

CHUCAOS IN CHILOÉ

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RESUMEN.- Los chucaos (*Scelorchilus rubecula*) en la Isla Grande de Chiloé están amenazados por la pérdida de hábitat, disminución en la calidad del hábitat de los bosques remanentes y una disminución en la conectividad entre fragmentos. Pueden reproducirse bastante bien en fragmentos que proporcionan un sotobosque denso, pero pierden sitios de nidificación y se tornan más vulnerables a la depredación cuando los fragmentos son talados o pisoteados por el ganado. Como se resisten a cruzar praderas abiertas, generalmente dependen de corredores de vegetación o matorrales para poder moverse entre fragmentos y encontrar parejas. La conservación de esta especie endémica en el paisaje Chilote se beneficiará de la mantención de los hábitats existentes con una mínima perturbación y de la retención o restauración con vegetación apropiada para la dispersión entre fragmentos.

When Darwin came to Chiloé in 1834/5, he noticed an 'odd little red-breasted bird' in the forest. A myth about this small bird that was told to Darwin is still told by country people today: If you hear a Chucao calling on your right as you walk from your house, all is well and you should proceed on your way, but if you hear one calling on your left, then that is bad luck and you should turn around and go straight back home! For my part, I am happy to hear chucaos calling on all sides, at any time!

By 2006 we can provide more scientific information about the Chucao Tapaculo (*Scelorchilus rubecula*). Like many other birds, the Chucao is endemic to a small part of Chile and westernmost Argentina, where the rainforest provides the dense understory preferred by this species (although it also occurs, often at lower abundances, in dense matorral and second-growth (MFW pers. obs.)) and in some plantations of exotic trees that have good understory cover (C. Estades, pers. comm.). The limited geographic range makes the Chucao very vulnerable to habitat loss and fragmentation. For this reason, I

began to study chucaos in about 1992, in order to examine the effect of forest fragmentation on Chucao biology and obtain information that could help maintain Chucao populations in areas with major loss of habitat.

Here, I summarize the principal findings of these years of work on Chiloé in hopes of making this information available and potentially usable by more people. As background: chucaos are socially monogamous, strongly territorial, nonmigratory understory birds that seldom fly very far. They forage chiefly on the forest floor, searching the litter for invertebrates; they also sometimes consume small frogs and fallen fruits (see also Correa et al. 1990). They mature in their first year, and they can raise two or even three broods per year. The longest-lived individuals recorded so far have been seven years old, but the average lifespan is considerably shorter. The estimated annual probability of survival is 44% from age 1 to 2 years and 72% from age 2 to 7 years (Willson and Pendleton in press).

The first important piece of information concerns nesting success: what is the nest success of chucaos in areas where the forest

has been fragmented by timber-harvest and clearing for agriculture? In North America, numerous studies have shown that, in forest fragments created by agriculture, nest success for many species of birds is lower than in continuous forest, sometimes so low that the population in the fragmented forest cannot sustain itself and so depends on immigration from other areas (Robinson et al. 1995). In the agricultural landscape of northern Chiloé, however, chucaos are able to nest quite successfully. The principal causes of nest failure are unusually bad weather and predation (perhaps mostly by rodents). About 63% of nests in forest fragments were successful in producing juvenile birds, compared to about 72% in the continuous forest of the Parque Nacional Chiloé (De Santo *et al.* 2002), a difference that is not statistically significant. In addition, although clutch sizes in the park are virtually always two eggs, clutch sizes in the fragments are commonly two eggs but quite frequently three eggs (De Santo *et al.* 2002). There were no negative effects of forest edge on nest success in fragments. Thus, one might conclude that Chucao populations should be prospering in the fragmented forest.

However, the fragments are increasingly disturbed by selective logging and, as a result, it is likely that both the density and the nest success of chucaos will decrease in the fragments in the future. Chucaos in Chiloé usually prefer to nest in cavities in trees or logs or earthen banks, or occasionally in piles of leaf litter caught in tree branches, in clumps of epiphytes, on tops of stumps, or on the surface of the ground. Although most nests have roofs, provided either by the cavity itself or constructed by the birds, some nests often have only a partial roof constructed of plant fibers or even no roof at all. Nest success was greater in cavities, especially with long entrance tunnels, than in less well-protected nest sites (DeSanto *et al.* 2002). So, as trees are remo-

ved from the fragments, the availability of good nest sites decreases, and nest failure becomes more common. Furthermore, reduction of concealing cover is caused by the roads used to extract timber, as well as by cattle that then penetrate more deeply into the fragments, eating and trampling the understory. Chucaos then become more vulnerable to predators, including Chilean Hawk (*Accipiter chilensis*; Figueroa *et al.* 2004a,b), Rufous-legged Owl (*Strix rufipes*), Austral Pygmy-Owl (*Glaucidium nanum*), and domestic dogs and cats that roam into the fragments from nearby farms (MFW pers. obs.). Removal of overstory trees also reduces the production of leaf litter, where chucaos find the majority their food.

The second critical piece of information concerns the ability of chucaos to move around the landscape from fragment to fragment. Juvenile birds need to disperse, in order to find their own territories and mates. But when the once-continuous forest becomes fragmented, the fragments are increasingly isolated from each other by pastures and agricultural fields. For chucaos (and the other tapaculos of the rainforest zone), open pastures lacking cover of shrubs, ferns, or quila are barriers to movement on the landscape (Sieving *et al.* 1996). We used playbacks of Chucao songs to assess the response of adult chucaos to different habitats for movement. In forest, chucaos often responded quickly to song playback, approaching the speaker, singing, and sometimes even attacking the speaker physically. But if the speaker was located in an open pasture, just a few meters from the forest edge, chucaos never came to the speaker, but instead ran back and forth in the forest edge, calling. If the pasture had a few stumps or piles of branches, occasionally chucaos ventured forth, using the cover of the branches, but the frequency of approach was still far less than in forest. Thus, the open habitats clearly restrict the movement of chucaos on the landscape.

Radio-tracking of adult chucaos released in forest fragments surrounded by matrix of differing vegetation structure confirmed this result (Castellón & Sieving 2006). Released birds moved through the landscape chiefly by using shrubby fields or linear corridors of vegetation between pastures, occasionally using other small fragments as stepping stones and crossing short open spaces to do so. In general, however, open habitats were avoided or entered only after considerable delay; some died rather than leave the cover provided by the site of release.

If the fragments are surrounded by pastures, movement from one fragment to another is obviously limited. As a result, juvenile chucaos are much more likely to remain in their natal fragment, in comparison with forests that are not so isolated: 21% vs 3% (Willson 2004). Presumably, the immigration of birds from other fragments is likewise limited. In addition, male chucaos in the isolated fragments often fail to obtain mates, even when their territories provide good habitat (18% without females vs 1% without females in continuous forest; Willson 2004). Thus, fragment isolation can have potentially serious consequences for Chucao populations, by limiting the number of actively breeding males and restricting the dispersal of juveniles to other fragments, thus inhibiting gene flow among local segments of the population.

In contrast, if the fragments are connected to each other by corridors of dense vegetation suitable for chucaos, juveniles can disperse and all males usually have mates. Such travel corridors may be broad expanses of dense shrubs but need not be more than a few meters wide, at least when travel distances are on a scale of a few hundred meters. Adult chucaos readily enter such corridors in response to playbacks (Sieving *et al.* 2000) and radio-tracked adults released in unfamiliar areas commonly used them (Castellón &

Sieving 2006). Juveniles are likely to be even more willing to travel in the corridors, given the need for dispersal. Shrubby fields are still fairly common in northern Chiloé, and strips of vegetation are, at present, often found along small streams and rivers and sometimes in windbreaks. However, many of these connecting corridors are being severed, as farmers bulldoze the banks of streams or cut the covering vegetation. Thus, accompanying the problem of decreasing habitat quality in the fragments, there is an additional problem of decreasing connectivity among fragments.

Although much biologically interesting information remains to be learned about Chucao populations in Chiloé and elsewhere, we now have sufficient information to suggest what is needed to maintain at least minimum levels of self-sustaining populations in this agricultural landscape (see also Willson *et al.* 2004). Clearly, it is necessary that some nesting habitat remains, preferably in the form of forest fragments distributed across the landscape. Habitat is being lost as industrial and local timber-harvest continues (Lara *et al.* 2002), although the establishment of plantations of exotic pines and eucalyptus on the logged areas might mitigate the loss to some degree, if they are managed with a good understory. The two next most obvious factors relevant to maintenance of Chucao populations are habitat quality and habitat connectivity. As long as farmers continue to extract large volumes of firewood and fenceposts from their forest fragments, habitat quality will continue to deteriorate. That means, at the present time, habitat connectivity acquires critical importance, enabling chucaos to disperse to the remaining areas suitable for nesting. Connecting corridors are also the easiest things to accomplish, because they correspond to conditions commonly produced by existing Chilote land-management practices. They also occupy little land-surface and therefore do not

diminish agricultural use significantly. Farmers in this area often leave native vegetation along streams and in deep arroyos, and some farmers maintain windbreaks. Corridors along streams often lead to the sea coast, where vegetated sea-cliffs, in some parts of the island, provide connections along the edge of the island – at no cost to anyone, since the sea-cliffs offer no valuable timber or forage for cattle and therefore could persist undisturbed. What then is needed, at minimum, is the encouragement of land-management that includes maintenance of vegetation along streams and in windbreaks, especially among fragments and between fragments and the sea-cliffs. The matrix of habitats around the fragments is clearly important (see also Simonetti *et al.* 2002), so retention of second-growth forest and shrublands would be useful in providing dispersal habitat. A network of forest fragments and connecting travel corridors and dispersal habitats could make it possible both to use the land for agricultural purposes and to keep a landscape with chucaos and other species that are a living legacy of the rainforest.

ACKNOWLEDGMENTS.- I thank J. J. Armesto (Universidad Católica) and Fundación Senda Darwin for a long and fruitful collaboration, the National Science Foundation (USA) and National Geographic Society for partial financial support, Chilote landowners for allowing access to their forest fragments, and numerous hard-working field assistants. This note is a contribution from Estación Biológica Senda Darwin.

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Boletín Chileno de Ornitología 12: 44-49
Unión de Ornitólogos de Chile 2006

**OBSERVACIONES SOBRE LA BIOLOGIA Y CONSERVACIÓN DEL COLILARGA
 (SYLVIORRHYNCHUS DESMURSII, FURNARIIDAE) EN LA ISLA DE
 CHILOÉ, CHILE**

**Observations on the biology and conservation of the Des Murs' Wiretail
 (*Sylviorthorhynchus desmursii*, Furnariidae) in Chiloe Island, Chile**

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ABSTRACT.- In this study we summarize the information on the ecology, natural history and conservation of the Des Murs' Wiretail (*Sylviorthorhynchus desmursii*; Furnariidae) we have obtained across several years of research in the north-east area of Chiloé Island in southern Chile. The Des Murs' Wiretail is an insectivorous and territorial bird species inhabiting the dense low vegetation in both forest understory and dense shrub lands, particularly when dense thickets of *Chusquea* spp dominate them. The Des Murs' Wiretail cannot fly across an opening larger than 50 m, making it sensitive to habitat fragmentation and isolation. The probability of a Des Murs' Wiretail to find a mate and breed reduces from 80% to 20% when its habitat is isolated by grasslands. Therefore, to enhance Des Murs' Wiretail conservation in human-dominated areas it is important to provide corridors that allow the movement of birds among habitat fragments, and continue studying the Wiretail and other forest fragmentation sensitive birds in areas where people live and work.