Artificial incubation of kakapo *Strigops habroptilus* eggs and brooding of chicks while in the nest, Codfish Island, New Zealand

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SUMMARY

There appears to be a risk of kakapo *Strigops habroptilus* eggs chilling when the female is away feeding. Since 1997 all nest had heat pads applied when the female was off the nest and supplementary food was provided to reduce the time necessary to forage. No mortality events have since occurred that can be attributed to chilling.

BACKGROUND

The kakapo *Strigops habroptilus*, a critically endangered flightless parrot endemic to New Zealand, breeds in association with the mass fruiting of plants, timing the hatching of chicks with the ripening fruit in autumn. Mating is initiated at least six weeks earlier in response to the amount of unripe fruit/seed. However, from time to time the abundance of ripe fruit is insufficient to support the incubating female, with attendance at the nest, and consequently the viability of eggs, suffering.

Two strategies have been employed to combat embryo and chick mortality due to chilling: supplementary feeding of the female to reduce forage time (Elliot *et al.* 2001) and the artificial incubation of eggs and brooding of chicks in the nest chamber while the female is absent. The technical challenge of incubating and brooding kakapo eggs and chicks in the wild nest is summarised here.

ACTION

Initial investigations quickly revealed that despite kakapo nesting in cavities of less than 0.5 m², the energy demands to heat this volume to the required temperature of around 36.5º C could not be easily provided. We then progressed to replicate the incubating features of a female kakapo.

The brood patch of the female was replicated by filling a 150 mm diameter rubber whoopy cushion with cellulose wallpaper paste. To this we attached a flexible 12 volt 10 watt heating mat on the top surface and a RTD (resistance temperature device) to sense the temperature on the bottom surface of the whoopy cushion next to the eggs. The whoopy cushion was then covered in a 30 cm custom made fibre pile cover with a fine curtain mesh window beneath to facilitate transfer of heat to the eggs. The whole affair resembled a floppy sun hut. The heating element and temperature sensor are connected via a 2 m cable to a temperature control unit which manages the temperature of the heat pad to within 1.1 ºC. The unit is powered by a 12 volt gel cell consuming approximately 1 Ampere of electricity per hour.

The heat pad is placed over the eggs or chicks in the nest within 15 minutes of the females' departure and is removed upon her return.

CONSEQUENCES

In the 1997 breeding season, Cyndy, a female kakapo, spent over three hours away from her three eggs on several occasions during incubation. We were unable to heat pad this nest due to access difficulties. It is believed that all eggs were compromised due to these extended periods of chilling which resulted in one mid-term embryo death, a death on hatching, and the last chick failing to gain weight and dying after considerable

intervention at 80 days, due to a compromised immune system. Since this occasion, all nests have had heat pads applied from approximately 10 days after laying and despite continuing high levels of early embryo death, there have been no mortality events that can be attributed to chilling.

Female attendance at nest has considerably improved due to supplementary feeding, however (Elliot *et al*. 2001) the kakapo conservation team still perseveres with artificial incubation and brooding in the nest to increase egg and chick thrift.

REFERENCES

Elliott G.P., Merton D.V. & Jansen W.P. (2001) Intensive management of a critically endangered species: the kakapo. *Biological Conservation*, 99, 121-133.