

Agonistic display and social interaction between female kakapo (*Strigops habroptilus*)

GRANT A. HARPER

Zoology Department, University of Otago,
PO Box 56, Dunedin.
grant.harper@stonebow.otago.ac.nz

JOANNE JOICE

321 Coast Rd, Warrington, R.D.1, Waikouaiti,
New Zealand.

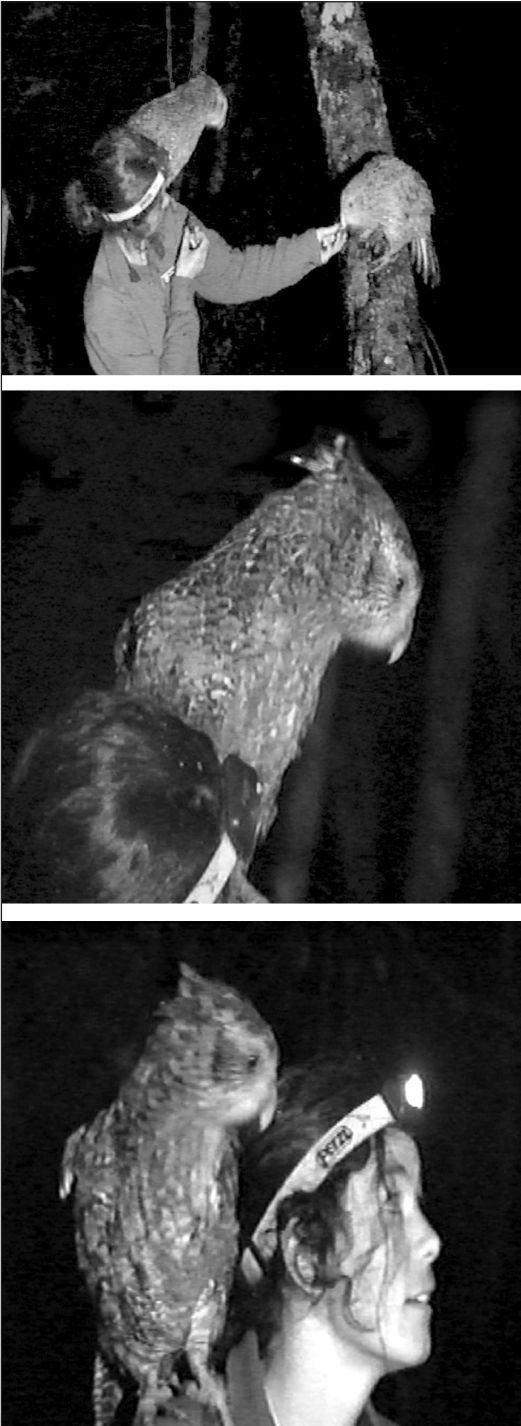
Kakapo (*Strigops habroptilus*) is a giant nocturnal, flightless parrot endemic to New Zealand (Merton *et al.* 1984). It is highly endangered, with (at December 2005) only 86 individuals in existence. It is the only parrot to use a lek mating system, and many aspects of male courtship behaviour have been observed at male display territories or 'track and bowls' (Merton *et al.* 1984; Powlesland *et al.* 1992), although recent video monitoring of nests has recorded female and chick behaviour also. Agonistic displays observed in male kakapo include threat displays that often escalate to fights and occasionally lead to injury and death (Higgins 1999). This paper describes the first observation of an apparent agonistic interaction between two female kakapo.

The observation occurred while filming kakapo on Codfish Island (Whenua Hou) nature reserve, 2 km north-west of Stewart Island, on 8 April 2002. A two-person film crew had accompanied us on a visit to weigh and assess the condition of a three-year-old, previously hand-reared, female kakapo named Hauturu. Although Hauturu had been free-living since mid-1999, she was comfortable with the presence of humans and would alight on a hand-held scale when tempted with food. Individual kakapo could be identified by the unique frequency of the radio-transmitter fitted to each bird.

We located Hauturu near a track in her usual home range at approximately 2000hrs and JJ proceeded to offer her grapes. She approached JJ, was weighed, and then climbed a nearby kamahi (*Weinmannia racemosa*) to about head height where she continued to accept food. She was filmed almost the entire time, and did not appear to be disturbed by the spotlight used for illumination. There was no wind, and it was raining lightly. After about 11 min. another female kakapo, Hoki, approached the group without hesitation. Hoki, a ten-year old bird, had also been hand-reared and was particularly tame. Hoki's nest, in which she was incubating a single-egg clutch at this time, was about 200 m away.

Hoki climbed a tree next to the track after 1.5 min. JJ continued to feed Hauturu, who had become less animated and was only nibbling on the offered food. After 3.5 min Hoki descended the tree and walked towards JJ, raising her anterior crown feathers. Hoki then began to accept grapes from JJ on the ground, but shortly afterwards, climbed onto JJ's shoulder. Hoki was raising her crest regularly at this stage, while feeding on the offered grapes (Fig. 1). Hauturu had 'frozen' in a hunched posture, with head lowered and no detectable movement, about 1.8m up the tree. Both birds were at a similar height, and only about 1.5m from each other (Fig. 1). For the next nine minutes Hoki continued eating grapes, and at regular intervals she leaned over towards Hauturu, raised herself up to her full height, and raised her crest. This caused Hoki's body and head to be elevated with respect to Hauturu's position. This behaviour occurred about six or seven times while Hauturu remained in her 'frozen' position. About five minutes after Hoki had climbed onto JJ's shoulder JJ began to feed both birds. Hauturu nibbled at the offered grapes, but remained 'frozen' (Fig. 1). After eight minutes GH passed some grapes to JJ. At his approach, Hoki raised her crest at GH, and Hauturu moved about 1m further up the kamahi trunk. After nine minutes had elapsed, Hoki climbed off JJ, onto the kamahi trunk that Hauturu was on, and descended to the ground. Hoki then accepted another grape, and one minute later, departed.

This kind of agonistic interaction between two unrelated adult kakapo has not been observed or reported before. This is despite many hours of filming of male kakapo at 'track and bowl' systems during the breeding season and some direct observations of males in Fiordland and Stewart Island (D. V. Merton pers. comm.), and hundreds of hours of recent filming of female kakapo on nests with chicks. The only other regular observations of kakapo behaviour were of Hoki when she was the sole occupant of an enclosure on Maud Island/Te Hoiere, Marlborough Sounds (Climo & Ballance 1997). Apparent agonistic behaviours that Hoki exhibited included raising all the feathers on her head and shoulders, "like a cat fluffing out its fur to make itself larger and more intimidating" (Climo & Ballance 1997). This behaviour has also been seen in male kakapo (Higgins 1999). Another apparently agonistic behaviour involved Hoki holding a stick in her beak, holding her wings half-raised, and moving from foot to foot (Climo &



► **Figure 1** Upper: Hoki on JJ's shoulder with crest raised, at full height and leaning towards Hauturu, who is 'frozen' on the tree. JJ is offering grapes to both birds. Centre: Detail of Hoki at full height, leaning towards Hauturu, with crest raised. Lower: Hoki with crest raised, but not at full height.

Ballance 1997; GH pers.obs.). This behaviour ceased after the observers had retreated.

Hoki has also used the same threat pose that males demonstrate at 'track and bowl' systems, of raising the wings over her head until they touched, or almost touched, at the tips (Higgins 1999; Climo & Ballance 1997; GH, JJ pers. obs). A male kakapo, Luke, has been filmed directing this display at black petrels (*Procellaria parkinsoni*) that encroached on his 'track and bowl' system on Little Barrier Island (Natural History New Zealand 1998).

Crest-raising has not been previously reported in kakapo, although similar crest-raising has been observed in other New Zealand parrots e.g., kaka (*Nestor meridionalis*) (GH pers. obs.), red-crowned parakeet (*Cyanoramphus novaezelandiae*) (Higgins 1999), and kea (*Nestor notabilis*) (Diamond & Bond 1999). Male kea use a facial display, similar to Hoki's crest raising, called the 'jay face', in which they flatten the anterior crown feathers and raise the posterior crown feathers. This display is used by dominant males when in possession of a resource (Diamond & Bond 1999).

It is possible that Hoki was using the crest-raising display for a similar reason, to show Hauturu that she was in possession of the offered grapes in this case. The 'freeze' response by Hauturu is a common response of kakapo to a perceived threat (Higgins 1999), but has not been previously observed in an interaction between two kakapo. Kea have a similar response, 'hunching', where a bird will crouch, lower the head and become immobile when attacked or chased. This position appears to 'cut-off' aggression stimulus for the dominant individual (Potts 1977). This interaction infers that both females knew each other, which is likely as they had adjacent home ranges, and that Hoki was the dominant individual. This infers some form of social hierarchy within the species, which in turn suggests a greater degree of social interaction than previously described (Higgins 1999).

The recent intensive management of kakapo has resulted in several observations of unrelated kakapo located together e.g., in the same tree, at supplementary feeding hoppers, and visitations to occupied nests and 'track and bowl' systems. These observations concur with those from the late 19th century when kakapo were both widespread and relatively abundant (Buller 1877; Reischek 1884; Pascoe 1957), such as, "...seen them in pairs on their nocturnal rambles" (Reischek 1884), and "...about a few score [kakapo] in a few hundred yards..." (Henry 1903). Conversely, these observers also commented on the largely solitary nature of kakapo, but most of these observations were of kakapo either roosting or in nests during the day. Nocturnal observations were mainly of males during the breeding season. Collectively, these observations, and ours, suggest a greater degree of social structure or hierarchy in kakapo than previously thought.

ACKNOWLEDGEMENTS

We thank Alison Ballance, Natural History New Zealand, for a copy of the video footage of the scene, and Ken Miller, Zoology Department, University of Otago, for preparation of the figures. The staff of the National Kakapo Programme, Department of Conservation, provided information on nocturnal observations of kakapo. Ron Moorhouse made useful comments on the text.

LITERATURE CITED

- Buller, W. L. 1877. Further notes on the ornithology of New Zealand. *Transactions of the New Zealand Institute* 10: 202.
- Climo, G.; Ballance, A. 1997. *Hoki: the story of a kakapo*. Godwit Publishing, Auckland.
- Diamond, J.; Bond, A. B. 1999. *Kea, bird of paradox. The evolution and behaviour of a New Zealand parrot*. University of California Press, Los Angeles.
- Henry, R. 1903. *The habits of the flightless birds of New Zealand*. Government Printer, Wellington.
- Higgins, P. J. (Ed.). 1999. *Handbook of Australian, New Zealand and Antarctic birds, Vol. 4: Parrots to dollarbird*. Oxford University Press, Melbourne.
- Merton, D. V.; Morris, R. B.; Atkinson, I.A.E. 1984. Lek behaviour in a parrot: the kakapo (*Strigops habroptilus*) of New Zealand. *Ibis* 126: 277-283.
- Natural History New Zealand. 1998. *To save the kakapo*. Video. Natural History New Zealand, Dunedin.
- Pascoe, J. D. 1957. *Mr Explorer Douglas*. Wellington, AH & AW Reed.
- Potts, K. J. 1977. Some observations of the agonistic behaviour of the kea (*Nestor notables*, Nestoridae) in captivity. *Notornis* 24: 31-40.
- Powlesland, R. G.; Lloyd, B. D.; Best, H. A.; Merton, D. V. 1992. Breeding biology of the kakapo (*Strigops habroptilus*) on Stewart Island, New Zealand. *Ibis* 134: 361-373.
- Reishek, A. 1884. Notes on New Zealand ornithology. *Transactions of the New Zealand Institute* 17: 187-197.

Keywords Kakapo; *Strigops habroptilus*; agonistic behaviour