



**JNCC Report  
No. 372**

**Non-native species in UK Overseas Territories:  
a review**

**Karen Varnham**

**2006**

©JNCC, Peterborough 2006

ISSN 0963 8091

**For further information please contact:**

Dr Vin Fleming  
International Unit  
Joint Nature Conservation Committee  
Monkstone House  
City Road  
Peterborough PE1 1YJ  
United Kingdom

**This report should be cited as:**

Varnham, K 2006.  
Non-native species in UK Overseas Territories: a review  
*JNCC Report No. 372*

## Contents

1.	Executive summary .....	1
2.	Introduction.....	2
3.	Aims .....	3
4.	Methods.....	4
5.	The Territories .....	5
6.	Results.....	6
7.	Invasive species issues in the Territories .....	9
7.1	Anguilla.....	9
7.2	Ascension.....	9
7.3	Bermuda.....	9
7.4	British Antarctic Territory .....	10
7.5	British Indian Ocean Territory.....	10
7.6	British Virgin Islands.....	10
7.7	Cayman Islands.....	11
7.8	Cyprus Sovereign Base Areas.....	11
7.9	Falkland Islands .....	11
7.10	Gibraltar .....	12
7.11	Montserrat.....	12
7.12	Pitcairn Islands.....	12
7.13	South Georgia .....	13
7.14	South Sandwich Islands .....	13
7.15	St Helena.....	13
7.16	Tristan da Cunha.....	14
7.17	Turks & Caicos Islands.....	14
8.	Crown Dependencies .....	15
9.	Discussion.....	16
10.	Acknowledgements.....	17
11.	References.....	18
	Annex 1. Structure of the database .....	20
	Annex 2. Summary of a workshop on invasive species in the UK Overseas Territories .....	23
	Annex 3. Contact with contributors to the project.....	28



# 1. Executive summary

Non-native species are a major cause of the loss of biodiversity globally and their impacts are especially severe on the island ecosystems and species typical of our Overseas Territories and Crown Dependencies. The biodiversity found in the Territories contains many globally threatened and endemic species and also populations of species whose abundance is of regional or global significance.

This study was commissioned to investigate, through desk study, the occurrence of non-native species in the Overseas Territories and Crown Dependencies of the United Kingdom.

The review collated information gathered from the literature, individual experts and organisations, both in the UK and in the Territories or Dependencies themselves, and was guided by a workshop at JNCC in January 2004 involving representatives of the Foreign & Commonwealth Office, the Department for International Development and the UK Overseas Territories Conservation Forum.

A minimum of 2261 non-native species is recorded as occurring across the UK Overseas Territories & Crown Dependencies with a total of >2900 records of occurrence overall. The review showed that Bermuda has the unfortunate distinction of topping the non-native species polls with 1139 species recorded – by contrast, the South Sandwich Islands have none.

A number of species are recorded as causing problems in several Territories. The study collated records of rats (*Rattus rattus*, *R. norvegicus* and *R. exulans*) from 14 Territories and feral cats (*Felis catus*) and house mice (*Mus musculus*) each from 11. The mimosa *Leucaena leucocephala* is currently the most widely recorded introduced plant species with records from 10 territories, followed by Australian pine *Casuarina equisetifolia* from eight Territories and lantana *Lantana camara* from six Territories. However, it only takes the presence of a single invasive species to have devastating consequences for some native wildlife.

In general, the number of non-native species recorded from a Territory is closely related to the amount of biological survey work carried out there in recent years. The number of species recorded in the database, therefore, does not necessarily reflect the true numbers of introduced species in many Territories. Numbers in most Caribbean Territories are likely to be far higher than recorded here whereas numbers from the Falklands, Bermuda, Gough Island, Ascension and St. Helena are based on recent research. This review should, therefore, be seen very much as work in progress. The low numbers of non-native species recorded from the British Antarctic Territory and the South Sandwich Islands are thought to be genuine.

This audit, the first of its kind, will help to inform any measures aimed at eradicating, controlling and, more importantly, preventing the future establishment of, non-native species and conserving the native biodiversity they threaten.

## 2. Introduction

Invasive non-native species are a major cause of biodiversity loss globally; their impacts are often most severe on the island environments typical of our Overseas Territories (Cheesman *et al.* 2003). Species on such islands are often vulnerable to the impacts of non-native species because of their previous isolation from predators, diseases or competitors. Indeed, the majority (72%) of global extinctions since 1500 have occurred on islands and, for example, 67% of threatened birds on oceanic islands are threatened by invasive alien species, compared to only 8% on continents (Baillie *et al.* 2004). Invasive species are also thought to be responsible for the extinction of at least 65 bird species, more than any other known factor (Baillie *et al.* 2004).

The Overseas Territories and Crown Dependencies of the United Kingdom are comprised mostly of island environments (Procter and Fleming 1999) and are notable for their numbers of endemic and globally threatened species (more than occur in the metropolitan UK). Whilst problems with invasive non-native species are apparent in many of the Territories, the full extent of the threat posed by non-native species, and of their occurrence within the Territories, has not been fully reviewed. A number of projects have been undertaken to eradicate, control or prevent the establishment of such species. However, available funding is unlikely to be adequate to deal with all problem species and those making decisions over funding require an overview of the range of issues to help enable an informed choice to be made as to priorities for action.

Accordingly, following a workshop on invasive species at the Bermuda conference (March 2003) of the UK Overseas Territories Conservation Forum (Cheesman *et al.*, 2003) and subsequent discussions in August 2003 with interested bodies in the UK, the Joint Nature Conservation Committee (JNCC) commissioned a desk study of the occurrence of non-native species within the UK Overseas Territories and Crown Dependencies. The project aimed to gather relevant data to enable informed decision making when dealing with non-native species in the Territories<sup>1</sup>.

This report summarises the results of that study; the full electronic dataset of non-native species in UK Overseas Territories is available on compact disc or from the JNCC website at [www.jncc.gov.uk/default.aspx?page=3634](http://www.jncc.gov.uk/default.aspx?page=3634).

---

<sup>1</sup> For convenience, the term ‘Territories’ will be used to refer collectively to both Overseas Territories and the Crown Dependencies.

### **3. Aims**

This project aimed to achieve the following:

- to produce, as far as possible, a complete, validated electronic dataset of non-native species in UK Overseas Territories & Crown Dependencies;
- to organise a workshop on the subject for UK stakeholders to validate, enhance and populate the dataset and to devise means by which issues regarding invasive non-native species might be prioritised for future action;
- to undertake direct consultations with governments, NGOs and specialists in Overseas Territories and Crown Dependencies to request their validation of the database and the contribution of data to it.

## 4. Methods

The project was undertaken in two phases. Phase 1 was to construct and populate, through desk study, a database of relevant information, concentrating on literature and UK-based sources of information. Phase 2 was then to invite comments and additional contributions, via a workshop or through correspondence, from people and institutions in the Territories and elsewhere to validate the dataset.

Information for the dataset was gathered on the non-native species present in each Territory, the ecological effects they have or may have, their current and potential distribution, the significance of the native species and habitats that non-natives are affecting, and the likelihood of successful control and any control attempts. This information, derived from published literature and other reports, was then compiled in an Excel spreadsheet (dataset fields are described in Annex 1).

A workshop for interested individuals based in the UK was held at JNCC in Peterborough on 9 January 2004, following the completion of phase 1 of the project. The summary record of this meeting is appended (Annex 2).

To validate the dataset subsequently, a list of potential contributors and contacts was drawn up, including governments, NGOs and specialists in Overseas Territories and Crown Dependencies. These were contacted to inform them of the project and to ask for their input. Contacts were provided with relevant sections of the dataset and supporting notes and were invited to check the data entries, to provide additional information or to direct the author to studies or individuals who may be able to provide further information. An example of the type of correspondence sent to contacts is included in Annex 3 to this report, along with a summary of contributors.

In addition, an email was sent to selected electronic list-servers. This described the project and invited people to contribute to the project and to specify those Territories for which they were able to provide information or comments. This led to some requests for taxon-specific information and, accordingly, compilations of records for invertebrates, aquatic species and amphibians and reptiles were created and sent out to interested individuals. The details of all the list-servers contacted are also given in Annex 3.



## **5. The Territories**

The UK's Crown Dependencies comprise the Isle of Man and the Bailiwicks of Jersey and Guernsey, the latter including the separate entities of Guernsey, Alderney and Sark.

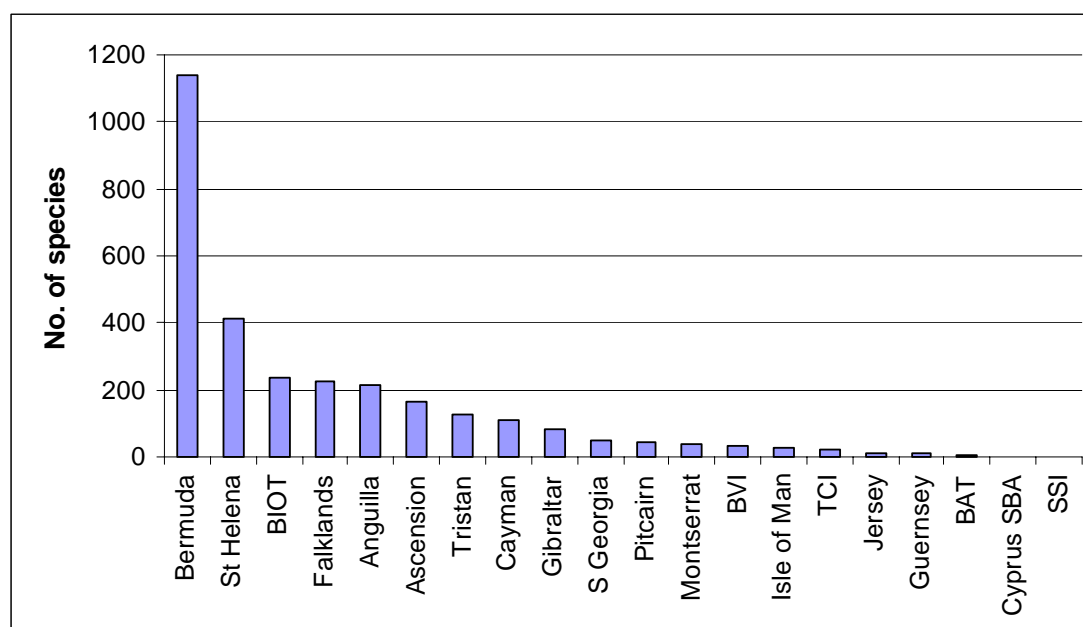
The UK's Overseas Territories comprise: Anguilla, Ascension Island, Bermuda, British Antarctic Territory, British Indian Ocean Territory, British Sovereign Base Areas on Cyprus, British Virgin Islands, Cayman Islands, Falkland Islands, Gibraltar, Montserrat, Pitcairn, Saint Helena, South Georgia & the South Sandwich Islands, Tristan da Cunha and the Turks & Caicos Islands.

Despite links in their governance, we have treated Ascension Island, St Helena and Tristan da Cunha separately here because each island group is different biogeographically. Similarly, we have treated South Georgia separately from the South Sandwich Islands, again because they each make separate biogeographic units.

## 6. Results

Almost 70 people and organisations were contacted over both phases of the project, of these 39 responded. The content of these replies varied from general expressions of support, but without additional information, to in-depth revisions of the existing data. The responses received were universally positive about the project and many were keen to see the database available via the internet in the future. This project certainly seems to have tapped into a growing interest in, and awareness of, invasive species issues. Many Territories are already involved in ongoing invasive species work such as cataloguing non-native species, undertaking eradication and control projects, devising legislation and engaging in regional invasive species strategies.

A number of correspondents provided further written resources and data, often unpublished and these provided a great deal of new information. The Bermuda Biodiversity Project (Glasspool *et al.* 2003), for example, sent a species list for the island which included records of c1000 additional non-native species. Mary Walker (pers. comm.) provided much information on the non-native plants of Anguilla, taken from her forthcoming book. The additional information collected during this phase of the project more than doubled the number of records of non-native species in the database, increasing from 1283 at the end of the first phase to 2950 at the end of the second phase of the project. Figure 1 compares the numbers of records collected for each Territory, ranked in order of the numbers of non-native species recorded. Table 1 shows how these records were distributed across three broad taxonomic groups (plants, invertebrates and vertebrates). In all, some 2261 non-native taxa are recorded from the UK Territories overall; of course, some taxa occur in more than one Territory.



**Figure 1.** The number of non-native species recorded in each Territory ranked in order of the number of non-native species (BIOT – British Indian Ocean Territory; BVI – British Virgin Islands; TCI – Turks & Caicos Islands; BAT – British Antarctic Territory; SSI – South Sandwich Islands).

## Non-native species in UK Overseas Territories: a review

**Table 1.** The number of non-native species recorded *per* Territory in each of three broad taxonomic groups

Territory	No. of plant species	No. of invertebrate species	No. of vertebrate species	Total no. of species
Anguilla	196	1	15	212
Ascension	103	50	14	167
Bermuda	414	699	26	1139
British Antarctic Territory	2	3	0	5
British Indian Ocean Territory	230	0	4	234
British Virgin Islands	8	8	15	31
Cayman Islands	74	8	27	109
Cyprus Sovereign Base Areas	0	0	0	0
Falkland Islands	196 <sup>2</sup>	10	18	224
Gibraltar	69	1	10	80
Guernsey	8	2	1	11
Isle of Man	6	0	14	25
Jersey	3	2	4	12
Montserrat	28	4	7	39
Pitcairn Islands	26	10	8	46
South Georgia	33	15	3	51
South Sandwich Islands	0	0	0	0
St Helena	291	103	20	414
Tristan da Cunha	42	75	3	129
Turks & Caicos Islands	8	2	12	22
<b>TOTAL RECORDS<sup>3</sup></b>	<b>1737</b>	<b>993</b>	<b>201</b>	<b>2950</b>

Records of non-native species across the Territories is still skewed very much towards those south Atlantic Territories where in-depth recent studies, notably in the Falklands (A. Douse, pers. comm.), on Gough Island (Jones *et al.*, 2003 a & b) and on Ascension and St Helena (Ashmole & Ashmole, 2000), have generated a great many records for some extremely remote areas. With the exception of Bermuda and Anguilla, numbers of records from the other Caribbean Territories remained fairly low, as did the response rate to emails asking for contributions to the database. Records from the Crown Dependencies are also limited. It is likely that the records from these Territories significantly under-estimate the true number of non-native species present. Records for Territories covered by the British Antarctic Survey (namely British Antarctic Territory, South Georgia & the South Sandwich Islands), although not large in number (the British Antarctic Territory has 5 non-native species records, the South Sandwich Islands have none), are the result of recent research and are likely to be a full and accurate picture of the situation in these areas.

Although many species records were collected during the course of the project, most of them consist of little more than a scientific name, a common name and perhaps some general information on their distribution within a Territory. Information on the ecological effects of most non-native species, and their potential distribution if left unchecked, is still limited. However, for most species, it is likely that this information simply does not exist, especially when bearing in mind that the great majority of

<sup>2</sup> Also includes fungi

<sup>3</sup> NB the same species may be recorded in more than one Territory.

## Non-native species in UK Overseas Territories: a review

species listed are likely to have no substantial ill effects on the ecosystems in which they now occur.

Even with these limitations, the database is potentially a very valuable resource and has a number of possible uses. It could be used to help prioritise invasive species projects, by providing information on those species causing the greatest ecological problems. It also allows species, which are not yet causing problems in a particular Territory but are known to cause problems in others, to be targeted for monitoring, control or prevention measures. Finally, and perhaps most importantly, the database provides a framework for the further collection of information on non-native species which could be used by people throughout the Overseas Territories & Crown Dependencies.

## 7. Invasive species issues in the Territories

The following comments are not intended to provide a full picture of the situation regarding non-native species in each of the Overseas Territories and Crown Dependencies; rather, they provide a summary of the key invasive species issues that arose during the course of the project.

### 7.1 Anguilla

The ongoing work by Mary Walker (pers. comm.) in producing her book on the flora of Anguilla has already been mentioned. Her records include many non-native species, but few appear to be truly invasive. She points out that it is often difficult to know whether a species is introduced or not, as humans have been modifying the Caribbean landscape for thousands of years. Anguilla is also fortunate not to have mongoose (*Herpestes auropunctatus*), which have been erroneously recorded on other databases (Kairo *et al.* 2003; Global Invasive Species Database<sup>4</sup>). The absence of mongoose has undoubtedly contributed to the survival of the endangered Anguillian racer snake (*Alsophis rijersmai*), whose relatives have been wiped out in many Caribbean islands. The main species recorded as causing problems are vertebrates such as cats (*Felis catus*), dogs (*Canis familiaris*), goats (*Capra hircus*) and rats (*Rattus* spp.) which are known or suspected to negatively affect populations of native reptiles through direct predation, competition for food or trampling of habitat.

### 7.2 Ascension

Knowledge of non-native species on Ascension has benefited from an excellent recent book (Ashmole and Ashmole 2000) on the island's natural history. A wide range of non-native species have been recorded from the island and are known to have had profound ecological consequences. Introduced spiders, centipedes and ants are known to predate many of the island's endemic invertebrate species, and have led to a number of extinctions. Invasive plants dominate large parts of the island, particularly the Mexican thorn tree (*Prosopis juliflora*) which out-competes native plants and causes soil erosion. Introduced mynah birds (*Acridotheres tristis*) extensively predate native sooty tern (*Sterna fuscata*) colonies, and cats and rats also predate seabirds and hatchling turtles. However, there are active control programmes to address many of these threats. Some areas of Mexican thorn are being cleared and the cat eradication programme has already produced benefits for native seabirds, which are re-colonising parts of the island.

### 7.3 Bermuda

Bermuda has the dubious distinction of having more non-native species recorded than any other Territory. However, this is partly due to particularly good records being available from this Territory, in the form of the recent work of the Bermuda Biodiversity Project (Glasspool *et al.* 2003) which has systematically collected a great deal of information on both the island's native and non-native species. Bermuda has extensive ecological problems caused by invasive species (Outerbridge *et al.* 2003).

---

<sup>4</sup> <http://www.issg.org/database/welcome/>

The pressures of habitat loss and extensive development have made the problems caused by invasive species all the more acute, as very little natural habitat remains. For example, invasive casuarina trees (*Casuarina equisetifolia*) over-shade native plants and increase soil erosion, while various species of introduced birds predate the endemic Bermuda skink (*Eumeces longirostris*) and displace native birds from nesting sites. Bermuda's great advantage is its active assemblage of conservationists, both government and non-government. The Department of Conservation Services has an ongoing programme of removing invasive plants and re-planting these areas with nursery-grown natives. Other organisations such as the Bermuda Zoological Society and the Bermuda Audubon Society are active in developing and promoting methods of controlling invasive species and assisting native species.

## **7.4 British Antarctic Territory**

The Antarctic as a whole has very few persistent non-native species, due largely to its extreme climate and the limited human activity in the area. Those species which have become established (three invertebrates and two species of grass) have no recorded ecological ill-effects. There are still risks of new species being introduced, however, despite good quarantine measures being in place. Climate change has already resulted in increased summer temperatures in recent years which may allow new species to become established or allow those already established to spread. The increase in human traffic, especially tourism, also increases the risk of new introductions. However, the highly regulated nature of human activity in the region means it should be fairly easy to ensure good quarantine measures are enforced. Awareness of the potential risks posed by non-native species is high.

## **7.5 British Indian Ocean Territory**

Most islands in the group are extremely remote and seldom visited and this is reflected in a lack of detailed records. Almost all of the records for this Territory come from the recent book on the *Ecology of the Chagos Archipelago* (Sheppard and Seaward 1999) and almost all of these refer to plants. There is some on-going cat control work around the US naval base on Diego Garcia, the only inhabited island in the group, with the aim to eradicate them from the whole island in the near future. Some recent work has also been undertaken to look at the potential to eradicate rats from one of the larger uninhabited islands, in order to enable seabird populations to recover and to reduce predation on hatchling turtles. This project has now been approved for funding by the Overseas Territories Environment Programme of the Foreign & Commonwealth Office and the Department for International Development. Overall, the distribution and effects of non-native species on the islands' biodiversity appear to be little known, which is not surprising considering how few scientists get to visit the area.

## **7.6 British Virgin Islands**

The records from the British Virgin Islands include non-natives from a wide range of taxa. Several species of introduced invertebrates are pests of agriculture, including the papaya (*Paracoccus marginatus*) and hibiscus mealybugs (*Macronellicoccus hirsutus*). Another recent invertebrate introduction, the agave weevil (*Scyphophorus acupunctatus*), is spreading throughout the islands at an alarming rate. This species

was first recorded here in 2001 and is devastating populations of native *Agave* plants. The island of Anegada has well documented problems with introduced mammals, including several species of feral livestock, known to affect the critically endangered and endemic Anegada rock iguana (*Cyclura pinguis*). Eradications of mammalian species have been carried out on two small islands near the main island of Tortola, including the significant reduction in the goat population of Great Tobago Island by the BVI Police Force.

## 7.7 Cayman Islands

A detailed set of records for the Cayman Islands were provided by two contacts (Fred Burton and Mat Cottam, pers. comms.). The islands have a range of non-native species, several of which are causing ecological problems. In addition to a number of agricultural pests, introduced invertebrates include a species of fire ant (*Solenopsis invicta*) which is known to predate a range of other invertebrates. This species may also affect vertebrate species such as small native lizards (through egg predation) and native iguanas (by invading their nests). A number of introduced plant species are also causing problems, mainly by out-competing native species. Native iguanas (3 sub-species of *Cyclura nubilis*) are also threatened by feral or uncontrolled cats and dogs, which have been shown to be efficient predators of iguanas. The long-running Blue Iguana Recovery Programme (for the critically endangered *C. n. caymenensis*) seeks to exclude these species from protected areas and also to control predatory rat species in iguana nesting sites.

## 7.8 Cyprus Sovereign Base Areas

Despite efforts, at the time this report was being completed, no records had been collected for this Territory and no experts identified.

## 7.9 Falkland Islands

A review of non native species in the islands for the Falklands Island Government, undertaken by Andy Douse (pers. comm.) as part of the development of a conservation and biodiversity strategy, has provided almost all of the information included in this section of the database. There is, however a notable absence of data on insects and other marine / terrestrial invertebrates and, as knowledge increases, the list of non-native species will grow. As would be expected, most of the species identified as non-native are causing no observable ecological effects and have a limited distribution. A few species are causing significant problems though, such as the brown trout *Salmo trutta*, introduced for sport fishing, which has caused a massive decline in the native zebra trout *Aplochiton zebra* population. The introduced trout is still increasing its range and is likely to reach other strongholds of the native species, though the existence of a number of isolated 'refugia' may well ensure the continued existence of a fraction of the genetic diversity of the native zebra trout. Introduced mammals such as rats and cats have also had big effects, mainly on native seabirds. The breeding of tussacbird *Cinclodes antarcticus* and the endemic Cobb's wren *Troglodytes cobbi* is now restricted to rat- and cat-free islands. However, brown rats (*Rattus norvegicus*) have been successfully eradicated from 17 small tussac covered islands as part of an ongoing rat eradication programme. Reindeer *Rangifer tarandus* were introduced from South Georgia in 2001 for commercial reasons.

## 7.10 Gibraltar

Most of the records for Gibraltar were provided by John Cortes of the Gibraltar Ornithological and Natural History Society and relate to non-native plant species found in the Upper Rock Nature Reserve. One species of particular concern in the reserve is the canary creeper (*Senecio angulatus*) which smothers native trees and bushes. This species is one of the targets of an active programme of weeding in the nature reserve, which is being carried out largely by volunteers. Other species, well established elsewhere in the Territory, are being carefully monitored as they approach the nature reserve and plans are in place to prevent their establishment there. A number of reptile and amphibian species are also recorded in the Territory, almost all restricted to the botanic gardens. Otherwise, little else on the distribution and status of non-native species in the rest of the Territory was uncovered.

## 7.11 Montserrat

The effects of the volcanic eruptions of the 1990s are still very apparent in Montserrat and have affected the spread of some non-native species. Many formerly domesticated animals have established feral populations in the exclusion zone following the evacuation of humans from the area. Some fairly extensive pig (*Sus scrofa*) control work has been carried out by the government, but ongoing efforts are needed to prevent the population from continuing to increase and dispersing further into the forest. Pigs are known to uproot many native plants, including *Heliconia* spp., the main nesting plant of the critically endangered and endemic Montserrat oriole (*Icterus oberi*). They are also believed to trample and predate turtle nests on beaches. The high numbers of fruit trees deliberately planted in forests provide a year round food supply for pigs and rats and may sustain their populations at levels higher than they might otherwise attain.

## 7.12 Pitcairn Islands

The main non-native species issue on the Pitcairn Islands appears to be the predation of endemic and other important nesting seabirds by rats. Research by Mike Brooke (pers. comm.) suggests that some seabird species are suffering unsustainably high levels of chick and/or egg predation on Henderson Island. Rats have been successfully eradicated from two of the smaller islands in the group, Oeno and Ducie, though attempts to eradicate them from Pitcairn itself have so far failed. Invasive plant species are also causing problems on the islands, notably rose-apple (*Syzygium jambos*) on Pitcairn. This tree, introduced and valued as a source of fuel wood, has spread rapidly into native plant communities, forming dense thickets. An ongoing project is looking at ways to remove it and restore cleared areas. The islands have other problem plant species including the widespread shrub *Lantana camara*, as well as a species of passion fruit (*Passiflora maliformis*) which is invasive on Pitcairn and appears to have been introduced relatively recently to near-pristine Henderson Island. Many records in the database have come from the management plan for Henderson Island (Brooke *et al.* 2004), which explains the emphasis in the database on records from this particular island.



### 7.13 South Georgia

There are a moderate number of non-native species established on South Georgia, mostly plants and invertebrates, few of which appear to be causing any particular problems. The most widespread non-native plants are two grass species, whose spread is likely to be assisted by introduced reindeer (*Rangifer tarandus*). Chickweed (*Cerastium fontanum*) is also widespread and is continuing to colonise new areas. An introduced beetle species (*Trechisibus antarcticus*) has been shown to predate the larvae of an endemic beetle (*Hydromedion sparsutum*), and several other invertebrate species may be competing with their native equivalents. Like the Antarctic, South Georgia has been largely protected from the risks of non native species introductions by its remoteness and its inhospitable climate. The glaciers which cover much of the island are impassable to the three introduced mammal species (house mice *Mus musculus*, brown rats and reindeer), restricting their distribution. However, it is likely that current trends in climate change will benefit introduced species as the glaciers recede and more suitable habitat is uncovered. Warmer temperatures, combined with increasing tourism, may also allow a wider range of potential invaders to arrive and become established; these factors led a recent review to conclude that South Georgia was the area most threatened by alien invasions in the (sub)Antarctic (Frenot *et al.* 2005).

### 7.14 South Sandwich Islands

The South Sandwich Islands, which are even more remote and inhospitable than South Georgia, have no recorded non-native species, based on recent visits by scientists from the British Antarctic Survey. Good quarantine measures are fundamental in enabling the islands to retain this distinction.

### 7.15 St Helena

Like almost all the Territories, St Helena has been profoundly altered by human activity and today bears little resemblance to the island found by 16<sup>th</sup> century seafarers. The landscape has been strongly modified by intensive grazing in the past, especially by goats which were removed in the 1960s. A number of invasive plant species dominate the island's vegetation, notably New Zealand flax (*Phormium tenax*) which forms impenetrable monocultures in parts of the island. Along with flax, the quinine tree (*Cinchona succirubra*) is responsible for the destruction of areas of native fern thicket. Other native plants are affected by animal invaders, such as the *Orthizia* scale insect which is decimating the last stands of native gumwood trees (*Commidendrum* spp.), and grazing species such as rabbits (*Oryctolagus cuniculus*) and sheep (*Ovis aries*). Ongoing efforts are being made to clear areas of invasive plants, especially New Zealand flax, and native gumwoods are being replanted. Endemic wirebirds (*Charadrius sanctaehelenae*) are negatively affected by a number of non-native species, such as the bull grass (*Juncus tenuis*) which reduces the suitability of their nesting sites. Non-native species are well recorded on St Helena, with much of the information in the database coming from the recent book on the natural history of Ascension and St Helena (Ashmole and Ashmole 2000) and from records of introduced plant species from the St. Helena Forestry Department.

## 7.16 Tristan da Cunha

Most of the records for Tristan are for species present on Gough and Inaccessible Islands, as these two have been the subject of recent management plans and, in the case of Gough, an in-depth study of the island's introduced invertebrate fauna (Gaston *et al.* 2003; Jones *et al.* 2003a). Records for Tristan itself and Nightingale Island are more patchy. Recent work on Gough Island (Jones *et al.* 2003a) identified around 75 species of introduced invertebrates and an analysis of historical records shows that around one in three to four visits by humans to Gough Island has resulted in the establishment of a new invertebrate species (Gaston *et al.* 2003). The ecological effects these species may be having has yet to be quantified. One species that may be having an indirect effect is the earthworm (*Lumbricus* sp.), which has become abundant on the island and comprises a large part of the diet of introduced house mice. This may act to enable mouse populations to attain higher numbers than might otherwise be possible. The mice on Gough are known to predate large numbers of native seabird chicks, including the Tristan albatross (*Diomedea dabbenena*). They are also suspected of preying on eggs and chicks of ground nesting Gough bunting (*Rowettia goughensis*) (Jones *et al.* 2003b; RSPB, pers. comm.). A number of introduced plants have also been recorded on Gough, including procumbent pearlwort (*Sagina procumbens*), a species known to be highly invasive elsewhere. Following the discovery of a small patch of this pearlwort on the island in 1998, a rapid and thorough eradication campaign was launched; this work is continuing under the support of the Overseas Territories Environment Programme. Another introduced plant, New Zealand flax, is the target of an ongoing eradication project on Inaccessible and Nightingale Islands.

## 7.17 Turks & Caicos Islands

Records from the Turks & Caicos Islands again highlight problems caused for native reptiles, especially the threatened rock iguana *Cyclura carinata carinata*, by feral and uncontrolled domestic mammals. As in the Cayman Islands and the British Virgin Islands, non-native mammals affect iguanas in a variety of ways, including by direct predation (cats and dogs), competition for food resources and trampling of nesting sites (by goats, cows *Bos taurus*, donkeys *Equus asinus* and horses *Equus caballus*). Some action is being taken against these species, including a cat eradication project on Long Cay. Further cat and rat control projects are planned. The Turks & Caicos Islands Government are also currently drafting legislation to protect their endangered species and this is to include provision for dealing with non-native species. Since compiling the database, the discovery of infestations on the native Caicos pine *Pinus caribaea* var. *bahamiensis* of an introduced scale insect, whose identity is yet to be confirmed, highlight the risks from newly introduced non-native species (UK Overseas Territories Conservation Forum, 2005)

## 8. Crown Dependencies

Not a great deal of information was gathered about the Crown Dependencies, so they are addressed here together. The Isle of Man seems to have the most information, held in their Biological Records Centre, but this is not readily accessible from outside the island. The species recorded from the Crown Dependencies are, as expected, broadly the same as those recorded from, or causing problems on, the UK mainland, notably Japanese knotweed (*Fallopia japonica*) and common aquatic invasive species such as parrot's feather milfoil (*Myriophyllum aquaticum*). This last species has been successfully controlled by the Société Guernesiaise at one of their nature reserves and control efforts are ongoing elsewhere on the island.

## 9. Discussion

This review is the first attempt at a comprehensive audit of the occurrence of non-native species across the UK Overseas Territories and Crown Dependencies. As such, it is likely to be a valuable contribution to the global resource of information on non-native and invasive species, especially on islands.

Although the review has recorded a minimum of 2261 species occurring in the Territories, this is likely to be a significant under-estimate. First, there is very little information available on the occurrence of non-native marine species, yet there is every chance that these may be significant both in number and in their impact. Second, some taxonomic groups are likely to be under-recorded, especially perhaps invertebrates or non-flowering plants and fungi. Third, many Territories have limited capacity or expertise available to record the full range of non-native species which may be present; more intensive studies are required before a full picture will be available of the range of non-native species occurring across all the Territories. Fourth, it is likely that the non-native biota of the Crown Dependencies is similar to that for the mainland United Kingdom; here, for example, non-native vascular plants account for some 40% of our entire flora (Preston *et al.*, 2002), suggesting a similar proportion in the Dependencies may be likely. By contrast, some in-depth studies in some of the Territories, notably in Bermuda, the south Atlantic and Antarctic, mean that information there is comprehensive and up to date, at least for some taxa. This project enables us to identify the gaps in knowledge across the Territories and to seek to fill these. However, it is also likely that the collated data is not entirely comprehensive because we may have missed relevant publications or studies. Accordingly, we welcome further additions, comments and corrections on the dataset. Details of how to provide additional information are provided at [www.jncc.gov.uk](http://www.jncc.gov.uk).

A number of species are recorded as causing problems in several Territories. The database includes records of rats (*Rattus rattus*, *R. norvegicus* and *R. exulans*) from 14 Territories and feral cats and house mice each from 11. Wild mimosa *Leucaena leucocephala* is currently the most widely recorded introduced plant species with records from 10 territories, followed by Australian pine *Casuarina equisetifolia* from eight Territories and lantana *Lantana camara* from six Territories.

Awareness of invasive species problems is clearly high in many Territories and there are several examples of effective invasive species control and eradication projects. Some Territories, such as Gibraltar and Bermuda, have ongoing projects controlling invasive plants in protected areas. On Montserrat, in a situation where total eradication is not feasible, rats are being controlled around nest sites of the critically endangered Montserrat Oriole.

There are also examples of successful eradication projects, removing a variety of mostly mammalian invasive species. Rat eradications have been carried out in at least six Territories and are planned for others. Cat eradication projects have been carried out in some Territories including the ground-breaking example from Ascension, where cats have been eradicated from the entire Territory (though confirmation of this is still awaited) and where the benefits to breeding seabirds are already apparent. Scientific monitoring of the ecological effects of eradication is extremely important and has been incorporated into a number of projects. This kind of study can show the

benefits as well as the unexpected consequences of removing invasive species and can be very useful for improving the effectiveness of eradication techniques.

There is a great deal of potential for further eradication projects within the Territories. Many territories contain large numbers of currently undeveloped smaller islands. Many of these islands still support relict populations of native species and fragments of rare habitats. Often they have fewer invasive species than mainland areas and so are cheaper and easier to restore. Unpopulated or remote islands also have lower risks of invasive species being accidentally (re)introduced, which also reduces long term management costs.

However, it is clearly as, if not more, important to prevent new species arriving than to eradicate existing problem species. Yet new species are still arriving in many Territories at an alarming rate, either intentionally or accidentally. Many of the species accidentally arriving could be prevented with stricter legal controls and more effective border controls and quarantine facilities. Entry routes for new species differ between the Territories. Typically, new species tend to arrive in Caribbean Territories through trade, especially of fruit, vegetables and live plants coming in from other Caribbean states and the mainland United States of America. On unpopulated south Atlantic Territories, such as South Georgia and Gough Island (Tristan da Cunha), scientists and adventure tourists account for most of the traffic. Although quarantine measures are generally strict on these vessels, any new species arriving on these near-pristine islands could have dramatic ecological consequences.

However, existing import restrictions tend to focus on economic pests. Current legal restrictions on the import of new species tend to concentrate on excluding agricultural pests and diseases, rather than species that are damaging from a conservation perspective. Laws seldom address the ecological consequences of transporting species between different islands or areas within a territory

Finally, although very much a first step, this project provides an important resource to those concerned with non-native species in the UK Overseas Territories and Crown Dependencies, whether in government departments and agencies (in the UK or the Territories) or in non-governmental organisations, including the UK Overseas Territories Conservation Forum. By contributing to the ongoing dialogue, this review may contribute to measures aimed at recording, understanding, eradicating, controlling or preventing the future establishment of non-native species and conserving the native biodiversity they threaten.

## **10. Acknowledgements**

I would like to thank all the people and organisations within the UK, the Crown Dependencies and the Overseas Territories who contributed to the database. I also thank Dr Vin Fleming of JNCC and Dr Mike Pienkowski (UKOTCF) for comments on this report.

## 11. References

- ASHMOLE, P. & ASHMOLE M. 2000. *St Helena and Ascension Island: a natural history*. Oswestry: Anthony Nelson.
- BAILLIE, J.E.M., HILTON-TAYLOR, C. & STUART, S.N. Eds. 2004. *2004 IUCN red list of threatened species: a global species assessment*. Gland, Switzerland & Cambridge, UK: IUCN.
- BROOKE, M. de L., HEPBURN I. & TREVELYAN, R., 2004. *Henderson Island World Heritage Site: Management Plan 2004-2009*. London: Foreign & Commonwealth Office.
- CHEESMAN, O.D., CLUBBE, C., GLASSPOOL, A.F. & VARNHAM, K. 2003. Dealing with invasive species: sharing knowledge and experience. *In*: M. PIENKOWSKI ed. *A Sense of Direction: a conference on conservation in UK Overseas Territories and other small island communities*. Over Norton: UK Overseas Territories Conservation Forum, 257-272. Available from: <http://www.ukotcf.org>.
- FRENOT, Y., CHOWN, S.L., WHINAM, J., SELKIRK, P.M., CONVEY, P., SKOTNICKI, M. & BERGSTROM, D.M. 2005. Biological invasions in the Antarctic: extent, impacts and implications. *Biological Review* 80: 45-72.
- GASTON, K.J., JONES, A.G., HANEL, C. & CHOWN, S.L. 2003. Rates of species introduction to a remote oceanic island. *Proceedings of the Royal Society (B)* 270: 1091-1098.
- GLASSPOOL, A.F., WARD, J.A., de SILVA, H., STERRER, W. & FURBERT, J. 2003. A biodiversity strategy and action plan for Bermuda – a recipe for success. *In*: M. PIENKOWSKI ed. *A Sense of Direction: a conference on conservation in UK Overseas Territories and other small island communities*. Over Norton: UK Overseas Territories Conservation Forum, 34-38. Available from: <http://www.ukotcf.org>.
- JONES, A.G., CHOWN, S.L. & GASTON, K.J. 2003b. Introduced house mice as a conservation concern on Gough Island. *Biodiversity and Conservation* 12: 2107-2119.
- JONES, A.G., CHOWN, S.L., WEBB, T.J. & GASTON, K.J. 2003a. The free-living pterygote insects of Gough Island, South Atlantic Ocean. *Systematics and Biodiversity* 1: 213-273.
- KAIRO, K., BIBI, A., CHEESMAN, O., HAYSOM, K. & MURPHY, S. 2003. Invasive species threats in the Caribbean region. Report to the Nature Conservancy by CAB International. Available from: [http://www.issg.org/database/species/reference\\_files/Kairo%20et%20al,%202003.pdf](http://www.issg.org/database/species/reference_files/Kairo%20et%20al,%202003.pdf)
- OUTERBRIDGE, A., DOBSON, A., CAREY, W. & WARD, J. 2003. Introduction to Bermuda's environment and conservation issues. *In*: M. PIENKOWSKI ed. *A Sense of Direction: a conference on conservation in UK Overseas Territories and*

## Non-native species in UK Overseas Territories: a review

*other small island communities*. Over Norton: UK Overseas Territories Conservation Forum, 19-31. Available from: <http://www.ukotcf.org>.

PRESTON, C.D., PEARMAN, D.A., & DINES, T.D. eds. 2002. *New atlas of the British flora: an atlas of the vascular plants of Britain, Ireland, the Isle of Man and the Channel Islands*. Oxford: Oxford University Press.

PROCTER, D. & FLEMING, L.V. eds. 1999. *Biodiversity: the UK Overseas Territories*. Peterborough: Joint Nature Conservation Committee.

SHEPPARD, C.R.C. & SEAWARD, M.R.D. 1999. *Ecology of the Chagos Archipelago*. Linnean Society Occasional Publications 2. London: The Linnean Society.

UK OVERSEAS TERRITORIES CONSERVATION FORUM. 2005. *Annual Report 2004/05*. Over Norton: UK Overseas Territories Conservation Forum. Available from: <http://www.ukotcf.org>.

## Annex 1. Structure of the database

**Database contents.** The dataset is compiled within an Excel spreadsheet. Access to it can be gained electronically through the JNCC web site.

**Territory pages.** Each Territory has a separate page (worksheet) listing the non-native species found there and contains the following fields (each with a brief description of their content).

**Taxon.** Each species has been assigned to a taxon category: plants by family, vertebrates by class and invertebrates by order. This approach seemed to give reasonable sized groups, with (for the most part) relatively familiar sounding names. This field was originally meant to use the same format as the 'organism type' field from the CABI database where species are described as, for example, plant – tree/creeper/shrub, or vertebrate – bird/mammal/reptile. However, for species not included on the CABI database (Kairo *et al.*, 2003) it was not always obvious into which category they should be placed (e.g. some plants were classed as shrubs in one place and trees in another).

**Scientific name.** The first encountered or most commonly used Latin binomial for each species.

**Synonyms.** Any other Latin binomials used for that species, including alternative spellings of the main name.

**Status.** The pages for the Caribbean Territories have an extra field ('*Status (CABI)*') which includes their classification on the CABI database (as exotic, naturalised or invasive). The Gibraltar page contains a similar column, describing the status of some plant species derived from the Upper Rock Nature Reserve Management Plan. The Falklands Islands and Cayman Islands pages also have columns containing classifications made by local experts. Species in these Territories that are not included on these lists have no entry for this field, nor do the other Territories. No decisions were made when compiling the data as to whether species are 'invasive' or not.

**Common name.** Any common names used for that species.

**Broad habitat.** This is another field taken from the CABI database (see status section above). Species are classified as either 'terrestrial', 'marine' or 'freshwater'. Where a species regularly uses two habitat types, both are included, e.g. some wildfowl may be classed as 'terrestrial/ freshwater'.

**Date of introduction.** Any information relating to when the species arrived in a Territory (and so may include two or more contradictory sources). For some species there is information on when a species was first recorded in a particular Territory (which may be many years after it was introduced).

**Ecological effects (known).** Any information on the ecological effects a species is known to be having in a specific Territory.



**Ecological effects (suspected or potential).** Information on the ecological effects a species is suspected of having or which it potentially might have (perhaps if its range or numbers increase).

**Routes of entry into a Territory.** How the species is known or suspected to have arrived in the Territory. Again, this field might contain information from two or more contradictory sources.

**Modes of transmission within a Territory.** How the species disperses within the Territory. For example, plants may spread by vegetative propagation or by setting seed. Domesticated mammals may be deliberately moved around by humans.

**Current distribution in a Territory.** Information on where the species is currently found. A lot of this information is currently very sketchy. For Territories consisting of many islands there is little information available on exactly which islands have been colonised by a particular species. Where a species is listed as occurring at only one or a few sites, it is possible that it also occurs at other sites from which no records have yet been made (or were not uncovered by this study).

**Potential distribution in a Territory.** Any information on the maximum potential distribution of each species within each Territory (i.e. the total suitable habitat for each species – some plants may be restricted to areas with a particular climate, whilst commensal rodents might be found wherever there are humans)

**Actions so far (control, education, research).** Information on any invasive species initiatives that have been carried out within each Territory. This could include information on raising public awareness and other educational programmes, successful and unsuccessful eradication or control projects (including feasibility studies), and research or monitoring of introduced species.

**Actions planned.** Any information on planned measures against invasive or non-native species measures. Can include proposed eradication/ control projects, education programmes etc.

**Desired outcomes.** From a conservation point of view, what is the desired outcome for any particular introduced species? For those that are found to be harmless, no action needs to be taken (though continued monitoring might be advisable). For others causing ecological problems, eradication or control might be appropriate according to circumstances. For species for which their ecological effects are currently unknown, more detailed research may be the first step.

**References page.** Relevant references are collected into a general section and sections for each of the Territories. The fields here are mostly self-explanatory.

**Territory.** References may be specific to one Territory or contain information on more than one Territory (in which case they are classed as ‘general’ in this column).

**Reference number.** Each reference has a unique number used in the text of other parts of the database.

## Non-native species in UK Overseas Territories: a review

**Author/s.** Names of authors.

**Year.** The year of publication for books, journals and websites, and the year the information was provided for personal communications.

**Title.** Title of the article, chapter etc. Personal communications (i.e. unpublished information) are listed as 'pers. comm.' in this field.

**Location.** This specifies the journal, website or other location from which the report is available. Contact details of people making personal communications are removed from public versions of the database.

## **Annex 2. Summary of a workshop on invasive species in the UK Overseas Territories**

### **Introduction**

This workshop was held at JNCC, Peterborough on 9 January 2004. It was attended by UK-based representatives of the government departments, agencies and NGOs with an interest in invasive species in the UK Overseas Territories. The meeting was held for the purposes outlined below and, especially, to build on the work commissioned by JNCC (and undertaken by Karen Varnham) to collate a database of non-native species in the UK Overseas Territories (OTs) and Crown Dependencies.

#### Purpose of the workshop

- To assess, validate and identify gaps in knowledge of dataset of invasive species in OTs.
- To share experiences of dealing with invasive species in OTs and to compare with the mainland GB approach.
- To discuss approaches to setting priorities for the eradication and prevention of establishment of invasive species in OTs.
- To determine next steps in how this work should develop including consultation with OTs, dissemination of results, practical applications etc.

The morning sessions enabled participants to present a short update on work which they were doing and which was relevant to the topic. These presentations are not summarised here but copies of the programme, presentations and / or overheads may be available on request. During the afternoon discussion session, participants reviewed the structure and contents of the database and also discussed ways of prioritising invasive species projects. These notes summarise those discussions.

### **1. Database review**

#### **Database structure and content**

- The database will be most useful in providing baseline information rather than acting as an analytical tool. It is not feasible for it to contain all the information necessary to enable invasive species projects to be prioritised, but it can have a useful role in directing people to appropriate references and knowledgeable individuals. It also gives a quantifiable indication of the scale of the problem within and between OTs.
- There was some doubt as to whether only invasive non-native species were to be recorded or whether all non-natives should be recorded, of which those species which were an ecological threat would be a sub-set. It was agreed that the adopted practice of recording all non-natives should be continued, judgements as to invasiveness could be made as appropriate.

## Non-native species in UK Overseas Territories: a review

- Each individual who has provided information as personal communications should be given a separate number in the reference page, including the report's author. (Note: this has now been done).
- A special note should be made of species that are invasive or non-native in one or more OTs, but threatened elsewhere, especially in their native range (e.g. Bermuda cedar *Juniperus bermudiana*).
- On each of the OT pages extra columns could be added for each of the Ramsar sites within the OT. Introduced species within that site could be marked with a tick, giving an accessible list of which species are present in each site. This would enable the database to make a significant contribution to UK reports to this MEA. Perhaps similar columns could be added for other protected areas such as nature reserves.
- Distributions of non-native species within territories should be recorded where this is feasible. Whilst this would be relatively simple, for example, for the three Cayman Islands it would be much less practical for the British Virgin Islands. It was felt to be important that the database not become too complex as this would inhibit the submission of information.
- A column for 'beneficial impacts' could also be included in the database, containing information about ecological, cultural or economic benefits of particular species. E.g. *Prosopis* sp. (timber and animal feed), *Casuarina* sp. (shade trees) and oleander (popular ornamental plant).
- 'Ecological effects elsewhere' could be included in another column on each of the OT pages. However there is already space for this information in the species summary page (Column i).
- The database should record eradication attempts, whether successful or not. In fact, these are recorded under the 'Actions so far' column.
- The 'desired outcomes' column (included on each of the OT pages) should be overtly linked to the actions referred to in the 'actions planned' column. Otherwise, it may be taken to representing the full range of views that may be expressed in relation to control or eradication programmes.
- It was noted that the date of establishment recorded in the literature was often many years after the species actually became established – the lag being due to delays in a species being recorded by someone sufficiently competent to identify it.
- There were relatively few non-native species identified that related to the marine environment or which were linked to aquaculture. However, this was not because they were deliberately ignored, simply that there was no information available upon them.
- The CABI database on Caribbean invasive species will be [publicly] available in due course.

### **Future work**

- Before sending it out to the OTs, the database could usefully be sent to more people in the UK for comment and additional material. Members of the contact group could be helpful in identifying key UK-based individuals to send it to and, perhaps, in contacting them directly in cases where they might be more likely to respond to known rather than unknown correspondents.
- There should be a deadline for UK and OT/CD contributions, to avoid the process dragging on indefinitely.
- The database should eventually be hosted on a suitable website (this can be done on the JNCC website), where it will be maintained, be kept up to date and be publicly available. The UKOTCF conference could be a useful mechanism to encourage periodic updates. There should be links to and from the database to other relevant sites (e.g. those of contact group organisations and other similar database resources, e.g. UKOTCF, GISP).
- Staff of contact group organisations (NGO and government) could take an active role in helping OT people add to the database when they are visiting the OTs for other purposes.

### **Information to send out to the OTs with the database**

- We should state when and where the database will eventually be available online (as far as is possible at this stage).
- Spell out the advantages to the OTs of contributing to the database – e.g. it could assist with funding applications, provide a valuable educational resource, support work on environmental charters etc.

## **2. Prioritising invasive species projects**

The group discussed approaches to prioritisation of projects. It was agreed that the longer term goal should be to prevent non-native species becoming established in the first place. However, where non-native species already exist and threaten native biodiversity then an approach needs to be taken for addressing short-term solutions. In other words, a long-term strategic solution needs to tackle the invasive species problem at both ends – preventing new introductions and eradicating/ controlling alien species already present. Such a strategy needs to include short-term crisis management actions as part of an integrated programme of prevention, early detection, control and eradication of problem alien species linked to education and awareness raising issues. These approaches can often best be thought of as a matrix, examples of which were presented and discussed.

### **Long-term approaches - preventing new alien species becoming established**

- Preventing the introduction of new alien species is extremely important, but the database does not include information on species that are not yet present in an OT (except for a small amount of info in the ‘notable invasive species not yet present’ column in the ‘OT summary’ page), nor was it designed to do so.
- It is more useful to look at the pathways by which new species are arriving in a territory, rather than looking individually at each species – one pathway can allow access by many species. Some information on entry pathways of species already found in the OTs is included in the ‘routes of entry’ column on each of the OT pages.
- The approaches taken in other countries could be useful as a means of applying lessons learned. The New Zealand approach (in paper from Rachel Garthwaite) addresses the issue at pre-border, border and then post-border stages with different emphasis for each.
- Currently there is little information available on what measures are in place in each of the OTs to prevent the introduction of new alien species. An audit of these measures would be a desirable first step. It could be difficult to justify additional spending on prevention measures without knowing more about the present situation. Such an audit needs to look at the issue more broadly (e.g. at human, plant & animal health) than looking at the implications for nature conservation alone.
- The audit of OT’s preventive measures is likely to be a significant piece of work in its own right and probably could not be undertaken as part of the current work on the database. The subject might need to be the basis of a separate study, assuming that this was seen as desirable by the OTs. One way of addressing the issue was for the subject to be a topic of the proposed UKOTCF conference in 2006.
- It is likely that the main obstacle to better preventive measures in the OTs is a lack of resources and capacity, and this is not something that the OTEP fund was intended to support.
- The introduction of new alien species is closely linked to the increase in global trade and travel. As this trend is likely to continue, the most cost-effective solution will be to invest in prevention measures now. Regional initiatives offer a number of benefits, especially in sharing the burden of preventive actions. Actions also need to focus on the sources of non-native species.
- Money invested in preventing the establishment of new alien species does not show short-term results in the way that money invested in eradication projects can and is often seen as less attractive to funding sources. This might deter prevention projects from being carried out.

### Short term priorities

- To aid the distribution of funds from the Overseas Territories Environment Programme, it was felt to be beneficial to have some guidance as to what the priorities should be for support from the fund (pending the development of longer-term approaches). It was felt that such short-term measures (typically eradication or control but which could include emergency preventive actions) should directly benefit the conservation status of:
  - i) globally threatened species;
  - ii) endemic species; and
  - iii) internationally or regionally important populations (including assemblages and habitats).Local cultural priorities should also be considered.
- Bids for such work should ideally be supported by an analysis of the risks, costs and benefits of doing (and of not doing) the proposed control and of the likelihood of success of any actions.
- The group noted there may be a bias towards eradication/ control projects that benefit threatened bird species, as there is often more baseline information available on their status and so on the benefits that are likely to accrue.
- Projects designed to prevent new alien species becoming established could also qualify as short-term emergencies, e.g. preventing the arrival of a species newly detected in an area which was known to be likely to damage features of interest such as those described above.
- One approach to prioritising individual invasive species eradication/ control projects would be to assess them using a matrix detailing of the problems they are likely to resolve (along the top) and eradicability (down the side). Species with high scores for both criteria would be priorities and could then be assessed by what it would cost to eradicate/ control them.
- Detailed and accurate feasibility studies would be extremely valuable in deciding which projects to fund. Funding feasibility studies may be a better use of money than to sink it into ill thought through eradication attempts.

## **Annex 3. Contact with contributors to the project**

Potential contributors were sent an email describing the project and asking for their assistance. In addition, they were sent notes on the structure and content of the database and extracts from it relevant to the potential contributor. The email and notes are reproduced below, along with a summary of contributors to the project..

### **1. Typical email sent to potential contributors**

*Dear ...*

*As some of you know, I am currently working on a project for the Joint Nature Conservation Committee in the UK to set up a database of non-native species in the UK Overseas Territories (OTs). The aim of the project is to learn more about the scale of the non-native species problem in the OTs and to help prioritise where action needs to be taken.*

*For the first phase of the project I have been collecting information mostly from written sources – papers, reports, websites etc, from both published and unpublished sources. This has been very successful and so far well over 900 non-native species have been recorded throughout the OTs. For the second phase we are looking to people with direct knowledge of OT conservation issues to update and add to the information gathered so far. We hope that this database will become a useful resource for OT conservationists, educators and other interested people. Eventually we hope to have the database online where it will be accessible to all who are interested in OT conservation issues.*

*I am attaching the ... page of the database here and would be extremely grateful if you would be able to look through it and make any additions or amendments to the contents. Any additional information would be welcome. In any event, I thought you might be interested to see the data we have so far. If you are not able to contribute at the present time, I'd be interested to know of any people who might be able to do so, or of any papers or reports where I might be able to find more information. If you have any comments or questions about the database project, or the contents of this particular page, do let me know and I'll get back to you ASAP. I'm also attaching a short note on the contents of the database and how to add to it – basically the golden rules are to reference everything (even if it's a personal communication) and to make any additions or changes in a different colour so I can see what you've done. To avoid the project dragging on too long, I'd like to collect in any responses by mid-May, with the aim of finishing the database by the end of May 2004.*

*I look forward to hearing from you,*

*Best wishes,*

*Karen Varnham*



## **2. Further information about the database sent to potential contributors (adapted from a document written as part of the first phase of the project, April 2004)**

**Which species have been included?** I have included all the non-native species that I came across. Many of these species are not recorded as invasive in the ecological sense, but I felt it would be better for the local experts (OT residents and the scientists working there) to identify which species are causing problems, than for that decision to be made for them. Also, it is likely that some of the non-native species known to be present are having detrimental ecological effects but that these effects have not yet been recognised.

How information has been referenced. All entries are referenced, with the exception of scientific and common names for taxa and broad habitat type. All of the referenced entries are followed by a number in brackets, each corresponding to a different source (books, published or unpublished reports, web sites and reliable personal communications). These are all included in the 'References' page, arranged by territory. Some references, which are not specific to one particular territory, are included in a 'General' section, at the top of the list. For the Caribbean OT pages, some information has been taken from the CABI Caribbean Invasive Species Database. References taken from this source have been given a new number and are included in the reference page here (they are all listed as having come from the CABI database in the 'location' column of the 'References' page).

In keeping with the policy of only including data validated by outside sources, a lot of seemingly obvious information has been left out. This includes such things as 'Routes of entry into territory' and 'Methods of transmission within territory', which are fairly obvious for things like rats, but less obvious for some plants and invertebrates.

Adding information. All contributions will be gratefully received. Please make any additions or amendments in a different colour so I can easily see where changes have been made, and add them to the main database. All comments should be referenced, but these references can be personal communications (i.e. unpublished information) as well as things published in reports, papers etc. References should all go in the 'References' page of the datasheet (as you might expect).

### 3. Responses received from consultations

#### Responses from contacts in Overseas Territories

<b>Territory/ name</b>	<b>Contact</b>	<b>Affiliation</b>	<b>Date replied</b>
<b>Anguilla</b>			
	Karim Hodge	Anguilla Government	21/04/04
	Avon Carty	Anguilla National Trust	21/04/04
	Mary Walker		12/05/04
<b>Ascension</b>			
	John Hughes		22/04/04
	Alex Jones		19/05/04
<b>Bermuda</b>			
	Annie Glasspool	Bermuda Zoological Society	23/04/05
<b>British Antarctic Territory</b>			
	Ron Lewis Smith	British Antarctic Survey, UK	04/06/04
	Helen Peat	British Antarctic Survey, UK	18/05/04
	Pete Convey	British Antarctic Survey, UK	01/06/04
	Bill Block	British Antarctic Survey, UK	27/05/04
<b>BIOT</b>			
	Charles Sheppard	University of Warwick, UK	22/04/04
<b>British Virgin Islands</b>			
	Nancy Woodfield	National Parks Trust, BVI	21/04/04
	Lianna Jarecki	H. Lavity Stoutt Community College, BVI	21/04/04
	Bruce Potter	Island Resources Foundation, BVI & US	21/04/04
	Judith Towle	Island Resources Foundation, BVI & US	21/04/04
	Shannon Gore		11/05/04
<b>Cayman Islands</b>			
	Mat Cottam	Department of the Environment, Cayman Islands	29/04/05
<b>Cyprus SBA</b>			
<b>Falklands</b>			
	Andy Douse	Department of Planning, Falkland Islands	29/04/04
	Alastair Lavery	RSPB	05/05/04
	Alex Jones		19/05/04
<b>Gibraltar</b>			
	John Cortes	Gibraltar Ornithological & Natural History Society	✓
<b>Montserrat</b>			
	Geoff Hilton	RSPB	28/05/04
<b>Pitcairn Islands</b>			
	Mike Brooke	University of Cambridge, UK	27/05/04
<b>South Georgia</b>			
	Sally Poncet		13/05/04
	Michael B Usher	University of Stirling	11/05/04
<b>South Sandwich Islands</b>			
	Pete Convey	British Antarctic Survey, UK	01/06/04
	Ron Lewis Smith	British Antarctic Survey, UK	04/06/04

## Non-native species in UK Overseas Territories: a review

<b>St Helena</b>		
Rebecca Cairns-Wicks	St Helena National Trust	22/04/04
Alex Jones		19/05/04
Isabel Peters	Development and Economic Planning Dept, St Helena	25/05/04
Neil McCulloch		12/05/04
<b>Tristan da Cunha</b>		
Alex Jones		19/05/04
<b>Turks &amp; Caicos Islands</b>		
Bryan Naqqi Manco	Turks & Caicos National Trust	06/06/04
Glenn Gerber	San Diego Zoo, US	22/04/04

### Responses from contacts in Crown Dependencies

<b>Territory/ contact name</b>	<b>Affiliation</b>	<b>Date replied</b>
<b>Guernsey</b>		
Charles David	Société Guernesiaise	11/05/04
<b>Isle of Man</b>		
Liz Charter	Department of Agriculture, Fisheries and Forestry, Isle of Man	23/04/04
Kate Hawkins	Biological Records Centre, Manx Museum	29/06/04
Isle of Man Bird Atlas		23/06/04
Philippa Tomlinson	Centre for Manx Studies, University of Liverpool, UK	29/06/04
<b>Jersey</b>		
Andrew Syvret	Société Jersiaise	12/05/04
Mike Freeman	States of Jersey	-

### List servers contacted

<b>Name</b>	<b>Contact details</b>
Herpdigest	asalzberg@herpdigest.org
Aliens-1 (list server of the IUCN Invasive Species Specialist Group)	Aliens-1@indaba.iucn.org
Caribbean Invasive Species Group	carib_ias_threat@yahoogroups.com
Caribbean Biodiversity	caribbean-biodiversity@yahoogroups.com
Caribbean Territories	carib-territories@yahoogroups.com
Caribbean Environmental NGOs	carib-ngo-forum@yahoogroups.com



**JOINT NATURE CONSERVATION COMMITTEE  
REPORT DISTRIBUTION**

Report number	372
Contract number/ JNCC project number	F90-01-657
Date received	June 2004
Report title	Non-native species in UK Overseas Territories: a review
Contract title	Invasive non-native species in UK Overseas Territories
Contractor	Karen Varnham
Comments	<p>All copies marked with an asterix are to receive copies of the publication with an enclosed CD of the database.</p> <p>The report provides the first comprehensive review by desk study of the occurrence of non-native species in the UK Overseas Territories &amp; Crown Dependencies. The review should contribute to measures aimed at eradicating, controlling and, more importantly, preventing the future establishment of, non-native species.</p>
Restrictions	None

**DISTRIBUTION:**

**JOINT NATURE CONSERVATION COMMITTEE**

Nominated Officer (Vin Fleming)	1 copy
Author (Karen Varnham)	2 copies
JNCC report collection	2 copies
International Unit	1 + top copy, spares
David Stroud	1 copy
Jim Reid	1 copy
Ian McLean	1 copy
FCO (Sustainable Development & Commonwealth Group)	2 copies

## Non-native species in UK Overseas Territories: a review

FCO (Overseas Territories Department)	2 copies
DfID (Overseas Territories Department)	2 copies
Defence Estates	2 copies
Department of Constitutional Affairs	1 copy
Defra	3 copies
Royal Botanic Gardens Kew	2 copies
British Antarctic Territory	4 copies
CSL	2 copies
Forestry Commission	1 copy
UK Overseas Territories Conservation Forum	2 copies
RSPB	3 copies
Royal Society	1 copy
CAB International	1 copy
Oliver Cheesman	1 copy
Co-operative Islands Initiative	1 copy
IUCN Global Invasive Species Database	1 copy
IUCN Global Invasive Species Programme	2 copies
Birdlife International	1 copy
Professor Michael B Usher, University of Stirling	1 copy
Anguilla Government	1 copy*
Anguilla National Trust	1 copy*
Mary Walker (Anguilla)	1 copy*
Ascension Island Government	1 copy*
Bermuda Zoological Society	1 copy*
Bermuda Government	1 copy*
BIOT Administration, FCO	1 copy*
BIOT Ecological Adviser	1 copy*
British Virgin Islands Government	1 copy*
BVI National Parks Trust	1 copy*
BVI H. Lavity Stoutt Community College	1 copy*
BVI Island Resources Foundation	1 copy*
Cayman Islands Government Dept of Environment	2 copies*
Cayman Islands National Trust	1 copy*
Cayman Island Blue Iguana Recovery Programme	1 copy*
Cyprus Sovereign Base Areas (per Defence Estates)	1 copy*
Falkland Islands Government	1 copy*
Falkland Conservation	2 copies*
Gibraltar, Government of	1 copy*
Gibraltar – GOHNS	1 copy*
Guernsey Government	1 copy*
Guernsey – Societe Guernesaise	1 copy*
Isle of Man – Dept of Agric, Fish & Forests	1 copy*
Isle of Man, Biological Records Centre, Manx Museum	1 copy*
Isle of Man, Bird Atlas project	1 copy*
States of Jersey – Government	1 copy*
Jersey – Societe Jersiaise	1 copy*
Montserrat Government	1 copy*
Montserrat National Trust	1 copy*

## Non-native species in UK Overseas Territories: a review

Pitcairn Islands Government	2 copies*
Pitcairn Islands Administration	2 copies*
Pitcairn Islands – Henderson Management Committee	2 copies*
South Georgia & South Sandwich Islands – Government	1 copy*
SGSSI – Sally Poncet	1 copy*
St Helena Government	1 copy*
St Helena National Trust	2 copies*
Tristan da Cunha Government	1 copy*
Tristan da Cunha – Alex Jones	1 copy*
Turks & Caicos Islands Government	1 copy*
TCI National Trust	1 copy*

### **ENGLISH NATURE**

HQ Library, Northminster House	2 copies
--------------------------------	----------

### **SCOTTISH NATURAL HERITAGE**

HQ, Library, Edinburgh	2 copies
Dr Andy Douse, Advisory Services, Inverness	1 copy

### **COUNTRYSIDE COUNCIL FOR WALES**

HQ, Library, Bangor,	2 copies
----------------------	----------

### **OTHERS - relevant recipients who must receive copies:**

Copyright Libraries Agent, 100 Euston Road, London NW1 2HQ	5 copies
---	----------

British Library, Legal Deposit Office, Boston Spa, Wetherby, West Yorkshire LS23 7BQ	1 copy
--	--------

TSO Bibliographic Department, 51 Nine Elms Lane, London. SW8 5DR	1 copy
---	--------

Zoological Record (Thomson Zoological Ltd) Innovation Centre, York Science Park Innovation Way Heslington York YO10 5DG	1 copy
---	--------

NHBS 2-3 Wills Road Totnes Devon TQ9 5XN	5 copies
---	----------

Pam Moncur Scottish Natural Heritage Publication Department Battleby, Redgorton Perth PH1 3EW	1 copy
---	--------