

Survival Blueprint

Keel-scaled boa, *Casarea dussumieri*



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1. STATUS REVIEW

1.1 Taxonomy:

Kingdom: Animalia
Phylum: Chordata
Class: Reptilia
Order Squamata
Family: Bolyeriidae

The keel-scaled boa *Casarea dussumieri*, also known as the Round Island boa and the split-jaw snake, is a nonvenomous constrictor. This species is the only living representative of the Bolyeriidae Family. Endemic to Mauritius, there is no subspecies.

1.2 Distribution and population status:

The keel-scaled boa became restricted to Round Island (219 ha) during the mid-1800s due to the invasion of introduced mammalian predators, mainly rats *Rattus norvegicus* and *R. rattus* everywhere else in Mauritius (Cheke & Hume 2008). Based on subfossilised bone deposits and historical encounters the species was once found on the mainland of Mauritius and other islets, including Gunner's Quoin (0.70 km²), Flat Island (2.53 km²) and Ile de la Passe (0.02 km²) (Arnold 1980, Cheke 1987, Cheke & Hume 2008). Seventy young healthy adult boas of equal sex-ratio were reintroduced to Gunner's Quoin from Round Island between 2012 and 2014, where a population is now growing and dispersing across the island (Cole et al. 2013, Goder et al. 2015). The annual survival estimate calculated was 88.6% with 95% confidence intervals of 79.5% and 93.9% for the Boa on Round Island (Hector unpublished data 2017).

There was a 17% chance of recapturing the same snake for the cyclonic period (January February, March, April, May and December) from 2006 to 2017. The body condition of female boas found on Round Island has remained constant between 2002 and 2016. This result suggests that there are ample food resources to support the growing population size of the snake. On Round Island most of the captured snakes are usually encountered in the Palm Rich habitat. However, for already tagged snakes, there is a higher chance of capturing them in the Mixed Weed and House regions compared to the Palm Rich habitat (Hector unpublished data 2017).



1.2.1 Global distribution:

Country	Population estimate (plus references)	Distribution	Population trend (plus references)	Notes
Mauritius	1,818 (Cole et al. 2018)	Round Island and Gunner's Quoin with an Area of Occupancy of 2.89 km ² and the Extent of Occurrence 32.95 km ²	Increasing (Cole et al. 2018)	This is the adult population estimate for both the Round Island and Gunner's Quoin populations

1.2.2 Local distribution:

Country	Region / province	Site	Level of Protection	Population size	Reference(s)	Notes
Mauritius	Offshore islets	Round Island	Closed Nature Reserve	1,636	Cole et al. 2018	This estimate is now likely to be an underestimate, given that the boa abundance has been shown to increase on Round Island in 2016-2018.
Mauritius	Offshore islets	Gunner's Quoin	Closed Nature Reserve	182	N. Cole unpublished data	This estimate is based upon encounter rates of adult boas on Gunner's Quoin to encounter rates of adult boas in similar structural habitat on Round Island where abundance has been estimated.



1.3 Protection status:

Casarea dussumieri is listed as Appendix I by the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora. Whilst there may be demand for the species within the pet trade, the only legally exported individuals known to currently exist are in captivity at the Durrell Wildlife Conservation Trust's, Jersey Zoo. The boa is protected by law under the Wildlife and National Parks Act (Act 13 of 1993 - 1 March 1994), amended The Native Terrestrial Biodiversity and National Parks Bill (No. XVI of 2015). Round Island and Gunner's Quoins are both natures reserved protected by law and are close to the public access.

1.4 Ecology, behavior and habitat requirements:

The keel-scaled boa is a nocturnal species, which feed mainly feed on other reptiles (Bullock, 1986; Bullock et al. 2002; North et al. 1994). The snake's unique intramaxillary joint is adapted to feed on barrel-shaped lizard prey (Frazzetta 1971, McAlpine 1981, Cundall and Irish 1986, 1989). They can also predate on the smaller birds, as well as seabird chicks (Cole 2009, Zuel 2009,). Juvenile and male boas are mostly found in trees and vegetated habitats and females are mainly encountered on the ground. However, the species can be found in all habitat types across Round Island and Gunner's Quoin up to 280 m above sea level (Zuel 2009, Cole 2009, Hector et al. 2016). Male boas reach approximately up to 83.0 cm in total length and are considerably smaller and slender than females that reach up to 144.5 cm in length (N. Cole & A. Hector unpubl. data). Adult Günther's geckos *Phelsuma guentheri* and Telfair's skinks *Leiolopisma telfairii* are known to be the natural predators of juvenile and male boas, while female boas are occasionally killed when attempting to predate large adult Telfair's skinks (Cole 2009, N. Cole pers. obs.). Female boas have home ranges of 0.15 to 0.56 ha, which is negatively related to the density of their main prey item the Telfair's skink (MRRP 2012) (i.e. ranges are smaller where prey density is high). Newly hatched juveniles are mostly encountered between January and April (Hector et al. 2016), but little is known about the wild reproductive system of the boa. In captivity, clutch size has ranged from 3 to 12 eggs, average 7.3 (Bloxam & Tonge 1986, Durrell Wildlife Conservation Trust unpubl. data). Releases on Gunner's Quoin have shown that boas are reproductively active four years after hatching (MRRP unpubl. data). Repeated monthly captures of individually identifiable adult females within seven habitats specific 1 ha nocturnal survey quadrats on Round Island from 2006 to 2017, gave an annual apparent survival estimate of 88.6% (N. Cole & A. Hector unpubl. data) (Figure1).



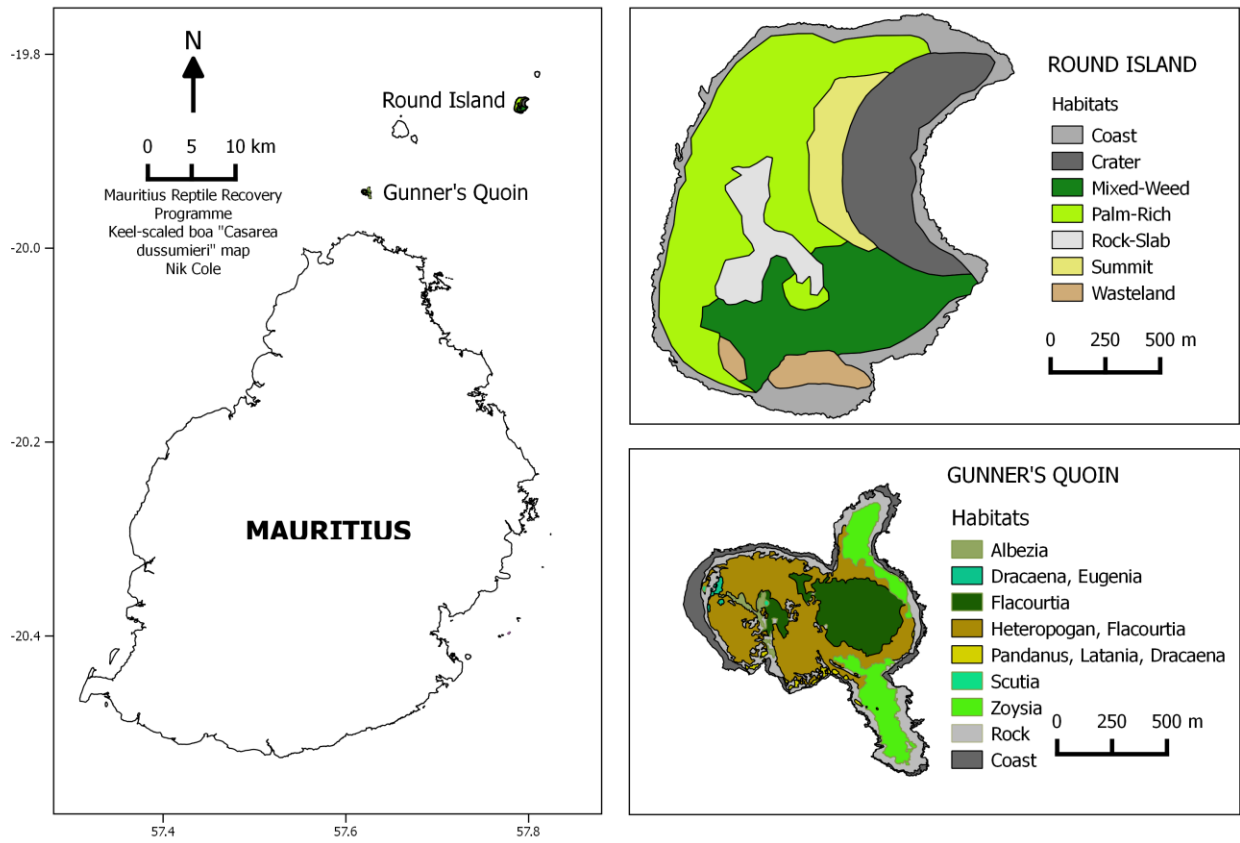


Figure 1: Location and habitats of Round Island and Gunner's Quoin.



1.5 Threat analysis:

Threat	Description of how this threat impacts the species	Intensity of threat (low, medium, high, critical or unknown)
Introduced mammals	On the mainland on Mauritius, introduced mammalian predators, such as rats <i>Rattus</i> spp., and cats <i>Felis catus</i> are thought to have been the main cause of historical declines and loss of the keel-scaled boa. They predate on the boas and their eggs, and compete for food. Mammalian herbivores such as <i>Capra aegagrus hircus</i> and rabbits <i>Oryctolagus cuniculus</i> were introduced on Round Island which had destroyed the boas' habitat increasing them to higher levels of exposure to predation and severe weather and reducing available prey abundances. They are now eradicated from Round Island however with the increasing number of catamarans, big fishing boats and local fishermen boats coming closer to both the islands there is a growing probability of invasion from mammal predations. Despite Gunner's Quoin being designated as a Closed Island Nature Reserve, it is frequently trespassed, increasing the risk of fire and non-native species introductions.	High
Illegal pet trade	With people being more aware of the existence on the keel-scaled boa on the island, there is a probability of the snakes being picking up for illegal trading.	Medium
Weather	Given the restricted range of the boa, extreme weather, intense cyclones, droughts and fire represent a significant threat to the survival of the species	Medium
Disease	With illegal pet trade in Mauritius, there could be a risk of snake fungal disease (SFD) being introduced that could be accidentally transported to Gunner's Quoin or Round Island via fomites.	Medium



1.6 Stakeholder analysis:

Country	Stakeholder	Stakeholder's interest in the species' conservation	Current activities	Impact (positive, negative or both)	Intensity of impact (low, medium, high or critical)
England	Durrell Wildlife Conservation Trust	Have been involved with conservation of Mauritian species since 1976, particularly the boa. Their staff are seconded as the Scientific Director and Islands Conservation Manager of MWF	Relevant activities specific to the boa include: Islands Restoration Programme, Round Island Restoration Programme, Mauritius Reptile Recovery Programme, Tortoise Rewilding, Islands Sensitisation Project, Durrell Conservation Training Ltd.	Positive	Critical
Mauritius	Mauritian Wildlife Foundation	MWF is the only non-governmental organisation in Mauritius to be exclusively concerned with the conservation and preservation of the nation's endangered plant and animal species; operating since 1984	See above for relevant activities. MWF hold an MoU with the Government (NPCS) to oversee the management of Round Island.	Positive	Critical
Mauritius	National Parks and Conservation Service	NPCS is the Government Agency responsible for the management of native terrestrial biodiversity and its ecosystems of Mauritius	Collaborative partners for the Round Island Restoration Programme and Mauritius Reptile Recovery Programme	Positive	Critical



England	ZSL's EDGE of Existence Programme	Improve the knowledge of EDGE species. Build in-country capacity to encourage young Conservation Biologists.	EDGE fellowship on the Round Island keel-scaled boa	Positive	Low
Mauritius	Forestry Service	Their mission is to manage forest resources for, with, and on behalf of the people of Mauritius.	Hold the jurisdiction of Round Island and Gunner's Quoin.	Positive	High
Mauritius	Police Helicopter Squadron and National Coast Guard	Their mission is to supply transport for us to access the Island	Transport people and material to the island and back to the mainland of Mauritius. Assist emergencies for evacuations off the island.	Positive	High



1.7 Context and background information that will affect the success of any conservation action for this species:

	Description	Threats	Opportunities
Socio-cultural effects and cultural attitudes	Mauritius is a multicultural and religious society with different beliefs. Some religious groups regard snakes as holy that give strength and others as demons and sources of destructions.	There is a risk that some people may trespass on Gunner's Quoin and persecute the snakes.	The high profile of the keel-scaled boa to the public eye will provide support for its protection. The work of the MRRP to restore the reptile community of Gunner's Quoin has led to greater protection and the island will soon be permanently staffed.
Economic implications	Even if there is a demand in the pet trade, the boa is protected by National laws and CITES	Illegal pet trade in Mauritius there could be a risk of introducing snake fungal disease (SFD)	Law enforcement of illegal pet trade and boarder checks is being promoted by the MRRP to Government.
Existing conservation measures	The permanent presence of staff and wardens jointly managed by the Durrell Wildlife Conservation Trust, Mauritian Wildlife Foundation, and National Parks and Conservation Service on Round Island. The islands are closed nature reserves where	The presence of wardens and staff and subsequent restorative actions are funding dependent on an annual basis.	Permanent staff on Gunner's Quoin will enhance protection. A long-term Vision has been developed for Round Island, by the MWF and the government of Mauritius, enhancing partner buy-in for continued support and funding.



	access without Government permission is illegal.		
Administrative/political set-up	Round Island and Gunner's Quoin are Closed Island Nature Reserves where public access is prohibited under the jurisdiction of the Forestry Service. The MWF and NPCS hold a MOU for the management of Round Island and for conservation actions on Gunner's Quoin.	Trespassing on both islands leads to the risk of fire, litter, trampling, the introduction of invasive species and poaching.	A long-term Vision has been developed for Round Island that will also support activities on Gunner's Quoin with all partners identifying the need for greater protection and patrolling.
Local expertise and interest	The Mauritius Reptile Recovery Programme has the interest and expertise to continue restoring reptile communities and the conservation of the boa.	Lack of funding and ongoing Government support	Capacity building and training of Mauritian Conservation Biologists
Resources	The funding and expertise for boa conservation are accessible.	The political crisis and economic changes in the country could threaten current conservation actions	The popularity of the Boa and national government interest on the species could help to secure future funding.
	Funding comes from numerous sources through Durrell, MWF and NPCS	As charitable organisations funding is never guaranteed for reptile conservation work through Durrell and MWF. Government support may change.	A new government can bring more funding and interest in conservation work, but equally it can bring less.



2. ACTION PROGRAMME

Vision (30-50 years)	
Saving the Endemic Species of Mauritius.	
Goal(s) (5-10 years)	
To improve the relationship of human and nature on northern Mauritius and the nearby islets, to ensure the survival of endemic species such as the round island keel-scaled boa.	
Objectives	Prioritisation <i>(low, medium, high or critical)</i>
Empowering professionals in the North of Mauritius (Islet dependent professional, Occasional islet visitors and Government staff) to appreciate the ecological opportunities that the islets offer to enhance sustainable livelihoods and to understand why trespassing those islands could make the endemic ecosystem at risk.	Critical
Develop regulation guidelines with the different Stakeholders, including government staff, to promote the sustainable use of the northern islets.	Critical
Raise awareness of the wider public including coastal villagers and schoolchildren from the north of Mauritius on the best practices respect to adopt when visiting islet to reduce impacts on islet wildlife.	High
Inspire youngsters to become the ambassadors of the wildlife to raise the awareness for the protection of nature.	High



Activities	Country / region	Priority <i>(low, medium, high or critical)</i>	Associated Cost	Timescale	Responsible stakeholders	Indicators	Risks	Activity type
Objective 1: Empowering professionals in the North of Mauritius to appreciate the ecological opportunities that the islets offer to enhance sustainably livelihoods.								
Empowering professionals	North of Mauritius	Critical	£30000	5years	Skippers, coastguards, fishermen	No more illegal intrusion on Round Island and Gunner's Quoin	Medium	Participatory
Objective 2: Develop regulation guidelines with the different Stakeholders, including government staff, to promote the sustainable use of the northern islets.								
Develop regulation guidelines	North of Mauritius	Critical	£30000	5 years	Skippers, coastguards, fishermen, government	Guideline produced	Medium	Participatory
Objective 3: Raise awareness of the wider public including coastal villagers and schoolchildren from the north of Mauritius on the best practices respect to adopt when visiting islet to reduce impacts on islet wildlife.								
Raise awareness of the wider public	North of Mauritius	High	£15000	5 years	Coastal villagers, Schoolchildren General public	Number of teachers, villagers and students approached.	Medium	Educational programme.
Objective 4: Inspired youngster to become the ambassador of the wildlife to raise the awareness for the protection of the nature.								



<p><i>Inspired youngsters</i> <i>The Mauritian National Curriculum Framework (NCF) promotes the implementation of projects that encourage education to be less focused solely on academic skills and cognitive development of the child and instead emphasizes a holistic approach to the development and competencies for life in the 21st century, for instance</i></p>	<p>North of Mauritius</p>	<p>High</p>	<p>£15000</p>	<p>5 years</p>	<p>Mauritian children</p>	<p>Eco student council produced.</p>	<p>Medium</p>	<p>Participatory</p>
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Activities	Country / region	Priority <i>(low, medium, high or critical)</i>	Associated Cost	Timescale	Responsible stakeholders	Indicators	Risks	Activity type
<i>“use of new technologies as tools for teaching and learning” (MIE 2015). I will try to implement my educational game in the school system.</i>								



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