

Restoration work on Round Island was initiated in the 1970s through the involvement of the Durrell Wildlife Conservation Trust in collaboration with the Forestry Service. Today the island is under the day to day management of the Mauritian Wildlife Foundation governed by a MoU with the Ministry of Agro Industry and Food Security, which is managed by the National Parks and Conservation Service.

Unlike many small tropical oceanic islands around the world, Round Island retained many of its original elements, as it has never been colonised by non-native invasive predatory mammals, reptiles or birds, with the exception of occasional occupancy by the Red-whiskered Bulbul *Pycnonotus jocosus*. However, this unique island did not remain entirely free from the pressure of invasive vertebrates. Introduced goats and rabbits released in the early 19th Century caused the loss of the hardwood species and severe declines in the palm populations, resulting in soil erosion and loss of habitat for many of the faunal species (Vaughan & Wiehe, 1937; Vinson, 1965; Bullock, 1977; Bullock et al., 2002; Bean et al., 2017). Mauritian naturalist, Jean Vinson, drew attention to the vulnerability of Round Island and the need to remove the introduced herbivores. By 1979, the goats *Capra aegagrus hircus* were removed, followed by the rabbits *Oryctolagus cuniculus* in 1986, with support of the Durrell Wildlife Conservation Trust (Merton, 1987; Cheke & Hume, 2008). These actions permitted the palm-rich areas to recover partially, although it also allowed non-native weeds proliferate, causing decline of some endemic herbaceous species (North & Bullock, 1986; North et al., 1994). Since the removal of the herbivores, there has been extensive restoration activities to restore the vegetation and rebuild Round Island's ecosystem (Merton et al., 1989; Cheke & Hume, 2008; Khadun et al., 2008; MWF-NPCS, 2008).

In 2001/2002, a field station was built on the island, which has since been permanently staffed by Wardens and Conservation Biologists. Permanent staffing of the island has brought a stop to seabird poaching that was prevalent in the past and through strict biosecurity protocols the risks of non-native species invasion has lessened considerably (Tatayah et al., 2007). Access to the island by boat is carried out by the National Coast Guard but can be difficult and dangerous as the island has a steep rocky coastline and the sea is often rough upon approach. In poor weather conditions, the island is only accessible by helicopter with the assistance of the Police Helicopter Squadron. No other forms of access to the island are permitted. The staff on Round Island maintain the facilities, restore the habitat, but also monitor the plants, reptiles and seabird populations and support research projects to help direct the management of the island.

Round Island supports the last remnant of a lowland palm rich community that formerly covered the dry lowland areas of Mauritius (Cheke & Hume, 2008). The palm community consists of several species of palms that are endemic to Mauritius. The hurricane palm, *Dictyosperma album* var. *conjugatum*, is Critically Endangered, with only one surviving wild individual on Round Island. Wild Round Island bottle palms *Hyophorbe lagenicaulis* are also restricted to Round Island and are Critically Endangered but are now regenerating well. The Endangered blue latan palm *Latania loddigesii* is the major palm covering extensive areas on the western and northern slopes. Round Island holds the greatest abundance of threatened screwpine, or 'vacoas' *Pandanus vandermeeschii* than anywhere else in Mauritius. With the disappearance of the hardwood forest, only two native hardwood species, the acacia indigène *Gagnebina pterocarpa* and one individual bois buis *Fernelia buxifolia* managed to survive (Strahm, 1993). Other highly threatened plants on the island include *Aerva congesta*, *Asparagus umbellatus*, *Dichondra repens*, *Chloris filiformis*, *Cymbopogon excavatus*, *Phyllanthus revaughanii*, *Selaginella barklyi* and *Vetiveria arguta*. Some of these small herbaceous species are threatened by invasive weeds, but additionally from native pioneers that have been planted, such as *Premna serratifolia* and *Scaevola taccada* if left unmanaged. Since permanent staffing and the creation of a plant nursery, there has been ongoing and extensive annual replanting activities with more than 29,000 plants of 52 species having been planted, 32 of which have been reintroduced; currently 38 of the 52 species are still present (Khadun et al., 2008; MWF-NPCS, 2008; Phil Lambdon unpublished data). Recent research to genetically barcode the island's plants

demonstrated that 97 species are currently present; 31 endemic, 35 native, one cryptogenic and 29 introduced species (Moorhouse-Gann et al., 2018).

In the 1800s, rich and deep soils were recorded in some locations on Round Island, whereas other areas, such as the exposed southeast were noted as barren (Lloyd, 1846). Most of the soils on Round Island are now sandy loams with a relatively uniform texture and little structure (Johnston, 1993). Soil erosion remains a serious issue for Round Island, particularly within the gullies that act to channel sediment from the island to the sea in heavy rainfall. Sediment traps and planting efforts have been partly effective in reducing soil erosion, although it is much localised and sediment continues to be lost (Bean et al., 2017). Focused planting and soil management are required particularly within areas, such as the gullies, that are the transport mechanism for sediment loss.

Without invasive predators and the relative remoteness of Round Island, these allowed it to retain the last semi-functional reptile dominated ecosystem in the Mascarenes. The reptile community reflects what once occurred on the mainland and other offshore islands of Mauritius prior to the arrival of humans. By the 1800s, the Telfair's skink *Leiolopisma telfairii*, Günther's gecko *Phelsuma guentheri*, Durrell's night gecko *Nactus durrellorum*, Burrowing boa *Bolyeria multocarinata*, Keel-scaled boa *Casarea dussumieri* and Mauritian giant tortoises *Cylindraspis spp.*, had become restricted to Round Island (Vinson & Vinson, 1969; Vinson, 1975; Arnold, 1980, 2000; Cheke & Hume, 2008; Cole, 2009). However, the tortoises went extinct in the 1840s and the last Burrowing boa was seen in 1975 and is now extinct (Lloyd, 1846; Bullock, 1977; Cole et al., 2018). Round Island also maintained three other reptiles, the Bojer's skink *Gongylomorphus bojerii*, the ornate day gecko *Phelsuma ornata*, both of which are endemic and found on other islands and for the day gecko on the mainland, and the native Bouton's skink *Cryptoblepharus boutonii* (Vinson & Vinson, 1969; Cole, 2009). By the 1970s, the abundances of the surviving reptile species were low due to the destruction of vegetation and it is likely that other endemic reptile species still found on other offshore islands and mainland were also once present, but were lost without being recorded. With the removal of the herbivores and plant restoration activities, reptile abundance has increased by over 1000% (Cole et al., 2018). Since 2006, the recovery of the reptile populations has permitted the reintroduction of some of Round Island's species back to other islands where the causes of their initial losses had been removed (Cole et al., 2009; Cole et al., 2014). With the extinction of the Mauritian tortoises, their important role in the ecosystem as grazers, browsers and seed dispersers was lost. To replace these plant-herbivore relationships in order to support the restoration of Round Island's ecosystem and after thorough research, non-native ecological replacements are being used, with the introduction of Aldabra giant tortoises *Aldabrachelys gigantea* and Madagascan radiated tortoises *Astrochelys radiata* (Griffiths et al., 2010, 2011, 2013).

Round Island is also an internationally important seabird island. The most fascinating species is the Round Island Petrel, which is a hybrid of three (possibly four) species that includes the Trindade Petrel *Pterodroma arminjoniana* (the only Indian Ocean breeding colony), the Kermadec Petrel *P. neglecta* and the Herald Petrel *P. heraldica*. Round Island is the only location in the world where a three-species hybrid mix has been uncovered to date (Brown et al., 2009; Tatayah, 2006, 2010). Round Island also contains the largest colonies of Wedgetailed Shearwaters *Ardenna pacifica*, Red-tailed Tropicbirds *Phaethon rubricauda*, both thought to be the largest in the Indian Ocean and one of the largest colonies of White-tailed Tropicbird *P. lepturus* in the Mascarenes. The island also has the only Indian Ocean population of Bulwer's Petrel *Bulweria bulwerii*, although it consists of only a few pairs. There are also other seabird species visiting the island, such as the Black-winged Petrel *P. nigripennis* and Barau's Petrel *P. baraui*, but these consist of a small number of individuals (Tatayah, 2010).

The native Green-backed Heron, *Butorides striata* breeds on the island in small numbers and native Ruddy Turnstones *Arenaria interpres* frequent the shoreline and rocky slopes. The native Mascarene Swiftlet *Aerodramus francicus* is occasionally seen. Several transient migrant species are also detected annually (Tatayah, 2010). House Sparrows *Passer domesticus*, Zebra Doves *Geopelia*

striata and the occasional vagrant, such as the Red-whiskered Bulbul represent the only non-native invasive vertebrates on the island. From 2008 there was an attempt to eradicate House Sparrows from the island in preparation for the translocation of the Mauritius Fody *Foudia rubra*, but both attempts were unsuccessful (Bednarczuk, et al., 2010; BirdLife International, 2016).

There have been several collections of invertebrates from Round Island, with more than 400 morphospecies within 17 orders have been detected, but much remains to be identified (Zuel, 2009). In the past few decades several species have been described that are endemic to Round Island, such as the Round Island stick insect *Apterograeffea marshallae*, centipede *Rhysida jonesi* and grasshopper *Odontomelus ancestrus*, which like other, now restricted invertebrates, would have been found on the mainland and other islands (Cliquennois & Brock, 2002; Lewis, 2002; Hugel, 2014). Some species are suspected to now be missing from the island, such as the tenebrionid beetle *Pulposipes herculenus* which is now restricted to Frégate Island in the Seychelles (Gerlach et al., 1997). However, others thought to be extinct have been rediscovered, such as the scorpion *Lychas serratus* (Nik Cole and Lorenzo Prendini unpublished data). Four species of small native land snails are known, one of which is an endemic variant restricted to Round Island, *Tropidophora fimbriata* var. *haemostoma* (Griffiths & Florens, 2006). The number of introduced invertebrate species is thought to be low, although the non-native and highly invasive big-headed ant *Pheidole megacephala* is the most abundant species on the island (Cole et al., 2009).

The uniqueness of Round Island makes it the focus of considerable international research and much of its secrets are still to be revealed. The protection and restoration of this precious remnant of a Mauritian ecosystem is paramount to the long-term survival of numerous plants and animals. The restoration of Round Island has been supported by monitoring and a range of studies, many of which have been opportunistic. The long-term monitoring of the reptile, seabird, plant and invertebrate communities need to be more structured to record and understand how the communities develop and to measure the impacts of introductions on the plant and animal communities. The restoration programme is proving exceptionally valuable as we start to unravel its secrets and to use the knowledge to restore other islands around Mauritius and elsewhere.

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