



On two different islands, two different psittacines - The Red-crowned Parakeet (L) and the Echo Parakeet (above) - face the challenge of one famous disease.

a tale of two psittacines

by
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ACROSS THE GLOBE, parrot conservation programs are managing a growing suite of threats. Arguably, the most sensitive of these threatened populations are the island endemics – those that are found nowhere else. Not only do these species have to cope with introduced predators and competitors, habitat destruction and urban encroachment, they have to do all of this within the geographic limitations of an island. Many of these populations have low genetic variability due to founder effects, bottlenecks and small size. This can reduce the population's ability to respond to rapid environmental change or threats such as new diseases.

The endangered Echo Parakeet (*Psittacula echo*) of Mauritius is a conservation success story, having been recovered from approximately 20 known birds in the 1980s. It is the last remaining endemic psittacine in the Mascarene Islands in the Indian Ocean. Echos now exist on an island that has less than 1% of the original native forest cover remaining, with introduced competitors and predation from cats and rats presenting a constant threat. In 1987, the Mauritian Wildlife Foundation (MWF), the Government of Mauritius

National Parks and Conservation Service (NPCS) and a number of international conservation bodies intensified the recovery program to save this important species. As a result of intensive management actions that included nest site monitoring, assisted rearing of chicks, and supplementary feeding, the population increased to an estimated 300 birds by 2005, and looked set to continue growing.

It seemed all was well.

a CROSS THE INDIAN OCEAN, the story was much the same but with different characters. New Zealand's parrots evolved in isolation, free from mammalian predators and human mediated habitat alteration. They developed some extraordinarily unique and iconic characteristics, typified by the large, flightless, nocturnal Kakapo (*Strigops habroptilus*). With the arrival of humans came habitat destruction and the introduction of stoats, rats and cats. This suite of new threats cut a swathe through native bird populations, causing the extinction of at least 51 species in New Zealand in just 150 years. Many,

such as the Red-crowned Parakeet (*Cyanoramphus novaezelandiae*) are now rarely seen nesting on the mainland where these threats still exist. Instead, they exist mostly on predator-free offshore islands.

NEW ZEALAND has led the way in island restoration projects, removing predators and restoring habitat to enable the persistence and recovery of many native species of birds. The Tiritiri Matangi open island sanctuary is one such haven for threatened species. This island was converted in the 1980s from barren farmland to a native fauna and flora ark, through the inspirational efforts of a volunteer army who planted nearly 300,000 trees during a 10-year period. Active removal of all mammalian pests, and the ongoing management by the Department of Conservation and the volunteer community group (Supporters of Tiritiri Matangi), enables 30,000 visitors each year to experience an island alive with native birdsong. The Red-crowned Parakeet is abundant on this island, with their vibrant green plumage, proud red crowns, and characteristic chattering calls.



Beak and Feather Disease Virus has now been found on both New Zealand and Mauritius. Feather damage can be dire (below) and results deadly. If birds live through infection, they may carry permanent signs (above).

RECENTLY RESEARCHERS HAVE FOUND there is something else these two parakeets have in common – Beak and Feather Disease Virus (BFDV - also known as PBFV). More than just a bad hair day, this parrot virus can be a serious threat to some species, with young birds dying, and adults succumbing after months of feather loss and immune system collapse. This is a challenge any species could do without, let alone the endangered Echo Parakeet, or recovering populations of Red-crowned Parakeets. Having survived the challenges associated with human colonisation, these two parakeets now face a new, and perhaps more insidious, threat – one that can affect them in even the most pristine of habitats. As we are learning, the impact of this virus in the wild is complex and the challenge for conservation management of these birds is to understand the diverse ways in which it presents itself.

In 2008, BFDV was detected for the first time in wild Red-crowned Parakeets of Little Barrier Island, by researcher Dr Luis Ortiz-Catedral. Since then, Tiritiri Matangi Island and Fiordland (South Island) have also confirmed the presence of the disease. BFDV was found in the Echo Parakeet in 2006 by the Mauritian Wildlife Foundation field team, and was associated with some mortality in this

species. Researchers from the Durrell Institute of Conservation and Ecology in the UK have since detected the virus in blood samples taken from birds both before and after the apparent disease outbreak. Though the Echo population now numbers over 500 birds (*PsittaScene*, August 2010) the disease is still cause for extreme concern.



KNOWING HOW CONTAGIOUS BFDV can be, the Echo Parakeet field team had to rapidly change the way the population was managed. All invasive techniques such as rescuing, clutch manipulations, hand-rearing, fostering and releasing were stopped immediately and no more birds were taken into captivity. The management program assumed a much more “hands off” approach and from this point, no matter how poorly a chick was developing in the wild it

would not be removed from its parents. It was hoped these steps would reduce the spread of infected feather dust and material between sites. A program of systematic sampling for BFDV was also initiated with all chicks and fledglings being screened. Adult birds were also regularly sampled to assess their infection status.

In New Zealand, the Department of Conservation and local researchers launched a response to survey parrots across the two main islands, trying to determine the distribution of this virus, and whether it threatened more critically endangered parrots such as the Orange-fronted Parakeet (*Cyanoramphus malherbi*) and the Kakapo.

EASTERN ROSELLAS (*Platycercus eximius*), a species exotic to New Zealand but established mainly on the North Island since the early 1900's, are known to carry the virus and most likely maintain it in the wild. The challenge for conservation managers of endemic New Zealand parrot populations is to determine the role rosellas may play as a disease reservoir. If they are able to sustain the disease at a higher prevalence, their presence may limit the options for native



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Birds like this Red-crowned Parakeet are first carefully caught in mist nets. Each is then tested for a number of diseases using samples from feathers, blood, faeces and skin.



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species restoration where native parrots and introduced rosellas co-exist in the wild. Given that the major focus of parrot conservation in New Zealand is through reintroduction and translocation programs, understanding where the virus occurs is critical to inform management decisions around the movement of birds.

Disease and conservation

THE ISSUE OF DISEASE affecting the conservation status of wild birds is not new, and the risks of emerging diseases have become more prominent with some recent dramatic examples. In 1999, American Crows (*Corvus brachyrhynchos*) were reported to be literally falling out of the sky in New York City. It was not long before scientists discovered West Nile virus had reached America, and was infecting and causing mortality in a range of bird species, as well as in humans. Crows seemed to be particularly susceptible, and research suggested that in some states declines of up to 60% of the population occurred. The impact on crows was so obvious, they became a reliable indicator of the spread of the virus, and crow deaths became one of the surveillance tools used to monitor this disease.

Fortunately, the emergence of BFDV in most populations is not so apocalyptic. The virus usually causes deaths only in

very young birds, so it is less common to see a population crash. However, it may be that subtle effects such as failure to breed, and egg and nestling deaths are harder to see in a wild population, and can cause longer term setbacks for recovery programs. For small populations of endangered birds, even a low mortality rate can have a significant impact on the long-term viability of the species. These effects can be particularly severe when considering their impacts on the founding individuals of new populations that result from translocation or reintroduction projects.

Global disease spread is not a new concept; however BFDV presents an interesting case study. How did it reach across the globe from its presumed origins in Australia? What role does the legal and illegal trade in parrots play in moving this virus? Did it really originate in Australia? Experts in the virus and molecular studies are still testing the possibility of multiple strains of the virus that may include variants that originated in other countries. Molecular studies have led to a CSI-like approach to this disease, tracing its origins and tracking its movements. With technology that lets us determine each virus' genetic "signature", we can now tease apart the ways in which this virus moves and changes. The key to understanding the history and origins of

BFDV lies in this level of investigation - DNA finger-printing of the virus. This is one part of the puzzle that will help us understand, and perhaps manage, this threat.

Understanding the threat

ALTHOUGH WE KNOW A LOT ABOUT BFDV, particularly in pet birds, there is much to be learnt about the way this virus affects wild populations, particularly those under pressure from other threats and small population sizes. BFDV does not cause the same symptoms or mortality rates in all species, and testing, whilst far more advanced these days, still has some limitations that further hamper our understanding. The way countries manage this disease will depend on the parrot species they have, the environment in which those species exist, the local threats and other stressors such as habitat alteration, climate



Birds are released after testing and conservation managers use test results to help stem the spread of disease, a real risk to threatened or recovering species like these.

change, and perhaps most importantly, the way in which that country prioritises conservation of their native species.

What can we do?

WHILST VACCINES HAVE BEEN DEVELOPED and are theoretically possible, the cost to bring these to the point of commercial availability, and to test them in a range of critical species, means they are unlikely to be a realistic option for the future.

It is very possible that many of the wild strains of BFDV around the globe have been the result of accidental or deliberate release of pet or exotic parrots into the wild. Engaging and educating owners of pet parrots on the risks for local/native parrots, and responsible parrot ownership is a crucial part of managing any further outbreaks in both New Zealand and Mauritius, as well as other parrot conservation hotspots. There are many other diseases that can make their way into the wild this way.

The illegal trade of parrots, by virtue of its covert nature, is not subject to standard quarantine measures or disease identification during movements of individuals. Globally, the illegal trade in wildlife is considered second only to the illegal trade in narcotics, and is a largely unquantifiable risk. The

historical expansion of BFDV was likely due to both illegal and legal trade in wildlife. However, in countries such as New Zealand with current import restrictions on exotic psittacines, it is the illegal trade that will pose an ongoing risk for introduction of novel strains, as well as other exotic diseases. Illegal trade is driven by ongoing high prices and demand for species that are either CITES listed, or subject to trade restrictions imposed by various national policies. The impacts of this trade are felt at many levels; not only through disease risks, but also the effects of removing breeding individuals from often threatened or critically endangered species can have long term impacts on the survival of small populations. Understanding these impacts, as well as the risks of disease spread, and assisting local authorities with policing this trade, are vital components of parrot conservation worldwide.

a large part of the conservation management for endangered parrot species worldwide is to reintroduce birds to new areas and create insurance populations, as well as provide varying levels of intensive management. It is important we learn more about BFDV so that we can understand the impacts of this disease on establishing or recovering populations. Active management of threatened species can

also introduce disease threats through translocations, and so conservation managers have a role to play in controlling the spread of this and other diseases. However even owners of pet parrots can help address this threat, with responsible pet ownership, education of other parrot owners, and prevention of accidental releases.

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