



## Restoring Island biodiversity: the reintroduction of endemic Mauritian reptiles

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## Mauritian reptiles

- Mauritius once maintained one of the richest reptile diversities in the World
- In the absence of terrestrial mammals the reptiles evolved to occupy all available niches
- Allowed adaptive radiation of:
  - Tortoises
  - Nocturnal and diurnal geckos
  - Skinks
  - Snakes



## Mauritian reptiles

- This adaptive radiation caused the formation of a unique ecosystem dependent upon reptiles
- Reptiles occupied all main functional groups:

## Mauritian reptiles

- Predators:



## Mauritian reptiles

- Prey:



## Mauritian reptiles

- Grazers and browsers:



## Mauritian reptiles

- Seed dispersers:



## Mauritian reptiles

- Pollinators:



## Mauritian reptiles



- Human related disturbances over the past 400 years:
  - Extensive habitat destruction
  - Introduction of non-native predators and competitors
- More than 60% of reptile species lost from the main island through extinction or extirpation
- The majority of the extant species are now confined to offshore islands

## Mauritian reptiles

- Remaining island populations:

- Restricted and/or fragmented distributions
- The loss of ecological links and food webs
  - loss of stability



- Vulnerable to further disturbances
  - Purposeful and accidental introductions
  - Anthropogenic and stochastic events



## The need for translocation

- 30 years ago it was recognised that:
  - The islands must be restored
  - Mammalian predators/herbivores had to be removed
  - Vulnerable reptile species should be translocated, which has been repeated by many since

## The need for translocation

- 30 years ago:
  - Recipient islands unsuitable and little known
- Donor reptile populations to endangered
- Little known about their ecological requirements, distribution and taxonomy



## The need for translocation

- Over the past 30 years
  - Forestry Service, DWCT, MWF and NPCS the driving force:
    - Habitat restoration and mammal eradication
  - Reptile research:
    - >40 scientific publications, many unpublished reports and numerous academic studies




## The need for translocation

- The next step in the restoration process is to start the translocations
- The re-establishment of sustainable reptile communities
- Secure future reptile populations
- Restore functional island ecosystems



## Skinks and geckos

- Essential to start with the ecological building blocks (most widespread and abundant)
- The skinks
  - Bojer's skink, *Gongylomorphus bojerii*
  - Telfair's skink, *Leiolopisma telfairii*
- The geckos
  - Durrell's night gecko, *Nactus durrelli*
  - Lesser night gecko, *Nactus coindemirensis*

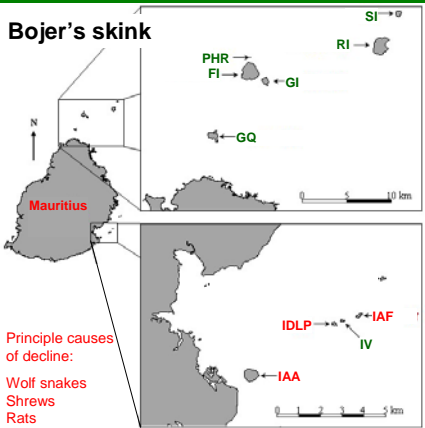


## Skinks and geckos

- Re-establishing populations of Bojer's skink, *Gongylomorphus bojerii*



## Bojer's skink



Most widely distributed skink

Historical accounts and fossil records for 3 islands and throughout the mainland

Principle causes of decline:  
 Wolf snakes  
 Shrews  
 Rats

## Skinks and geckos

- Freeman (2003) demonstrated
  - Bojer's skinks in high densities
  - Risks of inbreeding depression prevented by low level migration, thus maintaining genetic variation



- However:
  - no migration for Ilot Vacoas and a great risk of inbreeding depression

## Skinks and geckos

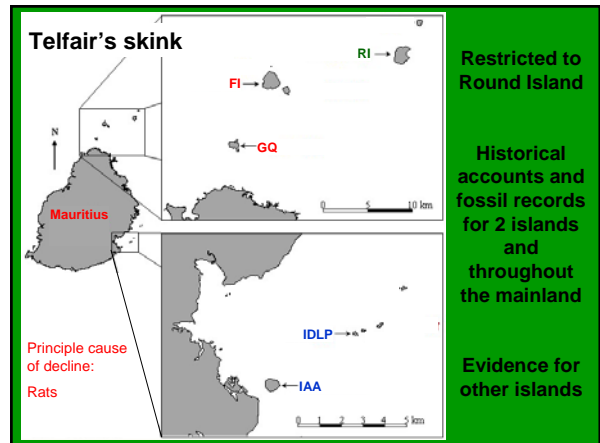
- Ilot Vacoas skink population
  - Genetically distinct from other populations
  - Must treat as a separate conservation management unit



- At great risk from further disturbances
- Their future survival is dependent upon translocation
  - Ile aux Fouquets most ideal as recipient island
    - Present until 1972, shrews no longer present

## Skinks and geckos

- Re-establishing populations of Telfair's skink, *Leiolopisma telfairii*



## Skinks and geckos

- Highly abundant - 26,000 (Pernetta 2004)
- Robust generalist (Food, Space, Time)
  - Adaptable to change – an ideal candidate
- An important component of the pristine Mauritian ecosystem:
  - Predator / Prey / Seed Disperser / Pollinator



## Skinks and geckos

- Telfair's repeatedly identified for translocation to:



## Skinks and geckos



### ▪ Ile aux Aigrettes

- Ideal habitat (possibly more suitable than Round Is)
- Cats and rats eradicated by 1991
- An abundant food source: invertebrates, fruits and reptiles
- Potential impact upon exotics:
  - Predation of African land snails and wolf snakes
  - Competitive exclusion of the shrew (may allow further re-introductions?)
- Ecotourism & education - increasing awareness of biodiversity issues

## Skinks and geckos



### ▪ Gunners Quoin

- Suitable diversity of habitat types
- Rats eradicated in 1995
- An abundant food source: invertebrates, fruits and reptiles
- Replacement of a lost predator
- Potential prey item for future reintroductions
- Disperser of *Pandanus* seeds and pollinator of *Latania*

## Skinks and geckos

### ▪ Re-establishing populations of night geckos:

- Three *Nactus* species



## Skinks and geckos

### ▪ The night geckos:

- Lesser night gecko, *Nactus coindemirensis*



## Skinks and geckos

### ▪ The night geckos:

- Durrell's night gecko, *Nactus durrelli*



## Skinks and geckos

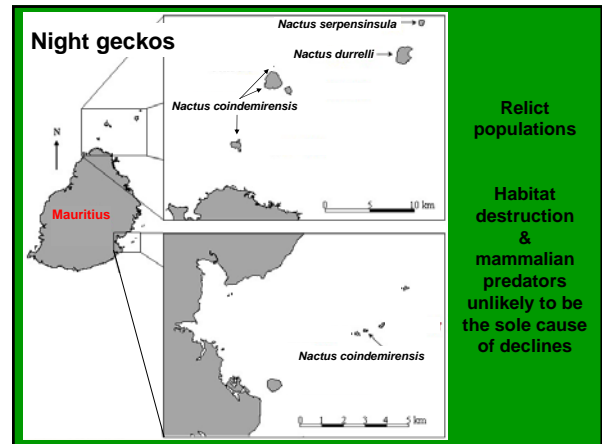
### ▪ The night geckos:

- Serpent Island night gecko, *Nactus serpensinsula*



## Skinks and geckos

- The most abundant reptiles in pristine Mauritius
- Would have been an important prey item for other reptiles and birds
- Catastrophic reduction in range
- Now extremely fragmented distribution



Relict populations

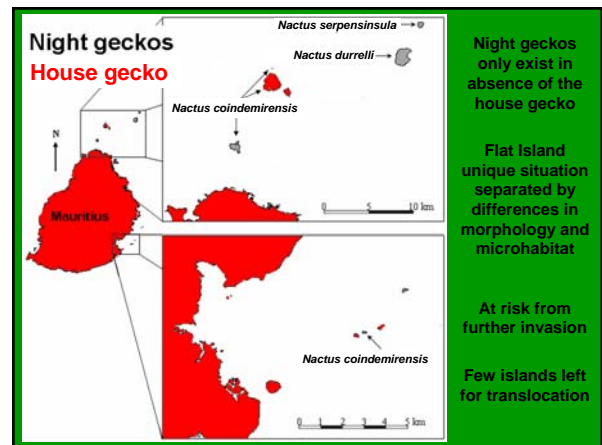
Habitat destruction & mammalian predators unlikely to be the sole cause of declines

## Skinks and geckos

- Previous research demonstrated that declines attributed to the introduced common house gecko, *Hemidactylus frenatus*



- Responsible for the competitive exclusion and predation of the night geckos



Night geckos only exist in absence of the house gecko

Flat Island unique situation separated by differences in morphology and microhabitat

At risk from further invasion

Few islands left for translocation

## Skinks and geckos

- Beneficial to translocate night gecko species to the same island
- Previous research into niche partitioning between the three species demonstrated:
  - Lesser & Durrell's night geckos co-evolved
  - Serpent island night gecko evolved in isolation
- Interspecific competition experiments between the Lesser & Durrell's night geckos:
  - No evidence competition or predation
- However, need to investigate long-term co-existence



## Skinks and geckos

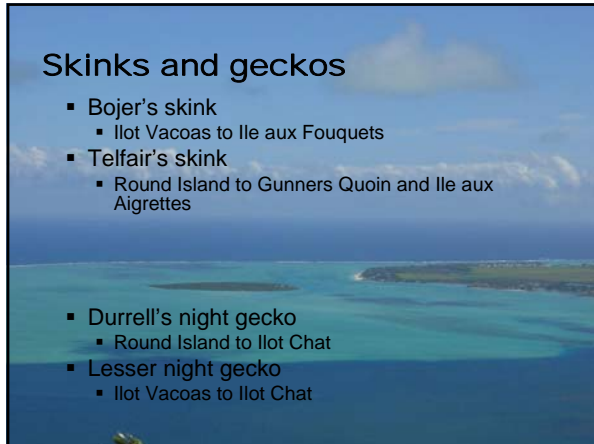
Ilot Chat



- Ideal for trial translocation of the two night geckos and test co-existence
  - No introduced competitors or predators
  - Suitable habitat and prey abundance
  - Small (0.036 ha) easily controlled and monitored


## Skinks and geckos

- Bojer's skink
  - Ilot Vacoas to Ile aux Fouquets
- Telfair's skink
  - Round Island to Gunners Quoin and Ile aux Aigrettes
- Durrell's night gecko
  - Round Island to Ilot Chat
- Lesser night gecko
  - Ilot Vacoas to Ilot Chat




## Monitoring populations

- Important to monitor:
  - Translocated populations
    - Survival
    - Recruitment
    - Dispersal
    - Home range
- Comparisons with donor populations
  - Diet
  - Microhabitat use
  - Health




## Monitoring populations

- Impact upon resident species
  - Native reptile populations
- Non-native terrestrial vertebrates



## Monitoring populations

- Important to monitor:
  - Invertebrate abundance
    - Determine prey selection by the translocated species and impact upon invert groups



## Preliminary timetable

- Currently
  - Setting up transects and surveying resident species
- October 2006
  - Translocate 80 night geckos to Ilot Chat (0.036ha)
  - 30 Telfair's to the aviaries for screening
- December 2006
  - Collect 100 Telfair's from Round Island and release with the 30 on Ile aux Aigrettes

## Preliminary timetable

- January 2007
  - 1<sup>st</sup> Bojer's translocation 10-20 to Ile aux Fouquets (2.5ha) repeated annually
- February 2007
  - Telfair's translocation 120 to Ile aux Aigrettes (26ha) and 250 to Gunners Quoin (76ha)
- February/March 07/08/09
- June/July 07/08
- October/November 07/08

Monitoring of resident vertebrates & invertebrates, translocated & donor populations

## Darwin Initiative outputs



- The establishment of
  - Telfair's on Gunner's Quoin & Ile aux Aigrettes
  - Bojer's on Ile aux Fouquets
  - Night geckos on Ilot Chat
- Training of MWF and NPCS
  - Herpetological conservation
  - Island Species-Led Action course
- To build capacity for further translocations
- Obtain greater public awareness of biodiversity issues and the work by MWF and NPCS

