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SHORT COMMUNICATION

Nest characteristics of the Chilean Hawk (*Accipiter chilensis*, Falconiformes: Accipitridae) in an Andean *Nothofagus* forest of northern Patagonia

RICARDO A. FIGUEROA R.¹, SERGIO ALVARADO O.^{1,2}, DANIEL GONZÁLEZ-ACUÑA³ & E. SORAYA CORALES S.¹

¹Studies for Wildlife Conservation and Management, Chillán, Chile, ²Division of Biostatistic and Demography, School of Public Health, Faculty of Medicine, University of Chile, Santiago, Chile, and ³Faculty of Veterinary Medicine, University of Concepción, Chillán, Chile

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Abstract

During the breeding seasons 2001–2005 we determined the nest measurements and characteristics of a Chilean Hawk (*Accipiter chilensis*) pair in an Andean *Nothofagus* forest of northern Patagonia (36°S; 50 km east of Chillán). The five platforms were built on forked branches in the upper part of the trees, 16–20 m above ground. One nest and one nesting tree were reused. Nests were built close to the main trunk or a vertical gross branch. The nesting trees were live adult *Nothofagus dombeyi* trees. The measured nests were oval-shaped platforms similar in size. Nests were built with dry twigs and sticks, which were strongly intertwined. The egg-shell remains found under the nesting trees were light bluish white or dull white, unspotted and nonglossy on the outer surface, and bluish tinged on the inner surface. Minor differences were found between our descriptions and those previously documented, which could be due to differences in sample size, individual differences between pairs, or structure of the nesting tree.

Resumen

Entre las estaciones reproductivas de 2001 a 2005 evaluamos las características y morfología del nido de una pareja de peuquitos (*Accipiter chilensis*) en un bosque andino de *Nothofagus* en Patagonia norte (36°S). Las cinco plataformas estuvieron ubicadas sobre ramas horquilladas en la parte superior de los árboles, 16–20 m sobre el suelo. Un nido y un árbol/nido fueron reutilizados. Los nidos fueron construidos apegados al tronco principal o a una rama vertical gruesa. Todos los árboles/nido fueron *Nothofagus dombeyi* adultos vivos. Las plataformas medidas presentaron una forma oval de tamaño similar. Los nidos fueron construidos con ramas secas las cuales estaban fuertemente entrelazadas. Los restos de cáscaras de huevo de peuquitos encontradas bajo los nidos presentaron un color blanco azulado o blanco sucio, sin manchas y sin brillo en la superficie externa y un color azulado en la superficie interna. Algunas divergencias se encontraron entre nuestras descripciones y aquellas documentadas previamente, lo que podría deberse a diferencias en tamaños de muestra, diferencias individuales entre parejas, o a la estructura de los árboles nido.

Keywords: *Accipiter chilensis*, Chilean Hawk, nest, Patagonia, southern temperate forest

Introduction

The secretive behaviour, low population densities, and habitat complexity make forest raptors difficult to study, and consequently most of them are poorly known (Thiollay, 1996; Bierregaard, 1998). Because raptors are top-order predators and generally have large home ranges, an understanding of their ecological requirements is crucial, particularly for those that are habitat-specialists (Bierregaard, 1998).

The Chilean Hawk (*Accipiter chilensis*; del Hoyo et al., 1994) is one of the least known forest-specialist raptors in the southern temperate rainforest region comprising Argentina and Chile. This hawk has been listed as rare along its entire geographic range (Jaksic & Jiménez, 1986; Jaksic et al., 2001), and its populations are considered threatened because of increasing habitat loss by extensive fires, logging, and hunting (Jaksic & Jiménez, 1986; Rottmann &

López, 1992). Del Hoyo et al. (1994) summarized the scant data known about its habitat, feeding, breeding, and movements. Recently, Figueroa et al. (2004) made a quantitative analysis of its diet.

In Chile, information about its nest is scarce and mostly qualitative (Housse, 1937, 1945). Pavez & González (1998) reported a nesting record in central Chile, but they did not give details of the nest site. Most recently, Ojeda et al. (2004) described the characteristics of a nest in the southern temperate forest in Argentina. Here, we report for the first time a description of the nest morphology and nesting site characteristics of the Chilean Hawk in Nevados de Chillán, northern Patagonia.

Materials and methods

Our study was conducted in the Huemules del Niblinto Nature Sanctuary and National Reserve (36°45'S, 71°29'W), 50 km east of Chillán, located in northernmost Patagonia (36–56°S). Niblinto is a private/public wildlife area (ca. 10 000 ha) that forms part of the Nevados de Chillán, a priority site for biodiversity conservation in Chile (Muñoz et al., 1996). The landscape around the Nevados de Chillán is rugged, composed of fairly narrow valleys (700–900 m in elevation) dominated by a second-growth *Nothofagus* mixed-deciduous forest and high hills (1500–2500 m in elevation, 30–45° slope) and steppe-shrublands. In general, the forest overstory is dominated by *Nothofagus dombeyi*, *N. obliqua*, *N. alpina* and *Podocarpus saligna* (20–30 m in height, 0.5–1.1 m in diameter). The canopy cover ranges from 50 to 85%. The midstory is composed of bamboo (*Chusquea* spp.; 2–3 m tall), and some dispersed shrubs (e.g. *Fuchsia magellanica*, *Azara lanceolata*; 1–2.5 m tall). The climate is Mediterranean-temperate, characterized by a dry summer (20–30°C) and a rainy, cold and snowy winter (mean annual rainfall >1000 mm; 0–10°C).

Surveys were undertaken during the breeding seasons (December to March) from February 2000 to 2006. To detect nests we searched for platforms on branches or fledgling presence by walking throughout the forest. Based on our experience, we also used indirect signs, such as vocalizations, feathers and droppings. From December 2001 to February 2006 we recorded five consecutive nesting events by a Chilean Hawk pair in a forest patch (30–40 ha) located on the southern border of Niblinto river (36°44'59"S, 71°29'09", altitude 800 m). In addition, during the first nesting record an abandoned nest was found adjacent to the active nest and we assumed that it had been built during the preceding breeding season of 2000 and included it in our descriptions. We identified nests by number

in the sequence of the building date. Since nests 2 and 5 were built on the same tree, measurements of the nesting tree were only taken once. Both nests could not be measured because the first was destroyed by a fallen branch, and the second was located on very old and fragile branches that were too dangerous to climb. During December 2004 the Chilean Hawks reused nest 3 and it was not measured again. Because of logistic limitations, we only climbed the nest trees to describe and measure platforms during March 2004. It is possible that the structure of nests was modified over time, but we detected no apparent changes in shape or size during our study. To describe the nest tree characteristics we recorded the following parameters: tree species, condition (live, partly dead or dead), height, diameter at breast height (d.b.h.), distance of nearest tree, distance of nearest nest tree, nest height, distance from the outer edge to the main trunk of the nest tree, diameter of main trunk at height of nest, number and diameter of branches supporting nest, and orientation.

Results

All five nests were built on live *Nothofagus dombeyi* trees more than 20 m tall and 42–120 cm in d.b.h. (Table I). Except nest 3 (>100 m in distance), all remaining nest trees were relatively close to each other (23–26 m). All nest trees were located in 100–200 m distance from the forest border and very close to other trees. Platforms were placed on forked branches (two to four) in the upper part of the trees (Table I). They were firmly fixed to branches and were relatively hidden from the ground. Most of the supporting branches were similar in diameter. Nests did not show a definitive orientation. The three measured nests were oval-shaped platforms similar in size (Table II). Material used for nest building consisted exclusively of dry twigs and sticks belonging to *N. dombeyi*, and which were strongly interlaced. Sticks were 0.2–1.5 cm in diameter, and 9–68 cm in length. Although we did not measure nests 2 and 5, they were similar in size, shape and building material. The inner cups of nests were covered with prey remains (e.g. feathers, bones, beaks), pellets and down of Chilean Hawk chicks. From the prey remains we identified some birds including Striped Woodpecker (*Picoides lignarius*), Thorn-tailed Rayadito (*Aphrastura spinicauda*), Huet-huet (*Pteroptochos* spp.), Austral Thrush (*Turdus falcklandii*), Patagonian Sierra-Finch (*Phrygilus patagonicus*) and Black-chinned Siskin (*Carduelis barbata*). Under all five nests we found pieces of eggshells that we assumed to be from Chilean Hawks. The outer surface of the eggshell

Table I. Characteristics of Chilean Hawk (*Accipiter chilensis*) nest trees in Nevados de Chillán, northern Patagonia, Chile.

Characteristic	Nest*				Mean ± SE
	1	2†	3	4	
Tree height (m)	29.7	23.0	24.6	26.0	25.8 ± 1.4
Tree d.b.h. (m)	120.0	47.0	45.0	42.0	63.5 ± 18.9
Distance to nearest tree (m)	5.2	3.2	2.3	1.2	3.0 ± 0.9
Distance to nearest nest-tree (m)	23.5	–¶	120.0	26.0	56.5 ± 31.8
Height of nest above ground (m)	19.6	17.0	16.6	18.9	18.0 ± 0.7
Distance of nest to main trunk (m)	2.5	0	0	0	0.6 ± 0.6
Diameter of main trunk at height of nest (cm)	–‡	14.0	15.5	7.0	12.2 ± 2.6
Diameter of branches supporting nest (cm)	4.2	4.0	3.1	3.8	4.3 ± 1.1
	3.8	3.0	2.5	4.0	
	16.0	3.0	–	2.8	
	–	–	–	1.8	
Orientation	NE	NE	SW	N	

*Order follows the building date (2000–2005). †Nest tree was reutilized during 2005 and was not measured again. ‡Nest was located outside of main trunk. ¶Equidistant to nest 1.

Table II. Morphometrics of the Chilean Hawk (*Accipiter chilensis*) nests in Nevados de Chillán, northern Patagonia, Chile.

Nest*	Nest diameter (cm)	Cup diameter (cm)	Depth of nest cup (cm)	Depth of nest (cm)
1	73.5 × 58.3	28.0 × 18.2	6.2	23.7
3	70.0 × 48.0	23.5 × 19.5	4.7	31.7
4	79.0 × 53.0	25.0 × 19.0	4.6	21.0
Mean	74.2 × 53.1	25.5 × 18.9	5.2	25.5

*Order follows the building date (2000–2005). Nests 2 and 5 were not measured (see Materials and methods).

was light bluish white or dull white, unspotted and not glossy. The inner surface of some fragments was bluish tinged. Because eggs were broken we could not measure them, but a reconstruction of fragments indicated that they were subelliptical in shape.

Discussion

Housse (1937) first described the Chilean Hawk's nest in Chile. Recently, Ojeda et al. (2004) described a nest of this species found in a *Nothofagus dombeyi* forest in southern Argentina. Similar characteristics between our nests and those previously described are nest tree location inside the forest (distant from forest border), platform location (close to main tree trunk), nest height (>18 m from ground), supporting substrate (forked branches), structure (dry twigs strongly interlaced) and cup diameter. However, both Housse (1937) and Ojeda et al. (2004) described nests as relatively round-shaped platforms (50–60 cm diameter). In addition, Housse (1937) asserted that the Chilean Hawks place their nest on branches distant from the main trunk. On the other hand, the nest found in southern Argentina was externally deeper (59 cm) and located higher above the ground (25.3 m) than those of Nevados de Chillán. These discrepancies may be the result of low sample sizes, individual differences between pairs or structure of the nesting tree. Recent

studies on breeding biology of Neotropical forest hawks shows distinctive variation in the nest characteristics (Thorstrom & Quixchán, 2000; Trejo et al., 2004). In general, morphometrics of nest and nesting site characteristics in Nevados de Chillán were similar to those given for the closely related Bicolored Hawk (*Accipiter bicolor*) by Thorstrom & Quixchán (2000).

Results from our study area suggest that Chilean Hawks may either build a new nest for each breeding season or eventually reutilize nests. In addition, Chilean Hawks may reutilize nesting trees, building a new nest. Egg color and shape observed in our study area were also similar to those reported for Bicolored Hawk (Wolfe 1964; Thorstrom & Kiff, 1999). Apparently, eggshell remains with light bluish white on the outer surface were from fresh-laid eggs as reported by Bent (1937) and Wolfe (1964), whereas the bluish color fades during incubation (Thorstrom & Kiff, 1999). Thus our observations contradict the assertion of Housse (1937, 1945) who described eggs as elliptical, smooth but somewhat thick-shelled, white with large yellowish or greenish blotches concentrated around the larger pole and with numerous small and gray spots elsewhere. Thorstrom & Kiff (1999) had already questioned the authenticity of Housse's eggs. Our results confirm that the Chilean Hawk is a forest-specialist raptor that breeds within protected forest patches

and prefers tall old evergreen trees to build its nests. Possibly, the dense foliage of treetops of *N. dombeyi* provides adequate shade for the chicks and hides them from other aerial predators. Research further field is necessary to determine the main factors influencing the selection of nesting sites.

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