

## Bird's eye view of goose nests

The wetlands of the Top End harbour a rich variety of water birds, especially ducks and geese. One of the most numerous and most distinctive is the magpie, or semipalmated, goose — so called because of its pied markings and the very small webs on its feet.

The late Dr Harry Frith of CSIRO and Dr Stephen Davies, formerly of CSIRO and now

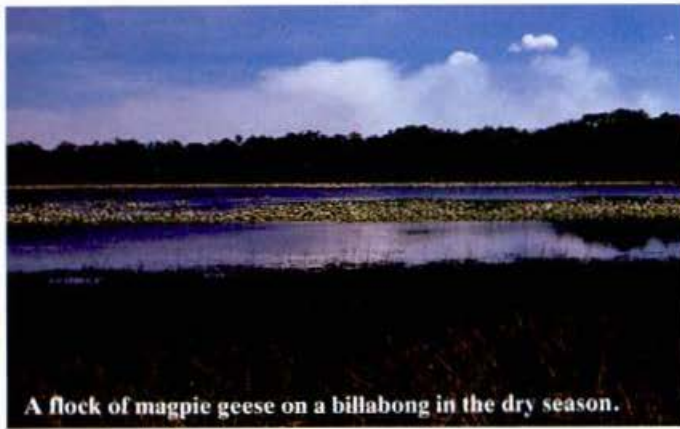
Director of the Royal Australasian Ornithologists' Union, carried out the earliest studies of these birds during the 1950s and early 1960s. By then, magpie goose colonies had become much less widespread than they were at the beginning of the century.

The bird's breeding range used to extend from the Fitzroy River in Western Australia, around the northern coast, to at least as far south as Grafton, N.S.W.

It also took in areas of

**Magpie geese in flight.**





A flock of magpie geese on a billabong in the dry season.

south-eastern and south-western Victoria, parts of the Murrumbidgee, Moree in New South Wales, Western Port in Victoria, and Bool Lagoon in South Australia. Now, however, the eastern and southern parts of the range have disappeared and breeding sites only appear as far south as Townsville in northern Queensland.

Magpie goose breeding colonies in the Top End are confined to the flood-plains of coastal rivers. Dr Frith and Dr Davies found the largest colony in the Northern Territory on the Daly River. From their 28 airborne surveys of the coastal plains between Darwin and Oenpelli during 1955–58, they estimated that the population in the region totalled 350 000 geese.

Since then, Mr Don Tulloch, who has just retired from the CSIRO Division of Wildlife and Rangelands Research, has completed a further survey of the birds. His study focused on the breeding habits of magpie geese — the factors that trigger breeding and nesting, nest numbers, and where the birds prefer to nest.

#### A goose nest close up.



The counting technique that Mr Tulloch used involved an observer taking a continuous series of photographs from a plane that flew along a number of set transects. The plane flew at a height of 300 m with a speed of 90–100 knots. Nests in each photograph were counted in the laboratory and compared with vegetation and rainfall data.

Results showed that the amount and timing of rain influence the extent of breeding among the geese. In 1983, when the heavy rains fell late (at the end of February and in early March), nest numbers in the same study area dropped sharply — to 250, from almost 2000 the year before. Mr Tulloch noticed in earlier studies that some geese laid their eggs on levees before the late rains. When the rains eventually came, the nests floated away.

Does rainfall affect breeding directly, or indirectly via its effect on food availability? The CSIRO work revealed that magpie geese prefer to nest in areas with the plentiful supplies of mixed spike rush and wild rice that follow heavy rain.

The 'bulbs' of spike rush only begin to grow when enough rain has fallen to saturate the top few centimetres of soil. The depth of the floodwaters is also important — wild rice flourishes in shallow water and on the edge of channels while spike rush grows in deeper water. Both plants are used by the geese for food and nesting. If rainfall is light, other grasses germinate instead and some swamps may show a change in vegetation from spike rush to those other grasses.

As the dry season progresses, the geese commence to dig for spike rush bulbs. While the water is receding and the ground is still damp, bulbs are fairly accessible. But when the soil becomes hard and dry, digging becomes more difficult and the birds seek more accessible food sources.



Spike rush — a preferred food of magpie geese — growing in floodwater at Kapalga.

The magpie goose population consists of breeding and non-breeding birds. Breeding geese remain in the colony while the others leave to feed on grasses. Before egg-laying, geese rest during the hottest part of the day at the edges of swamps and lagoons, and feed in the early morning and late evening.

Wild rice is an important food in the breeding cycle. Many goslings hatch at about the time the wild rice ripens, and young birds will feed on it. If young hatch in areas with little or no wild rice, the adults guide the goslings to areas where it occurs.

Pairs of magpie geese are less common than trios of two females and one male sharing a nest. Both females lay eggs in the shared nest. All three birds share in nest-building, incubation, and care of young.

Nest-building begins about 2 months before egg-laying. The early rudimentary nests act as platforms or stages, upon which male geese preen and court, stimulating the females to ovulate. Nests belonging to trios contain up to 16 eggs, while the nests of pairs contain six to ten.

Predators, including snakes, raid many of the nests, and about 30% of the eggs survive to hatch. Those remaining hatch after 24–25 days' incubation and the young goslings that survive predation by hawks, sea eagles, snakes, and dingoes learn to fly at about 10 weeks of age.

Sea eagles, dingoes, and man are the three main agents

of death for adult magpie geese.

Mr Tulloch has estimated the age of the oldest birds from banding records. A bird banded at a place called Beatrice Hill in December 1959 was shot 25 years and 10 months later, in October 1984. As the bird was at least 2 years old when it was banded, Mr Tulloch inferred that magpie geese can live to an age of at least 27 years.

Aborigines traditionally harvested goose eggs for many years, but had little impact on the breeding colonies. Shooting proved to be more damaging to population



**One of the photographs used to count goose nests at Kapalga, taken from a plane flying at about 300 m.**

numbers. This practice escalated during the 1950s when experimental rice crops were planted at Humpty Doo, south of Darwin.

In 1956/57, the Northern Territory Administration planted a rice crop at Beatrice Hill and, during the following year, geese caused damage to it. This precipitated a declaration of war against geese, and army units became involved in the battle at Humpty Doo.

Other rice-cultivation operations have blamed their failure on magpie geese, although in some cases unskilled management and poor farming practices appear to have at least contributed.

Because of its sensitivity to environmental change and the visibility of its nests during the breeding season, Mr Tulloch believes that the magpie goose would be an ideal species for use in monitoring of, for example, the effects of metals from uranium-mining operations, or the effects of damming and drainage projects.

Dr Frith's and Dr Davies' study indicated that magpie geese rapidly disappeared from areas affected by intensive human activity. The dramatic and consistent

population decline in the period 1958 to 1971, when numbers fell from 350 000 to 50 000 (the estimate from Mr Tulloch's work), suggested that the birds' situation had become precarious. But their numbers recovered equally consistently until, by 1980, they had reached their former levels. Magpie geese are slow breeders, with many specific breeding and food needs that make them highly susceptible to outside change.

So, unless properly managed, these native inhabitants of the wetlands could disappear, as they have done throughout southern Australia. Late wet seasons like the one of 1983 are natural disasters for them. The risk exists that such seasons, combined with major environmental changes caused by feral animals or man, could tip the balance against them.

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Magpie goose populations on the coastal plains of the Northern Territory (1958–1980). D.G. Tulloch and J.L. McKean. *Corella*, 1983, 7, 32–6.

Ecology of the magpie goose. H.J. Frith and S.J.J.F. Davies. *CSIRO Wildlife Research*, 1961, 6, 91–141.