



The Fragile Millions of the Tropical North

Despite its huge numbers in northern Australia, the magpie goose has disappeared from its former southern strongholds and faces an uncertain future, write Barry Brook and Peter Whitehead.

At the height of the wet season, vast flocks of magpie geese congregate to feed on bulbs buried within the rich sediments of the South Alligator river's flood plain. The wetlands of Kakadu National Park support perhaps a million of these spectacular birds, with large seasonal aggregations found across the "Top End" from the Kimberly in the west to the subcoastal swamps bordering the Gulf of Carpentaria in the east. The magpie goose (*Anseranas semipalmata*) is a spectacular and uniquely Australasian waterfowl. New Guinea also supports substantial populations, but their great abundance in the tropics belies their status as a species under threat.

Within the last 150 years the magpie goose has been displaced from most of its former range in south-eastern Australia. Contrary to popular wisdom they should not really be considered an iconic tropical bird because, historically, they lived as far south as Victoria. Yet through a combination of hunting, poisoning and deliberate habitat modification, such as the draining of "useless" marshes for agriculture, probably assisted by a particularly severe drought early in the 20th century, the geese were systematically exterminated

from most of Australia's temperate regions. They are still hunted in northern Australia today by recreational shooters and indigenous people, but it is a global threat – climate change – that may put their future in peril.

For many millennia the magpie goose has been taken for food by Aboriginal hunters, with a single bird providing a rich bounty of energy-rich (albeit very fatty) meat. Early work suggested as many as 270,000 birds were taken in the indigenous harvest each year, mainly around the communities of Arnhem Land. However, recent work has revised this estimate downward to about 120,000. The geese are now also favoured by non-indigenous hunters as game birds, with up to 30,000 shot under a permit system each year across the Adelaide, Mary and Daly river flood plains.

By any yardstick, a lot of birds are being taken annually for meat and sport. Historically, overestimation of the resilience of natural systems, from the Atlantic cod of the Grand Banks to the Great Plains bison, has led to the collapse of many once-abundant wildlife populations.

This then begs an obvious question – is the current harvest of magpie geese

in the Northern Territory sustainable in the long-term, or will unfettered hunting invoke a decline in the tropical population similar to that already witnessed in the south of the continent?

Early analyses showed the populations of geese to be very resilient to harvest, but these conclusions were based primarily on aerial counts of birds in different areas and did not account for the compensatory effects of dispersal. That is, localised populations that were being monitored by wildlife biologists often grew or declined simply because segments of the geographically larger regional population moved about from year to year, driven by fluctuations in food availability and rainfall. Temporary immigration can cause a population to appear more robust than it actually is.

Our more recent work considered the demography of the population – how many juveniles and adults died each year, at what age adults first reproduced, how many eggs the females laid, how many goslings hatched, and so on. Using these hard-won field data as a basis, we built computer simulation



Left: The spectacular and uniquely Australasian waterfowl, the magpie goose.



models that incorporated demography, dispersal between local populations and environmental fluctuations to provide more realistic estimates of the levels of harvest the geese of northern Australia could tolerate.

While the work showed that the original estimates of sustainable harvest were optimistically high, it also showed that over-harvest is not, at present, a major threat to the geese. A harvest of about 10% of the overall population per annum would be sustainable in the long term. Given a current population size in northern Australia of perhaps 2.5–3 million magpie geese, the current off-take is closer to 5%. Although some river systems may be harvested at levels close to, or even exceeding, replacement levels in some years, the immigration of birds into these areas from lightly harvested or unharvested “refuge” regions appears to act as a robust safeguard.

But what if the baseline shifts? Climate change is a “hot topic” in the scientific community. The ecological implications of global warming are potentially profound, and could lead to rising sea levels and more intense

cyclones in the tropics. Both of these factors would increase the regularity and severity of seawater washes through the low-lying flood plains of northern Australian rivers.

Too much saltwater is bad news for the magpie goose’s favourite food, a grass-like sedge (*Eleocharis dulcis*) that grows best in brackish swamps that experience occasional entries of tidal waters but are fed mostly from wet season flows of freshwater. Being poised at this interface between the sea and non-saline swamps means that the species will be the first to feel the effects of even minor rises in sea level. This sedge is also being outcompeted in some areas by introduced African and South American plants and churned up in the mires created by exotic megafauna such as Asian water buffalo and feral pigs.

Will the significant subsistence and recreational harvests of magpie geese be sustainable as the areas and quality of available habitat contract under the influence of saltwater intrusion and the scourge of introduced pasture grass species? We are tackling these important questions with PhD student, Lochran Traill, in an ambitious project

funded by the Australian Research Council. Working on the flood plains of the South Alligator River in Kakadu, we are studying the dependence of magpie geese on the abundance and seasonal availability of the tubers of *Eleocharis* to build fat reserves to endure food shortages that come in the late dry season. We are also investigating how the millions of feeding geese affect the sedge. Understanding the strength and nature of the feedbacks involved in the interaction between grazer and food plant is a critical first step in predicting the impact of current and future threats to the wetlands.

Magpie geese are the fragile millions of the tropical north. If they are to remain a numerically, ecologically and culturally dominant feature of these landscapes, flexible and scientifically robust management will be required that accounts for the needs of the species, their habitat and the Aboriginal people living in remote regions who depend upon and respect the resource they represent.

Given uncertainties in predicting precisely how the environments of northern Australia will be altered by global climate change and invasive species during this century, it is critical that scientists and wildlife managers improve understanding of the ecology of the interactions between geese, sedge, and the complex hydrology of seasonally variable tropical wetlands. Monitoring will also be paramount to ensure we are able to track changes in goose abundance and



pre-empt or circumvent threats to their survival before they become irreversible.

The wetlands of Kakadu, and northern Australia more broadly, would be a poorer place indeed without these noisy, conspicuous and important avian icons.

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Abundant flocks of magpie geese epitomise the biodiversity of northern Australia's wetlands, but they face an uncertain future in the face of global warming. Photo: Lochran Traill