Control of the black rat *Rattus rattus* for the conservation of the Antiguan racer *Alsophis antiguae* on Great Bird Island, Antigua

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SUMMARY

The critically endangered Antiguan racer *Alsophis antiguae*, used to be abundant throughout the Lesser Antillean islands of Antigua (and its satellite islands) and Barbuda. Non-native black rats *Rattus rattus* were identified as a serious predator of the snake on Great Bird Island, therefore the decision was made to eradicate the rats. A poison-baiting programme proved successful, with the racer population more than doubling in only 18 months in response. Other fauna, including several species of seabirds and hawksbill turtle *Eretmochelys imbricata,* also benefited greatly from rat removal.

BACKGROUND

The Antiguan racer *Alsophis antiguae* is a harmless colubrid snake which used to be abundant throughout the Lesser Antillean islands of Antigua (and its many satellite islands) and Barbuda (total area of 440 sq km) in the Carribean. It is an ambush predator, feeding mainly on lizards such as Watts' anole *Anolis wattsi*, spotted anole *Anolis leachi* and Antiguan ground lizard *Ameiva griswoldi*. It is a diurnal, ground dwelling snake preferring habitat with a dense canopy cover, dense undergrowth and an accumulation of leaf litter.

However, in the late nineteenth century the Asian mongoose *Herpestes javanicus* was introduced to Antigua in order to control the invasive black rat *Rattus rattus* which was destroying European settlers' sugar cane crops. The mongooses had negligible impact on the rats, instead predating on the more easily captured endemic species, decimating the population of Antiguan racer. In fact in 1936, H.W. Parker declared this snake extinct on Antigua main island. Antiguan racers persisted for a few more decades on some of the mongoose-free offshore islands, but by the 1980's, they were known only to persist on one islet, Great Bird Island, 2.5 km off the north-east coast of Antigua. This islet represents less than 0.1% of the species' original range. Awareness of the plight of the Antiguan racer was raised in 1991 in an article in the journal Oryx, and the species was listed by IUCN as Critically Endangered in 1996.

ACTION

Study site: Great Bird island (9.9 ha) comprises of a variety of distinct macro habitats, including beaches, forest, grassland and cliffs. It is a coralline limestone island with more than half of its area covered in dry littoral forest, with a maximum canopy height of around 6 m. The centre of the island is low lying and sandy, sparsely covered with grasses, agaves and trees.

Survey assessing the status of the Antiguan racer: In 1995, a six week survey was undertaken on Great Bird Island to find out the status of the Antiguan racer. Using mark-recapture techniques, the survey estimated the population size to be approximately 51 (± SE 7) adult and sub-adult racers, with a skewed male:female ratio of 1:1.8. Although mongoose-free, non-native black rats *Rattus rattus* were common and identified as a serious threat to the racer population - over 50% of racers caught were scarred with rat bites and 42% had lost part of their tail. This had implications for reproductive success of male racers, as the hemipenis and retractor muscles are located in the tail. As a result of this assessment, the Antiguan Racer Conservation Project (ARCP) was created and the decision was made to attempt to eradicate rats from Great Bird Island before the end of 1995.

Rat eradication: The method chosen to eradicate rats was poisoning using brodifacoum, an anticoagulant rodenticide. To minimise injuries to animals other than rats, the brodifacoum was presented at a concentration of 0.005% in rain-proof waxy 20g blocks (Klerat™, donated by Syngenta Agrochemicals) that birds and reptiles find unappealing and distasteful. Signs were placed on landing beaches to warn people not to tamper with the bait or poisoned rats, nor to allow domestic dogs *Canis familiaris* on to the island. The wax is dyed blue so that the rodenticide can be easily seen as blue flecks in the faeces or intestines of animals that have consumed it. Anticoagulant rodenticides work by preventing the clotting of blood, and death is due to internal bleeding within a few days of ingesting the substance. The relatively slow acting nature of this poison is important, because some rats are inherently suspicious of new foods placed in their environment, and it therefore takes several days for the entire population to be fooled into accepting the bait as a safe food. Certain invertebrates, most notably hermit crabs, also readily eat large quantities of the rodenticide, but are unaffected by it; the brodifacoum briquettes were nailed on top of wooden blocks to prevent crabs from dragging them away. Any uneaten or excreted brodifacoum is readily broken down into inert products by soil bacteria.

Bait stations (730 in all) were set up over the whole island in late 1995 in a 10 m x 10 m grid formation. This took three weeks of hard labour by a large team, but was necessary to ensure a good chance that every rat on the island would come into contact with at least one bait station. Every station had several bait blocks, checked daily and replaced as necessary. The social structure of rats meant that initially dominant individuals tested and ate the bait, so the bait had to be replenished to ensure that lower ranking individuals (mostly females and juvenile males) also consumed a fatal dose.

As a precaution against reinvasion, rats were also simultaneously cleared from the two Galley Islands, which are very close to Great Bird Island.

CONSEQUENCES

Success of eradication: The successful eradication of rats from Great Bird Island took only seven days of poisoning, and was only the second such project in the Caribbean. (The first being the eradication of rats from the 2 ha Praslin island in St Lucia, as part of an effort to conserve the St Lucia whiptail lizard *Cnemidophorus vanzoi*).

Effects of rat eradication on racer population and other indigenous fauna: Not only has the racer benefited from rat eradication - the population more than doubled in number within 18 months - but other species on the island have also benefited from freedom from rat predation, including some globally threatened species (e.g. West Indian whistling duck *Dendrocygna arborea* and hawksbill turtle *Eretmochelys imbricate*). The nesting colony of red-billed tropicbirds *Phaethon aethereus* has more than quadrupled in size since 1995, while the mixed tern colonies (bridled tern *Sterna anaethetus*, sooty tern *S.fuscata*, least tern *S.antillarum* and brown noddy *Anous stolidus*) have grown exponentially to number many hundreds.

Ongoing monitoring: The island continues to be checked monthly for signs of rat presence and, aside from one rat that was found and killed in 2001, has remained rat-free.

Conclusions: Rat predation was the primary threat to the Antiguan racer on Great Bird Island. The successful rat eradication on the island was the first of a series of conservation activities to safeguard the long-term future of the racer. Not only has the racer benefited from rat eradication but many other native species have also benefited. Some local tour operators have began bird watching tours to the island in response to the increased number of birds and other fauna now present on the island.