



Winged invaders: Bird introductions

Lorinda Hart and **Colleen Downs** consider the example of the rose-ringed parakeet.



The common myna – an abundant invasive species. Image: Lorinda Hart

Invasion biology has become an important area of biological research, especially in the light of global climate change. The invasion of alien species is recognised as one of the leading causes of extinction of indigenous animal species, particularly birds. The negative impacts of alien birds could include damage to property and crops, noise and nuisance, and the spread of disease to humans and native species. One example is feral pigeons found in cities. They nest and roost on buildings in large flocks and spread harmful bacteria in their faeces and in some cases parasites from their feathers. Some people also develop an allergy to their feather and scale dust.

Certain invasive bird species also hybridise with native species. An example is mallard ducks breeding with our indigenous duck species. As a result our 'pure' ducks are at risk of being replaced by mallard-indigenous duck hybrids. But how do invasive bird populations begin?

How are birds introduced?

Birds are kept as pets and ornamental captives and because they can fly, they have a high escape risk. In South Africa many bird species have escaped from captivity or have been intentionally released into the wild by well-meaning people. Some of these birds have been able to survive, establish



The popular rose-ringed parakeet. Image: Sophia Turner

breeding colonies and spread in their new environment. This is how species such as the common myna and the mallard duck became known as invasive species. Of the ten invasive bird species that live in the wild in South Africa, six are believed to have been deliberately introduced, e.g. chukar partridges and common starlings, three escaped captivity, e.g. mallard ducks and one, the house crow, was most likely a ship stowaway. It is also believed that these ship-hitching birds spread from Durban to Cape Town in this way.

Some bird species cannot survive or breed in South Africa and are of less concern. For example, in the late 1800s British colonials tried to deliberately introduce game birds (pheasant and quail) for hunting and song birds (thrushes and nightingales) which reminded them of England, but these introductions were mostly unsuccessful.

Birds are able to cover great distances and cross geographic barriers, allowing them to expand their ranges relatively quickly. This means that they can spread quickly once they are introduced to a new place. The common starlings did just that. They spread from 18 birds released in Cape Town, crossing over the mountains 30 years later and have since spread to KwaZulu-Natal and Mpumalanga, showing no signs of stopping.

As with all alien species introductions, the successful invasion of alien bird species worldwide could be because of the capabilities of the birds themselves (e.g. they could be well-suited to the climate of the region where they are introduced), the environments they find themselves in (the forest they were introduced to contained very similar nesting sites and food to the region they came from overseas), or specific chance factors at the time of introduction (e.g. enough birds were released at the same time to ensure successful breeding), or any combination of these. Identifying common traits which have led to the successful invasion of a certain species, such as the common myna is difficult because there is very little literature available on invasive birds in South Africa, and not enough is known about how these species affect our local fauna and flora. It is important to identify invasive traits because as the pet trade expands with demands to import new and exotic species, screening for 'invasive traits' could prevent new problem species from being brought into the country.



The chukar partridge – an introduced game bird. Image: Wikimedia Commons

The human link

Invasions have been strongly linked to human disturbance and urbanisation, especially with the success of invasive bird species. Humans have altered nearly 50% of the Earth's land surface, and continue to do so, so there is plenty of human-modified habitat available. As the cities become larger and denser, natural habitats and ecosystems become scarce. Urban areas have a wide variety of different bird habitats and are highly fragmented because of the construction of buildings and houses. Most bird species cannot live in these areas and need natural areas for nesting and feeding, but a few species are able to exploit new niches created by human activity or expanding existing niches (such as gardens and

Species	Scientific name	Place of origin	Control
Chukar partridge	<i>Alectoris chukar</i>	Eurasia	None
Common peacock	<i>Pavo cristatus</i>	Indian subcontinent	None
Rose-ringed parakeet	<i>Psittacula krameri</i>	Central and north Africa, Asia and Indian subcontinent	None
Common chaffinch	<i>Fringilla coelebs</i>	Europe, north Africa and western Asia	None
Rock dove/feral pigeon	<i>Columba livia</i>	Europe, north Africa and south Asia	No official control programme, some industrial areas control locally
House crow	<i>Corvus splendens</i>	India and surrounds	Poison largely successful
Common starling	<i>Sturnus vulgaris</i>	Temperate Europe and western Asia	None
Common myna	<i>Acridotheres tristis</i>	Asia	None, some breeding pairs locally removed
Mallard duck	<i>Anas platyrhynchos</i>	Most of the northern hemisphere	Programmes in place, largely using poison
House sparrow	<i>Passer domesticus</i>	Europe, Asia and Mediterranean	None

A table showing invasive birds in South Africa and current control strategies, identified from the book *Alien and Invasive Animals: a South African Perspective* by Mike Picker and Charles Griffiths (Struik Nature, 2011).

buildings). Introduced species are also more likely to be found in urban areas due to the abundance of food and nesting sites. Feral pigeons and common mynas are good examples of species that benefit from humans, as they feed on scraps in the streets or are fed and have many buildings to nest and roost on.

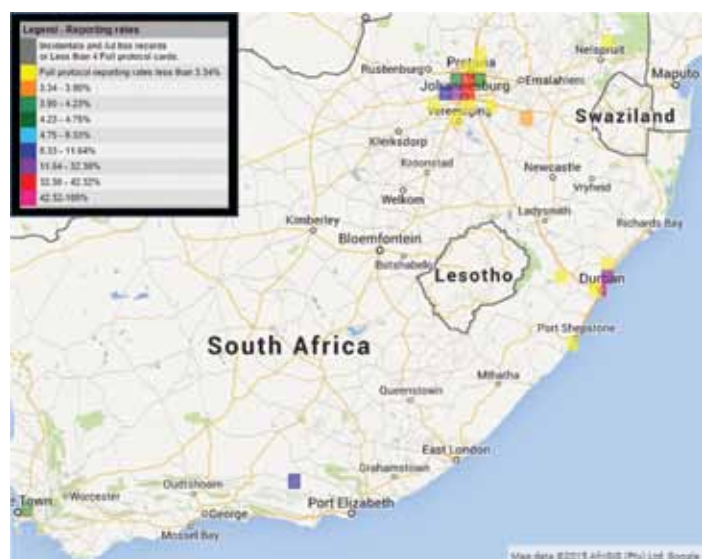
Exotic parrots

More recently exotic parrot species have been setting off researchers' warning bells, with reports of feral birds on the increase. One species of particular concern, which has become a successful invader in South Africa, is the rose-ringed parakeet. It is native to southern Asia and sub-Saharan Africa, but today it is the most widespread invasive parrot worldwide, with established feral populations in at least 35 countries on five continents. Parrots are popular pets as they are colourful and charismatic. As with other caged birds, escapes and releases are quite common. Their popularity also makes it difficult for nature conservation officials to trap or remove them, because the public enjoys seeing them around. Today there are several exotic parrot species in the wild in South Africa (see Symes 2014 review for further reading). Not all of these will become invasive as their numbers may be too low or they could be a long-lived species with very specific breeding requirements and take a long time to produce offspring, so their population will grow very slowly.

In South Africa, rose-ringed parakeets have established breeding colonies in Gauteng and KwaZulu-Natal. First sightings in South Africa were noted in 1972 and initial breeding records date back to the 1980s in Gauteng. These birds were considered rare and were most likely escapees from cages. While they were also seen to breed in Cape Town in the 1950s, these populations did not persist. Today, in South Africa, they are considered fairly common in areas where they occur and in 2005 it was estimated that the population in Durban was about 700 – 1 000 individuals. It is likely to have increased since then, and so the current rose-ringed parakeet population size and trends in South Africa need to be determined. Researchers at the University of KwaZulu-Natal are busy setting up research projects on this species.

Overseas their populations are expanding exponentially and it is suspected that once the South African population is sufficiently large, similar trends will be experienced here. In general, invasive bird species have a lag period, which can last for decades, after which there is a population explosion. This was true for the common myna whose population appeared

Box 1: Citizen scientists facilitate research



This map shows the current distribution of rose-ringed parakeets in South Africa. It was generated on Google maps by the *Southern African Bird Atlas Project* (SABAP, <http://sabap2.adu.org.za>). This project relies on citizen scientists and researchers who submit sighting records of birds observed in different areas. The different coloured squares show the different reporting rates of a species in different areas. Rose-ringed parakeets currently have strongholds in Durban and Johannesburg and are spreading outwards from these areas. They are also being observed in smaller groups in the Cape and near Port Elizabeth for example. This public platform allows the spread and decline of certain species to be monitored and is a wonderful example where technology, enthusiastic observers and scientific research can work together to benefit conservation. To learn more visit <http://sabap2.adu.org.za>.

unchanged for 30 years, after which it soon became one of the worst invasive bird species in South Africa. Numerous efforts to eradicate invasive species have been largely unsuccessful due to this phenomenon, and early detection has been suggested as a key step in any control strategy. Based on a recent study and data from the *Southern African Bird Atlas Project (SABAP)*, rose-ringed parakeets largely occur in urban areas. There are already indications that this species is spreading into neighbouring suburbs and these birds have once again been sighted in the Cape and in other areas.

Rose-ringed parakeets are generalist birds, occurring in a wide range of habitats and feeding on a variety of food items. This means that they are not very fussy and easily adjust to new and different environments. Researchers from the University of KwaZulu-Natal have found that these parakeets are able to conserve energy in extremely cold situations and show no sign of hypothermia at 5°C, despite being a tropical species. This physiological capability has no doubt facilitated its spread across the world. It is important that we understand the threats these birds could pose to our ecosystems. In South Africa these birds have been seen to evict black-collared barbets and golden-tailed woodpeckers from their nests, but whether or not they are having a significant effect on these species has not yet been quantified. Where food and nest sites are not limiting, these birds have the capacity to reproduce successfully and rapidly. When their population gets big enough they spread from urban areas to more rural areas and can damage crops and disrupt natural ecosystems. Although this species is widely studied on a global scale, very little work has been done in South Africa. There is currently no management plan to control rose-ringed parakeets, although discussions are currently underway to determine which methods would be most suitable. Public education should also be undertaken to create awareness of the potential threat these parakeets pose to indigenous species. **Q**

Dr Lorinda A Hart is a post-doctoral research fellow at the University of KwaZulu-Natal under the supervision of Prof. Colleen Downs and Dr Mark Brown. She has broad research interests and is especially interested in ecophysiology, and urban and invasive ecology. Her PhD focused on avian and bat frugivores which fed on invasive fruits commonly found in South Africa, particularly KwaZulu-Natal. The effect that frugivores have on invasive seed germination and the energetic rewards gained by the frugivores that feed on these fruits was also quantified. After her PhD she conducted public surveys and determined the current rose-ringed parakeet distribution in the in the greater Durban Metropolitan area of eThekweni. She is currently involved in several projects on a range of species including fruit bats, birds of prey, woolly-necked storks and a variety of seabirds from the Seychelles.

Prof. Colleen T Downs has been at the University of KwaZulu-Natal since 1994. Her research interests are broad and multidisciplinary. They include the conservation, ecology, physiology and behaviour of terrestrial vertebrates in unpredictable environments. This includes ecosystem health in KwaZulu-Natal incorporating conservation, general biology and persistence of mammal, herpetological and bird species with changing land use (including urban ecology). This includes several species such as Cape parrots, bushbuck, oribi, pelicans, Cape vultures, Nile crocodiles, fruit bats, raptors, small carnivores and feral cats. Another interest is science education (particularly problems experienced by Biology students and development of strategies to address these). Her other contribution has been in the development of research capacity, particularly at both undergraduate and postgraduate levels.

Further reading

Hart LA and Downs CT 2014 Public surveys of rose-ringed parakeets, *Psittacula krameri*, in the Durban Metropolitan area, South Africa. *African Zoology*, 49:283-289.

Pickler M and Griffiths C 2011 Alien and Invasive Animals: A South African Perspective. Struik Nature, Cape Town.

Symes CT 2014 Founder populations and the current status of exotic parrots in South Africa. *Ostrich* 85:1-10.

From hydrologist to invasion biologist

Farai Tererai is the Deputy Director: Planning, Monitoring and Evaluation for the Working for Wetlands programme within the Department of Environmental Affairs (DEA). As a former hydrologist, Farai find himself now battling invasive alien species in our wetlands. *QUEST* asked him a few questions about his career in invasion science.

What did you study?

All my studies were in the broad discipline of environmental science. My undergraduate and honours degrees were in Geography. I studied both physical and human geography, but I discovered that I was more interested in physical geography, which was the focus of my Masters degree. After working as a hydrologist for a few years I enrolled for a PhD at the DST-NRF (C•I•B) Centre of Excellence for Invasion Biology at Stellenbosch University.

What are your current duties?

The Working for Wetlands programme's mandate is to protect wetlands, to promote their wise use and rehabilitation of those wetlands that are degraded. My job involves the development of monitoring and evaluation systems, standards, and best practices, and providing planning support to our national projects.

Describe the career path that led you to your current position

During my work as a hydrologist I gained experience in various fields. I moved into monitoring and evaluation for a non-governmental organisation called GOAL-Ireland where I helped to develop and implement monitoring and evaluation systems for their development projects. After my PhD I worked for the Agricultural Research Council (ARC) on a short-term research contract modelling the potential

distribution an invasive alien shrub, Crofton weed (*Ageratina adenophora*). I then joined the University of Cape Town as a postdoctoral research fellow in the African Climate and Development Initiative (ACDI) and then joined the Working for Wetlands Programme.

What do you enjoy about your work?

I enjoy my position because it gives me the opportunity to do fieldwork, to examine the biological diversity of wetlands, and, more importantly, it allows me to pull together all my interests and previous experience – hydrology, riparian ecology, and invasion ecology.

What do you do to unwind?

I am fond of swimming and hike regularly. I am also a keen reader and enjoy spiritual books.



Farai Tererai. Image: Farai Tererai