



# Global Re-introduction Perspectives: 2016

Case-studies from around the globe

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IUCN/SSC Re-introduction Specialist Group (RSG)



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i. Bolson's tortoise, USA @ Turner Endangered Species Fund  
ii. Wetapunga, New Zealand @ Richard Gibson  
iii. Morelos minnow, Mexico @ Topiltzin Contreras-MacBeath  
iv. *Silene cambessedesii*, Spain @ Emilio Laguna  
v. Tasmanian Devil, Maria Island, Tasmania @ Simon DeSalis  
vi. Agile frog, Jersey @ States of Jersey Department of the Environment

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## Re-introduction of the oriental pied hornbill in its historical range in Singapore

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### Introduction

The southern oriental pied hornbill (*Anthracoceros albirostris convexus*) is a common bird in most of its distribution area (CITES II) covering Malaysia, Sumatra, Java, Bali, Borneo and other islands in the region. This highly adaptable bird thrives in numerous urbanized areas throughout its range and shows remarkable tolerance for human presence. Never the less, it had been extinct in Singapore for over a 100 years when a pair of birds were sighted nesting in Pulau Ubin (a small island north-east of Singapore) in March 1994. When the Singapore Hornbill Project was initiated in 2004, the birds were still only present on this island and had not re-colonized the heavily developed main island of Singapore.

### Goals

- Goal 1: In-depth study of the reproductive cycle through technology-assisted observations inside and around the nesting cavity (HD cameras, temperature and humidity sensors and weighing scales).
- Goal 2: Development of appropriate artificial nests to increase the number of potential breeding cavities in suitable areas.
- Goal 3: Identification and enrichment of nesting and foraging sites suitable for the species on mainland Singapore.
- Goal 4: Increase population in Singapore mainland.
- Goal 5: Assure genetic diversity of re-introduced population through input of non-consanguine individuals from captive stocks.



Southern oriental pied hornbill

### Success Indicators

- Indicator 1: Collection of necessary data for an in-depth comprehension of the reproductive ecology

of the species, in order to establish a detailed list of requirements for breeding.

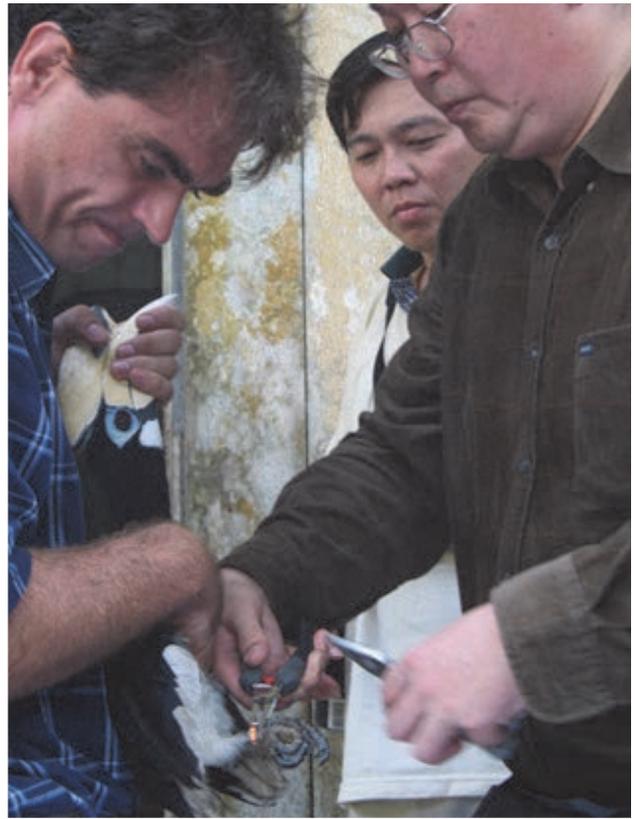
- **Indicator 2:** Utilization of artificial nests by potential breeding pairs in a wild environment where trees with large cavities have become scarce.
- **Indicator 3:** Colonization of improved environments (garden and parks on Singapore mainland) by breeding pairs.
- **Indicator 4:** Establishment of a viable breeding population throughout Singapore territory.
- **Indicator 5:** Successful breeding of non-related individuals.

### Project Summary

**Feasibility:** Oriental pied hornbills are large birds, nesting in tree cavities in which the female remains confined for the whole duration of the breeding cycle, entirely depending on the male for feeding and supply of nesting material.

In 2004, a field study was initiated on the sole existing breeding pair on Singapore territory. At this time, the species was confined to the small island of Ubin, north-east of Singapore. It led to much deeper investigations on the breeding-cycle with the monitoring of the nesting cavity and its surroundings through close-circuit television cameras. From the very start, students, volunteers and government agencies were involved in analyzing data with the objective of understanding the biology of the species, engage in its conservation and possibly, in its re-distribution over its historical range throughout Singapore. The species absence from the mainland for over a 100 years could be explained by the scarcity of suitable nesting cavities and foraging areas due to the intense urbanization of the original habitat.

**Implementation:** Suitable re-introduction areas were identified and enriched under the direction of the Singapore National Parks board while our team was working on the realization of artificial nests tailored to satisfy the needs of the species, assure safety from main predators (civet cats and reticulated pythons) and water as well as allow for further studies. The nests were first and successfully experimented on captive birds at the Singapore Bird Park. A strategy was jointly designed by the Singapore Hornbill Project team and National Parks to distribute artificial nests and re-locate birds in such way as to



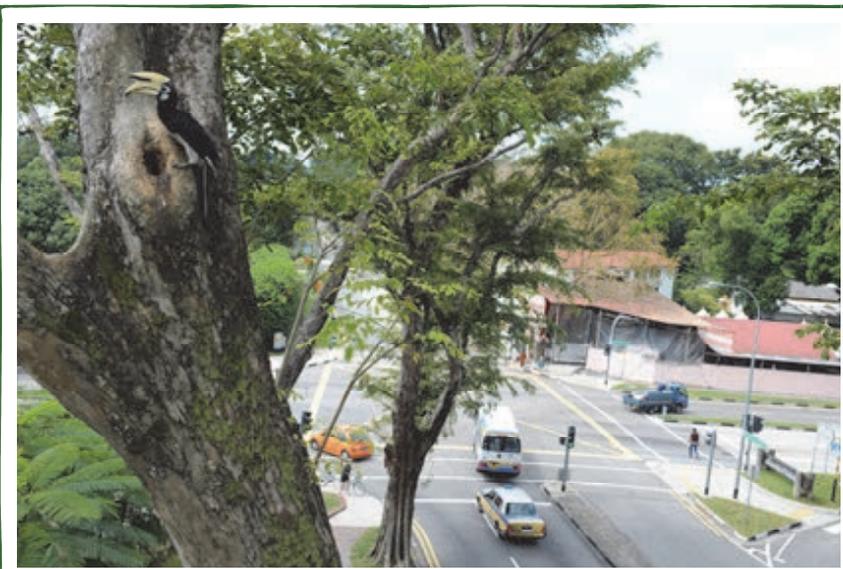
Ringling hornbills

## Birds

allow for a spreading of the newly introduced population throughout the desired range.

Nests were first placed in areas where they could attract visiting birds (from neighboring Malaysia) and offspring of the breeding pairs of Ubin, while the population was strengthened with two re-introductions (total of 3 birds) from captive stock donated by WRS (Wildlife Reserves Singapore). Several translocations of birds from the Ubin stock were also carried out to avoid in-breeding and assure genetic diversity. Genetic studies of wild and captive populations have been performed by the Singapore National University. The artificial nests were readily adopted by the birds and a resident, breeding population of southern oriental pied soon established itself across the island.

**Post-release monitoring:** Several artificial nests were equipped with high-tech monitoring devices to allow for in-depth studies of the breeding ecology of the species. The final version of the nest included 4 HD cameras with zooming capacity, temperature, humidity, CO<sub>2</sub> and oxygen sensors, 2 electronic weighing scales (on outside perch and inside the nest). All equipment was connected to 2 computers and recording 24 hours a day. Data collected through this close monitoring brought a very comprehensive understanding of the breeding ecology of the species as well as some startling discoveries such as infanticide-cannibalism. A couple of males were also equipped with specially designed GPS devices to measure and monitor their movements during the breeding season. These studies were publicized through public screenings of movies, public talks and scientific publications. After 6 years of efforts, the Singapore population was counted to be over 100 birds, with 10 confirmed breeding pairs. The majority started nesting in the provided nests and moved to natural cavities in the following breeding seasons. This seems to show that the number of birds will be regulated by the availability of nesting cavities across the territory and should not need intrusive management strategies in the future. Genetic diversity of the population, on the other hand, may require monitoring over the years.



Hornbill on tree in urban habitat

### Major difficulties faced

- Identification of suitable habitat in a highly urbanized environment with few suitable natural nesting cavities and food shortage.
- Education of resident populations to avoid capture and/or conflict with the birds.

- Assure the establishment of the birds on very small and highly disturbed territories.

### Major lessons learned

- In a world with fast receding natural environments, the challenge of offering venues for wildlife in our highly developed urban areas should be explored further. Our cities can host certain diversity and number of wildlife if properly planned.
- This forest species has shown adaptability to urban environment and human proximity above expectations.
- Never the less, this adaptability should not be over-estimated and co-existence with wildlife in urban environments requires long-term and well-studied development.
- Co-existence with wildlife has a strong impact on awareness about environmental issues on resident populations.

### Success of project

Highly Successful	Successful	Partially Successful	Failure
√			

#### Reason(s) for success/failure:

- Strong and durable support of local government agencies and partners.
- Successful enrichment of habitat to host birds.
- Overall positive response and interest of resident populations.
- Availability of high-tech equipment on site.
- Cohesion of the team for the whole duration of the project (6 years).

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