Notornis, 2008, Vol. 55: 155-157
0029-4470 © The Ornithological Society of New Zealand, Inc.

SHORT NOTE

The proportion of white-backed and black-backed Australian magpies (*Gymnorhina tibicen*) in a Waikato population

DAI MORGAN
Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton, New Zealand
d.k.morgan@massey.ac.nz

Australian magpies (*Gymnorhina tibicen*) are polymorphic and 3 main forms, based on back markings and geographic location, have been recognised: white-backed (WB), back-backed (BB) and western varieties (Schodde & Mason 1999). Western magpies are found in the southwest of Australia and are geographically isolated from WB and BB populations. WBs are mainly found in the southeast and BBs in the central and northeast of Australia (Schodde & Mason 1999). Where the 2 populations meet, interbreeding occurs and a high proportion of magpies have intermediate patterns on their backs (Burton & Martin 1976).

Two varieties, the WB and BB, were released at several sites in New Zealand from 1864 to help control pasture invertebrates (Drummond 1907; Thomson 1922; McIlroy 1968) and are now found in most regions where suitable habitat exists (Bull *et al.* 1985; Robertson *et al.* 2007). BBs appear to be most common in Hawke's Bay and North Canterbury while WBs are the predominant variety throughout the rest of the country (Heather & Robertson 1996); however, reports of BBs and intermediates in regions outside Hawke's Bay and North Canterbury occur (e.g., McCaskill 1945; McIlroy 1968; O'Donnell 2002).

Veltman (1984) is the only study that has reported the proportion of WB, BB and intermediates in New Zealand. Her study, conducted on farmland near Linton, Manawatu, reported that 65% of trapped magpies (*n*= 55) were WB and 35% were intermediates; no BBs were recorded (see Fig. 1 for colour classes).

There are no records of magpies being released in the Waikato region when the original liberations occurred (Drummond 1907; Thompson 1922; McIlroy 1968); therefore, presumably they colonised by invading from surrounding release sites (for summary see McIlroy 1968). The first recorded occurrences of magpies in the Waikato were during the mid-1950s (Anon. 1955; Fordham 1955), although no mention of variety was made in these reports. Given that WBs appeared to be dominant at release sites closest to the Waikato (i.e., Auckland: McIlroy 1968), it is highly likely that this was the first variety to arrive. Furthermore, BBs were not reported as present in the Waikato in McIlroy's (1968) summary. BBs, which are now present in the Waikato (pers. obs.), presumably took longer to reach this region as their original release points (probably Hawke's Bay; McIlroy 1968) were further away. The aim of the current paper is to provide baseline data for future studies to explore whether back colour variation is fluctuating or static in a Waikato population.

Magpies were captured using 'Larsen' style live traps (from 15 Sep 2006 to 27 Oct 2006) at 11 sites over the lower southeast to northeast slopes of Mt Pirongia (37°59'S, 175°05'E) as part of a larger experiment investigating the impact of magpies

---

Received 17 Jul 2007; accepted 30 Sep 2007

*Current address: Ecology, Massey University, Private Bag 11 222, Palmerston North, New Zealand on the distribution of native birds (Morgan *et al. in prep.*). Of the magpies captured (*n*= 174), 125 birds of mixed age and gender were photographed so that the dorsal pattern could be scored later (52 magpies were disposed before they could be photographed). Data from different age classes and genders were pooled as these variables do not influence colour patterns (Cole 1921); however, on 4 occasions I found it too difficult to categorise the patterns of fledglings and these were dropped from the analysis. I used the dorsal pattern classification used by Veltman (1984) to score back colour (Fig. 1). Other classifications have been developed in Australia which include up to 4 intermediate morphs (e.g., Cole 1921; Burton & Martin 1976); however, to my knowledge, Veltman's (1984) is the only one that has been used in New Zealand, and so most appropriate for this study.

The proportion of photographed magpies in each colour class (A-E) is summarised in Fig. 1. Most (75/125; 60%) magpies were WB, intermediate morphs (B-D; Fig. 1) made up 35% (44/125) of the sample, and the remainder were BB (6/125; 5%) (Fig. 1). These results are very similar to those found by Veltman (1984) in the Manawatu (see above); although, the reason(s) for this can not be determined from my study.

The reason(s) for the distribution of WB and BB magpies in Australia is currently unknown. However, two hypotheses have been suggested: (1) WB and BB magpies evolved in allopatry and have only recently expanded their ranges to come into contact (Burton & Martin 1976); this seems unlikely as there are no genetic differences between BB and WB magpies (as would be expected if the 2 varieties were allopatric for a long period; Hughes *et al.* 2001); (2) WB and BB magpies have never been isolated, rather back colour variation has evolved *in situ* and is maintained by local selection pressures (Hughes *et al.* 2001). Hughes (1982) suggested that back colour may be determined by a small number of gene loci with the genes that express black back colour being dominant over those that express for white back colour. Later work confirmed that this is likely to be true as WB parents can only produce WB chicks while BB parents produce both colour morphs (see Hughes 1982); this provides support for the hypothesis that environmental conditions in the southeast of Australia favour WBs while BBs are favoured in the north. In addition, Kallioinen *et al.* (1995) suggested that the function of magpie back colour may have been associated with conspicuousness and that BB magpie were predominantly 'open-country' birds while WBs preferred forest habitats during their evolution. Therefore, BBs may have been less conspicuous to avian predators in open-country habitats, while WBs had an advantage in attracting potential mates with a more conspicuous back colour within a forest interior (Kallioinen *et al.* 1995), although this hypothesis remains untested.

Prior to this paper, no study had measured the proportion of the magpie population that are WB, BB or intermediate in the Waikato; however, reports suggested that WBs were more common (and perhaps the only variety) in this region in the past (e.g., McIlroy 1968, Edgar 1972, Heather & Robertson 1996). Although I present results from a relatively small area, the large proportion (40%) of combined intermediates and BBs suggest that BBs have indeed been successful colonisers over a relatively short period (i.e., up to 40 years). This may indicate that the local selection pressures (that appear to favour BB in central and northern areas of Australia and WB in south east; Hughes *et al.* 2001) are either neutral (if the genes that express BB are dominant over WB; Hughes 1982), or

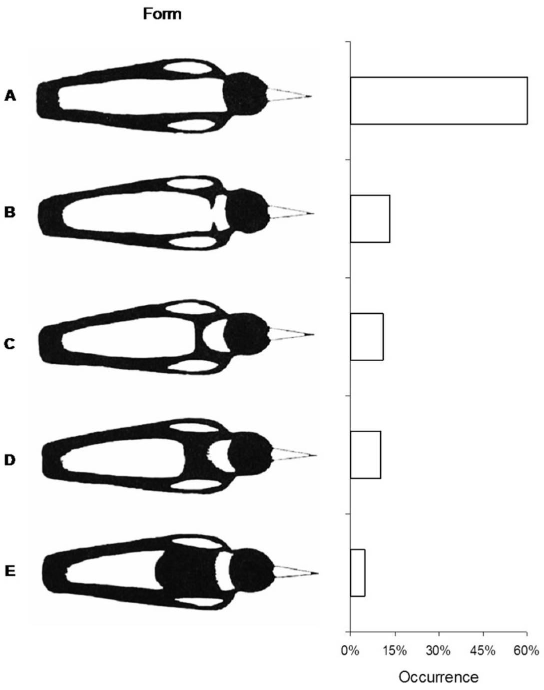

Fig. 1 The percentage of white-backed (A), intermediate (B-D) and black-backed (E) magpies (n= 125) trapped at 11 sites around Mt Pirongia, Waikato. Magpie back pattern classification guide adapted from Veltman (1984).

encourage BBs in the Waikato. If this is the case, the proportion of BBs would be expected to increase in the future. Alternatively, in New Zealand there are no important avian predators of adult magpies in rural areas (harriers, *Circus approximans*, can capture relatively large prey [e.g., lagomorphs: Heather & Robertson 1996], but no reports exist of an adult magpie being taken). Therefore, the potential benefit BBs may have gained from being less conspicuous in open areas in Australia would no longer apply in New Zealand, and in the absence of avian predation, WB individuals may be selected if they have a superior ability to attract potential mates or advertise territorial boundaries (Kallioinen *et al.* 1995). Thus, WBs would be expected to persist in the Waikato, regardless of whether the genes that express black backs are dominant to those that express white backs (Hughes 1982).

ACKNOWLEDGEMENTS

I thank the residents of Whatawhata, Te Pahu and Pirongia who cleared magpie traps on their properties; Environment Bay of Plenty and Environment Northland for lending some magpie traps; and J.R. Waas, C.J. Veltman and P.M. Sagar for comments which improved the manuscript. This project was funded by Environment BoP, Greater Wellington Regional Council, Auckland Regional Council, Hawke's Bay Regional Council, Environment Waikato and a FRST grant UOWX0501. All procedures were approved by the University of Waikato Animal Ethics Committee (Protocol 664).

LITERATURE CITED

Anon. 1955. Classified summarised notes. *Notornis. 6*: 85-108.

Bull, P.C.; Gaze, P.D.; Robertson, C.J.R. 1985. *The atlas of bird distribution in New Zealand*. Wellington, Ornithological Society of New Zealand.

Burton, T.C.; Martin, A.A. 1976. Analysis of hybridisation black-backed and white-backed magpies in south-eastern Australia. *Emu. 76*: 30-36.

Cole, C.F. 1921. Variations in the black-backed magpie (*Gymnorhina tibicen*). *Emu. 21*: 50-54.

Drummond, J. 1907. Dates on which introduced birds have been liberated, or have appeared, in different districts of New Zealand. *Transactions and Proceedings of the New Zealand Institute. 39*: 503-508.

Edgar, A.T. 1972. Classified summarised notes, 1963-1970. *Notornis. 19* (suppl.): 1-91.

Fordham, R.E.W. 1955. Magpies at Marakopa. *Notornis. 6*: 131.

Heather, B.D.; Robertson, H.A. 1996. *A field guide to the birds of New Zealand*. Auckland, Viking.

Hughes, J.M. 1982. An explanation for the asymmetrical 'hybrid' zone between white-backed and black-backed magpies. *Emu. 82*: 50-53.

Hughes, J.M.; Baker, A.M.; De Zylva, G.; Mather, P.B. 2001. A phylogeographic analysis of southern and eastern populations of the Australian magpie: evidence for selection in maintenance of the distribution of two plumage morphs. *Biological Journal of the Linnean Society. 74*: 25-34.

Kallioinen, R.U.O.; Hughes, J.M.; Mather, P.B. 1995. Significance of back colour in territorial interactions in the Australian magpie. *Australian Journal of Zoology. 43*: 665-73.

McCaskill, L.W. 1945. Preliminary report on the present position of the Australian magpies (*Gymnorhina hypoleuca* and *G. tibicen*) in New Zealand. *The New Zealand Bird Notes. 1*: 86-104.

McIlroy, J.C. 1968. *The biology of magpies,* (Gymnorhina spp.) *in New Zealand*. Unpubl. M.Ag.Sc. thesis, Lincoln College, Canterbury.

O'Donnell, C.F.J. 2002. Classified summarised notes, South Island and outlying islands, 1 July 1999 to 30 June 2000. *Notornis. 49*: 111-114.

Robertson, C.J.R.; Hyvönen, P.; Fraser, M.J.; Pickard, C.R. 2007. *Atlas of bird distribution in New Zealand 1999-2004*. Wellington, The Ornithological Society of New Zealand, Inc.

Schodde, R.; Mason, I.J. 1999. *The directory of Australian birds*. Collingwood, CSIRO Publishing.

Thomson, G.M. 1922. *The naturalisation of animals and plants in New Zealand*. Cambridge, University Press.

Veltman, C.J. 1984. *The social system and reproduction in a New Zealand magpie population, and a test of a cooperative breeding hypothesis*. Unpubl. Ph.D. thesis, Massey University, Palmerston North.

Keywords Australasian magpie; *Gymnorhina tibicen*; colour morphs, Waikato; New Zealand