

NEST-SITE SELECTION, DIET AND PARENTAL CARE OF THE WEDGE-TAILED EAGLE *Aquila audax* IN WESTERN NEW SOUTH WALES

LISA M. SILVA and DAVID B. CROFT¹

School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney, NSW 2052

¹Present address: UNSW Arid Zone Field Station, Fowlers Gap via Broken Hill, NSW 2880; Corresponding author: d.croft@unsw.edu.au

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Nest-site characteristics and selection of the Wedge-tailed Eagle *Aquila audax* were studied in 1997 at Fowlers Gap, in arid western New South Wales, Australia, by measuring parameters of nest trees ($n = 9$ active, 31 inactive) and other trees ($n = 150$ in circular plots around nest trees). Parental behaviour and prey items at two nests were recorded by remote time-lapse video surveillance, from week 4 of the nestling period to fledging. Active nests were mostly in live gums *Eucalyptus* sp. in creeks, whereas most inactive nests were in non-eucalypts or dead trees on ridges. Riparian nest trees were significantly taller, with larger crowns, than nest trees on downs or ridges, and non-nest trees in creeks; ridge nest trees were significantly taller than ridge non-nest trees. Six clutches were all of two eggs; fledging success was 0.6 young per attempt ($n = 9$). The eagles' breeding diet consisted of mammals (44% by number), birds (6%) and reptiles (34%); mostly rabbits *Oryctolagus cuniculus* (33%), juvenile kangaroos *Macropus* sp. (6%) and Bearded Dragons *Pogona vitticeps* (29%). By biomass, important prey were mammals (77%: rabbits 45%, kangaroos 26%) and reptiles (12%). Parental behaviour is described, and the video surveillance method is evaluated.

INTRODUCTION

There have been many studies on the ecology of the Wedge-tailed Eagle *Aquila audax*, quantifying aspects of diet and prey selection, nest-site selection and dispersion, and breeding biology (see Marchant and Higgins 1993 for a review; also Olsen and Marples 1992; Burnett *et al.* 1996; Sharp 1997; Richards and Short 1998; Debus and Rose 1999; Falkenberg *et al.* 2000; Harder 2000; Aumann 2001a,b; Sharp *et al.* 2001, 2002a,b; Olsen *et al.* 2006). Some of these studies, and others in progress (Davey and Pech 2004; Fuentes *et al.* 2004), have examined the effect of food supply or nest sites on eagle breeding success. However, other than the study of Harder (2000) there has been little quantification of breeding behaviour and parental care in the Wedge-tailed Eagle in the field. Anecdotal information is mainly from captive birds (reviewed by Marchant and Higgins 1993; see also Fleay-Thomson 2002), photographic studies (Cupper and Cupper 1981; Hollands 1984), and an observational study of one breeding event (Allott *et al.* 2006).

Following the impact of the calicivirus (haemorrhagic disease) on the population of the European Rabbit *Oryctolagus cuniculus* in the Australian arid zone, there may be effects on the Wedge-tailed Eagle's prey composition, population or breeding success (Falkenberg *et al.* 2000; Sharp *et al.* 2002a; Davey and Pech 2004). The virus arrived in the present study region in spring 1996 (Sharp *et al.* 2002a). Dietary studies have investigated the role of the rabbit in the eagle's ecology, but such studies usually rely on the analysis of prey remains and regurgitated pellets, which may have inherent biases (Sharp *et al.* 2002b). Attempts to overcome these biases can include direct observation of prey items delivered to nests, but this method is labour-intensive and sample sizes are limited by logistics. The number of nests that can be watched simultaneously is limited (without introducing multiple-observer bias in aspects such as prey size or identity), and long periods of observation are not practical.

This study sought to investigate aspects of the nesting biology of the Wedge-tailed Eagle (nest-site characteristics and selection, diet, potential prey populations, and parental roles during the nestling period), with behaviour and prey recorded using remote surveillance of nests by time-lapse video. The aims of the study were to identify characteristics of nest trees compared with non-nest trees; quantify prey items in relation to the availability of certain species; describe and quantify parental behaviour in relation to brood size and chick growth; and evaluate the video-surveillance method for observing raptors. Data on nest spacing and dispersion from the present study (Silva 1998) were incorporated into the discussion by Sharp *et al.* (2001).

STUDY AREA AND METHODS

Study site

The study was conducted at Fowlers Gap Arid Zone Research Station (31°05'S, 141°45'E), 112 kilometres north of Broken Hill in far western New South Wales. The station covers 39 200 hectares in a semi-arid to arid landscape used for grazing of livestock. Most of the area is high sandstone ranges with belts of Mulga *Acacia aneura*, she-oaks *Casuarina* and chenopod shrubs, grading to minor ridges and plains covered in perennial grasses. Watercourses are lined with River Red Gum *Eucalyptus camaldulensis*.

Nests

In 1997, Wedge-tailed Eagle nests were located during habitat searches by walking or driving (vehicle or trailbike traverses), initially in March then again between mid-July and late August (incubation and nestling periods) to determine eagle activity. Nests were easily identified by their size relative to other raptor nests. Each nest was recorded by GPS and plotted on a topographic map, classified as active (adult, eggs or chicks on/in nest) or inactive (no sign of activity, or activity did not proceed beyond the presence of fresh nest material), and