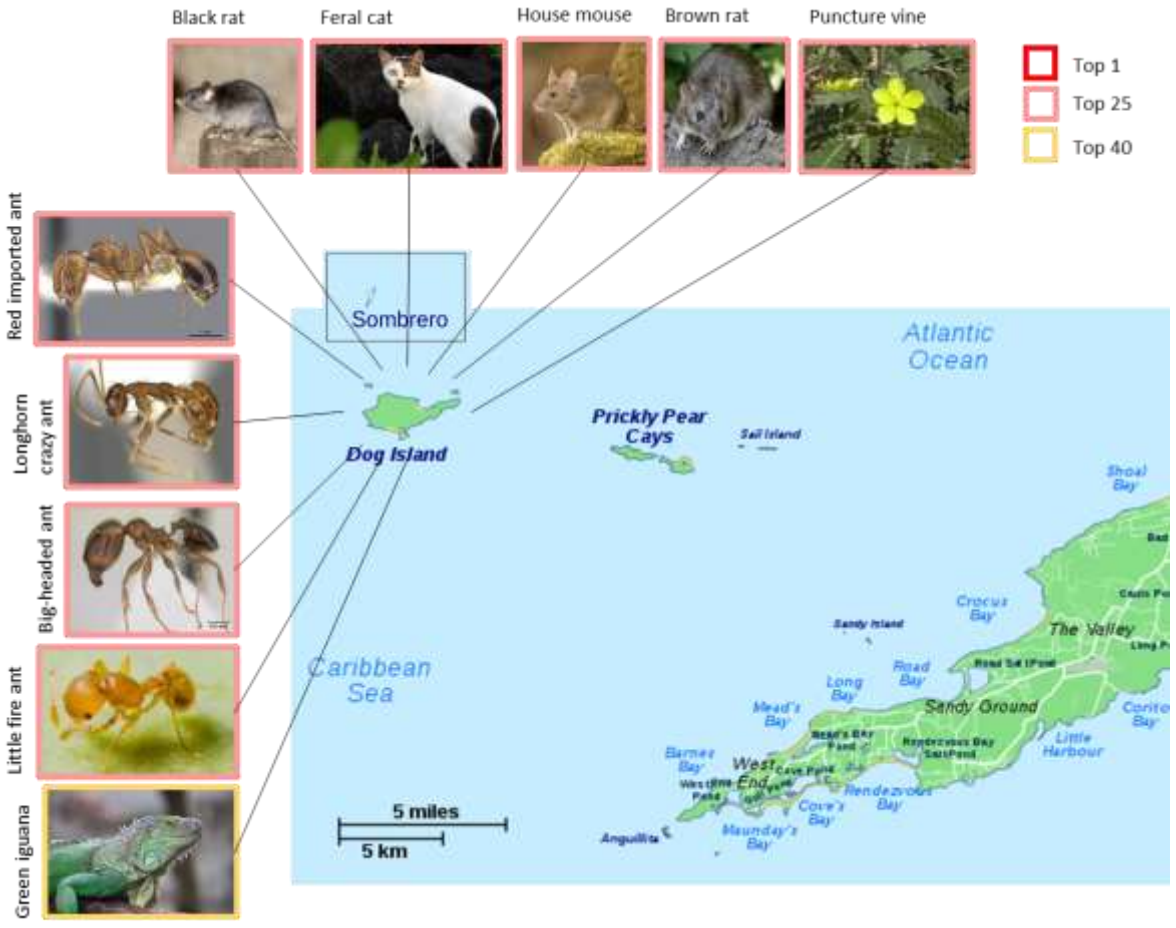


Box 12. Threat of species spreading to Dog Island

Threats to Dog Island are similar to those that threaten Prickly Pear+; however, the likelihood of some species arriving in Dog Island was considered less likely because it is more distant from the main island, it is visited less frequently and there are no restaurants. Prickly Pear Cays could act as a stepping stone to Dog Island and so biosecurity in Prickly Pear+ could also benefit Dog Island.

The main pathways of likely introduction to these islands include:

- **Hitchhiking on drift wood**, wrack, etc.
- **Natural dispersal**, there is potential for the green iguana to swim directly to this island.
- **Boats**, stowaways in visiting vessels.
- **Visitors**, hitchhikers in visitor's bags, equipment, picnics.



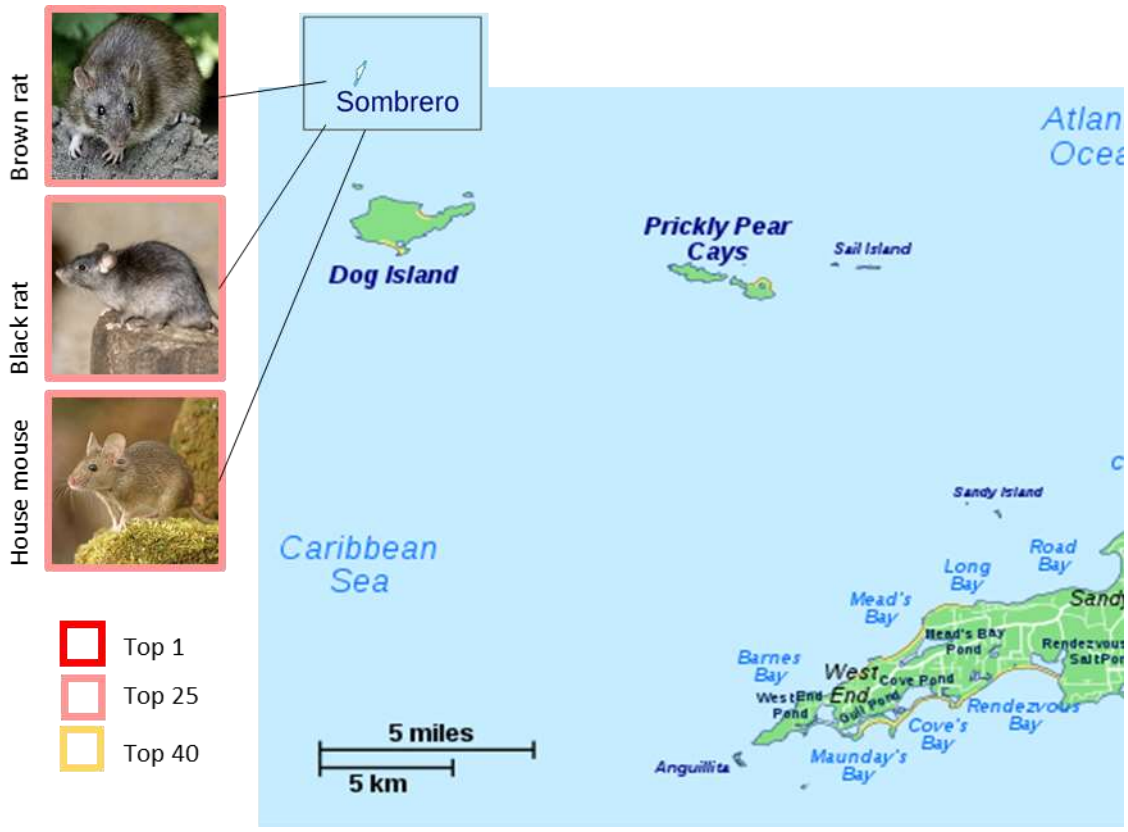
Box 13. Threat of species spreading to Sombrero Island

The risk of species spreading to Sombrero Island is relatively low compared to Prickly Pear+ and Dog Island, despite the important breeding bird status of the island as well as the endemic lizards found there. This is mainly because of the considerable distance to Sombrero Island (55km from Anguilla main island), which makes it less likely that spreading species would be able to arrive. The environmental conditions on Sombrero also make establishment unlikely for many species.

Despite this, there are still species that pose a serious threat for which biosecurity should be considered. Rodents pose a particular threat, because of the possibility that they may hitchhike on vessels visiting or equipment taken to the island, could survive on the island despite the relatively harsh conditions and would most like have devastating impacts on the breeding birds.

The main pathways of likely introduction to these islands include:

- **Hitchhiking on drift wood**, wrack, etc.
- **Boats**, stowaways in visiting vessels.
- **Visitors**, hitchhikers in visitor's bags and equipment.



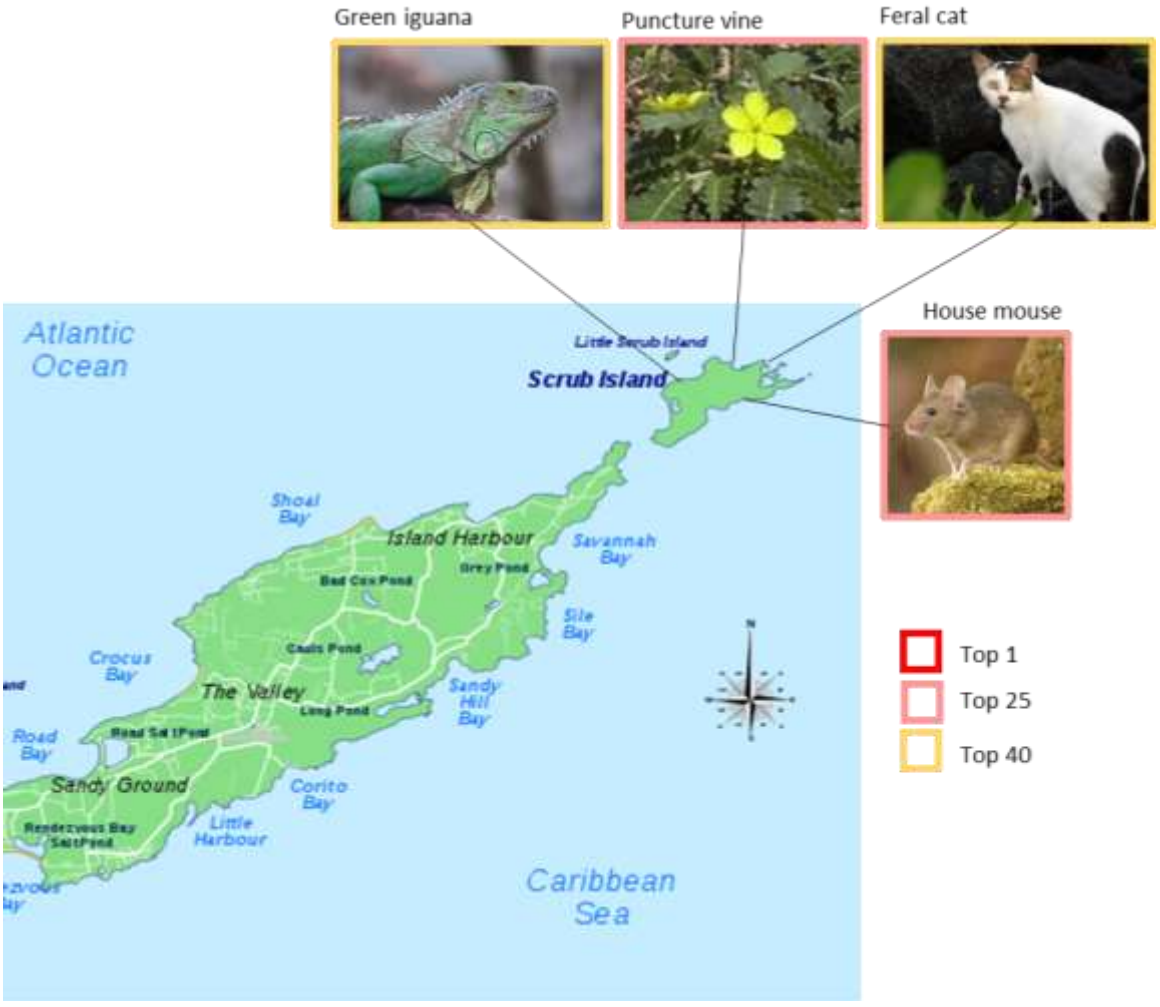
Box 14. Threat of species spreading to Scrub Island

Scrub island is privately owned and uninhabited; however, it is regularly visited by charter boats, people picnicking, fisherman and people camping. It is an important island for endemic reptiles, birds and breeding sea turtles.

The house mouse and feral cat pose a direct threat through predation of native reptiles and birds. The green iguana could damage native plants. Puncture vine is a smothering plant that can alter habitats, including those used by breeding turtles.

The main pathways of likely introduction to these islands include:

- **Hitchhiking on drift wood**, wrack, etc.
- **Natural dispersal**, a number of species, particularly the green iguana and rodents, could swim directly to these islands.
- **Boats**, stowaways in visiting vessels.
- **Visitors**, hitchhikers in visitor's bags, equipment, picnics.



4. Discussion

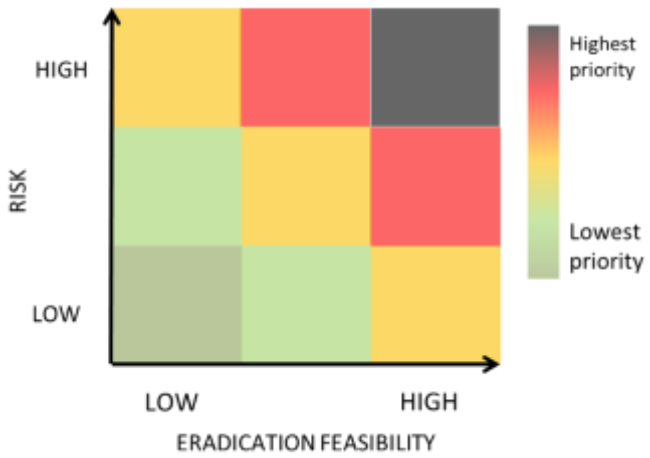
There are many invasive species established in Anguilla and a wide range of possible management actions that could be taken. The main purpose of this work was to rapidly screen these options in an effort to provide a more manageable short list of potential priorities, as well as to focus on eradication and spread prevention. In doing so, the intention was to provide evidence to help justify management action as well as to support plans and bids for future work in Anguilla.

4.1. Eradication priorities

Potential eradication priorities were identified, with the eradication of Brazilian jasmine highlighted as particularly feasible. Should funds become available, it is recommended that these species be considered priorities for more detailed assessment and, ultimately, eradication action. Priority in this case was based on the feasibility of eradicating species that have already been identified as invasive (i.e. that cause, or have the potential to cause, negative impacts). However, these could be further refined using more detailed assessments of risk for each species (see Box 15).

Box 15. Combining risk assessment and eradication feasibility to prioritise species

Invasive non-native species can be prioritised based either on how much risk they pose to a territory or on how feasible it would be to eradicate them. However, these factors can also be combined to refine priorities for eradication. Here species that pose a high risk and for which eradication is highly feasible are given highest priority, with species that are lower risk or lower feasibility given lower priority.



The individual scores of the feasibility assessment can provide insight into potential issues that may arise when attempting management. For example, eradication of the vervet monkey is likely to be very feasible, but public and international acceptability of this work would require careful handling (reflect in the very low score for acceptability). In contrast, eradicating the fire ant may be quite acceptable, but there are other barriers to overcome including accessibility of land to lay traps and preventing re-invasion.

Attention for eradication tends to focus on widespread and abundant pest or weed species, such as rats, giant African land snail and mimosa. However, despite the importance of their impacts, these species would be the most challenging to completely eradicate and for which eradication is least likely to succeed. The species for which territory-wide eradication is most feasible are often the ones which have not attracted much attention to date, but if left unmanaged risk becoming widespread problems.

In terms of future funding requirements, the total cost of eradicating all nine priority species was estimated to range from $590k to $2.8 million USD, based on the individual cost estimates for each species (the wide range here reflects the broad bands used to score potential cost, designed to help

manage uncertainty in rapid assessment). However, cost savings may be possible by tackling multiple species at the same time, such as the plant species found on the grounds of hotels and co-occurring invasive ant species.

Before taking direct management action it would be essential to ground truth these results by undertaking more detailed assessment. In particular, a clearer understanding of where species are established on the islands is important. This was not known with confidence for many species, including the house sparrow, fire ant and Brazilian jasmine. Tools are available to support the management and capture of species occurrence data (e.g. iNaturalist) and it may be useful to explore how these could be used in Anguilla. They can be particularly useful for capturing citizen reporting, which appears to be an important source of records for species at the early stages of invasion (for example, farmers often reported sightings of the vervet monkey).

In many cases there was also be a considerable risk of re-invasion post eradication. This would need to be carefully managed through regulation, biosecurity improvements and contingency planning to ensure the legacy of any eradication attempt.

4.2. Spread prevention priorities

Examination of the species/island combinations to identify the risk of spread to new islands within Anguilla resulted in a very different group of priority species than those identified for eradication. These were generally species that were more widespread on the main island and probably well-known to people as common pests and weeds. The challenge here is to keep these species from spreading to off-shore islands which are refugia for rare and threatened endemics species, important seabird nesting colonies and turtle nesting sites. The fact that they may be familiar species on the main island makes stopping the spread difficult, as people tend to assume that their presence is normal and not be aware of the need to look out for them, or be alert if they spot them on other islands. The key in this case is effective communication through education and awareness raising, tied to simple internal biosecurity procedures and guidelines to reduce the risk of accidental transport out from the main island.

While all of the off-shore islands are important and at risk, some were identified as of particular concern, primarily because of the ease with which invasive species could reach them from the main island. Prickly Pear+ and Dog Island were particularly at threat because of their proximity and the frequency of visitors. Biosecurity associated with pathways to these islands was considered a priority, including day trips from both the main island and St. Martin/St. Maarten, researchers that may be visiting the island and goods and equipment brought in to supply the restaurants / cafes on Prickly Pear+. Some species, including the rodents, could reach these islands on wrack, floating logs or in some cases by swimming and so pathway management may not be enough to protect them. In these cases early detection and contingency planning will also be a high priority.

4.3. Cross-cutting issues

The importance of land access for control programmes, and in particular the large hotels became apparent when considering both eradication feasibility and pathways of spread with Anguilla. Many species that could be considered for eradication are present on land owned and managed by hoteliers. If hoteliers could be encouraged to take action to remove priority species from their land, this could make eradication considerably easier and cost effective in many cases. However, INNS play a role in the beautification of the tourism sector, for landscaping purposes or adding to their aesthetics, and this is especially true for hotels. Hotels also regularly import ornamental plants for landscaping which may be vectors for new pests as well as the potential for becoming weeds. As a

result there is a risk not only of spreading species within Anguilla, but also re-introducing species after they have been eradicated. It is important to work with the hoteliers on this issue, and make them partners in protecting the unique natural treasures of Anguilla; for example this could be done by adoption of a voluntary Code of Practice, developing lists of acceptable species for importation, approved nurseries for sourcing, and clear biosecurity guidelines. Promotion of invasive species awareness as part of their "green" reputation should be done, equating it with recycling and plastic-use reduction.

4.4. Recommendations

The following general recommendations are made:

1. Eradication priorities require further investigation:
    a. The distribution and abundance of the priority species needs to be confirmed by ground trothing, as confidence was generally low with regards this information;
    b. Establishing where priority species occur on the islands;
    c. It is particularly important to focus on species in small populations that are spreading rapidly, particularly vervet monkey, house sparrow, etc.

2. Development and support of effective control measures for key species:
    a. Development of management plans, based on appropriate methods;
    b. Eradication of species where it is cost-effective and acceptable;
    c. Control programmes for species of high concern for spread within Anguilla;
    d. Contingency plans, early detection and rapid response plans for INNS on off-shore islands.

3. Biosecurity needs to be strengthened:
    a. At the border, with adequate resources and equipped biosecurity facilities to allow appropriate inspection of imported goods;
    b. Biosecurity procedures and guidelines should be developed, including controls on imported live plants;
    c. Internally for day visitors, restaurant owners and researchers to reduce the risk of spread of existing pests and weeds to the off-shore islands.

4. Biosecurity legislation needs to be updated so that it provides comprehensive provisions for regulated articles, and includes provisions for internal control of INNS and addresses the issue of access to private land.

5. Communication and awareness needs to be raised through social media, leaflets, signage, and posters:
    a. With the hotels, working with them to manage species on their land and reduce the biosecurity risk of importing live plant material for landscaping;
    b. With the local community visiting the off-shore islands or working in restaurants there;
    c. The programme should include social media, the local press, targeted posters and leaflets (in English, Creole and Spanish), and internal advocacy to raise awareness with Ministers and government officers;
    d. With boat owners and international visitors visiting the main island and off-shore islands on day trips.

6. More work is required to improve the baseline information, in the form of basic surveys on distribution and abundance of INNS in Anguilla. It is especially important to establish where species occur on the islands, particularly for species with small populations that are spreading rapidly, such as the vervet monkey and house sparrow.

5. References

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Annex 1. List of expert participants from Anguilla

Name	**Organisation**
Sinclair Buchanan	Farmers Association
Ras Elijah	Farmers Association
Conrad Gumbs	Farmers Association
Melissa Carty	Customs
Karen Richardson	Customs
Ambrell Richardson	Department of Health Protection
Lesroy Lake	Department of Health Protection
Melissa Hodge	Department of Health Protection
Trenton Roach	Department of Agriculture
Sheldon Richardson	Department of Agriculture
Corlon Fleming	Department of Agriculture
Dwight Carty	Department of Agriculture
Rhon Connor	Department of Environment
Melissa Meade	Department of Environment
Devon Carter	Anguilla National Trust
Tashim Fleming	Anguilla National Trust
Clarissa Lloyd	Anguilla National Trust
Aaron Richardson	Anguilla National Trust
Kafi Gumbs	Department of Fisheries and Marine Resources
Euclid Niles	Department of Land & Survey
Marcia Duncan-Fleming	Department of Land & Survey
Stafford John	Department of Physical Planning

Annex 2. List of expert participants from UK, Europe and USA

Name	**Organisation**	**Role**	**Workshop attendee**
Olaf Booy	GB Non-native Species Secretariat, UK	Facilitator	Yes
Jill Key	GB Non-native Species Secretariat, UK	Facilitator	Yes
Helen Roy	Centre for Ecology and Hydrology, UK	Facilitator	Yes
Tim Adriaens	INBO, Belgium	Vertebrate group leader	Yes
Pete Robertson	Newcastle University, UK	Vertebrate group participant	Yes
Aileen Mill	Newcastle University, UK	Vertebrate group participant	No
Alan MacLeod	Defra, UK	Invertebrate group leader	Yes
David Roy	Centre for Ecology and Hydrology, UK	Invertebrate group participant / data manager	Yes
Wolfgang Rabitsch	Environment Agency, Austria	Invertebrate group participant	Yes
Trevor Renals	Environment Agency, UK	Plant group leader	Yes
Danielle Frohlich	USA	Plant group participant	Yes
Wayne Dawson	Durham University, UK	Plant group participant	No
Zarah Pattison	Newcastle University, UK	Plant group participant	No
Rob Tanner	EPPO, France	Plant group participant	No

Annex 3. Guidance for assessing the feasibility of eradication

Step 1 – define the eradication strategy

Based on this information, a brief strategy should be described by the assessor the aim of which is to completely eradicate the species from the territory. This will be a single strategy, but could include multiple methods (e.g. trapping, chemical use and mechanical removal). The strategy that is most likely to be successful should be described, avoiding being too conservative (i.e. no eradication possible despite techniques being available) or unrealistic (i.e. cost / damage caused vastly outweighs potential benefits). If no realistic strategy can be envisaged then it can still be useful to quickly assess extreme strategies. If necessary, more than one eradication strategy can be assessed.

Step 2 – assess the eradication strategy

The eradication strategy should be assessed using the criteria defined under the headings below (steps 2a to 5). The response score is a 5 point scale from 1-5 (table below). In all cases 1 is the least favourable and 5 the most. For example, a very effective eradication strategy scores 5, a very ineffective strategy scores 1; whereas a very inexpensive strategy (i.e. the cost favours taking action) scores 5, a very expensive one scores 1.

Criteria	**Response Score**				
	1	**2**	**3**	**4**	**5**
Effectiveness	Very ineffective	Ineffective	Moderate effectiveness	Effective	Very effective
Practicality	Very impractical	Impractical	Moderate practicality	Practical	Very practical
Cost	>£10M	£1-10M	£200k-1M	£50-200k	<£50k
Negative impact	Massive	Major	Moderate	Minor	Minimal
Acceptability	Very unacceptable	Unacceptable	Moderate acceptability	Acceptable	Very acceptable
Window of opportunity	< 2 months	2 months - 1 year	1 – 3 years	4-10 years	>10 years
Likelihood of reinvasion	Very likely	Likely	Moderate likelihood	Unlikely	Very unlikely
Conclusion (overall feasibility of eradication)	Very low	Low	Medium	High	Very high

Step 2a - effectiveness

This part of the assessment scores how effective the defined eradication strategy would be regardless of other issues, such as the practicality of deploying methods, costs, acceptability of methods, etc. which are taken into account elsewhere. For example, the eradication strategy for a non-native fish in a river could be to flood it with the piscicide rotenone – this would likely score 'very effective' despite low scores associated with practicality, impact and acceptability.

Points to consider:

- How effective has this approach proven to be in the past or in an analogous situation?

- How effective is the approach despite the biology / behaviour of the target organism?

Step 2b - practicality

How practical is it to deploy the described strategy? In particular, consider barriers that might prevent the use of the strategy such as issues gaining access to relevant areas, obtaining appropriate equipment, skilled staff, chemicals, etc. If there are any legal barriers to undertaking the work these should be assessed here.

Points to consider:

- How available are the methods in the risk management area?
- How accessible are the areas required to deploy the eradication strategy?
- How easy would it be to obtain relevant licences or other approvals / permissions (e.g. access permission) to undertake the approach?
- How easy would it be to overcome legal barriers?
- How safe are the methods used in this approach (are there health and safety barriers)?

Step 2c - cost

Cost relates to the total direct cost of eradicating the species from the risk management area using the defined eradication strategy. Total cost includes the cost of staff, resources, materials, etc. over the entire time period involved in the eradication and any required post eradication surveillance and follow-up. Note indirect costs (e.g. loss of business) are considered an impact and not recorded here.

In your comment, indicate the period over which costs would be occurred (i.e. number of years) and, if possible, indicate whether the cost would be evenly spread, frontloaded or back loaded.

Step 2d - impact

Impact relates to the impact of the eradication strategy itself. It is important to note that any indirect economic impacts (i.e. economic consequences of the eradication strategy rather than the cost of the strategy itself) are recorded here and not under 'cost'.

Points to consider:

- How significant is the environmental harm caused by this approach?
- How significant is the economic harm caused by this approach?
- Examples of economic harm might include: reduction in the ability to trade or do business as a result of the management method; loss of earnings; reduction in tourism; reduction in house prices; etc.
- How significant is the social harm, including to human health, caused by this approach?
- Examples of social harm might be a reduction in a person's use or enjoyment (e.g. preventing them walking in a woodland or fishing in a river), disruptions of communities, etc.

Step 2e - acceptability

Acceptability relates to significant issues that could arise as a result of disapproval or resistance from individuals, groups or sectors. This does not include regulatory or legislative barriers which are considered under practicality.

- How acceptable is the approach likely to be based on environmental / animal welfare grounds?
- Note this question relates to likely criticism / resistance that the approach would meet based on environmental / animal welfare grounds.
- How acceptable is the approach likely to be to the general public?
- How acceptable is the approach likely to be to other stakeholders?

Step 3 – asses the window of opportunity

The window of opportunity relates to how quickly the species will spread beyond the point that eradication, using the defined strategy, would be effective. Assessors should consider how long it would take before the responses given to other steps (2a-2e) would no longer be valid.

Step 4 – assess the likelihood of re-invasion

Assuming the eradication is successful, i.e. there are no wild populations of the species left, how likely is it that re-invasion will occur? Note that unless the eradication strategy has deliberately targeted populations in containment or otherwise not in the wild (i.e. in gardens, zoos, etc.) introduction from these should be considered part of re-invasion.

Step 5 – determine the overall feasibility of eradication

This is the conclusion of the assessment. A score should be provided for the overall feasibility of eradication taking into account all other factors (i.e. steps 2a – 4). Assessors should provide a score they judge to be appropriate, taking other scores into account (but note the overall score is not necessarily the mean of other scores).

Annex 4. Guidance for assessing the threat of invasive species established in parts of Anguilla to islands where they are not current established

Step 1 – scoring likelihood of arrival (on recipient island)

Thinking of the different pathways by which species may move between islands, what is the likelihood of the target species arriving on the recipient island within the next 10 years? This could be as a result of intentional introduction (e.g. imported into the recipient island as a commodity), unintentional introduction (e.g. as a hitchhiker in produce or as hull fouling) or natural spread (for example a non-native insect flying from one island to another).

If possible, record the likely pathway of introduction and the donor island (where the species is most likely to arrive from) in the comments section.

Step 2 – scoring likelihood of establishment (on recipient island)

If the species were to arrive on the island, what is the likelihood of it being able to establish (i.e. form a self-sustaining population)? Take into account the ecological properties of both the species and community that it is invading. Scores should reflect life-history characteristics including reproductive rate and ecological features such as tolerance of a broad range of environmental conditions or availability of food supply in the introduced range.

Step 3 – scoring magnitude of impact (on recipient island)

If the species were to establish, how much impact could it have? The primary focus is on biodiversity impact, paying particular attention to rare or important native species (e.g. endemics and globally threatened species) that might be affected. Biodiversity impact is defined using a 5 point scale (table below – note these have been modified from categories used in the EICAT scheme). If there are also likely to be human health or economic impact please note this in the appropriate column of the scoring spreadsheet.

Score	Biodiversity impact	Example for OTs assessment
1 – minimal	None or negligible	NA
2 – minor	Reductions in the performance of individuals in the native biota, but no declines in native population sizes	A native species remains established in similar numbers and extent, but there are impacts on the fitness of individuals (e.g. through predation, competition, etc.)
3 – moderate	Declines in the population size of at least one native taxon (not of particular conservation importance). Not extinction.	A native species not of particular conservation concern remains established on the island, but is reduced in number and / or extent.
4 – major	Population extinction of at least one native taxon or population declines in a native taxon of particular conservation importance	A native species not of particular conservation concern is driven to extinction on one island, but survives as a native species in other areas within the territory or elsewhere. Or a decline in a population of particular conservation (e.g. of an endemic or globally threatened species).
5 – massive	Irreversible population or global extinction of at least one native taxon	A native species endemic to the island and no-where else is driven to extinction

Annex 5. Guidance for scoring confidence

For every score please record your confidence in that score. This should be based on your expert opinion, but the table below is provided as a guide to the different confidence levels.

Confidence Score	Examples
High	There is direct relevant evidence to support the assessment. The situation can easily be predicted. There are reliable/good quality data sources relevant to the assessment. The interpretation of data/information is straightforward. Data/information are not controversial, contradictory.
Medium	There is some evidence to support the assessment. Some information is indirect, e.g. data from phylogenetically or functionally similar species have been used as supporting evidence. The interpretation of the data is to some extent ambiguous or contradictory.
Low	There is no direct evidence to support the assessment, e.g. only data from other species have been used as supporting evidence. Evidence is poor and difficult to interpret, e.g. because it is strongly ambiguous.

Annex 6. Consensus scores for the feasibility of completely eradicating established non-native species from Anguilla.

Column G indicates the expert group: V(ertebrate), I(nvertebrate) and P(lant). Scores are given for the effectiveness, practicality, cost, impact, acceptability, window of opportunity and likelihood of reinvasion for the given eradication strategy (a brief summary of the strategy is given here, but is available in more detail). The eradication strategy is based on the situation in Anguilla and the overall feasibility of eradication is determined based on all criteria, with associated confidence in overall feasibility of eradication recorded. Species are ordered by overall score, within each group (e.g. high, medium) species are in no particular order. While not the focus of this work, species were flagged if long term management (*) or eradication from some islands but not the whole territory (#) were thought to be important options to consider.

G	Scientific name	English name	Situation	Eradication strategy	Effect.	Pract.	Cost	Impact	Accept.	Window	Reinv.	Overall	Conf.
P	*Jasminum fluminense*	Brazilian Jasmine	1 island 5-10 popns <1 ha	Manual and herbicidal treatment	high	high	<$50k	minor	high	4-10 yrs	med	v. high	med
I	*Wasmannia auropunctata*	Little Fire Ant	1 island 1-3 popns <1ha	Chemical control	high	med	<$50k	minimal	v. high	1 – 3 yrs	med	high	med
I	*Plutella xylostella*	Diamond-Back Moth	1 island 5-10 popns 1-10km^2	Chemical control	v. high	v. high	$50-200k	minimal	v. high	2 mo - 1 yr	med	high	med
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	1 island 10-50 popns 1-10ha	Manual and herbicidal treatment	high	high	$200k-1M	minimal	high	1 – 3 yrs	med	high	med
P	*Tribulus cistoides*	False Puncture Vine	1 island 1-3 popns <1ha	Manual removal	med	high	$50-200k	minor	high	1 – 3 yrs	high	high	med
V	*Passer domesticus*	House Sparrow	1 island 1-3 popns <1ha	Trapping and netting	high	high	<$50k	minor	med	2 mo - 1 yr	high	high	med
I	*Papilio demoleus*	Lime Swallowtail	1 island 5-10 popns 1-10km^2	Chemical control	v. high	high	<$50k	minimal	med	1 – 3 yrs	med	high	med
I	*Diaphorina citri*	Citrus Psylid	1 island 5-10 popns 1-10km^2	Chemical control	v. high	high	$50-200k	minimal	high	1 – 3 yrs	med	high	low

V	*Chlorocebus aethiops*	Vervet Monkey	1 island 1-3 popns 1-10km^2	Trapping, shooting, bounty	high	high	$200k-1M	minor	v. low	1 – 3 yrs	low	high	high
I	*Paratrechina longicornis*	Longhorn Crazy Ant	1 island 5-10 popns 1-10ha	Chemical control	high	med	$50-200k	minimal	v. high	1 – 3 yrs	med	med	med
I	*Tapinoma melanocephalum*	Ghost Ant	1 island 5-10 popns 1-10ha	Chemical control	high	med	$50-200k	minimal	v. high	1 – 3 yrs	med	med	med
P	*Porophyllum ruderale*	Yerba Porosa	1 island 5-10 popns 1-10ha	Manual removal	med	med	<$50k	minimal	high	2 mo - 1 yr	med	med	med
P	*Asystasia gangetica*	Chinese Violet	1 island 5-10 popns <1ha	Manual removal	low	low	$200k-1M	minor	high	2 mo - 1 yr	med	med	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	1 island 5-10 popns <1ha	Manual and herbicidal treatment	low	med	$200k-1M	moderate	med	1 – 3 yrs	med	med	low
V	*Rattus norvegicus#*	Brown Rat	2 islands 1-3 popns 10-100km^2	Poison bait and trapping	high	low	>$10M	minor	v. high	>10 yrs	med	low	high
V	*Rattus rattus#*	Black Rat	2 islands 1-3 popns 10-100km^2	Poison bait and trapping	high	low	>$10M	minor	v. high	4-10 yrs	med	low	high
I	*Lissachatina fulica**	Giant Africa n Land Snail	1 island 50+ popns 10-100km^2	Chemical control	low	low	$200k-1M	moderate	v. high	1 – 3 yrs	med	low	med
I	*Solenopsis invicta*	Red Imported Fire Ant	1 island 10-50 popns 10-100km^2	Chemical control	high	low	$50-200k	minimal	v. high	1 – 3 yrs	high	low	med
I	*Pheidole megacephala*	Big-Headed Ant	1 island 10-50 popns 10-100km^2	Chemical control	high	med	$50-200k	minimal	v. high	1 – 3 yrs	high	low	med
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	1 island 50+ popns 10-100km^2	Manual and herbicidal treatment	med	med	$200k-1M	moderate	high	1 – 3 yrs	v. high	low	med

P	*Cuscuta americana*	American Dodder	1 island 50+ popns 10-100km^2	Manual and herbicidal treatment	med	med	$200k-1M	moderate	high	1 – 3 yrs	v. high	low	med
V	*Mus musculus#*	House Mouse	2 islands 1-3 popns 10-100km^2	Poison bait and trapping	low	low	>$10M	minor	high	>10 yrs	med	low	med
V	*Iguana iguana**	Green Iguana	1 island 1-3 popns 10-100km^2	Multiple capture methods and shooting	low	med	$1-10M	minor	high	1 – 3 yrs	v. high	low	med
V	*Gallus gallus*	Feral Chicken	1 island 1-3 popns 10-100km^2	Trapping and netting	high	med	$200k-1M	minor	high	1 – 3 yrs	high	low	med
V	*Capra hircus#*	Feral Goat	3 islands 5-10 popns >100km^2	Coralling and shooting	v. high	low	$200k-1M	minor	v. low	>10 yrs	low	low	med
P	*Azadirachta indica*	Neem Tree	1 island 50+ popns 10-100km^2	Manual and herbicidal treatment	low	low	$1-10M	moderate	med	4-10 yrs	med	low	low
P	*Euphorbia heterophylla*	Star Of Bethlehem	1 island 50+ popns 1-10km^2	Herbicide	high	med	$1-10M	minor	high	4-10 yrs	high	low	low
P	*Indigofera tinctoria*	True Indigo	1 island 5-10 popns <1ha	Manual and herbicidal treatment	med	med		minor	high	4-10 yrs	med	low	low
P	*Kalanchoe delagoensis*	Chandelier P lant	7 islands 50+ popns 10-100km^2	Controlled burning and herbicide	high	high		minor	high	1 – 3 yrs	med	low	low
P	*Sansevieria hyacinthoides*	African Bows tring Hemp Mother In Laws Tongue	1 island 5-10 popns <1ha	Manual removal	low	low	$1-10M	major	med	1 – 3 yrs	med	low	low
P	*Abutilon hirtum*	Indian Mallow	1 island 1 to 3 popns <1 ha	Herbicide	med	med	$200k-1M	minor	low	1 – 3 yrs	med	low	low

V	*Pantherophis guttatus*	Corn Snake	1 island 1-3 popns 10-100km^2	Multiple capture methods	low	med	$50-200k	minor	high	4-10 yrs	low	low	low
V	*Canis lupus**	Feral Dog	1 island 1-3 popns 10-100km^2	Capture and sterilisation (possibly euthanise)	high	med	$200k-1M	minor	v. low	1 – 3 yrs	high	low	low
V	*Felis catus**	Feral Cat	1 island 1-3 popns 10-100km^2	Capture and sterilisation (possibly euthanise)	high	low	$1-10M	minimal	v. low	4-10 yrs	high	low	
P	*Antigonon leptopus**	Coral Vine Coralita	1 island 10-50 popns 1-10ha	Manual removal	med	med	$1-10M	moderate	med	1 – 3 yrs	low	low	med
P	*Oxalis corniculata*	Creeping Woodsorrel	1 island 10-50 popns 1-10ha	Manual and herbicidal treatment	v. low	v. low		moderate	med	1 – 3 yrs	v. high	v. low	high
	*Osteopilus septentrionalis**	Cuban Tree Frog	1 island 1-3 popns 10-100km^2	Trapping and citric acid	low	low	>$10M	major	high	4-10 yrs	high	v. low	high
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	1 island 50+ popns 10-100km^2	Chemical control	low	v. low	$1-10M	major	low	>10 yrs	high	v. low	med
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	1 island 5-10 popns 1-10km^2	Physical control	low	med	<$50k	minimal	v. high	>10 yrs	med	v. low	med
P	*Acacia nilotica*	Gum Arabic Tree	1 island 50+ popns 10-100km^2	Manual and herbicidal treatment	med	med	$200k-1M	major	med	4-10 yrs	high	v. low	low

Annex 7. Established species in Anguilla ranked by the biodiversity threat that they pose to islands where they are not currently established.

Arrival (A) and establishment (B) were scored from very unlikely to very likely (1-5). Impact (C) was scored from minimal to massive (1-5). High, medium or low confidence was recorded for each of these scores (H, M, L). The product of scores (A*B*C) was used initially to order threats. Final rank was determined by discussion in plenary and consensus of the group. Species of the same rank are in no particular order (i.e. they are considered equally important).

G	Scientific name	English name	Island	Arr. (A)	Conf.	Est. (B)	Conf.	Imp. (C)	Conf.	A*B*C	Rank
V	*Iguana iguana*	Green Iguana	Prickly Pear+	5	H	5	H	5	H	125	Top 1
V	*Rattus rattus*	Black Rat	Dog	5	H	5	H	5	H	125	Top 25
V	*Mus musculus*	House Mouse	Dog	5	H	5	H	5	H	125	Top 25
V	*Rattus norvegicus*	Brown Rat	Dog	5	H	5	M	5	M	125	Top 25
V	*Mus musculus*	House Mouse	Little Scrub	4	H	5	H	5	H	100	Top 25
V	*Rattus rattus*	Black Rat	Little Scrub	4	H	5	H	5	H	100	Top 25
V	*Rattus norvegicus*	Brown Rat	Little Scrub	4	H	5	M	5	M	100	Top 25
V	*Mus musculus*	House Mouse	Scrub	5	H	5	H	4	H	100	Top 25
P	*Tribulus cistoides*	False Puncture Vine	Dog	5	H	5	H	4	H	100	Top 25
P	*Tribulus cistoides*	False Puncture Vine	Prickly Pear+	5	H	5	H	4	H	100	Top 25
P	*Tribulus cistoides*	False Puncture Vine	Scrub	5	H	5	H	4	H	100	Top 25
V	*Rattus norvegicus*	Brown Rat	Prickly Pear+	4	H	4	M	5	M	80	Top 25
V	*Rattus rattus*	Black Rat	Prickly Pear+	4	H	4	M	5	M	80	Top 25
I	*Solenopsis invicta*	Red Imported Fire Ant	Prickly Pear+	5	H	4	M	4	M	80	Top 25
I	*Pheidole megacephala*	Big-Headed Ant	Prickly Pear+	5	H	4	M	4	M	80	Top 25
V	*Rattus rattus*	Black Rat	Sombrero	3	H	5	H	5	H	75	Top 25
V	*Mus musculus*	House Mouse	Sombrero	3	H	5	H	5	H	75	Top 25
V	*Rattus norvegicus*	Brown Rat	Sombrero	3	H	5	M	5	L	75	Top 25
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Prickly Pear+	4	H	4	M	5	M	80	Top 25
I	*Wasmannia auropunctata*	Little Fire Ant	Dog	3	L	4	H	5	M	60	Top 25

I	*Solenopsis invicta*	Red Imported Fire Ant	Dog	3	L	4	M	5	M	60	Top 25
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Dog	3	L	4	M	5	M	60	Top 25
I	*Pheidole megacephala*	Big-Headed Ant	Dog	3	L	4	M	5	M	60	Top 25
V	*Felis catus*	Feral Cat	Dog	4	H	3	H	5	H	60	Top 25
V	*Felis catus*	Feral Cat	Prickly Pear+	4	H	3	M	4	H	48	Top 25
P	*Tribulus cistoides*	False Puncture Vine	Little Scrub	5	H	5	H	3	H	75	Top 40
P	*Tribulus cistoides*	False Puncture Vine	Scilly Cay	5	H	5	H	3	H	75	Top 40
P	*Antigonon leptopus*	Coral Vine, Coralita	Prickly Pear+	4	H	4	M	4	H	64	Top 40
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Prickly Pear+	4	H	4	H	4	M	64	Top 40
V	*Iguana iguana*	Green Iguana	Little Scrub	4	H	3	M	4	M	48	Top 40
V	*Iguana iguana*	Green Iguana	Dog	5	H	3	L	4	L	60	Top 40
V	*Iguana iguana*	Green Iguana	Scrub	5	H	3	L	4	L	60	Top 40
V	*Mus musculus*	House Mouse	Prickly Pear+	4	H	3	M	4	M	48	Top 40
P	*Jasminum fluminense*	Brazilian Jasmine	Prickly Pear+	4	M	3	H	4	H	48	Top 40
V	*Felis catus*	Feral Cat	Scrub	4	H	3	M	4	H	48	Top 40
V	*Felis catus*	Feral Cat	Scilly Cay	4	H	3	L	4	L	48	Top 40
I	*Solenopsis invicta*	Red Imported Fire Ant	Little Scrub	3	L	4	M	4	M	48	Top 40
I	*Pheidole megacephala*	Big-Headed Ant	Little Scrub	3	L	4	M	4	M	48	Top 40
V	*Gallus gallus*	Feral Chicken	Prickly Pear+	3	L	4	H	4	M	48	Top 40
I	*Wasmannia auropunctata*	Little Fire Ant	Prickly Pear+	3	H	4	M	4	M	48	Top 40
P	*Euphorbia heterophylla*	Star Of Bethlehem	Dog	4	H	5	H	3	M	60	Top 75
I	*Solenopsis invicta*	Red Imported Fire Ant	Scrub	4	L	4	M	3	M	48	Top 75
I	*Pheidole megacephala*	Big-Headed Ant	Scrub	4	L	4	M	3	M	48	Top 75
P	*Abutilon hirtum*		Prickly Pear+	4	M	4	M	3	M	48	Top 75
P	*Abutilon hirtum*		Scrub	4	M	4	M	3	M	48	Top 75
P	*Antigonon leptopus*	Coral Vine, Coralita	Dog	4	H	4	M	3	M	48	Top 75
P	*Antigonon leptopus*	Coral Vine, Coralita	Scilly Cay	4	H	4	M	3	M	48	Top 75
P	*Azadirachta indica*	Neem Tree	Prickly Pear+	4	H	4	M	3	M	48	Top 75
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Dog	4	H	4	M	3	M	48	Top 75

P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Prickly Pear+	4	H	4	M	3	M	48	Top 75
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Dog	4	H	4	H	3	M	48	Top 75
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Scrub	4	H	4	H	3	M	48	Top 75
P	*Cuscuta americana*	American Dodder	Dog	4	M	4	H	3	H	48	Top 75
P	*Cuscuta americana*	American Dodder	Prickly Pear+	4	M	4	H	3	M	48	Top 75
P	*Euphorbia heterophylla*	Star Of Bethlehem	Prickly Pear+	4	H	4	H	3	M	48	Top 75
P	*Indigofera tinctoria*	True Indigo	Dog	4	M	4	M	3	M	48	Top 75
P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Dog	4	M	4	M	3	M	48	Top 75
P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Prickly Pear+	4	M	4	M	3	M	48	Top 75
I	*Tapinoma melanocephalum*	Ghost Ant	Prickly Pear+	4	H	4	M	3	M	48	Top 75
V	*Felis catus*	Feral Cat	Little Scrub	4	H	2	M	5	H	40	Top 75
P	*Antigonon leptopus*	Coral Vine, Coralita	Little Scrub	4	H	3	M	3	M	36	Top 75
P	*Azadirachta indica*	Neem Tree	Dog	4	H	3	M	3	M	36	Top 75
P	*Jasminum fluminense*	Brazilian Jasmine	Dog	4	M	3	H	3	H	36	Top 75
P	*Jasminum fluminense*	Brazilian Jasmine	Little Scrub	4	M	3	H	3	H	36	Top 75
P	*Jasminum fluminense*	Brazilian Jasmine	Scrub	4	M	3	H	3	H	36	Top 75
V	*Gallus gallus*	Feral Chicken	Scrub	3	H	4	H	3	H	36	Top 75
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Scrub	3	L	4	M	3	M	36	Top 75
I	*Wasmannia auropunctata*	Little Fire Ant	Scrub	3	L	4	M	3	M	36	Top 75
I	*Tapinoma melanocephalum*	Ghost Ant	Dog	3	L	4	M	3	M	36	Top 75
V	*Iguana iguana*	Green Iguana	Sombrero	4	H	2	H	4	L	32	Top 75
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Little Scrub	2	L	4	M	4	M	32	Top 75
I	*Wasmannia auropunctata*	Little Fire Ant	Little Scrub	2	L	4	M	4	M	32	Top 75
V	*Pantherophis guttatus*	Corn Snake	Dog	2	L	4	L	4	L	32	Top 75
V	*Pantherophis guttatus*	Corn Snake	Scrub	2	H	4	M	4	L	32	Top 75
V	*Pantherophis guttatus*	Corn Snake	Prickly Pear+	2	M	4	M	4	H	32	Top 75
V	*Mus musculus*	House Mouse	Scilly Cay	4	H	4	H	2	H	32	low

V	*Gallus gallus*	Feral Chicken	Scilly Cay	4	H	4	M	2	M	32	low
P	*Abutilon hirtum*		Scilly Cay	4	M	4	M	2	M	32	low
P	*Acacia nilotica*	Gum Arabic Tree	Scilly Cay	4	M	4	M	2	M	32	low
P	*Asystasia gangetica*	Chinese Violet	Dog	4	M	4	M	2	M	32	low
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Scrub	4	M	4	M	2		32	low
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Little Scrub	4	H	4	H	2	M	32	low
P	*Cuscuta americana*	American Dodder	Scrub	4	M	4	H	2	H	32	low
P	*Euphorbia heterophylla*	Star Of Bethlehem	Scrub	4	H	4	H	2	M	32	low
P	*Indigofera tinctoria*	True Indigo	Prickly Pear+	4	M	4	M	2	M	32	low
P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Little Scrub	4	M	4	M	2	M	32	low
P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Scrub	4	M	4	M	2	M	32	low
P	*Abutilon hirtum*		Dog	2	M	5	M	3	M	30	low
P	*Tribulus cistoides*	False Puncture Vine	Anguillita	5	H	3	H	2	H	30	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Dog	3	M	3	M	3	M	27	low
V	*Canis lupus*	Feral Dog	Dog	3	H	2	M	4	H	24	low
V	*Canis lupus*	Feral Dog	Scrub	3	H	2	M	4	H	24	low
V	*Canis lupus*	Feral Dog	Little Scrub	3	H	2	M	4	H	24	low
V	*Canis lupus*	Feral Dog	Prickly Pear+	3	H	2	M	4	H	24	low
V	*Chlorocebus aethiops*	Vervet Monkey	Dog	2	H	3	L	4	M	24	low
V	*Chlorocebus aethiops*	Vervet Monkey	Scrub	2	H	3	M	4	L	24	low
V	*Capra hircus*	Feral Goat	Prickly Pear+	2	H	3	M	4	H	24	low
P	*Antigonon leptopus*	Coral Vine, Coralita	Sandy Island	4	H	2	M	3	M	24	low
P	*Azadirachta indica*	Neem Tree	Scilly Cay	4	H	2	M	3	M	24	low
I	*Tapinoma melanocephalum*	Ghost Ant	Little Scrub	2	L	4	M	3	M	24	low
P	*Abutilon hirtum*		Little Scrub	2	M	4	M	3	M	24	low
P	*Acacia nilotica*	Gum Arabic Tree	Prickly Pear+	2	M	4	M	3	M	24	low
P	*Acacia nilotica*	Gum Arabic Tree	Scrub	2	M	4	M	3	M	24	low

V	*Passer domesticus*	House Sparrow	Dog	4	M	3	L	2	H	24	low
P	*Azadirachta indica*	Neem Tree	Little Scrub	4	M	3	M	2	M	24	low
P	*Azadirachta indica*	Neem Tree	Scrub	4	M	3	M	2	M	24	low
P	*Euphorbia heterophylla*	Star Of Bethlehem	Scilly Cay	4	H	3	H	2	M	24	low
P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Anguillita	4	M	3	M	2	M	24	low
P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Scilly Cay	4	M	3	M	2	M	24	low
I	*Tapinoma melanocephalum*	Ghost Ant	Scrub	3	L	4	M	2	M	24	low
P	*Asystasia gangetica*	Chinese Violet	Scrub	3	M	4	M	2	M	24	low
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Scilly Cay	3	H	4	H	2	M	24	low
I	*Solenopsis invicta*	Red Imported Fire Ant	Anguillita	3	L	4	H	2	H	24	low
I	*Pheidole megacephala*	Big-Headed Ant	Anguillita	3	L	4	H	2	H	24	low
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Anguillita	3	L	4	H	2	H	24	low
I	*Wasmannia auropunctata*	Little Fire Ant	Anguillita	3	L	4	H	2	H	24	low
I	*Tapinoma melanocephalum*	Ghost Ant	Anguillita	3	L	4	H	2	H	24	low
V	*Felis catus*	Feral Cat	Sombrero	2	H	2	M	5	H	20	low
V	*Canis lupus*	Feral Dog	Sombrero	2	H	2	M	5	H	20	low
V	*Iguana iguana*	Green Iguana	Sandy Island	5	H	2	H	2	L	20	low
V	*Passer domesticus*	House Sparrow	Little Scrub	5	H	2	H	2	H	20	low
V	*Passer domesticus*	House Sparrow	Scilly Cay	5	M	2	H	2	H	20	low
V	*Passer domesticus*	House Sparrow	Anguillita	5	H	2	H	2	H	20	low
V	*Mus musculus*	House Mouse	Anguillita	2	M	3	M	3	M	18	low
V	*Rattus norvegicus*	Brown Rat	Anguillita	2	M	3	M	3	M	18	low
V	*Rattus rattus*	Black Rat	Anguillita	2	M	3	M	3	M	18	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Scrub	3	M	3	M	2	L	18	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Prickly Pear+	3	M	3	H	2		18	low
V	*Gallus gallus*	Feral Chicken	Sandy Island	3	L	3	M	2	M	18	low
P	*Antigonon leptopus*	Coral Vine, Coralita	Scrub	3	H	3	M	2	M	18	low

P	*Antigonon leptopus*	Coral Vine, Coralita	Anguillita	3	H	3	M	2	H	18	low
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Anguillita	3	H	3	H	2	M	18	low
P	*Euphorbia heterophylla*	Star Of Bethlehem	Anguillita	3	H	3	H	2	M	18	low
V	*Canis lupus*	Feral Dog	Scilly Cay	4	H	1	L	4	L	16	low
V	*Chlorocebus aethiops*	Vervet Monkey	Prickly Pear+	2	H	2	M	4	M	16	low
V	*Gallus gallus*	Feral Chicken	Dog	1	H	4	H	4	H	16	low
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Sombrero	1	L	4	M	4	M	16	low
I	*Wasmannia auropunctata*	Little Fire Ant	Sombrero	1	L	4	M	4	M	16	low
I	*Pheidole megacephala*	Big-Headed Ant	Sombrero	1	L	4	M	4	M	16	low
I	*Solenopsis invicta*	Red Imported Fire Ant	Sombrero	1	L	4	M	4	M	16	low
V	*Felis catus*	Feral Cat	Sandy Island	4	H	2	M	2	L	16	low
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Little Scrub	4	M	2	M	2		16	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Prickly Pear+	4	H	2	M	2	H	16	low
P	*Cuscuta americana*	American Dodder	Little Scrub	4	M	2	H	2	H	16	low
P	*Euphorbia heterophylla*	Star Of Bethlehem	Little Scrub	4	H	2	H	2	M	16	low
V	*Rattus rattus*	Black Rat	Scilly Cay	2	H	4	L	2	H	16	low
P	*Acacia nilotica*	Gum Arabic Tree	Dog	2	M	4	M	2	M	16	low
P	*Abutilon hirtum*		Sandy Island	4	M	4	M	1	M	16	low
P	*Abutilon hirtum*		Anguillita	4	M	4	M	1	M	16	low
P	*Asystasia gangetica*	Chinese Violet	Prickly Pear+	4	M	4	M	1	M	16	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Sandy Island	5	H	3	M	1	H	15	low
V	*Iguana iguana*	Green Iguana	Scilly Cay	2	H	2	M	3	L	12	low
V	*Iguana iguana*	Green Iguana	Anguillita	2	H	2	H	3		12	low
V	*Pantherophis guttatus*	Corn Snake	Little Scrub	1	H	4	L	3	L	12	low
I	*Tapinoma melanocephalum*	Ghost Ant	Sombrero	1	L	4	M	3	M	12	low
V	*Passer domesticus*	House Sparrow	Sombrero	3	M	2	H	2	H	12	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Little Scrub	3	M	2	M	2	H	12	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Scrub	3	H	2	M	2	H	12	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Scilly Cay	3	H	2	M	2	H	12	low

P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Sandy Island	3	M	2	M	2	M	12	low
V	*Rattus norvegicus*	Brown Rat	Scilly Cay	2	H	3	M	2	L	12	low
P	*Indigofera tinctoria*	True Indigo	Scilly Cay	4	M	3	M	1	M	12	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Dog	4	M	3	M	1	H	12	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Little Scrub	4	M	3	M	1	H	12	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Prickly Pear+	4	M	3	M	1	H	12	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Scrub	4	M	3	M	1	H	12	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Sombrero	3	M	4	M	1	H	12	low
V	*Capra hircus*	Feral Goat	Little Scrub	1	H	2	M	5	H	10	low
P	*Tribulus cistoides*	False Puncture Vine	Sombrero	5	H	2	H	1	H	10	low
P	*Asystasia gangetica*	Chinese Violet	Scilly Cay	3	M	3	H	1	M	9	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Scilly Cay	3	M	3	M	1	H	9	low
V	*Chlorocebus aethiops*	Vervet Monkey	Little Scrub	2	H	1	M	4	M	8	low
V	*Chlorocebus aethiops*	Vervet Monkey	Sombrero	2	H	1	M	4	L	8	low
V	*Pantherophis guttatus*	Corn Snake	Sombrero	1	H	2	L	4	H	8	low
V	*Gallus gallus*	Feral Chicken	Sombrero	1	H	2	M	4	H	8	low
V	*Canis lupus*	Feral Dog	Sandy Island	4	H	1	M	2	L	8	low
P	*Acacia nilotica*	Gum Arabic Tree	Anguillita	4	M	1	M	2	M	8	low
V	*Pantherophis guttatus*	Corn Snake	Sandy Island	2	H	2	L	2	L	8	low
V	*Gallus gallus*	Feral Chicken	Anguillita	2	H	2	H	2	H	8	low
P	*Antigonon leptopus*	Coral Vine, Coralita	Sombrero	2	H	2	H	2	H	8	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Dog	2	M	2	M	2	H	8	low
I	*Tapinoma melanocephalum*	Ghost Ant	Scilly Cay	4	L	2	M	1	H	8	low
P	*Azadirachta indica*	Neem Tree	Sandy Island	4	M	2	M	1	M	8	low
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Sandy Island	4	H	2	H	1	M	8	low
P	*Euphorbia heterophylla*	Star Of Bethlehem	Sandy Island	4	H	2	H	1	M	8	low
P	*Indigofera tinctoria*	True Indigo	Sandy Island	4	M	2	H	1	M	8	low
P	*Indigofera tinctoria*	True Indigo	Scrub	4	M	2	H	1	M	8	low

P	*Jasminum fluminense*	Brazilian Jasmine	Scilly Cay	4	M	2	H	1	H	8	low
I	*Tapinoma melanocephalum*	Ghost Ant	Sandy Island	4	L	2	M	1	H	8	low
V	*Chlorocebus aethiops*	Vervet Monkey	Sandy Island	2	H	1	M	3	L	6	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Sombrero	1	H	2	M	3	M	6	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Scilly Cay	1	H	3	M	2	L	6	low
I	*Wasmannia auropunctata*	Little Fire Ant	Scilly Cay	3	L	2	M	1	H	6	low
I	*Wasmannia auropunctata*	Little Fire Ant	Sandy Island	3	L	2	M	1	H	6	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Prickly Pear+	3	H	2	M	1	H	6	low
P	*Asystasia gangetica*	Chinese Violet	Little Scrub	3	M	2	M	1	M	6	low
P	*Azadirachta indica*	Neem Tree	Anguillita	3	M	2	M	1	M	6	low
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Anguillita	3	M	2	M	1		6	low
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Scilly Cay	3	M	2	M	1		6	low
P	*Cuscuta americana*	American Dodder	Anguillita	3	M	2	H	1	H	6	low
P	*Cuscuta americana*	American Dodder	Scilly Cay	3	M	2	H	1	H	6	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Anguillita	3	M	2	H	1	H	6	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Scrub	2	L	3	L	1	H	6	low
P	*Asystasia gangetica*	Chinese Violet	Anguillita	2	M	3	M	1	M	6	low
V	*Capra hircus*	Feral Goat	Sombrero	1	H	1	M	5	H	5	low
I	*Solenopsis invicta*	Red Imported Fire Ant	Scilly Cay	5	L	1	H	1	H	5	low
I	*Solenopsis invicta*	Red Imported Fire Ant	Sandy Island	5	L	1	H	1	H	5	low
I	*Lissachatina fulica*	Giant African Land Snail	Scilly Cay	5	L	1	H	1	H	5	low
I	*Lissachatina fulica*	Giant African Land Snail	Sandy Island	5	L	1	H	1	H	5	low
I	*Lissachatina fulica*	Giant African Land Snail	Prickly Pear+	5	H	1	H	1	H	5	low
I	*Pheidole megacephala*	Big-Headed Ant	Scilly Cay	5	L	1	H	1	H	5	low
I	*Pheidole megacephala*	Big-Headed Ant	Sandy Island	5	L	1	H	1	H	5	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Little Scrub	2	H	1	M	2	L	4	low
V	*Pantherophis guttatus*	Corn Snake	Scilly Cay	1	H	2	L	2	L	4	low
V	*Pantherophis guttatus*	Corn Snake	Anguillita	1	H	2	M	2	H	4	low
V	*Capra hircus*	Feral Goat	Scilly Cay	1	H	2	M	2	H	4	low

I	*Paratrechina longicornis*	Longhorn Crazy Ant	Scilly Cay	4	L	1	H	1	H	4	low
I	*Paratrechina longicornis*	Longhorn Crazy Ant	Sandy Island	4	L	1	H	1	H	4	low
I	*Lissachatina fulica*	Giant African Land Snail	Scrub	4	L	1	H	1	H	4	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Sandy Island	4	M	1	H	1	H	4	low
P	*Indigofera tinctoria*	True Indigo	Little Scrub	4	M	1	H	1	M	4	low
P	*Jasminum fluminense*	Brazilian Jasmine	Sandy Island	4	M	1	H	1	H	4	low
P	*Jasminum fluminense*	Brazilian Jasmine	Anguillita	4	M	1	H	1	H	4	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Sandy Island	4	M	1	H	1	H	4	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Scrub	2	L	2	M	1	H	4	low
P	*Acacia nilotica*	Gum Arabic Tree	Little Scrub	2	M	2	M	1	M	4	low
P	*Asystasia gangetica*	Chinese Violet	Sombrero	2	H	2	H	1	M	4	low
P	*Cryptostegia madagascariensis*	Madagascar Rubbervine	Sombrero	2	H	2	H	1	M	4	low
P	*Euphorbia heterophylla*	Star Of Bethlehem	Sombrero	2	H	2	H	1	H	4	low
V	*Chlorocebus aethiops*	Vervet Monkey	Scilly Cay	1	H	1	M	3	L	3	low
V	*Chlorocebus aethiops*	Vervet Monkey	Anguillita	1	H	1	H	3	M	3	low
I	*Lissachatina fulica*	Giant African Land Snail	Little Scrub	3	L	1	H	1	H	3	low
I	*Lissachatina fulica*	Giant African Land Snail	Anguillita	3	L	1	H	1	H	3	low
I	*Plutella xylostella*	Diamond-Back Moth	Scilly Cay	3	L	1	H	1	H	3	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Scilly Cay	3	L	1	H	1	H	3	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Sandy Island	3	L	1	H	1	H	3	low
P	*Asystasia gangetica*	Chinese Violet	Sandy Island	3	M	1	M	1	M	3	low
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Sandy Island	3	M	1	M	1		3	low
P	*Cuscuta americana*	American Dodder	Sandy Island	3	M	1	H	1	H	3	low
P	*Indigofera tinctoria*	True Indigo	Anguillita	3	M	1	H	1	M	3	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Prickly Pear+	1	H	3	L	1	H	3	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Little Scrub	1	L	3	L	1	H	3	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Dog	1	L	3	M	1	H	3	low
V	*Felis catus*	Feral Cat	Anguillita	1	H	1	M	2	H	2	low
V	*Canis lupus*	Feral Dog	Anguillita	1	H	1	M	2	H	2	low

I	*Papilio demoleus*	Lime Swallowtail	Scrub	2	L	1	H	1	H	2	low
I	*Papilio demoleus*	Lime Swallowtail	Scilly Cay	2	L	1	H	1	H	2	low
I	*Papilio demoleus*	Lime Swallowtail	Sandy Island	2	L	1	H	1	H	2	low
I	*Papilio demoleus*	Lime Swallowtail	Prickly Pear+	2	H	1	H	1	H	2	low
I	*Lissachatina fulica*	Giant African Land Snail	Dog	2	L	1	H	1	H	2	low
I	*Plutella xylostella*	Diamond-Back Moth	Scrub	2	L	1	H	1	H	2	low
I	*Plutella xylostella*	Diamond-Back Moth	Sandy Island	2	L	1	H	1	H	2	low
I	*Plutella xylostella*	Diamond-Back Moth	Prickly Pear+	2	H	1	H	1	H	2	low
P	*Acacia nilotica*	Gum Arabic Tree	Sandy Island	2	M	1	M	1	M	2	low
P	*Azadirachta indica*	Neem Tree	Sombrero	2	H	1	M	1	M	2	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Sandy Island	2	H	1	M	1	H	2	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Anguillita	2	H	1	M	1	H	2	low
P	*Indigofera tinctoria*	True Indigo	Sombrero	2	M	1	H	1	M	2	low
P	*Jasminum fluminense*	Brazilian Jasmine	Sombrero	2	M	1	H	1	H	2	low
P	*Oxalis corniculata*	Creeping Woodsorrel	Sombrero	2	H	1	H	1	H	2	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Sombrero	1	L	2	L	1	H	2	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Little Scrub	1	L	2	M	1	H	2	low
V	*Osteopilus septentrionalis*	Cuban Tree Frog	Anguillita	1	H	2	H	1		2	low
P	*Abutilon hirtum*		Sombrero	1	M	2	M	1	M	2	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Sombrero	1	L	1	H	1	H	1	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Scilly Cay	1	L	1	H	1	H	1	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Sandy Island	1	L	1	H	1	H	1	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Dog	1	L	1	H	1	H	1	low
I	*Maconellicoccus hirsutus*	Pink Hibscus Mealy Bug	Anguillita	1	L	1	H	1	H	1	low
I	*Papilio demoleus*	Lime Swallowtail	Sombrero	1	L	1	H	1	H	1	low
I	*Papilio demoleus*	Lime Swallowtail	Little Scrub	1	L	1	H	1	H	1	low
I	*Papilio demoleus*	Lime Swallowtail	Dog	1	L	1	M	1	H	1	low
I	*Papilio demoleus*	Lime Swallowtail	Anguillita	1	L	1	H	1	H	1	low
I	*Lissachatina fulica*	Giant African Land Snail	Sombrero	1	L	1	H	1	H	1	low

I	*Plutella xylostella*	Diamond-Back Moth	Sombrero	1	L	1	H	1	H	1	low
I	*Plutella xylostella*	Diamond-Back Moth	Little Scrub	1	L	1	H	1	H	1	low
I	*Plutella xylostella*	Diamond-Back Moth	Dog	1	L	1	M	1	H	1	low
I	*Plutella xylostella*	Diamond-Back Moth	Anguillita	1	L	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Sombrero	1	L	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Scrub	1	L	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Scilly Cay	1	L	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Sandy Island	1	L	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Prickly Pear+	1	H	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Little Scrub	1	L	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Dog	1	L	1	H	1	H	1	low
I	*Diaphorina citri*	Citrus Psylid	Anguillita	1	L	1	H	1	H	1	low
I	*Sceliphron caementarium*	Australian Mud Dauber Wasp	Anguillita	1	L	1	H	1	H	1	low
V	*Capra hircus*	Feral Goat	Sandy Island	1	H	1	M	1	H	1	low
V	*Capra hircus*	Feral Goat	Anguillita	1	H	1	M	1	H	1	low
P	*Acacia nilotica*	Gum Arabic Tree	Sombrero	1	H	1	H	1	H	1	low
P	*Cassytha filiformis*	Love Vine (Yellow Dodder)	Sombrero	1	M	1	H	1		1	low
P	*Crotalaria verrucosa*	Purple Rattle Pod	Sombrero	1	H	1	M	1	H	1	low
P	*Cuscuta americana*	American Dodder	Sombrero	1	M	1	H	1	H	1	low
P	*Sansevieria hyacinthoides*	African Bowstring Hemp, Mother In Laws Tongue	Sombrero	1	M	1	H	1	M	1	low
V	*Mus musculus*	House Mouse	Sandy Island	5	H	5	H	2	H	50	low
V	*Rattus rattus*	Black Rat	Sandy Island	5	H	5	H	2	H	50	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Dog	5	H	5	M	2	H	50	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Little Scrub	5	H	5	M	2	H	50	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Prickly Pear+	5	H	5	M	2	H	50	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Scrub	5	H	5	M	2	H	50	low
P	*Tribulus cistoides*	False Puncture Vine	Sandy Island	5	H	5	H	2	H	50	low
V	*Passer domesticus*	House Sparrow	Scrub	5	H	4	H	2	H	40	low

V	*Passer domesticus*	House Sparrow	Sandy Island	5	H	4	H	2	H	40	low
V	*Rattus norvegicus*	Brown Rat	Sandy Island	4	H	5	M	2	L	40	low
V	*Passer domesticus*	House Sparrow	Prickly Pear+	4	H	5	H	2	H	40	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Anguillita	4	H	5	M	2	H	40	low
P	*Kalanchoe delagoensis*	Chandelier Plant	Scilly Cay	4	H	5	M	2	H	40	low
V	*Gallus gallus*	Feral Chicken	Little Scrub	2	H	2	H	5	H	20	low