



Waterbirds on the wing

HEATHER MCGINNESS, KATE BRANDIS, VERONICA DOERR, RICHARD KINGSFORD, RALPH MAC NALLY AND JOHN MARTIN PROVIDE THE LOW DOWN ON TRACKING THE MOVEMENTS OF WATERBIRDS AND THEIR CHOICE OF HABITATS.

It's a subject that has mystified many Australians and resulted in heated debates — how is it that large numbers of waterbirds are able to turn up in the most remote and unexpected places after years of absence, thousands of kilometres from where they are usually seen? How do they get there, where are they coming from and what are they responding to from so far away? Where do they go to feed and shelter in the time between their irregular breeding events? Why do they select some places and not others?

Answers to these questions are critical for land and water managers, as well as the curious public. With waterbird populations in decline across the Murray–Darling Basin (MDB) and limited quantities of environmental water available to help address this decline, our efforts to improve and maintain waterbird habitats need to be guided by better knowledge of what waterbirds need, where and when. How can we be strategic with our limited resources to promote successful breeding, juvenile survival and healthy populations in both the short term and the long term?

Figuring this out in Australia can be tricky because many of our species are highly nomadic, and others are decidedly 'cryptic', meaning they are hard to find and study. These characteristics mean that even basic life history or demographic data for common waterbird species can be hard to measure (e.g. population sizes and extents, juvenile survival rates, adult survival rates and longevity).

However, technology is catching up to some Australian birds. Through work done by the Waterbird Theme of the MDB Environmental Water Knowledge and Research (MDB EWKR) project, we are starting to fill some of the knowledge gaps by tracking the movements of one waterbird species, the Straw-necked Ibis, by using satellite GPS transmitters.

The transmitters record hourly GPS location fixes between 7.00 am and 7.00 pm, as well as taking a midnight 'fix' to record roosting/nesting locations. The trackers have an accuracy of about 10 metres, are solar charged and expected to transmit for at least two years.

During spring and summer 2016–17, there were 20 ibises fitted with transmitters. Five adults and 10 juveniles were tracked from Barmah-Millewa forest in the southern MDB, and another five adults tracked from the Macquarie Marshes in the northern MDB. Another 20 or more ibises will be tracked from spring and summer in 2017–18.

Flying high

After just six months, the satellite tracking has already advanced our knowledge of previously poorly understood ibis movement and population patterns and trends.

Long-distance movements

Individual ibis have travelled long distances quickly. One adult female ('Gracy') was caught in the Macquarie Marshes in October 2016, and soon after travelled over 400 kilometres south to the Murrumbidgee River. In mid-November, she returned to the Macquarie River area before leaving in mid-January 2017 to travel north, reaching Townsville in early May, over 1200 kilometres from the Marshes.

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Far left: A Straw-necked Ibis. Spread: The satellite-tracking team in the Macquarie Marshes, October 2016. Below: An adult bird is released after having a satellite transmitter fitted. Photos throughout Heather McGinness.

Northern and southern ibises are mixing and using some of the same sites and routes, consequently Straw-necked Ibises in the MDB may be one interacting population. However, behaviour in the 2016–17 year may be unusual because of the extent and duration of flooding. This will need to be investigated with tracking in later years and with more birds.

Common ‘flyways’ or movement corridors for separate birds/groups

Six of the 10 adults and three of the juveniles travelled along a particular north-east to south-west route within the MDB, in different directions. This route corresponds to zones or boundary lines in maps of average climatic conditions, rainfall, topography, etc. For examples of climate zones, see the Bureau of Meteorology — <http://www.bom.gov.au/climate/averages/maps.shtml>

Foraging and stopover points and regions

The Lachlan River floodplain near Condobolin was an important area for foraging by many of the tracked ibises in the 2016–17 summer. Tracking identified the re-use of other sites by different birds at different times in both Victoria and New South Wales. Identifying these areas could be important for future bird management. We found that birds are foraging in a range of land uses, including agricultural and native habitats.

‘Coupled’ habitats for roosting and foraging—adults

Foraging habitats have remnant vegetation with large trees for roosting nearby. If these areas are preferred by the ibises, then the coupled habitats might be targeted for management.

The Straw-necked Ibis (*Threskiornis spinicollis*) is a colonially breeding waterbird species, which means that it builds nests with other birds of the same or similar species in tight-knit groups. These colonies can number in the tens to hundreds of thousands of nests in wet years with widespread flooding. Colonially nesting waterbirds are the primary focus for study in the MDB EWKR project because:

- They are one of the main waterbird indicators for environmental flows management and policy. There is good evidence this group of waterbirds provides a sound model for understanding relationships between environmental flows and waterbird recruitment.
- Response variables are more easily measured for these than for other species of waterbirds because their breeding events and nests are relatively easy to locate and survey. The sites of major colonies are known, as are some of the breeding thresholds related to flows and inundation.
- The effects of predation and other threats on these species are likely to be more easily measured because their nests, eggs and fledglings are fairly obvious.

The Straw-necked Ibis was chosen for satellite tracking because they are good representatives of the points noted above and are known to nest in large numbers in nearly all major MDB wetlands managed with environmental flows.

Straw-necked Ibises have spectacular rainbow-hued iridescent dark feathers on their wings and back, and distinctive straw-like feathers on their necks.

They are also known as the ‘farmer’s friend’ because when on dry land they eat large quantities of pest insects such as locusts. When in wetlands, they eat frogs, aquatic insects, spiders, fish, molluscs and small reptiles. They are generally thought to be less adaptable and opportunistic than the Australian White Ibis and don’t scavenge as much and tend to avoid saltwater areas. They are highly mobile and nomadic, and appear to have closer ties with inland floodplains and wetlands.





‘Coupled’ night versus day habitats—juveniles at nesting sites

Juveniles roost in one part of the nesting colony but spend the day ‘creching’ together in another part of the colony up to 100 metres away.

Variation in propensity to travel or remain as residents

Some birds have remained in one general area or catchment for months, while others have travelled nearly continuously, with some moving more than 1000 kilometres. However, most birds ‘settled down’ for the winter, making only local movements during the colder months.

Movement associations with weather

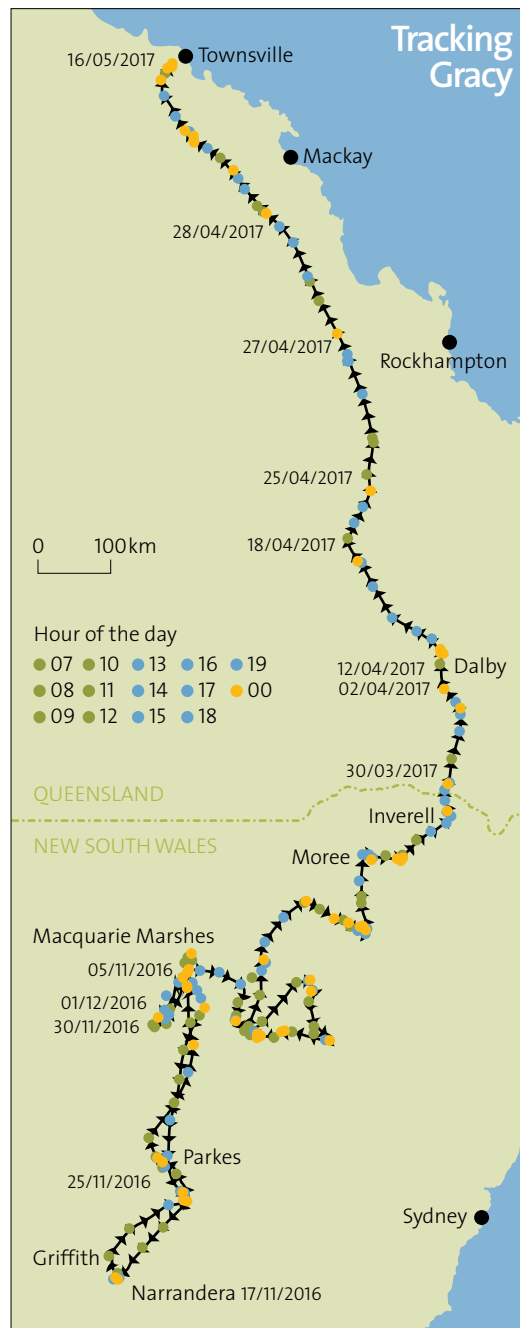
Similarities in departure times and departure dates for long trips are probably associated with thermal upwellings, which is suggested by distances travelled per hour and by time of day. Weather changes may trigger long-distance movements, such as a drop in temperature with rainfall or a shift in wind direction.

High mortality rates—particularly for juveniles

There are multiple possible causes of death in colonially nesting waterbirds and their young, including predation (e.g. raptors, foxes, cats and dogs), disease (e.g. botulism, which was widespread in 2016–17), parasites, poisoning, starvation, entanglement in nesting material and heat exhaustion. Tracked ibises have died due to botulism (a soil-borne bacterium), predation and vehicle impacts. The initial cause of mortality often cannot be definitively ascertained, with scavenging of carcasses (and transmitters!) very common by birds and feral mammals. The extremely high temperatures recorded in the 2016–17 are likely to have had a negative impact on some birds. Juveniles are more susceptible than adults to these pressures, and so some losses from breeding events are not unexpected.

FOR FURTHER INFORMATION

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Above: Movements of ‘Gracy’, a female Straw-necked Ibis, from 17 November 2016 to 17 May 2017. Above left: Adult Straw-necked Ibis in the Macquarie Marshes breeding colony. Detailed maps of all tracked birds are on the project’s website and Facebook page—<https://www.facebook.com/ColonialWaterbirdScience/>

Data analyses to be conducted as part of the broader MDB EWKR project will explore these patterns and trends in more detail. Recommendations for land and water managers will be developed from the results, particularly focusing on the spatial and temporal locations, characteristics and requirements of foraging habitats and birds that may influence environmental watering, vegetation management or pest management decisions.

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