

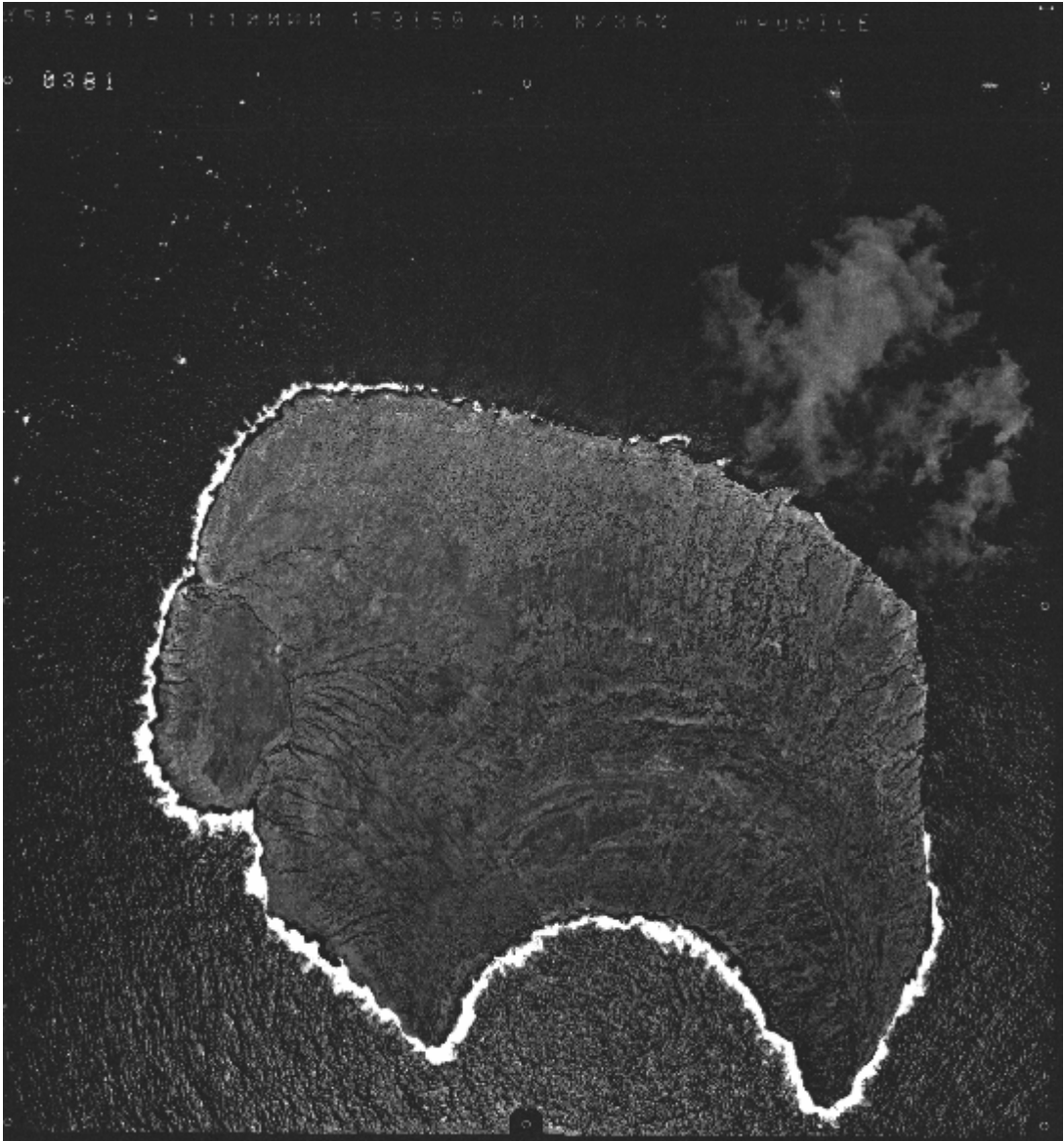
**A MANAGEMENT PLAN**  
**FOR THE**  
**RESTORATION OF ROUND ISLAND**  
**MAURITIUS**  
**2008-2012**

**MWF REVISED VERSION FEBRUARY 2010**



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**Fig 1. Aerial view of Round Island**

## Summary and recommendations (Updated from Merton *et al.* 1989)

Round Island is of exceptional biological importance because:

1. It is the only relatively large island in the Mascarenes free of introduced mammals and reptiles; it is also one of the very few remaining elevated islands in the world that is rodent-free.
2. It supports the last remnants of a palm rich forest once characteristic of the northern plains of Mauritius and is free of major woody weed species.
3. It is home to at least ten threatened native plant species, including nine taxa endemic to Mauritius, and is potential habitat for many threatened plant species that could be introduced or reintroduced.
4. It is home to possibly eight taxa of native reptiles including six were that are endangered: two geckos, two skinks and two primitive boa snakes. All of these taxa are endemic to the Mascarenes and five were until 2006 now occur only on Round Island.
5. It is the only known breeding ground in the Indian Ocean for the rare Round Island petrel and an important breeding site for three other species of seabird.

These biological values were under threat as a result of over 150 years of modification by introduced rabbits and goats. The eradication of goats in 1979 and rabbits in 1986 saved much of the remaining biota of Round Island from destruction and has facilitated the possibility of the restoration of the island to a condition more like that of the nineteenth century.

**A realistic management goal for Round Island is to restore the island's palm-rich forest and hardwood forest, secure the future of the island's endangered plants and animals, use the island as a refuge for a limited number of endangered Mauritian plant and animal species and as a source of reptiles for translocation onto other islets.**

To achieve this goal 13 specific objectives need to be addressed within five years of the publication of this plan:

1. Maintain consistent and continuously improve effective precautions against introduction of alien animals and plants.
2. Attain effective control or eradication of all problem weeds
3. Secure the Round Island populations of the ten species listed in 6.3 of threatened native plants that were present in 1986 using appropriate techniques.
4. Intensify the restoration process in areas with suitable soils.
5. Re-establish hardwood species formerly recorded on the island and others likely to have been present where possible.
6. Continue the assessment of the population biology and ecology of the Round Island Keel-scale Boa, Guenther's Gecko and Durrell's Night Gecko and Telfair's Skinks in order to gather relevant info for planned translocations
7. Where possible establish wild populations of threatened geckos, skinks and snakes now found only on Round Island on other rat-free islands.
8. Continue the search for the Round Island Burrowing Boa in order to confirm its survival or extinction.
9. Survey the invertebrate fauna of the island.
10. Establish viable populations of carefully selected endangered plant species from Mauritius.
11. Secure seabirds populations, and consider use of the island as a refuge for selected endemic land birds.
12. Increase our understanding of the process of soil erosion on the island and implement soil conservation measures as appropriate.
13. Continue existing, and establish on-going monitoring and research programme, incorporating field trials where appropriate, that will measure the effectiveness of all management and restoration techniques used on the island.
14. Introduce and manage tortoise grazers to benefit the native grassland community and help control invasive species.

**To achieve these objectives, the following also need to be met:**

15. Maintain sufficient experienced and appropriately qualified staff and effective and safe infrastructure for effective implementation of Round Island management objectives.
16. Use the conservation importance of Round Island and the restoration activities being carried out as a flagship to raise public awareness and support for conservation on Round Island and in the Republic of Mauritius as a whole.
17. Secure sufficient funding to implement Round Island management objectives
18. Investigate Round Island as an important meteorological centre
19. Explore the use of Round Island as a scientific whale and dolphin observatory
20. Implement a viable administrative framework for Round Island

**The management of Round Island must be integrated into that of other Mauritian islets, which need to be considered as a unit for conservation purposes. As such, this management plan is integrated into the Islets National Park Strategic Plan (2004). Other strategic plans and policies such as the National Biodiversity and Strategic Plan (2006-15) and the National Environmental Strategies for the next decade (ERM, 1999) and the Non Sugar Sector Strategic Plan (2003) all pleaded for a strategic and integrated approach to islets management. The restoration and multipurpose use of these islets should be carried out as per approved management plans. These plans and policies have all recommended that Round island be classified as a closed Nature Reserve and will be used strictly for the purpose of conservation and protection of native biodiversity.**

THE REPUBLIC OF MAURITIUS  
A Management Plan for the Restoration of Round Island  
(2008-2012)

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## **PREFACE**

The restoration of Round Island is a celebrated conservation success story. Due to decades of tireless work to remove introduced species and restore the forest, the island has been transformed from a barren dying desert to a vibrant ecosystem that provides a haven for several endemic plant, reptile and insect species, to large seabird colonies, and to the last fragment of palm forest that is left in the Mascarenes. For many of these species this small offshore islet represents their only home on earth.

Although we must congratulate ourselves on these successes, our work to protect vulnerable ecosystems from introduced species can never stop. If it did, the hard work and investment over the last 35 years could be lost overnight.

This document, the Round Island Management Plan 2008-2012, provides a comprehensive management plan for the continued protection and restoration of this precious island for the next five years. It builds upon the plan that was completed in 1989 and that has helped to drive the work on the island for the last 15 years.

The restoration of Round Island to date has involved collaboration between national government agencies, NGOs and international scientists and organisations. It has been financed by the Government of Mauritius and international agencies. This level of collaboration and cooperation has been, and continues to be part of the driving force behind the conservation of this island, and I believe that this management plan will ensure that one of the biodiversity treasures for the Republic will continue to remain a bright star for global biodiversity.

**Honourable Satya Veyash FAUGOO**  
**Minister of Agro Industry, Food Production & Security**

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All photographs courtesy of Ashok Khadun, except Fig 1 (Ministry of Housing and Lands), Fig 20, 21 (Christine Griffiths).

## 1. Introduction

Merton *et al.* produced the first management plan for Round Island in 1989. The overall vision for the management of the island and the goals and objectives needed to attain this vision have changed very little since this time. However, after over a decade of further conservation experience on Round Island it is clear that some of these objectives need to be revised and others removed. There also additional objectives, the need for which has only become clear over the past ten years.

This current management plan clearly articulates the overall objectives of the Round Island management programme for the next five years. It does not go into detail on the history of the island; this can be found in Merton *et al* (1989).

Detailed information about the quarantine procedures, the plant restoration plan, the weed strategy plan, and a protocol in the event of rediscovering a Burrowing Boa are provided as separate documents and available on the National Parks and Conservation Service (NPCS) & Mauritian Wildlife Foundation (MWF) websites.

In June 2006 a Darwin Initiative project to restore island reptile communities was initiated. Following consultation it was agreed that the first reptile translocations proposed within the Darwin project should commence. To date four reptile species have been translocated to rat free islands within their former range, two of these reptiles are from Round Island (Durrell's night gecko to Ilot Chat, and Telfair's Skink to Gunner's Quoin and Ile aux Aigrettes). To determine the success of these initial translocations, the survival, population growth and impact of these reptile species upon the recipient islands are being closely monitored. The findings will be used to set the protocols for future translocations involving the other Round Island reptiles. The strategic plan for future translocations will be written and agreed upon by the major stakeholders within this three year Darwin project.

The current management plan is part of the MWF and NPCS efforts to carry out islet management in line with best practices. An annual evaluation of prevailing management practices will be carried out in order to assess their efficacy in relation to this management plan. An annual work plan for the upcoming year will be produced following this evaluation. Additional documentation will also be revised annually as part of this process.

Conservation work on the island is carried out by the Mauritian Wildlife Foundation through a Memorandum of Agreement with the NPCS, and using funding from NPCS and other sources. MWF must provide regular progress reports to NPCS, and both parties will also meet regularly to set tasks and targets.

An updated Management plan will be produced at the end of 2012

## **1.1 Contact Information**

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## **1.2 Location**

Round Island, one of the group of six islets off the north coast of Mauritius, is situated 22.5 km NE of Cap Malheureux at latitude 19° 54'03"S and longitude 57° 47'03"E (Fig 1.).  
Area: 169 ha. (officially), although when determined from digital maps, was found to be 219 ha  
Maximum altitude 280m.

## **1.3 Map coverage**

Current maps available include:

- 1: 100,000 Series Y682 (DOS 529) edition 5 -OS 1994
- 1:25,000 Series Y881 (DOS 329) SHEET 14 edition 6-OS 1991
- Map B in (Bullock *et al.*, 1982)

## **1.4 Aerial Photographic coverage**

This is available from Ministry of Lands and Housing.

## **1.5 Site Status**

Round Island was classified as a Nature Reserve in 1957. The regulations governing Nature Reserves are contained within the Forests and Reserves Act No.41 of 1983. Round Island has always been effectively a closed nature reserve (IUCN, 1999) as recommended by the islets taskforce (2001) and the Islets National Park Strategic Plan (2004), but this status has no basis in law as yet.

## **1.6 Tenure**

Round Island is under the jurisdiction of the Ministry of Agro Industry and Fisheries, Mauritius. The island is administered jointly by NPCS and MWF. A Memorandum of Agreement signed between these parties in 1994, and renewed in 2006 includes collaborative actions for projects undertaken on Mauritius and offshore islets, including Round Island. An MOA dealing specifically with the management of Round Island will be signed shortly by the two parties

## **1.7 Access**

Access to the island by boat is very difficult as there is usually a high swell and almost the entire island is bordered by jagged rocks descending steeply into the sea. A low relatively flat rock on a relatively sheltered situation on the west coast (the "landing rock") is the only location that can be used for the loading and unloading of equipment and personnel from boats. It is located approximately 1.5 km from the Round Island field station and is accessed via a steep, hot, rock gully to the southwest ridgeline. Due to the consistent trade winds and associated rough seas from June to November the island is not usually accessible by boat. During this period, and episodes of rough seas at other times, the only safe and reliable access to the island is by helicopter.

## **1.8 Infrastructure**

### **1.8.1 Field Station and associated facilities**

A semi permanent field station was constructed on the island from January - April 2002. The field station was built to facilitate the greater activity on the island that was deemed to be necessary for the scaling up of restoration activities (Section 5). The field station is built with treated pine. It comprises of a kitchen and dining area, an office and store, a bedroom designed to sleep four people and a veranda. The roof is constructed of prepainted iron sheets.

The house has a limited 12 and 240-volt electricity supply via 7 solar panels. The solar panels capture light which is channelled to 6 batteries found under the field station. Two solar charging controllers maintain the electricity at 12- and 24- volt. Part of this electricity is transformed in 240-volt electricity using a sinewave inverter. This provides enough electricity for lighting, a computer, a telephone, a fridge and sundry other electrical equipment. There is also one 240-volt generator for emergency backup and for powering high voltage equipment such as power drills and rock breakers used away from the field station. Cooking is by bottled gas.

Communications are maintained via a radio link telephone which also allows internet and e-mail access. In addition there is a cell phone on the island so that in almost all circumstances telephone contact with the mainland should be possible. These telephones can be used by staff when travelling alone on the island. The Round Island field station is also part of a VHF radio network that is linked to all other Mauritian field stations in which MWF operates and MWF's Vacoas office. In addition there are two handheld radios for use in the field. There is a marine radio for contact with the Mauritius Ports Authority and National Coast Guard and fire flares for emergencies.

The Round Island field station is equipped with a laptop computer with internet facility. All data collected on the island is entered into databases on this computer and backed up regularly on the mainland. The GIS program Arcview is an essential tool of the work on the island: GPS locations and maps for all planting sites, weed sites, sea-bird nest sites, Guenther's Gecko egg sites are stored, analyzed and used as tools for future work. For all planting sites regular monitoring data including survivorship, growth and fixed point photos are collected. There is a weather database with daily recordings of temperature, rain and wind for the last four years. All reptile data is collected in excel database for each species. Another database contains all discoveries and checks of new exotic weeds that are to be eradicated. In addition digital copies of all reports, datasheets and projects related to Round Island are kept on the computer.

Water supply is via water catchments and storage tanks around the field station area. Drinking water is filtered from this stored water via a portable, solar battery/12-volt powered water filter. The filter pumps water from the source and through a 5.0 micron sediment pre-filter. The water then passes through a carbon-polishing filter that has the capabilities of removing harmful contaminants. The polished filtered water is then channelled past an ultraviolet light for disinfection, which provides pure drinking water.

Organic waste is composted in a compost bin. Non-degradable waste is compacted as far as possible and returned to the mainland for disposal. A composting toilet was constructed in July 2002.

### **1.8.2 Water catchments**

A great deal of effort has been made to catch water from bare rock slopes on Round Island in order to provide a supply to irrigate restoration plantings and for use for those living on the island. The first water catchments were constructed in December 2001 and these have been added to since this time. There is now 53,000 litre of water storage capacity on the island.

## **1.9 Transport**

Helicopter access is provided by the courtesy of the Mauritius Police Helicopter Squadron at a discounted rate of Rs5, 000 per hour, which has been revised to Rs 29,900 per hour in February 2007. Boat access is used whenever the weather and the sea conditions permits

## **1.10 Administration and staffing**

Round Island has a team of three wardens (one of whom may be the Head Warden) who work on the island for four-week periods followed by two weeks off the island. This time is divided between rest and recuperation and attending to Round Island-related matters on the Mauritian mainland. In addition there is a MWF Islet Plant Restoration Manager who is based on Round Island and Ile aux Aigrettes where the bulk of the plants for Round Island are grown. This core staff is joined by other staff from MWF and NPCS as they are needed, usually for periods of less than four weeks.

The day-to-day restoration work is managed by the Round Island Wardens according to an agreed work plan. In collaboration with NPCS, MWF Managers provide overall management of the project.

## **2. Environment**

### **2.1 Physical**

#### **2.1.1 Climate**

The driest period extends from September to November during which time droughts are frequent. The wettest period is concentrated between December and March, which is also the tropical cyclone season. Cyclones, where winds exceeding 250 km/hr can occur, are usually accompanied by torrential rains. The western, leeward, side is the hottest and driest part of the island, while the east, summit, south and the southeast slopes, which are under the influence of the south east trade wind, are cooler and wetter. The upper southeast slopes of the island are sometimes cloud capped, especially in summer. There are no meteorological stations on Round Island to provide accurate weather data for the island although a rain gauge has provided rainfall data for the vicinity of the field station since 18 July 2002.

#### **2.1.2 Hydrology**

The big swells of the open sea around the coastline cause considerable salt sprays around the islet. Due to its porous rock, steep slopes and gullies, there is little accumulation of water, other than in small ephemeral pools. Flash floods occur during heavy rains.

#### **2.1.3 Geology**

The island is a basaltic volcanic cone, probably dating between 25000-100000 years, which is considerably younger than the major volcanic mountains of Mauritius (Saddul, 1995). Slopes are steep, averaging 10-15° over the lower two-thirds of the island, and 20-25° in the upper third. The crater, which has been breached and partly eroded away by wave action from the southeast, forms the eastern side of the island where the slope averages about 30°. There are two distinctive level areas in the south west of the island known as 'helipads'.

The rock throughout the island is composed of successive beds of welded tuff formed from deposits of volcanic ash with some coarse ejecta, mostly scoriaceous, but containing a few large boulders of solid basalt. Some calcareous boulders exist at the summit and quartz can be found along fissures in the rock. The tuff beds dip steeply towards the sea on all sides of the island.

Weathering and erosion from wind and water is very active and the overlapping ash beds have been sculptured into numerous cavernous overhangs, steps, pedestals, and other weird shapes. Flooding during high intensity rainstorms has cut ravines throughout the island that become deeper as the shoreline is approached. In the northwest these gullies extend to below sea level. The northern end of the island is a mixture of narrow ledges and very steep slopes and 50-100 m high sheer cliffs which bound the greater part of the shoreline. During the last glaciation when the sea level was lower, it is believed that Round Island and all northern islets were connected to Mauritius.

#### **2.1.4 Soils**

Nineteenth century records indicate that some parts of the island were covered with a rich and deep layer of soil while other parts were barren, particularly in the southeast, which is more exposed to the trade winds (Lloyd, 1846). Lloyd reported that in most parts on the island there was sufficient soil for the growth of the native palms.

The surveys carried out by Johnston (1993) form the basis of the current knowledge of the soils on the island. Most of the soils on Round Island were found to be sandy loams with a relatively uniform texture. The soil has little structure and very poor profile development. The Round Island soils have been classified into two types: *Lithic leptosols* on the western facing slope and *Dystric leptosols* with *Dystric regosol* components found mostly on the southern spur area.

The Round Island soils are generally acidic, in particular in the Wedge-tailed Shearwater burrow areas, where soil pH is as low as 5.0. Phosphorus levels are high but nitrogen is low. Percentage organic matter averages a little over 5% but is very variable. There appears to be no deficiencies of the key elements necessary for plant growth.

The soil depth varies considerably; in sheltered areas, soil can be as deep as 30cm and usually 11-30cm. Some of the deepest soils are found in the Old Camp gully, in the south west of the island, where they often reach a depth of 60cm. In most parts of the island where soil is present it is very shallow, averaging about 5cm in depth.

## **2.2 Biological**

### **2.2.1 Flora**

A detailed analysis carried of the vegetation types on Round Island in 2003, defined 7 distinct types (Johansson 2003). The seven major vegetation types defined are: closed palm forest, open palm forest, mixed weed community, herb-rich weed community, rock slab community, the "helipads" and the summit community.

Each of these communities contains Critically Endangered species, but perhaps the most renowned is the closed and open palm forest, dominated by three Mauritian endemic species, all of which are considered to be threatened (*Sensu* IUCN 1999) either because of low absolute numbers or limited numbers of populations in Mauritius as a whole.

The one remaining individual of the hurricane palm (*Dictyosperma album* var *conjugatum*) on Round Island is the last known wild individual of the taxon. Fortunately, attempts at saving this taxon from extinction have been successful. In 1990 Wendy Strahm collected viable fruits from the recumbent tree on the southwest slope that died after Cyclone Hollanda in 1994. 50 plants were propagated and have now been planted out on Ile aux Aigrettes which has served as a refuge for this Critically Endangered palm. More recently, the personnel of the National Parks and Conservation Service has succeeded in propagating more than 250 plants, but the exact location of all of these plants now is not known (Dulloo *et al.* 1996). Attempts at re-introducing a dozen of these plants onto Round Island have not been successful. However, a few individuals originating from this stock have been successfully introduced on Ile aux Aigrettes.

The Round Island Bottle Palm (*Hyophorbe lagenicaulis*)(**Fig 2**) is grown as an ornamental in Mauritius and throughout the tropics. These individuals are of unknown provenance and the last wild population is restricted to Round Island. By 1988 the Bottle Palm was reduced to only eight adult trees and six juvenile plants that miraculously escaped the rabbits. Many of the adult trees have now died and only two of the founder individuals are now left but high levels of recruitment following the eradication of rabbits has resulted in increasing densities of bottle palms on Round Island. Some of these new recruits started to fruit in the late 1990's.



**Fig 2. *Hyophorbe lagenicaulis***



**Fig 3. *Latania loddigesii***

The Blue Latanier *Latania loddigesii*(**Fig 3**) is the most abundant palm on the island covering extensive areas on the western and northern slopes. Round Island contains the largest Latanier population in Mauritius. Recruitment has considerably increased since the eradication of rabbits.

The largest remaining population of *Pandanus vandermeerschii*(**Fig 4**), one of ten extant Mauritian endemic screwpines or 'Vacoas', is found on Round Island. Like the Latanier, it is considered to be Critically Endangered because of its restricted distribution. It has also increased in number since the eradication of rabbits.



**Fig 4. *Pandanus vandermeerschii***



**Fig 5. *Fernelia buxifolia***



Only two native hardwood species, *Gagnebina pterocarpa*(**Fig 6**) and one individual of *Fernelia buxifolia*(**Fig 5**) were still present on Round Island prior to the beginning of active restoration work. Recently a number of other hardwood species have successfully been introduced to the island (Appendix 1).



**Fig 6. *Gagnebina pterocarpa***



**Fig 7. *Lomatophyllum tormentorii***

Another of the rare plants of the island is the Critically Endangered *Lomatophyllum tormentorii*(**Fig 7**). This species is only known from two locations: Round Island where it is not common and Gunner's Quoin, where it is abundant. It has been slowly gaining ground on Round Island since the eradication of rabbits.

Previously known also from mainland Mauritius and Rodrigues, *Aerva congesta*(**Fig 8**), a tiny prostrate herb is now found only on Round Island. There is a population of perhaps 100 plants around the two flat areas in the southwest. It seems that increasing vegetation cover, particularly by *Ipomoea pes-caprae* ssp *braziliensis* may be threatening these plants. It has been successfully propagated on Ile Aux Aigrettes for the field gene bank and for re-introduction on Round Island.



**Fig 8. *Aerva congesta***



Other rare plants include *Chloris filiformis*, *Vetiveria arguta*, *Phyllanthus revaughanii*, *Selaginella barklii*, *Asparagus umbellulatus*, and *Dichondra repens*. Although these species occur in other locations, the populations on Round Island are important as they may represent a different genetic stock. It is important to recognise that most of these are also threatened by expanding exotic vegetation on the island. Actions to address this issue need to be considered in the plan. These should include no further efforts to vegetate key areas such as the helipads.

The first comprehensive list of plant species on Round Island was made by the Edinburgh University expedition in 1975, which recorded 43 species (Bullock & North, 1975). Strahm recorded 55 species in 1986 and Dulloo made a list of 60 species in 1993 (Bell *et al.*, 1994). 114 species are currently known from the island. This increase in numbers reflects growing numbers of weed species and native introductions or reintroductions. Plant species found on Round Island are listed in Appendix 1. Some new arrivals such as *Lantana camara*, *Chromolaena odorata* and *Mikania micrantha* may be significant new colonisers and should receive priority action.

The vegetation communities of Round Island have retained a wide range of their original elements although they have been severely modified since the 1800's and were threatened by herbivores. Highly invasive woody weeds have not reached the island. However, those weeds already present occupy large areas of the island following goat and rabbit eradication.

### 2.2.2 Fauna

Round Island's relative isolation and difficult access have helped to protect its native reptile fauna, which is internationally famous. These reptiles once existed on the mainland of Mauritius but were probably extirpated due to the impacts of introduced rats and other alien vertebrates (Arnold 1980, Cheke 1987). Eight species of reptiles still exist on Round Island, seven of which are endemic taxa to Mauritius (Appendix 2). Five species were until 2006\* restricted to Round Island; Guenther's Gecko (*Phelsuma guentheri*) (Fig 9), Durrell's Night-gecko (*Nactus durrelli*) (Fig 12), Telfair's Skink (*Leiolopisma telfairii*) (Fig 15), Keel-Scaled Boa (*Casarea dussumieri*) (Fig 13), and Burrowing Boa (*Bolyeria multocarinata*). The latter boa is considered extinct by IUCN as it has not been seen for more than 32 years despite intensive searches. Telfair's Skink, Guenther's Gecko, and Keel-scaled Boa were known to be present on Flat Island and Gunner's Quoin but are now extinct on these islands, possibly a reflection of the susceptibility of these species to introduced predators. These are all large bodied species indicating, possibly, that larger species are more prone to extirpation than smaller bodied species. Their continued existence on Round Island highlights the integrity and importance of the reptile community on Round Island. Bojer's skink (*Gongylomorphus bojerii*) (Fig 11) is only found on some of the small islands off Mauritius, while the Ornate Day Gecko (*Phelsuma ornata*) (Fig 10) is widespread on offshore islands and coastal regions of the mainland. The eighth species, Bouton's Skink (*Cryptoblepharus boutonii*) is widespread in the Western Indian Ocean. The only confirmed reptile extinctions from Round Island are limited to Giant Tortoises (*Geochelone* spp.).



Fig. 9. *Phelsuma guentheri*



Fig. 10. *Phelsuma ornata*



**Fig. 11. *Gongylomorphus bojerii***



**Fig. 12. *Nactus durrelli***



**Fig. 13. *Casarea dussumieri* (Adult)**



**Fig. 14. *Casarea dussumieri* (Juvenile)**



**Fig. 15. *Leiopisma telfairi***



Round Island is also an internationally important seabird island. A list of the seabird populations and the number of nesting pairs on the Mauritian Northern islets is given in Appendix 3. Round Island has the only Indian Ocean breeding colony of Trindade Petrel (*Pterodroma arminjoniana*) (Fig 17). This petrel is taxonomically closely related to the Kermadec Petrel (*P.neglecta*), which also breeds on Round Island.



Fig. 16. *Phaethon lepturus*



Fig. 17. *Pterodroma arminjoniana*

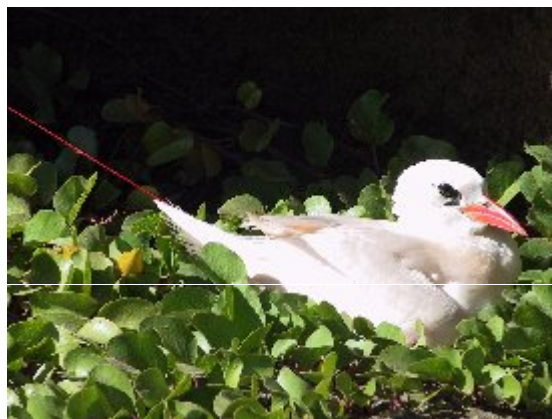


Fig. 18. *Phaethon rubricauda*

The taxonomic position of the Round Island Petrel is still unresolved and it appears to be a hybrid of three petrels (Trindade Petrel, Kermadec Petrel and the Herald Petrel); apparent intermediates are seen on the island (Tatayah, 2007). Round Island has the largest colonies in the Mascarenes of Wedge-tailed Shearwater (*Puffinus pacificus chlororhynchus*), Red-tailed Tropicbird (*Phaethon rubricauda*) (Fig 18) and possibly also the White-tailed Tropic Bird (*Phaethon lepturus*) (Fig 16). Breeding Bulwer's Petrel (*Bulweria bulweri*), and Black-winged Petrel (*Pterodroma nigripennis*), not known to be breeding, have also recently been found on Round Island.

\* Under a Darwin Initiative funded project, two reptiles restricted to Round Island were translocated to predator free offshore islets in December 2006. Telfair's Skink were reintroduced to Gunner's Quoin and Ile aux Aigrettes, and Durrell's Night-gecko have been introduced to Ilot Chat. These represent the first endemic reptile reintroductions in the Mascarenes.

Sightings of a Flesh-footed Shearwater (*Puffinus capensis*) with a brood patch, Audubon's Shearwater (*P.lherminieri bailloni*), a Little Shearwater (*P. assimilis*), a white-necked Petrel (*Pterodroma cervicolis*) and Barau's Petrel (*Pterodroma barau*) have been documented from the island suggesting that small numbers of these species may occasionally breed there. The native Little Green Heron (*Butorides striatus*) breeds on the island in small numbers. The African Black Swift (*Apus barbatus*) has also been spotted on the island. For a review of seabirds and landbirds, refer to Tatayah (2007).

There have been several collections of invertebrates from Round Island. The 1975, 1982, 1989 and 1996 and 2003 expeditions of Bullock and North looked at the abundance of invertebrate food supply of the reptiles. These specimens were only identified to order or family level (Bullock *et.al.*, 1975, Bullock et al. 1983, Bullock & North, 1991). Nicholas Pike collected invertebrates on Round Island and collected the only example of a spectacular tenebrionid beetle, (Pike 1873). This beetle is very similar to a species currently known only from Fregate Island, Seychelles.

A new species of sap-sucking scale insect, *Asterolecanium targioni tozzetti* (Homoptera: Asterolecaniidae) was discovered on *Dictyosperma album* var *conjugatum* (Williams & Mamet, 1986). Centipedes new to science were collected in 1993 on Round Island and Serpent Island (*Scolopendra abnormis*), in 1995 on Round Island only (*Rhysida jonesi*), as well as *Cryptops decoratus*, previously recorded from Madagascar (Lewis 2002). Several new species of *Coccidia* endoparasites in the genus *Eimeria* have been identified from Round Island reptiles (Leinwand *et al.*, 2005). An endemic wingless stick insect, first collected by Nicolas Pike on Round Island in 1870, has recently been described as *Apterograeffea marshallae*. It may have been present on mainland Mauritius, but is now restricted to Round Island (Cliquennois & Brock 2002).

Three species of land crabs are known from Round Island: *Geograpsis grayi* which is common, *G. stormi* which is rare, and a species of Hermit crab, which is also common. An endemic variety of land snail, *Tropidophora fimbriata* var. *haemostoma* is also confined to Round Island, where it is moderately common, and represents the largest living variety of this snail (Griffiths & Florens, 2006). Two other native snail species are also known from Round Island, *Quickia concisa* and *Gastrocopta microscopica*.

### 3. Evaluation of Features

#### 3.1 Naturalness

Round Island has retained many of its original elements although the tortoise trade and the introduction of rabbits and goats have vastly changed its landscape. Even though some native plant species are now regenerating, large areas that were once forested are still barren. The island has a recovering seabird and reptile community (although one or both endemic tortoises have been extirpated from the island). The island is free of all introduced mammals and reptiles, in sharp contrast with mainland Mauritius and many of its other offshore islets E.g. Agamid Lizard, House Geckos and Indian Lesser Wolf-snake on Ile aux Aigrettes; House Geckos on Flat Island, Gabriel and the Mahebourg Bay islets (except Ilot Vacoas); Indian Blind-snake on Flat Island, Ile aux Aigrettes and Ile de la Passe. However, due to human interference, the island has lost many of its former species, notably its tortoises and bats (Cheke, 1987) which are likely to have had key ecological roles in grazing and dispersal.

The goats and rabbits that were introduced to the island in the nineteenth century have had a tremendous impact on the island in reducing its vegetation cover, causing large-scale soil erosion and eliminating the native hardwood forest. Nevertheless, the island is relatively free of woody weeds, which cause major problems on the mainland and elsewhere. The only exotic woody plant present on Round Island is *Desmanthus virgatus*, which is much less pernicious than many other species present on the mainland and on other islets.



**Fig. 19. Naturalness**

With the elimination of mammalian herbivores the bare areas are now becoming colonised by the native creepers *Ipomoea pes-caprae* and *Tylophora coriacea*, as well as introduced species. The elimination of vegetation cover caused through human intervention has drastically reduced the stability of the steep slopes of the island. Soil blocks, first experimented with in 1993, appear to be quite effective in collecting soil (Daszak 1994) though reliable evaluations of their efficacy have yet to be undertaken. Some soil blocks have become rapidly colonised with plants, albeit mainly exotics grasses and herbs, but they are helping to conserve soil that would have otherwise been washed down to the sea.

Until recently Round Island has never been occupied for long periods of time, although various visitors have spent variable lengths of time on the island since the nineteenth century. The field station and infrastructure for water catchment erected in 2002 represent the only significant constructions on the island. Amongst the human artefacts that can be found on the island are some aluminium and iron stakes and pegs to demarcate study areas and for tents, gun cartridges left during the eradication of rabbits and goats and by other shooting parties and musket balls, and a range of litter (especially glass bottles) left by campers and other occasional visitors in the past.

### 3.2 Fragility

The fragility of Round Island has been vividly demonstrated by the devastation caused by introduced goats and rabbits. The risk of introducing alien animals, particularly house geckos, rodents, shrews and ants as well as weedy plants, is becoming a growing concern with the increasing number of visits to the island. Four important new weed species have been located in just over a decade. These are *Achyranthes aspera* in 1992, Spear grass *Heteropogon contortus* in 1994 and Triffid weed or Siam weed *Chromolaena odorata* in October 2000. The former is now one of the major weed species on Round Island. In 2006, another very serious and highly invasive plant Minute a mile *Mikania micrantha* was found. The only adult plant was already full of mature fruits. The whole plant was smothered under thick black plastic sheeting. The stem was cut and the plant perished under the heat of the plastic. Subsequently, few very young seedlings were removed and no new plants have been seen since. *Heteropogon* is still very localised close to the Camp area and in four other sites on the island. It has the scope of expanding since there are many open habitats available for its spread. *Chromolaena* has been uprooted several times from a three patches. *Chromolaena* is one of the world's worst weeds in warm dry areas (Wittenburg and Cock 2001) and it has the potential to become the most serious weed on the island.

With the elimination of goats and rabbits, a number of fast growing exotics are becoming serious problems on the island. Merton *et al.*(1989) highlighted two exotic species, namely *Desmanthus virgatus* and *Desmodium incanum*, as being the most serious threats to the vegetation of Round Island and recommended that regular weeding trips (3 to 4 a year) be undertaken to work towards the eradication of these two weeds (Section 5). During the past decade, Round Island has witnessed a change in vegetation cover, with new weeds species that have become more widespread than *Desmanthus* and *Desmodium*. The major species of current concern in addition to *Desmanthus* and *Desmodium* are *Achyranthes aspera*, *Cenchrus echinatus*, *Abutilon indicum*, *Conyza canadensis*, *Dactyloctenium ctenoides* and *Chloris barbata*. Of these, *Cenchrus* and *Achyranthes*, despite their recent introduction in the early 1990's, have gained considerable ground and are the dominant species in many parts of the island. These species may well be interfering with the regeneration of some of the island's native plant species. There is evidence to suggest that the native grass *Vetiveria arguta* is being outcompeted by alien grasses principally, *Cenchrus*, *Dactyloctenium*, and *Chloris barbata*. See the Round Island Weed Management Plan for a comprehensive review of the weed control strategy for Round Island.

It is envisaged that with the introduction of the giant tortoises many of the exotic weeds will be brought under greater control.

So far rodents have not reached the island, and the one House Gecko (*Hemidactylus frenatus*) that did arrive was killed. However, their introduction is a real possibility if adequate precautions during visits to the island are not taken or if an accidental shipwreck occurs close to the island. Rodents,

in particular rats, can lead to extinctions of the reptiles, birds and plants as has been the case on mainland Mauritius and other islets. The survival of the reptile community is dependent on the absence of such predators. Predation on birds can also lead to a reduction in the input of nutrients to the island, in the form of guano and this may affect the fertility of the soil and invertebrate abundance. It is feared that the introduction of House Geckos to Round Island could result in the extinction of *Nactus durrelli* as it has been found that the former evict *Nactus* from refugia, where they then face predation. House Geckos are additionally very aggressive to *Nactus* (Cole *et al* 2005).

The loss of soil and reduced vegetation cover on the island has also affected the reptile community. Although most reptile species seem to have proven to be very resilient to the drastic environmental changes that took place on Round Island in the last two centuries, at least one species, the Burrowing Boa might have become extinct. In addition, one (or both) endemic Mauritian Giant tortoises (*Geochelone spp.*), last seen in 1846 has been extirpated from Round Island

Before the construction of the field station and permanent presence on the island, regular incidences of sea bird poaching were recorded (Tatayah 2006). Birds were hunted for their meat considered to be an aphrodisiac by some and it was rumoured that this delicacy was on the menu in several restaurants in the northern part of Mauritius. Poaching continues unabated on Gunner's Quoin, where there is no permanent presence.

Several of the Round Island reptile species are likely to have a very little genetic variation at the population level that may make them very vulnerable to ecological changes on the island.

The increasing grass cover over the island has increased the island's vulnerability to damage by fire. The recently introduced *Heteropogon contortus* grass is particularly prone to fire, as is shown in parts of mainland Mauritius where it burns (accidental or criminal) annually during the dry season. It is important that measures be taken to prevent the incidence of fire on the island such as a restricted smoking policy, provision of fire fighting equipment, preventing scattering of broken glass bottles on the island, etc.

The physical landscape of Round Island is also very fragile. The volcanic tuff is very friable and easily broken off and can be damaged by trampling. This makes Round Island unfit for large parties of visitors. The denuded soil is exposed to the vagaries of weather like high winds and heavy rainfall, which cause extensive soil erosion problems on the island.

### **3.3 Potential value**

*The presence of a unique combination of endemic plants and animals and the absence of alien mammals and major woody alien plants makes Round Island one of the richest scientific reserves in the conservation world. The various scientific and management work carried out on the island since the 1970's have now become a model that has been used internationally in similar conservation projects around the world.*

The eradication of rabbits from an area as large as Round Island was a remarkable achievement at the time (Merton 1987) and since this time the experiences on Round Island have been used as a model for the eradication of rabbits from other islands.



Round Island has become a 'living laboratory', where one can study ecology of reptiles, birds and plants, ethology of various animal species as well as the impacts of alien species eradication on the ecological changes on the island. Round Island has now been the subject of detailed ecological studies for the past 32 years. Since 1975 the vegetation, reptile and bird communities have been studied and monitored regularly (North & Bullock 1986, North *et al.* 1994, Bullock *et al.* 2002). Vegetation has also been studied through a series of 15 permanent quadrats, which have now been expanded into 20 permanent quadrats to answer specific questions. The near permanent presence on the island offers further scope for detailed long-term studies.

The conservation work being undertaken on the island is of great value. It offers an opportunity to develop restoration techniques for the re-establishment of native communities that can be used to inform restoration of other similar islands elsewhere in Mauritius and in other parts of the world.

Round Island is also a potential habitat for the introduction of many threatened plants that cannot be sustained elsewhere. In addition it has potential to act as a refuge for animal species that are threatened on mainland Mauritius.

Round Island has the potential to be used as a training centre for ecologists and conservationists to learn about ecosystem structure and function and restoration activities. In this context the unique fauna and flora offers opportunities for pure research work at tertiary level. These possibilities must be balanced against the fragility of the island.

### **3.4 Public Use**

The physical nature of Round Island, its accessibility and fragility does not make it suitable for extensive public use. The treacherous terrain and difficult boat access is a major deterrent for potential visitors. As previously outlined, the island is very fragile and vulnerable. Increasing visitor access to the island will exacerbate all the risk factors outlined in Section 4.2. The on-going restoration activities on the island by MWF and NPCA are not compatible with regular visitor access.

However, it is important that the public is made aware of the work carried out on site in order to obtain their support and co-operation, especially when we consider the bird poaching by local fishermen that occurred in the past. The value of the island to the public, both nationally and internationally must be highlighted. Flat Island offers great opportunities for providing exposure to islets conservation works due to its large size and the fact that it can receive controlled visitors. With further development of the National Coast Guard post on Flat Island, it must be used for an intensification of the control of illegal activities around the northern Mauritian islets.

### **3.5 The site in wider perspective and implications for management**

The management of Round Island cannot be considered in isolation from the other five islets in the northern islets group. Many of the conservation activities for threatened animals, particularly the reptiles, would require the use of the other islets as satellite habitats. These islets may also be a source of material for restoration work on Round Island. For example, *Psiadia arguta* from Gabriel



Island is used as a pioneer for re-vegetating parts of Round Island. Limited funding and capacity for restoration work may mean that it will be necessary to plan phased restoration work for the islets as a whole. For example intensive restoration work on Flat Island could commence as Round Island restoration work becomes less intense. Clearly conservation experience on one or more of these islets is likely to have great relevance to activities on other islets. It is therefore imperative that this management plan is fully integrated into the Islets National Park Strategic Plan (2004). This will provide the context within which individual islet management plans can be developed.

#### **4. Development of Conservation activities on Round Island**

Visits by several amateur naturalists were effected in the 19<sup>th</sup>C. In the 20<sup>th</sup> C, further interest was spurred by Jean Vinson in the late 1930's onwards, and the interest continued by his son, Jean Michel Vinson and others (e.g. Frank Gill, Stanley Temple, Anthony Cheke), as from the 1960's and 1970's (see review in Tatayah 2007). However, conservation activities on Round Island can be dated to 1975 when the first comprehensive ecological study of the island was undertaken by the Edinburgh University Expedition (Bullock and North 1976). A series of permanent quadrats to monitor vegetation changes on the island was established. The last sighting of the Burrowing Boa was made during this expedition. Population sizes of the plants, reptiles, rabbits and goats were estimated. The first serious attempt at eradicating these herbivores was carried out during this expedition when 883 rabbits and all but two goats were shot (Bullock 1977). David Bullock and Steve North have been coming back to Round Island to carry out repeat vegetation and reptile surveys every seven years since 1975.

In 1976 Gerald Durrell and personnel from the Durrell Wildlife Conservation Trust (DWCT) made their first visit to the island. This visit led to the active involvement of DWCT in the conservation of endangered reptiles and the support of management activities on the island. Telfair's Skinks, Guenther's Geckos and Round Island Keel-scaled Boas were taken to DWCT for the start of extensive studies on the captive breeding and biology of these species (Durrell 1976).

Goats were finally eradicated from the island in 1979. In 1986 rabbits were eradicated in a three month operation (Merton 1987). This was followed by an expedition in 1988 to assess the success of the rabbit eradication campaign and to monitor vegetation change following this. This expedition led to the production of the first Management Plan of Round Island (Merton *et al.* 1989).

Between 1990 and 1998, there were regular management trips to Round Island for weeding of potentially invasive plants principally *Desmanthus virgatus* and *Desmodium incanum*. These trips were undertaken jointly by the Mauritius Government and MWF. The weeding of *Desmanthus virgatus* and *Desmodium incanum* was abandoned in 1998 as eradication was deemed not to be feasible.

In 1993 an Operation Raleigh expedition stayed on the island for a continuous period of a month (Daszak, 1994). The first use was made of soil and gully blocks. That year marked the first extensive ringing work on Round Island Petrels with over 250 birds rung. Samples from reptiles from Round Island and other islands were collected for DNA studies. This resulted in the describing of the Night Gecko as a distinct species *Nactus durrelli* (Arnold & Jones 1994).

In the same year an ODA team visited Round Island and other islets around Mauritius and Rodrigues for developing an overall management plan for offshore islets (Bell *et al.* 1994). This work resulted in the eradication of Brown Rats (*Rattus norvegicus*) and Indian Lesser-naped Hares (*Lepus nigricollis*) from Gunner's Quoin, Ship Rats (*Rattus rattus*) from Gabriel Island and House Mice (*Mus musculus*) from Ile aux Cocos and Ile aux Sables, Rodrigues in 1995 and cats, mice and Ship Rats from Flat Island. Indian Lesser-naped Hares and rabbits (*Oryctolagus cuniculus*) introduced in 1996, were eradicated from Gunner's Quoin in 1995 and 1997 respectively.

Funding from GEF through the World Bank was secured for the 'Mauritius Biodiversity Restoration Project' from 1996-2001, for the restoration of Ile aux Aigrettes, nature reserves in Rodrigues and Round Island. The Round Island component emphasised pilot planting activities in addition to weeding. Survivorship of plants planted on Round Island proved to be very poor. It was not always possible to coincide expeditions with appropriate planting times as visits were for short periods of time and had to be planned well in advance. This exacerbated the risk for the plants that were already under stress because of need to bring plants bare-rooted to the island for quarantine reasons.

From 2002 it has been possible to carry out more intensive restoration work with the securing of the World Bank GEF funding for the 'Restoration of Round Island' project. The project provided funding towards the construction of a semi-permanent field station. There were also funds for permanent Round Island staff. Before this project began personnel would work on Round Island for a small fraction of their time. Currently there is a nearly year long presence on the island. This, together with a supply of water on the island, has lead to much more successful restoration plantings than ever before. Increased staff time on Round Island has enhanced our ability to undertake more detailed monitoring and ecological studies than was previously possible.

The considerable conservation effort and experience accumulated on Round Island over more than a decade has allowed us to refine our management goals and objectives. These are outlined in Sections 5 and 6.

## **5. MANAGEMENT GOAL**

The following management goal is modified from Merton *et al.* (1989):

**To restore the island's palm-rich forest and hardwood forest, secure the future of the island's endangered plants and animals, use the island as a refuge for a limited number of endangered Mauritian plant and animal species and as a source of reptiles for translocation onto other islets**

## 6. Management Objectives

Broad management objectives are stated and detail is given of the measures needed to fulfil these objectives. Where measures are not currently being carried out the degree of progress achieved towards their implementation is discussed. Documents containing further details are referred to throughout.

### 6.1 Maintain consistent and continuously improve effective precautions against introduction of alien animals and plants

*Further detail: A Guide to Visiting Round Island (Appendix A), the Round Island Plant Restoration Plan (Appendix B), the Round Island Weed Management Plan (Appendix C).*

Quarantine is one of the most important components of our management of Round Island. Serious pest and weed outbreaks could destroy those features that make Round Island such a valuable conservation site. This could more than nullify all our conservation efforts.

1. Legislation. The Forests and Reserves Act (1983) states that no plant or animal should be introduced to a nature reserve. This includes islet nature reserves. This act may need to be reworded to state that plants or animals can be introduced to a nature reserve for conservation purposes only.
2. Storage of materials to go to Round Island in a rodent proof building. This is not currently the case but acquisition of such a building is a priority.
3. Sealing of boxes, crates, tents and other equipment, use of plastic crates.
4. Check on stores and equipment prior to departure.
5. All visitors to Round Island must read and understand the document *A Guide to Visiting Round Island*
6. All visitors to Round Island must not eat fruits specified in *A Guide to Visiting Round Island* for twenty four hours prior to their visit.
7. All visitors to Round Island must ensure that their clothing and footwear are completely free of seeds, and this must be checked by an experienced officer.
8. Check on boats. This is very difficult to implement but needs to be done, possibly by conducting training exercises with the National Coast Guard.
9. Check on helicopters. Helicopters are much less likely to be carrying pests and plant material than boats but nonetheless there is some quarantine risk. The comments made above in regard to boats equally apply to helicopters. This responsibility rests with the captain before the helicopter leaves the hangar.
10. Maintain helicopter take off area to a weed-free site as is being currently done with the help of the Forestry Service. The current site used at Petit Raffray is surrounded by a waste ground that is home to 49 weed species. In the long term a purpose built helipad should be constructed, which is not close to any possible weed sources. In the interim, the Petit Raffray helipad (present volley-ball pitch) and sufficient buffer area should be transferred to the Ministry of Agriculture and a more efficient weed control ensured at all times. The cemented area should be increased significantly. There is also a need to address the potential for island to island movement of species and applying contingency and quarantine arrangements to those movements as well.
11. Inspection of gear during unpacking.
12. Contingency plans against pest and weed introductions produced and a rodent destruction kit, insecticides, herbicides and black plastic kept on island to destroy incipient pest and weed outbreaks. If rodents are detected on the island, a rat-poisoning grid will be

established around the area of detection. The grid will be established in consultation with individuals experienced in rat-eradication procedures, in order to reduce risk to other fauna on the island and ensure maximum effectiveness of the eradication.

13. Monitoring for signs of introduced animals.
14. Access to island by permission only.
15. No permanent mooring points close to Round Island.

## **6.2 Attain effective control or eradication of all problem weeds**

*Further details: The Round Island Weed Management Plan.*

Precautions against introducing new weeds are detailed in this document. This section discusses the control of species already present on Round Island.

1. Periodic searches throughout the island will be conducted for species prioritised for eradication and control of new introductions.
2. Management action shall be according to the weed eradication flowchart in *The Round Island Weed Management Plan*.
3. Localised weed management around plantings will be carried out as necessary.
4. The fate of the native herbaceous community on Round Island will be investigated and weed management will be carried out in localised patches as necessary.

## **6.3 Secure the Round Island populations of the ten species of threatened native plants that were present in 1986 using appropriate techniques**

*Further details: The Round Island Plant Restoration Plan.*

Management options for each species are discussed in *The Round Island Plant Restoration Plan*. The management options are of seven kinds:

1. Seed sowing in favourable areas specifically targeting *Hyophorbe lagenicaulis* and *Pandanus vandermeerschii*
2. Planting seedlings raised in the island's nursery e.g. *Gagnebina pterocarpa*, *Vetiveria arguta*, *Aerva congesta*, *Fernelia buxifolia*, *Phyllanthus revaughanii*, *Phyllanthus mauritianus*, *Asparagus umbellulatus*
3. Weeding and planting in localised patches e.g. *Aerva congesta*. Investigate the re-introduction of *Aerva congesta* to other offshore islets and Rodrigues.
4. Transplanting e.g. *Hyophorbe lagenicaulis*, *Pandanus vandermeerschii*
5. DNA studies on the *Dictyosperma album* var. *conjugatum* are still inconclusive. The best strategy is to ensure that all known plants are safeguarded and when seeds are obtained, an attempt will be made to grow seedlings for restocking on Round Island.
6. Make optimum use of natural seedlings

## **6.4 Intensify the restoration process in areas with suitable soils**

*Further details: The Round Island Plant Restoration Plan.*

Natural recovery of *Latania* is proceeding well in certain areas, notably the palm rich forest in the southwest. However, natural recovery is much slower for some species (*Hyophorbe*, *Pandanus*) and for some areas (eg East Round Island). These species and areas need greater attention. It is proposed that the locations in these areas are planted with native pioneers in order to provide propagule sources for the surrounding area for future years.

The following measures are being undertaken in order to enhance the restoration process in these areas.

1. Plant out nursery-grown pioneers and for wind breaks mainly *Latania*, *Pandanus*, *Hyophorbe*, *Scaevola taccada*, *Tournefortia argentea* but also other species in order to enhance diversity.
2. Provide water to these plants as necessary.
3. Protect planted areas against Shearwater burrowing as necessary.
4. Sow seeds into restoration areas.
5. Treat restoration planting and seed sowing as field trials in order to gain valuable information to aid future restoration work on Round Island and elsewhere.
6. Restore the tussock community on Round Island(e.g *Vetiveria arguta* and *Cymbopogon excavatus*)

## **6.5 Re-establish hardwood species formerly present on the island and others likely to have been recorded where possible**

*Further details: The Round Island Plant Restoration Plan.*

The process of re-establishing a hardwood community has been initiated. The species planted are agreed by a sub committee of practitioners, but the list needs to be periodically reviewed. Hardwoods will continue to be planted as appropriate using techniques detailed in *The Round Island Plant Restoration Plan*. However, planting programmes in the short- term will prioritise the head starting of pioneers and the use of Round Island as a refuge for endangered species as these will offer relatively greater immediate gains. Priority must also be given to the restoration of the hardwood community described by Barkly (1870) and Johnston (1894) that existed below the summit.

## **6.6 Continue the assessment of the population biology and ecology of the Keel-scale Boa, Guenther's Gecko and Durrell's Night-gecko and the Telfair's Skink in order to gather relevant information for planned translocations**

Efforts to establish appropriate and robust methods for regular monitoring have begun and concentrate on identifying differences in relative abundance between habitat types and indicators of population change (Burn & Underwood 2001). The programmes also aim to understand breeding success, longevity, mortality of these species in view to assist in the analysis of the success of future reintroductions on offshore islets.

Ecological research into the Keel-scaled boa has been initiated using radio tagging and thrice weekly night searches. There is also a programme of surveying chosen Guenther's Gecko egg sites to provide basic information on the species natural history, which was upgraded to a full PhD study. Surveying and seasonal variation in the health of the Telfair's Skink is also carried out. A PhD has also been carried out investigating the ecology of Night-gecko species and inter-specific interactions with introduced House Gecko species (on other islets) (Cole 2005). The latter study, as well as that of Freeman 2003) has been the basis for a Darwin Initiative project initiated in 2006 for the translocation of reptiles.

## **6.7 Where possible, establish wild populations of threatened geckos, skinks and snakes now found only on Round Island on other rat-free islands**

Translocation of Round Island reptiles to other offshore islets requires much background work regarding species ecology and availability of resources on potential islands. Donor and recipient islands must also be safeguarded against ill-conceived adverse developments. However, while research into habitat utilisation and selection is integral to finding appropriate habitats on the other islands for their translocation, it should be noted that current habitat preferences may only be part of far wider spectrum of habitat types that they once utilised within pristine Mauritius.

For example the Guenther's Gecko is restricted to using Pandanus and Latania palms on Round Island, as no other large tree/palm species are present in abundance. Trial translocations of Guenther's Geckos could therefore be tried over the next few years to other islands with large tree species that offer similar microhabitats as found on Round Island.

As part of the Darwin Initiative project the first translocations of the Durrell's Night-gecko and Telfair's Skink have already been implemented. The Durrell's Night-gecko has been translocated to the house gecko free island, Ilot Chat, to test the long-term co-existence with the smaller endemic Lesser Night-gecko *Nactus coindemirensis* (as suggested by Cole 2005). If this proves successful then the Durrell's Night-gecko could be translocated to the few remaining house gecko free islands, most of which are currently inhabited by the Lesser Night-gecko. The Telfair's Skink has been translocated to Gunners Quoin and Ile aux Aigrettes to initiate new populations. The successful establishment and population growth of this species upon the two islands will permit the future translocation of the Keel-scaled Boa, which relies upon the skink as a principle prey item. The timing of boa translocations is therefore dependent upon the success of the current Telfair's Skink translocation and probably won't occur for some years.

The entire translocation project should be coordinated by a single member of staff to ensure an integrated approach. The staff member should ideally be someone who is currently being trained in herpetological conservation techniques through the current Darwin Initiative project.

## **6.8 Continue the search for the Burrowing Boa in order to confirm its survival or extinction**

The continued existence of the Burrowing Boa is becoming increasingly unlikely. The high level of human activity on the island since 2002, and frequent surveys by experienced personnel including digging through soil and vegetation, might be expected to have uncovered this snake if it survives. The hunt will continue in suitable habitats and under favourable weather conditions but hopes are not high. However, a plan that details the procedures to be engaged in the event that the boa is rediscovered has been drawn up (this is available as a separate document and is held on Round Island-Appendix D).

## **6.9 Survey the invertebrate fauna of the island.**

This has been carried out in an *ad hoc* manner on many occasions. With a long-term presence on the island it should be possible to undertake more systematic efforts.

1. In the short term a comprehensive inventory will be compiled and analysed.
2. In the longer term appropriate and robust methods for monitoring of population sizes of key species and groups (e.g. reptile prey) will be established.
3. Techniques established on Round Island will be used on other islets to provide information necessary to inform decisions on reptile or bird translocations.

## **6.10 Establish viable populations of carefully selected endangered plant species from Mauritius**

*Further details: The Round Island Plant Restoration Plan.*

Nearly the entire endemic flora of Mauritius is threatened to some degree. Out 306 endemic species 113 species have been classified as Critically Endangered. At least 95 of the 141 Critically Endangered species have less than 50 known adults left in the wild.

So far few of these species have been successfully introduced/reintroduced into protected areas.

1. The absolute lack of suitable introduction and reintroduction sites for rare species in Mauritius, where plants can be given appropriate care, means that Round Island must be optimally used for this purpose as part of an integrated species recovery plan for the threatened plants of Mauritius.
2. Rare plant species introduced should only be from the list in the Round Island plant restoration plan, as agreed by the stakeholders, and only from the source populations indicated in this plan in order to optimise conservation of intra-specific diversity.
3. Suggestions for additional native plant (re) introductions to Round Island should be evaluated against the following criteria: suitability for Round Island, lack of appropriate alternative sites for introduction, availability of personnel and infrastructure for the care and management of rare plants, possibility of hybridisation with other species on Round Island, possibility of invasiveness on Round Island.
4. Rare plants should be planted in suitable sites in several easily accessible locations and not dotted around in order to facilitate aftercare and monitoring.
5. Rare plant establishment on Round Island should take priority over the restoration of hardwood forest in the short term as the latter will take many years while some of the endangered plants may go extinct imminently if recovery measures are not taken now.

### **6.11: Secure seabirds populations, and consider use of the island as a refuge for selected endemic landbirds.**

The seabird colony on Round Island is of international importance. The following research and management have been prioritised:

1. Maintain wardening of Round Island as protection against poachers
2. Continue monitoring of seabirds to assess population trends
3. Build local capacity in seabird management and study

In addition, it is thought that in the future Round Island could be used as a rat-free haven to establish populations of Critically Endangered birds such as the Mauritius Fody (*Foudia rubra*).

### **6.12 Increase our understanding of the process of soil erosion on the island and implement soil conservation measures as appropriate**

Soil traps appear to be effective in some cases but their efficacy is inconsistent. Many methods have been suggested for the blocking of gullies to hasten soil accumulation. However, it is important to recognise that many of the gullies on the island extend below sea level, suggesting that erosion and gulleying are “natural” processes on the island, it is also apparent that the rate of erosion has been increased dramatically with the loss of vegetation cover. *Latania loddigessii* regeneration along gullies has had a positive effect on slowing down soil loss, and this observation should be used to direct stabilisation along gullies. However, much of the debate has been undertaken among non-specialists. A specialist in soil erosion control should be recruited in order to advise on:

1. The optimum method for soil traps construction.
2. Effective construction of gulley blocks to facilitate soil accumulation.
3. Monitoring programmes to assess the efficacy of the soil conservation measures and to assess soil conservation in non-managed areas.

### **6.13 Continue existing, and establish on-going monitoring and research programme, incorporating field trials where appropriate, that will measure the effectiveness of all management and restoration techniques used on the island**

A comprehensive programme of research and monitoring work will yield information to help restore Round Island and other key ecosystems in Mauritius and elsewhere. Research should be question oriented as far as possible and where possible flora and fauna research should be integrated. The following are amongst the topics to be investigated:

1. The success of each species planted for as a pioneer, for hardwood restoration and for rare species recovery purposes.
2. The success of different planting techniques and watering regimes on plant survivorship.



3. Potential habitat availability for landbird species, which could be reintroduced to Round Island.
4. Changes in soil character as restoration proceeds.
5. Habitat and prey use by Round Island reptiles as a guide to suitability of potential reintroduction sites.
6. The biology of reptile species in order to plan re-introductions onto other islands or protected areas of the Mauritius mainland with a focus on the Gunther's Gecko and the Round Island Boa.
7. The nesting requirements of the Round Island Petrel with a view to translocating them to other islets or providing additional nest sites on Round Island.
8. Long term ringing studies of other seabirds on Round Island in view to study global dispersal.
9. Studying the climatology of Round Island in order to plan future plant requirements more accurately.
- 10 Study the impact of the introduction of the Aldabran Giant Tortoise (*Geochelone gigantea*) and the Madagascan Radiated Tortoise (*Geochelone radiata*) to replace the grazer browser niche that has been lost from Round Island. This may help in the competitive advantage of some of the native ground flora.  
Field trials undertaken on Ile aux Aigrettes using the giant tortoises have benefited the native plant community in several ways: preventing exotic species from forming dense monotypic stands, preventing grasses from swamping native seedlings, and dispersed ebony seeds which were suffering from seed-dispersal limitation.
- 11 Continuation of the long-term monitoring as started by Bullock and North (1978), and Johansson (2003), on a 7 yearly cycle.

## **6.14 Introduce tortoise grazers to benefit the native grassland community and help control invasive species.**

In order to recreate and restore any ecosystem, it is vital to reinstall as many of the key components as possible. While there is no antidote for the extinction of a species, there is the possibility of using an analogue (an ecological replacement).

In view of the fact that the distributions of many native and endangered species are currently restricted to Round Island and again to isolated patches on the island, the introduction of a grazer is probably critical for the long-term persistence of these species. To test this, *in situ* studies are vital to gain a greater understanding of the complex interactions of tortoises with Round Island's communities. The introduction of a small population of sub-adult Aldabra Giant Tortoises, *Geochelone gigantea* (**Fig 20**) and Madagascar Radiated Tortoises *Geochelone radiata* (**Fig 21**) is

likely to fulfil some of the present management tasks (Zuël & Smith, 2004a): dispersal of palm and hardwood seeds, which are currently seed-dispersal limited, and control of invasive species, thereby benefiting low growing native grassland plants. The effects on the plant communities and the survival of the animals need to be closely monitored during this trial to evaluate the possibility for a larger scale introduction. Tortoises have been introduced in June 2007 for this trial, as part of a PhD study.



**Fig. 20. *Geochelone gigantea***



**Fig. 21. *Geochelone radiata***

## **6.15 Maintain sufficient experienced and appropriately qualified staff and effective and safe infrastructure for the implementation of Round Island management objectives**

Living and working on Round Island for long periods is very demanding. The island can be very hot and windy and much of the work requires walking, often carrying heavy equipment, over steep and treacherous slopes. Isolation and small teams place great demands on social skills. Those working on the team must be mature individuals with the capacity to live in the field. These people must also be well educated and technically experienced conservationists because of the need for them to work without daily supervision on bird, plant and reptile conservation projects. It is unlikely that those with children and demanding family commitments will choose to live on the island for long periods of time.

Experience has shown that even most of those ideally qualified to work on Round Island are unlikely to continue on the Round Island team for more than one year. The need for highly experienced people and the necessarily short-term nature of the posting makes it difficult to ensure that appropriate staff is always available for the Round Island team. The lack of such individuals can jeopardise the success of the project.

1. It is key that in the long-term more keen and able Mauritians are found to undertake this type of work. Therefore, it is important to consider Mauritians for positions on Round Island as far as possible and to encourage Mauritians as part of national capacity-building efforts.
2. Relationships need to be developed with organisations abroad such as Department of Conservation (New Zealand) and the Island Conservation and Ecology Group (USA) who have experience of working in similar conditions and who can help provide appropriately qualified staff for up to one year for the Round Island project.
3. It is essential to maintain the infrastructure on the island to ensure efficiency and safety. An assessment of the state of Round Island infrastructure and replacement and improvement needs will be made annually by the Wardens. This will be in addition to the continual assessments of the infrastructure that are carried out as part of the Warden's regular duties.
4. A team of three Wardens (one of whom may be promoted Head Warden) has been recruited for Round Island, and their period spent on the island rotated such that there are always two people present.
5. Additional labour will be provided from the NPCS labour force, as necessary

## **6.16 Use the conservation importance of Round Island and the restoration activities being carried out as a means of raising public awareness and support for conservation on Round Island and in Mauritius as a whole.**

The conservation work carried out on Round Island is amongst the most significant in the Republic of Mauritius and is of global importance. As Round Island is out of bounds to the public it is crucial that the information about the work being carried out is communicated to this group. This can be achieved by the following:

1. Regular coverage of Round Island in the Mauritian media.
2. Production of interpretive material exclusively about Round Island or featuring Round Island.
3. The use of Ile aux Aigrettes and National Parks and Conservation Service exhibitions as a means of displaying information about Round Island.

### **6.17 Secure sufficient funding to implement Round Island management objectives**

Funding under the GEF grant administrated through the World Bank lasted until March 2005 and proved vitally important in allowing fundamental infrastructure and basic management protocols to be put in place.

Since the end of this project, continuous funding has been requested from the National Parks and Conservation Fund. The long-term success of the restoration of Round Island depends on this kind of long-term commitment from the government. Additional sources of funding could come from revenue made from visits to the popular Ile aux Aigrettes Nature Reserve or sponsorship from local companies.

In addition, an agreement with the Helicopter Squadron and the National Coast Guard of the Mauritius Police Force that allows transport to Round Island for the cost of the petrol is a very important contribution to the conservation of the island.

### **6.18 Investigate Round Island as an important meteorological centre**

Investigate Round Island as an important meteorological centre. Being the northern most inhabited frontier of Mauritius, Round Island can provide early warning signals during tropical cyclones for the rest of the country, and Reunion. For such, an automatic weather station must be installed. In addition, a tide gauge and sea surface temperature meter would be very useful for the study of climate change.

Advantage to Round Island: meteorological data specific for the island since data from Grand Gaube/G Bay does not reflect true climatic data for Round Island.

### **6.19 Explore the use of Round Island as a scientific whale and dolphin observatory**

Explore the use of Round Island as a scientific whale and dolphin observatory. Dolphins and whales are regularly sighted from the field station or whilst staff are working on the island. There is great potential to use observation spots on the island to monitor the whale/dolphin species in our waters, whether there are young/what age, assess the potentials that these species are breeding in our waters (especially whales), potential for relocating dugongs etc

## **6.20 Implement a viable administrative framework for Round Island**

**The Director of NPCS is responsible for the overall activities on Round Island, and as such a Memorandum of Agreement between MWF and NPCS is a prerequisite for management of the island.**

MWF will be responsible for the day-to-day running of the island. Staff recruitments will be targeted mostly towards Mauritian nationals and the recruitment will be carried out jointly by NPCS and MWF.

A management structure as set out in general terms in the Islets National Park Strategic Plan, should be used and modified as necessary to ensure smooth running and information flow, including the deposition of all research findings with the Director of NPCS.

## **7. The Future**

The current phase of Round Island restoration as detailed in this management plan involves intensive plant restoration activities along with the establishment of monitoring systems and ecological studies on key Round Island species. This demands a near permanent presence on the island.

As vegetation communities recover and animal populations are secured it is envisaged that the time required on the island will be reduced. For example

1. Planting of pioneer species could be stopped after a period and the plants left to establish and mature. In ten years time it is possible that another period of intensive planting might be necessary to establish late successional species underneath a canopy.
2. The frequency of weeding on the island may be able to be decreased once the weeds are under control and the native vegetation is dominating. Thus, eventually it may only be necessary to have weeding expeditions to the island rather than a permanent presence.
3. Island-wide surveying of reptile, birds and vegetation every 3-5 years to ensure the population sizes are being maintained, and that weeds are being controlled.

One issue that remains to be resolved however is that of preventing access to the island and whether this would be possible to maintain without a permanent presence there, especially when the island additionally holds free-roaming tortoises, Mauritius Fodies and weather station of national importance.

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**Appendix 1.** Plant species found on Round Island and the other northern islets. The list includes native plants found on the islands prior to 1986, alien plants found to date and those introduced for conservation purposes since 1986.

FAMILY	SPECIES	PLANTED POST 1986 or ALREADY PRESENT	ENDEMICITY	COMMON NAME
Acanthaceae	<i>Asystasia gangetica</i> (L.) T. Anders.	present	Exotic	Herbe pistache
Acanthaceae	<i>Barleria observatrix</i> Bosser et Heine	planted	endemic	Barleria
Aizoaceae	<i>Sesuvium ayresii</i> Marais	present	endemic	
Aizoaceae	<i>Trianthema portulacastrum</i> L.	present	Exotic	Brede cacayanga
Amaranthaceae	<i>Achyranthes aspera</i> L. var. <i>indica</i> L.	present	Exotic	Herbe sergent
Amaranthaceae	<i>Aerva congesta</i> Balf. F.	present	Mascarenes	
Amaranthaceae	<i>Amaranthus viridis</i> L.	present	Exotic	Brede malabar
Araliaceae	<i>Gastonia mauritiana</i> Marais	planted	Endemic	Bois boeuf
Arecaceae	<i>Dictyosperma album</i> (Bory) H.Wendl.&Drude var <i>conjugatum</i> H.E. Moore& L.J. Gueho	present	endemic	Palmiste de l'ile Ronde
Arecaceae	<i>Hyophorbe lagenicaulis</i> (Bailey) Moore	present	endemic	Bottle palm
Arecaceae	<i>Latania loddigesii</i> Mart	present	endemic	Latanier bleu
Asclepiadaceae	<i>Tylophora coriaceae</i> Marais	present	Mascarenes	Liane ipeca
Asteraceae	<i>Ageratum conyzoides</i> L.	present	exotic	Herbe bouc
Asteraceae	<i>Conyza canadensis</i> (L.) Cronq.	present	exotic	Herbe gandia
Asteraceae	<i>Psiadia arguta</i> (Pers.) Voigt.	planted	endemic	Baume de l'ile Plate
Asteraceae	<i>Sonchus aspera</i> (L.) Hill	present	exotic	Lastron
Asteraceae	<i>Sonchus oleraceus</i> L.	present	exotic	Lastron
Asteraceae	<i>Tridax procumbens</i> L.	present	exotic	Herbe caille
Boraginaceae	<i>Cordia curassavica</i> (Jacq) Roem. Et Schult.	present	exotic	Herbe conde
Boraginaceae	<i>Hilsenbergia petiolaris</i> (Lam.) J.S. Mill	planted	native	Bois Pipe
Boraginaceae	<i>Tournefortia argentea</i> L.f.	planted	native	Veloutier
Bursaraceae	<i>Protium obtusifolium</i> (Lam.) Marchand	planted	endemic	Bois colophane batard
Celastraceae	<i>Cassine orientalis</i> (Jacq.) Kuntze, Rev. Gen.	planted	Mascarenes	Bois d'olive
Celastraceae	<i>Maytenus pyria</i> (Willemet) N.Robson	planted	endemic	Bois a poudre
Chenopodiaceae	<i>Chenopodium murale</i> L.	present	exotic	Botrice
Chenopodiaceae	<i>Tetragonia expansa</i> Murr.,Comm.Goetting	present	exotic	Epinard
Combretaceae	<i>Terminalia bentzoë</i> L. ssp. <i>bentzoë</i> (L.) L.f.	planted	Mascarenes	Benjoin
Commelinaceae	<i>Commelina benghalensis</i> L.	present	exotic	Herbe cochon
Convolvulaceae	<i>Dichondra repens</i> J.R.& G.Forster	present	Mascarenes	faux pelouse
Convolvulaceae	<i>Ipomoea pes-caprae</i> (L.) R.Br.subsp. <i>brasiliensis</i> (L.) Ooststr.	present	Mascarenes	Liane batatran
Cyperaceae	<i>Cyperus difformis</i> L.	present	exotic	
Cyperaceae	<i>Cyperus rubicundus</i> Vahl	present	Native	Herbe oignon
Cyperaceae	<i>Fimbristylis cymosa</i> R.Br.	present	Native	
Ebenaceae	<i>Diospyros egrettarum</i> Richardson	planted	endemic	Bois ebene
Ebenaceae	<i>Diospyros melanida</i> * Poiret	planted	endemic	Bois ebene
Ebenaceae	<i>Diospyros tessellaria</i> * Poiret	planted	endemic	Bois ebene
Erythroxylaceae	<i>Erythroxylum hypericifolium</i> * Lam.	planted	endemic	Bois a balais
Erythroxylaceae	<i>Erythroxylum sideroxyloides</i> Lam.	planted	endemic	Bois de ronde
Euphorbiaceae	<i>Euphorbia hirta</i> L.	present	exotic	Jean Robert
Euphorbiaceae	<i>Euphorbia prostrata</i> Aiton	present	exotic	Rougette
Euphorbiaceae	<i>Euphorbia thymifolia</i> L.	present	exotic	Petite rougette
Euphorbiaceae	<i>Margaritaria anomala</i> (Baillon) Fosberg	planted	native	Bois chenille

FAMILY	SPECIES	PLANTED POST 1986 or ALREADY PRESENT	ENDEMICITY	COMMON NAME
Phyllanthaceae	<i>Phyllanthus amarus</i> Schum.& Thonn.	present	exotic	petit tamarin blanc
Phyllanthaceae	<i>Phyllanthus mauritianus</i> H.H. Johnston	Present	endemic	
Phyllanthaceae	<i>Phyllanthus revaughanii</i> Coode	Present	endemic	
Euphorbiaceae	<i>Stillingia lineata</i> (Lam.) Muell. Arg.	Planted	Mascarenes	Fangame
Fabaceae	<i>Alysicarpus vaginalis</i> (L.) DC.	present	exotic	
Fabaceae	<i>Caesalpinia bonduc</i> (L.) Roxb.	Planted?	Mascarenes	Cadoque
Fabaceae	<i>Desmanthus virgatus</i> (L.) Willd.	Present	exotic	Herbe gallon
Fabaceae	<i>Desmodium incanum</i> DC	Present	exotic	Petit acacia
Fabaceae	<i>Desmodium triflorum</i> (L.) DC	Present	exotic	trèfle noir
Fabaceae	<i>Gagnebina pterocarpa</i> (Lam.) Baillon	Planted	Mascarenes	Acasia
			native	
Felices	<i>Acrosticum aureum</i> L.	Present		Fern
Felices	<i>Adiantum rhizophorum</i> Sw.	Present	native	Fern
Felices	<i>Christella dentata</i> (Forsk.) Brown. & Jermy	Present	native	Fern
Felices	<i>Nephrolepis bisserata</i> (Sw.) Schott	Present	native	Fern
Felices	<i>Pteris vittata</i> L.	Present	native	Fern
Flacourtiaceae	<i>Homalium integrifolium</i> (Lam.) Baillon	Planted	endemic	Bois riviere
Flacourtiaceae	<i>Scolopia heterophylla</i> (Lam.) Sleumer	Planted	Mascarenes	Bois goyave
Goodeniaceae	<i>Scaevola taccada</i> (Gaertn.) Roxb.	Present	Native	Veloutier vert
Lecythidaceae	<i>Foetidia mauritiana</i> Lam.	Planted	Mascarenes	Bois puant
Liliaceae	<i>Asparagus umbellatus</i> Bresler	Present	Mascarenes	Asperge sauvage
Liliaceae	<i>Dracaena concinna</i> Kunth.	Present	endemic	Bois chandelle
Liliaceae	<i>Lomatophyllum tormentorii</i> Marais	Present	endemic	Mazambroun
Lytraceae	<i>Pemphis acidula</i> J.R. & G. Forster	Planted	Native	Bois matelot
Malvaceae	<i>Abutilon indicum</i> (L.) Sweet	present	exotic	Mauve du pays.
Malvaceae	<i>Hibiscus fragilis</i> DC.	Planted	endemic	Hibiscus
Malvaceae	<i>Sida pusilla</i> Cav.	Present	Native	Herbe panier
Malvaceae	<i>Thespesia populnea</i> (L.) Soland. Ex Correa	Planted	Native	Porcher
Meliaceae	<i>Turraea thouarsiana</i> (Baillon) Cavaco R. Keraudren	Planted	Endemic	Bois quivi
Moraceae	<i>Ficus reflexa</i> Thunb	Planted	Mascarenes	Figuier
Moraceae	<i>Ficus rubra</i> Vahl	Planted	Mascarenes	Figuier blanc
Myoporaceae	<i>Myoporum mauritianum</i> A. DC.	Planted	Endemic	
Myrsinaceae	<i>Badula crassa</i> A.DC.	Planted	Endemic	Bois nacre
Myrtaceae	<i>Eugenia lucida</i> Lam.	Planted	Endemic	Bois clou
Nyctagynaceae	<i>Boerhavia coccinea</i> Mill	Present	Native	Herbe pintade
Nyctagynaceae	<i>Boerhavia diffusa</i> L.	Present	exotic	Herbe pintade
Oxalidaceae	<i>Oxalis corniculata</i> L.	Present	exotic	Petit trefles
Pandanaceae	<i>Pandanus vandermeerschii</i> Balf. F	Present	Endemic	Vacoas
Poaceae	<i>Cenchrus echinatus</i> L.	Present	exotic	Herbe cateaux
Poaceae	<i>Chloris barbata</i> Swartz.	Present	exotic	
Poaceae	<i>Cymbopogon excavatus</i> (Hochst.) stapf	Present	Mascarenes	Citronelle maron
Poaceae	<i>Dactyloctenium ctenoides</i> (Steud.) Lorch ex Bosser	Present	exotic	Herbe brosse a dent
Poaceae	<i>Digitaria horizontalis</i> Willd var <i>porrantha</i> (Steud.) Henrard	Present	exotic	
Poaceae	<i>Heteropogon contortus</i> (L.) P.Beauv. Ex Roem. & Schult.	Present	exotic	
Poaceae	<i>Setaria pallide-fusca</i> (Schumacher) Stapf & Hubbard	Present	exotic	
Poaceae	<i>Sporobolus virginicus</i> (Linn.) kunth.	Present	exotic	

FAMILY	SPECIES	PLANTED POST 1986 or ALREADY PRESENT	ENDEMICITY	COMMON NAME
Poaceae	<i>Stenotaphrum dimidiatum</i> (L.) Brongn.	present	exotic	Herbe bourique
Poaceae	<i>Stenotaphrum micranthum</i> (Desv.) C.E.Hubbard	Present	Mascarenes	Petit herbe bourique
Poaceae	<i>Vetiveria arguta</i> (Steud.) Hubbard	Present	Mascarenes	Vetiver
Poaceae	<i>Zoysia matrella</i> (L.) Merrill	Present	Mascarenes	Herbe pique fesse
Portulacaceae	<i>Portulaca oleracea</i> L.	present	exotic	
Rubiaceae	<i>Fernelia buxifolia</i> Lam.	Present	Mascarenes	Bois buis
Rubiaceae	<i>Myonima nitens</i> (Poirot) Verdc	Planted	Endemic	
Rubiaceae	<i>Pyrostria cordifolia</i> A. Rich. Ex DC.	Planted	Endemic	
Rubiaceae	<i>Tarenna borbonica</i> (E.G. et A. Henderson) Verdc.	Planted	Mascarenes	Bois de rat
Rutaceae	<i>Zanthoxylum heterophyllum</i> (Lam.) Smith	Planted	Mascarenes	Catafille Noir
Sapindaceae	<i>Dodonaea viscosa</i> (L) Jacq.	Planted	Native	Bois de reinette
Sapindaceae	<i>Hornea mauritiana</i> Bojer ex Baker	Planted	Endemic	Bois a L'huile
Sapindaceae	<i>Stadmania oppositifolia</i> Poir.	Planted Present	Native	Bois de fer
Solanaceae	<i>Lycopersicon esculentum</i> Mill		exotic	Pomme d' amour
Solanaceae	<i>Nicotiana tabacum</i> L.	Present	exotic	Tabac
Solanaceae	<i>Withania somnifera</i> DC	Present	exotic	Poc-poc sauvage
Sterculiaceae	<i>Dombeya mauritiana</i> Friedmann	Planted	Endemic	Dombeya
Sterculiaceae	<i>Trochetia parviflora</i> Bojer ex Baker	Planted	Endemic	Bois de rose
Verbenaceae	<i>Clerodendrum heterophyllum</i> (Pioret) R. Br.	Planted	Endemic	Bois cabri
Verbenaceae	<i>Premna serratifolia</i> L.	Planted	Mascarenes	Bois surreau
Verbenaceae	<i>Lantana camara</i>	Recorded once	exotic	Vielle fille

**Appendix 2. Native** reptile species found on the Northern islands. Ex = Extinct; (Carl Jones, unpublished)

/ = not recorded; + = present

SPECIES		Round Island	Flat Island	Gabriel Island	Gunners Quoin	Pigeon Rock	Serpent Island
Latin name	Common name						
<i>Leiopisma telfairii</i>	Telfair's Skink	+	Ex	/	Ex*	/	/
<i>Gongylomorphus bojerii</i>	Bojer's Skink	+	+	+	+	+	+
<i>Gongylomorphus spp.</i>	Orange-tailed Skink	/	+		/	/	/
<i>Cryptoblepharus boutonii</i>	Bouton's Skink	+	+	+	+	/	/
<i>Phelsuma ornata</i>	Ornate Day-gecko	+	+	+	+	/	/
<i>Phelsuma guentheri</i>	Gunther's Gecko	+	/	/	/	/	/
<i>Nactus durrelli</i>	Durrell's Night-gecko	+	/	/	/	/	/
<i>Nactus serpensinsula</i>	Serpent Island Night-gecko	/	/	/	/	/	+
<i>Nactus coindemirensis</i>	Lesser Night-gecko	/	/	/	+	+	/
<i>Casarea dussumieri</i>	Keel-scaled Boa	+	Ex	/	Ex	/	/
<i>Bolyeria multocarinata</i>	Burrowing Boa	Ex?	Ex	/	Ex	/	/

\*Re-introduced

**Appendix 3.** Seabird species found on the Northern islands and the estimated number of annual breeding pairs (Carl Jones, unpublished).

SPECIES		Round Island	Flat Island	Gabriel Island	Gunners Quoin	Serpent Island	Pigeon Rock
Latin name	Common name						
<i>Pterodroma arminjoniana</i> & <i>P. neglecta</i> & <i>P. heraldica</i>	Round Island Petrel	150-200					
<i>Bulweria bulweria</i>	Bulwer's Petrel	>2					
<i>Puffinus pacificus</i>	Wedge-tailed Shearwater	40000-80000	10-20	250-400	3000-5000	5-10	3000-5000
<i>Phaeton rubricauda</i>	Red-tailed Tropicbird	1000-2000	15-30		200-300		200-300
<i>Phaeton lepturus</i>	White-tailed Tropicbird	+750-1500	5-10	15-30	50-100		50-100
<i>Sula dactylatra</i>	Masked Booby					40-60	
<i>Sterna fuscata</i>	Sooty Tern					200000-300000	
<i>Anous stolidus</i>	Brown Noddy					20000-30000	
<i>Anous tenuirostris</i>	Lesser Noddy					20000-30000	