Management strategies for keystone bird species:

The Magellanic woodpecker in Nahuel Huapi National Park, Argentina

By Valeria Ojeda

VALERIA OJEDA

DAVID TATIN

FOREST LOSS AND FRAGMENTATION are affecting the temperate forests of southern South America at an increasing rate (Armesto et al. 1998). A large portion (about 30 million acres [12 million ha]) of these *Nothofagus* species–dominated forests includes several national parks in Chile and Argentina (fig. 1). Most of these protected areas lack management plans or have old plans under reevaluation in light of new biological information and theoretical framework changes, as focus shifts from single-species management to ecosystem management. For this task, resource managers need information on the biology of species that (1) are threatened, (2) are indicators of particular forest conditions, (3) are highly appealing ("flagship"), (4) generate key habitat structures or resources ("keystone"), or (5) require large territories such that their protection ensures the preservation of many other organisms ("umbrella").

Some species display several of these characteristics, and knowledge of such species is of major importance in park planning and management. The Magellanic woodpecker (*Campephilus magel-*

Figure 1. Magellanic woodpeckers rely heavily on *Nothofagus*, or southern beech, forests of southern Chile and Argentina, making little use of tree species in other genera. Two *Nothofagus* species are dominant in Nahuel Huapi National Park: *N. dobeyi*, a large, evergreen form found in wetter areas and valleys that grows to a height of 148 ft (45 m); and the deciduous *N. pumilio*, which adopts a shrub form at upper tree line, but attains heights of 100 ft (30 m) on moderate slopes.

[Its] role as a keystone species in creating cavity habitat for other species was suspected. . . . but the most basic information on its natural history was lacking.

lanicus) represents a good model species to demonstrate the role of ecosystem management in park planning. My dissertation research (2000–2006) was based at Nahuel Huapi National Park, Argentina (fig. 2), but applicable to forest management within and adjacent to preserves in northwestern Patagonia and elsewhere.

The ecological roles of the Magellanic woodpecker

Several woodpecker species decreased in number in the 20th century because of loss of forest habitat worldwide (Winkler and Christie 2002). The forests of southern Chile and Argentina hold three woodpecker species, two of which are small to medium in size—*Colaptes pitius* (length: 13 inches [33 cm]) and *Picoides lignarius* (7 inches [18 cm])—and show no obvious population decline or range retraction. The Magellanic woodpecker, in contrast, is a large (18 inches [46 cm]) species renowned for its sexual dimorphism; that is, the differences in form between males and females (fig. 3). It is the third largest member of its genus after ivory-billed woodpeckers (*C. principalis* and *C. imperialis*). Its large size compared with other neotropical woodpeckers and its typical behavior—moving year-round in noisy family groups—have made this woodpecker very conspicuous and charismatic.

Magellanic woodpecker populations are declining in several parts of their range, so this species appears to be an excellent indicator of ecosystem response to decreasing old-growth forest habitat. However, empirical information on habitat relations was extremely limited when I began my research. In particular, preliminary observations on the structures required for nesting, roosting, and foraging indicated that standing dead trees (the "key" resource for several woodpecker species in the world) may not alone be able to support viable populations of Magellanic woodpeckers. Their role as a keystone species in creating cavity habitat for other species was suspected but undocumented. The Magellanic woodpecker looked attractive as a multirole species, but the most basic information on its natural history was lacking.

The Magellanic woodpecker . . . represents a good model species to demonstrate the role of ecosystem management in park planning.

Figure 2. Situated in the foothills of the Andes Mountains, Nahuel Huapi National Park (reddish rectangle) is located in northwestern Patagonia, southern South America.

The main objectives of my research were to (1) describe the most relevant traits of the nesting biology and social behavior of the Magellanic woodpecker, (2) explore cavity tree and cavity site selection in pristine forests, and (3) assess the ecological role of this woodpecker through the construction of cavities potentially used by other species.

Methods

I conducted a mid-term (1998–2006) study of the woodpeckers' reproductive biology and social behavior based on about 40 nests (Ojeda 2004; Ojeda and Chazarreta 2006), and studied nesting habitat selection in old-growth continuous forest (2003–2005) based on 160 cavities (Ojeda 2006). I studied the habitat selection process at three levels: (1) the forest patch surrounding the cavity (0.10-acre [0.04-ha] circular plots), (2) trees used for cavity location, and (3) the portion of the tree where cavities were excavated. At each level I recorded variables such as tree height and diameter at breast height; presence/absence of fruiting bodies of wood-rotting fungi; number of saplings and stumps (<10 feet [3 m] high) in the plots; and distance from a plot to the closest building, trail, road, forest opening, and water body. I recorded architecture and morphometrics data (e.g., vertical and horizontal diameter of the cavity entrance, compass orientation, vertical depth) for more than 100 cavities, as well as excavation dynamics, use patterns, and causes of cavity loss. I studied other species' use of Magellanic woodpecker cavities by inspecting cavities in the trees and by monitoring cavity entrances from ground blinds or hides. Small video cameras mounted on poles were inserted into the cavities at various times throughout the year.

COURTESY OF TIM BOUCHER

Figure 3. As with other species of *Campephilus*, Magellanic woodpeckers have black plumage, a strong crest, a pale wing patch (white, in this case), and a specialized bill and tail. Males (right) have a scarlet head and neck while females (left) have a black head with curled crest and a dull red base of the bill. Because it is the only large woodpecker in its range, misidentification in the field is impossible. These powerful woodpeckers excavate a new nesting cavity every year, mostly in partially decayed parts of living trees (as shown in the image at right).

Main findings

At the landscape scale, cavities were frequently clustered; the cavities in some of these clusters were maintained as roosts by family groups throughout the year. I was able to confirm eight bird and one mammal species as secondary users of Magellanic woodpecker cavities. Most users were midsize to large species that adopted abandoned woodpecker cavities; these species were also found nesting or roosting in other natural holes, which were abundant at the study sites. I recorded circumstantial evidence of direct competition for woodpecker cavities only among some secondary users (e.g., pygmy owl and parrot species) and between these secondary users and the woodpeckers.

Magellanic woodpeckers were rather nonselective regarding the site surrounding the cavity tree; the selection hierarchy was instead strongly biased toward the cavity tree itself. The woodpeckers excavated cavities mostly in live trees 16–20 inches (40–50 cm) in diameter at breast height (with a minimum threshold of about 12 inches [30 cm]) and greater than 170 years in age (with an average of about 200 years). Suitable portions of boles for cavity excavation were those devoid of branches with a diameter greater than or equal to 12 inches (30 cm) and rarely greater than 16 inches (40 cm), which indicated an optimum diameter. In general, cavity trees had distinctive heart rot decay, but nevertheless in a tree live enough to persist in the environment for years. Although alive, these trees exhibited the phenomenon of vigor decline significantly more than their neighbors of the same age class, as shown

by the suppression of radial growth during the last decades. The minimum threshold diameter at breast height recorded for cavity trees (12 inches [30 cm]) was strikingly similar to the values reported by other authors for geographic extremes of the species' distribution and for different forest types, suggesting that cavity excavation size may be a constraint for the species.

Conclusions

The incompatibility between the conservation of Magellanic woodpeckers and current trends of widespread exploitation of *Nothofagus* forests is among the most important conclusion of the present study. The harvesting systems used in timber operations today would impoverish forest habitat for this woodpecker and for other cavity nesters, mainly through rot reduction at the managed sites. Heart rot is characteristic of unmanaged native forests and was a greater factor in the tree selection made by Magellanic woodpeckers than any other habitat feature measured in this study. Much more data are needed in order to determine the actual ecological roles of this woodpecker, mostly with regard to potential obligate users of its cavities in forests with low availability of natural holes.

The Magellanic woodpecker did not prove sensitive to intermediate levels of human presence (e.g., closeness to trekking trails or car access roads) or to moderate exploitative practices (e.g., < 50% firewood removal and occasional selective cutting) in their territories. The tolerance and charismatic nature of this species make it an ideal tool for the development of profitable alternative forest activities such as ecotourism, recreation, and biodiversity prospecting, both within and outside of protected areas. This reflects the claim of many international visitors that the Magellanic woodpecker is a flagship and probably a keystone species of the forests of southern Argentina and Chile.

Acknowledgments

This research was supported by the Canon National Parks Science Scholars Program and CONICET-Argentina. Idea Wild and Birders' Exchange provided equipment fundamental to this study. The Universidad Nacional del Comahue provided constant support to these studies in different ways and at different stages.

References

Armesto, J., R. Rozzi, C. Smith Ramírez, and M. Kalin Arroyo. 1998. Conservation targets in South American temperate forests. Science 282:1271–1272.

Ojeda, V. 2004. Breeding biology and social behaviour of Magellanic woodpeckers (*Campephilus magellanicus*) in Argentine Patagonia. European Journal of Wildlife Research 50:18–24.

Ojeda, V. 2006. Nesting habitat selection and reproductive biology of Magellanic woodpeckers *Campephilus magellanicus* (Aves, Picidae) in northwestern Patagonia, Argentina. Dissertation. Universidad Nacional del Comahue, Bariloche, Argentina.

Ojeda, V., and M. L. Chazarreta. 2006. Provisioning of Magellanic woodpecker (*Campephilus magellanicus*) nestlings with vertebrate prey. Wilson Journal of Ornithology 118:251–254.

Winkler, H., and D. A. Christie. 2002. Family Picidae (woodpeckers). Pages 296–555 *in* J. Del Hoyo, A. Elliott, and J. Sargatal, editors. Handbook of the birds of the world. Volume 7: Jacamars to woodpeckers. Lynx Edicions, Barcelona, Spain.

About the author

MARTJAN LAMMERTINK

Valeria Ojeda *(photo) was a 2003 Canon Scholar from the Universidad Nacional del Comahue in Bariloche, Argentina. She completed her dissertation, "Nesting habitat selection and reproductive biology of Magellanic woodpeckers* Campephilus magellanicus *(Aves, Picidae) in northwestern Patagonia, Argentina," in 2006. Dr. Ojeda is a wildlife biologist with CONICET (Concejo Nacional de Investigaciones Científicas y Técnicas) and the Universidad Nacional del Comahue in Bariloche, Argentina. She can be reached at campephilus@bariloche.com.ar.*