ORNITOLOGIA NEOTROPICAL 10: 27–34, 1999

VULNERABILITY OF RUFOUS-VENTED CHACHALACAS (*ORTALIS RUFICAUDA*, CRACIDAE) TO MAN-INDUCED HABITAT ALTERATIONS IN NORTHERN VENEZUELA

Angela Schmitz-Ornés[1]

Department of Wildlife and Range Sciences, University of Florida, Gainesville, Florida 32611, USA

Abstract: Chachalacas (*Ortalis* spp.) are the smallest and most abundant members of the widely endangered family Cracidae. Although in northern Venezuela Rufous-vented Chachalacas (*Ortalis ruficauda*) are still in relatively good numbers, their populations face hunting and habitat destruction. This study is the first attempt to quantify the effects of agriculture and urbanization on population densities of this species. The relative density of chachalacas differs significantly among habitats under different human pressures. This study presents evidence indicating that, contrary to popular belief, chachalacas are being affected by, and are vulnerable to, habitat changes caused by man.

Resumen. Las guacharacas (*Ortalis* spp.) conforman los miembros mas pequeños y abundantes de la amenazada familia Cracidae. Aunque las poblaciones de guacharacas (*Ortalis ruficauda*) en el norte de Venezuela todavía se encuentran en altas densidades, se enfrentan a cacería y destrucción de sus hábitats. Este estudio constituye el primer intento de cuantificación de los efectos de la agricultura y la urbanización sobre las densidades poblacionales de esta especie. Las densidades de guacharacas difieren significativamente entre hábitats bajo distintas presiones humanas. Este estudio presenta evidencia que indica que, contrario a la creencia popular, las guacharacas son afectadas por las actividades humanas y son vulnerables a cambios en sus hábitats causados por tales actividades. *Aceptado el 14 de Febrero de 1998*.

Key words: Cracidae, chachalaca, guacharaca, Ortalis ruficauda*, density, conservation, habitat changes, Venezuela.*

INTRODUCTION

The Rufous-vented Chachalaca, a member of the Neotropical family Cracidae, is restricted to northern Venezuela (Delacour & Amadon 1973). Cracids are widely recognized as an important food resource for Latin American rural populations (Ojasti *et al.* 1983, Redford & Robinson 1987, Silva & Strahl 1991). These birds are among the most hunted of all avian families in several countries of Central and South America (Redford & Robinson 1987), occupying, respectively, the fourth and tenth places in percentages of total biomass consumed by indigenous people and colonists(Ojasti 1983). However, hunting is not the only threat that affects this group of birds. Widespread habitat destruction has caused

[1]*Present address:* Museo de Ciencias Naturales Guanare, UNELLEZ, Guanare 3310, Estado Portuguesa, Venezuela.

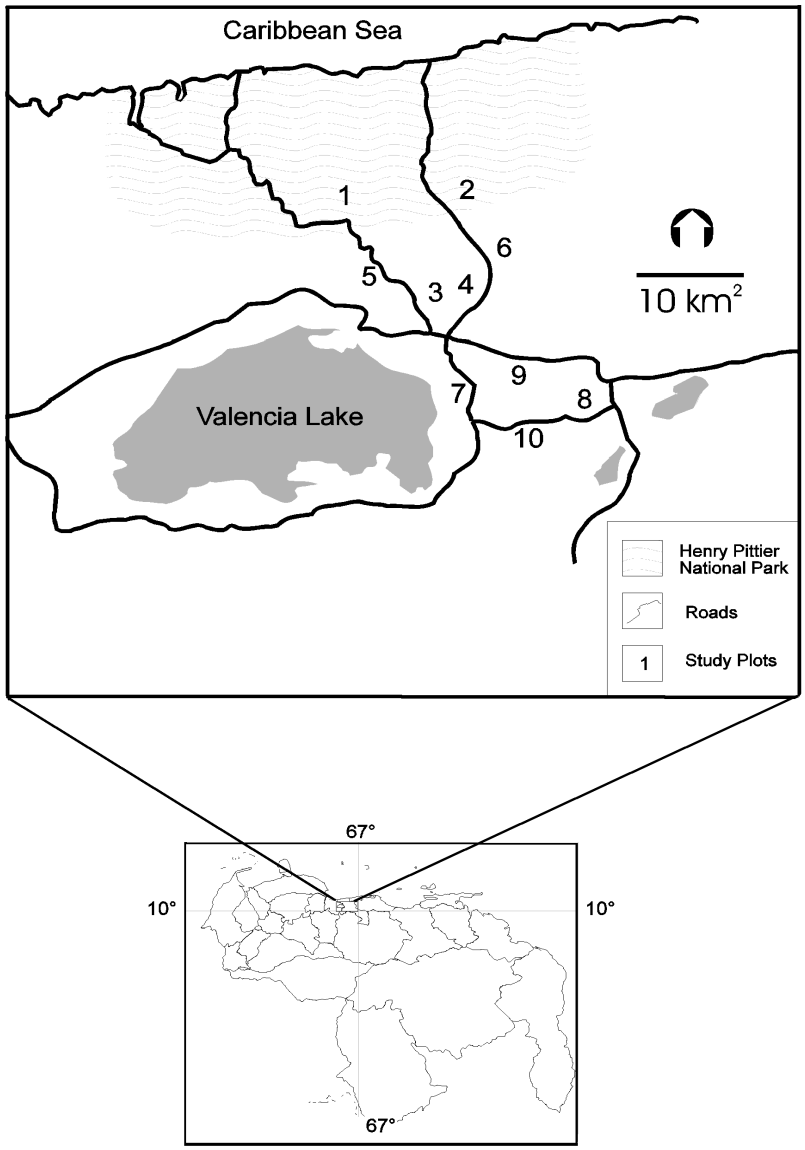

FIG. 1. Index map of study site and plots. 1, natural A; 2, natural B; 3, agric-forest A; 4, agric-forest B; 5, urban-forest A; 6, urban-forest B; 7, agric-isol A; 8, agric-isol B; 9, urban-isol A; 10, urban-isol B.

this endemic Neotropical family of large, forest dwelling, frugivorous birds to become one of the most endangered avian groups in the region (Strahl & Silva 1989).

Cracids may be important species, not only as a source of protein for humans, but also, through seed dispersal, as significant contributors to the health of forests (Schaefer

1954, Strahl & Silva 1989). Several species of Cracidae have been cited as indicators for forest management and conservation plans (Strahl & Grajal 1991).

Chachalacas (*Ortalis* spp.) are the smallest and most abundant members of the family. Unlike most other taxa of cracids, species in the genus *Ortalis* inhabit secondary and relatively disturbed forests as well as more open habitats like woodlands and savannas. Despite hunting pressures, *Ortalis* species are still abundant at many localities throughout their range, whereas other cracid genera have undergone a decline. This relative abundance is presumably due to the fact that their habitat preferences differ from those of other cracid genera.

Chachalacas, commonly called "Guacharacas" in Venezuela, generally do not inhabit humid forest depths, but prefer instead thickets, bushy borders of streams, or the low woodlands that are found throughout the drier parts of the tropics (Schaefer 1953, Delacour & Amadon 1973). Chachalacas are mainly frugivorous and herbivorous, eating soft fruits, seeds, flowers, green shoots, and leaves (Vaurie 1968, Delacour & Amadon 1973).

We lack information regarding the biology and ecology of these birds; consequently we know little about their sensitivity to human impact. Contrary, and still poorly understood, population trends have been observed. For example, the Plain Chachalaca (*O. vetula*) has reportedly increased in areas of Texas where, 40 years before, it had decreased as a result of habitat destruction (Homerstad 1988), whereas, the Rufous-headed Chachalaca (*O.* erythroptera) has substantially declined in Ecuador, Peru, and possibly Colombia owing to hunting pressure and extensive clearance of its forest habitat (Strahl in prep.).

The response of Rufous-vented Chachalaca (*O. ruficauda*) populations to destruction of forests in northern Venezuela because of agriculture and urbanization may be different from that of other cracid species. In particular, such habitat modifications may be positive for chachalaca populations if they result in increased availability of food resources. However, beyond a certain degree of forest destruction, and depending upon the specific kind of impact, this positive effect may become negative as protected areas for chachalacas to nest and roost are lost. In this study I compare the effects of two types of human impact on relative densities of the Rufous-vented Chachalaca in northern Venezuela: 1) Substitution of original forests by plantations and agricultural crops; and 2) Substitution of natural habitats by urbanized areas.

STUDY AREA

This study was conducted in northern Venezuela from May to August 1990. Ten 4-km^2 circular study plots, numbered 1 through 10, were selected in the Central Depression and at the base of the mountains that constitute part of Henry Pittier National Park around the city of Maracay (Aragua State; Fig. 1). The plots are located at an altitude of 450–700 m. This limited elevational range was chosen to avoid significant differences in vegetation due to altitude. The mean annual rainfall is 955 mm, distributed in two periods, a dry season from December to April and a rainy season from June to October. The mean annual temperature is 24.6oC (Ramia 1981). I worked in this area because it has undergone relatively more disturbance than other regions in Venezuela due to its high human population density.

Five replicate pairs of plots (A and B) were placed in the following 5 habitat types: 1) Natural (A and B): Areas covered by deciduous and semi-deciduous forests located inside Henry Pittier National Park; 2) Agric-

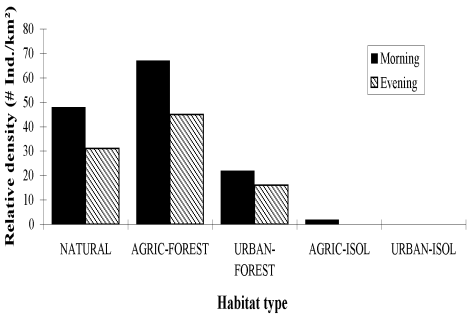

FIG. 2. Relative density of Rufous-vented Chachalacas in different types of habitats in northern Venezuela at different times of day.

forest (A and B): Agricultural areas including fruit plantation fields, with contiguous hills covered by deciduous and semi-deciduous forests; 3) Urban-forest (A and B): Populated areas, with contiguous hills covered by deciduous and semi-deciduous forests, located in the suburbs of Maracay; 4) Agric-isol (A and B): Fruit or other agricultural plantations located in the suburbs of Maracay and isolated from continuous forest, and 5) Urban-isol (A and B): Populated areas in the suburbs of Maracay, isolated from continuous forest.

METHODS

Relative densities of Rufous-vented Chachalacas were determined by the variable circular-plot method (Reynolds *et al.* 1980, Schmitz-Ornés 1991, Schmitz-Ornés in prep) modified to include playbacks (Marion 1974, Marion *et al.* 1981) to provoke a response from these secretive birds.

The number of calling birds was recorded in each of the 10 study plots. Each plot contained 5 playback stations located at least 500 m apart to keep them statistically independent. During a period of 1.5 months (late June to early August) the 50 stations (5 stations x 10 plots) were visited 12 times each. Six visits were made in the morning, between 05:40 and 08:30 h, and six during the evening, between 18:00 and 19:30 h, for a total of 6 complete cycles of observation. These visits were timed to correspond to the activity peaks of the species (pers. observ.). The areas censused for agric-forest and urban-forest were each subdivided into three components (or sub-habitats): 1) the core of the habitat (core), 2) the adjacent forested and less disturbed hills (hill), and 3) the intervening ecotone or base of the hill (margin).

The normality of the data was tested using the Shapiro-Wilk statistic (W) and the Kolmogorov D statistic (SAS 1988). Relative densities, maximum and minimum distances of observation, time of day (morning, evening), observational cycles, and playback stations were compared among areas. The non-parametric tests of Kruskal-Wallis and Wilcoxon Rank Sum tests ($P < 0.05$) (SAS 1988) were used to make multiple or pairwise comparisons, respectively. Further details about the methodology will be described elsewhere (Schmitz-Ornés in prep).

RESULTS

Relative densities (birds/km^2) of Rufous-vented Chachalacas did not differ significantly, either among observation cycles (6 in total) or between replicates (A and B). Therefore, the data were pooled for comparisons among areas.

The relative density of chachalacas differed significantly ($P < 0.05$) among habitats with different human impacts (Fig. 2). Density was highest agric-forest, followed by the natural area and urban-forest. Agric-isol and urban-isol had densities near 0 birds/km^2 (only one pair of birds was observed at agric-

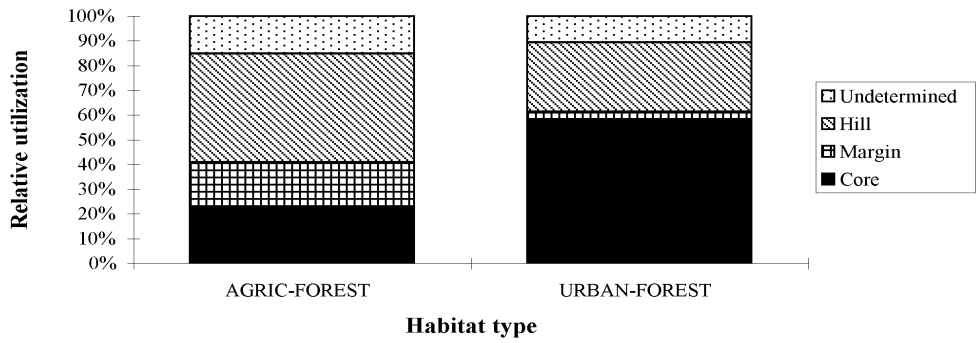

FIG. 3. Relative utilization by the Rufous-vented Chachalacas of different sub-habitats within agricultural and urbanized areas (agric-forest and urban-forest)

isol during one of the observation cycles). The difference in densities between similar kinds of habitats with isolation from continuous forest was significant. In agricultural areas, densities ranged from 48–67 birds/km^2 in plots adjacent to continuous forest (agric-forest), to nearly 0 birds/km^2 in plots isolated from continuous forest (agric-isol). The same pattern held in urbanized zones, which ranged from 17–22 birds/km^2 in the area bordered by continuous forest (urban-forest), to 0 birds/km^2 in the suburban isolates (urban-isol). A differential number of detections ($P < 0.05$) between mornings and evenings in the distinct sub-habitats was also revealed (Fig. 2).

Chachalacas inhabiting agric-forest spent nearly as much time in the margin or ecotone (18.2%) as in the core area (22.6%). Furthermore, they responded to playbacks from the hills surrounding the area in 44% of the observations (Fig. 3). Chachalacas seem to require areas of continuous forest even if they forage in introduced fruit plantations. In urban-forest, even though they did use the adjacent hills, at least during the peaks of activity, they frequented the core of the defined habitat a higher percentage of the time (58.3%; Fig. 3).

DISCUSSION

Populations of chachalacas have been thought to be relatively resistant to environmental changes, because they are supposed to be rather versatile birds (Ocampo 1981, Phillips 1981, Porras & Arriaga 1981, Teixeira & Sick 1981). In Brazil, according to Teixeira & Sick (1981), 4 species of *Ortalis* live in some of the most heavily disrupted areas of that country, apparently due to their ability to survive in second growth forests and open environments. Porras & Arriaga (1981) and Ocampo (1981) even suggested that chachalacas seem to gain vital space with the destruction of primary forests, and noted that the Guianan (or Little) Chachalaca (*O. motmot*) inhabits lightly cultivated areas or abandoned and thickly overgrown agricultural plots. According to Phillips (1981), chachalacas are the only members of the family Cracidae that are not prone to immediate endangerment, due to their ability to use second-growth vegetation. However, one species of *Ortalis*, the Rufous-headed Chachalaca, is presently considered endangered (S. D. Strahl in prep.), although its conservation status is poorly understood.

Estimates of Rufous-vented Chachalaca population densities in Venezuela given here suggest that this and, by extension, other *Ortalis* species are more adaptable than other cracid genera in the sense that they use secondary and modified habitats. Nevertheless, Rufous-vented Chachalacas are also sensitive to human disturbance because they need a certain degree of vegetative protection in order to survive. In this study I found almost no chachalacas in areas lacking adjacent continuous forests. Chachalacas seem to be positively affected by a certain degree of habitat perturbation. Thus, agricultural lands provide better habitat than less disturbed deciduous forest (natural), probably because of more constant or dependable sources of food. More field work is needed to determine whether groups living in natural habitats tend to range more widely in order to find food than those in partially impacted areas. The number of individuals in an area may not just be determined by the availability of food, but also, among other factors, by the availability of nesting sites during the breeding season. Rufous-vented Chachalacas exhibit appreciable variability in its choice of nest site (Friedmann & Smith 1955, Lapham 1970, Schmitz-Ornés 1998). However, protective and less disturbed areas for nesting and roosting also seem to be essential (Schmitz-Ornés pers. observ.) in the determination of the number of individuals in a region, and these less disturbed areas may be provided mainly by continuous forests.

Urban (as opposed to agricultural) areas are less favorable for chachalacas, although urbanized fragments can support a limited number of birds if they are adjacent to forested areas. In this case, food sources are undoubtedly scarcer (unless people provide these), so there is no advantage to their living in populated areas where they will be directly jeopardized by people. I speculate that birds still living in urbanized areas are remnants of larger populations that range into these areas in search of food, while continuing to occupy less disturbed habitats for other activities, such as breeding.

Even though agric-forest and urban-forest both have relatively high densities of Rufous-vented Chachalacas, the two habitat types differ with regard to use of their various sub-habitats (core, hill, and margin). By using the ecotonal and core areas of the agricultural plots (agric-forest), the birds can take advantage of new food resources, while still using the more protected areas during other periods of the day. Inurban-forest, in which density of chachalacas is lower, birds also occur in hill areas, at least during the peaks of activity, but use the core of the defined habitat a higher percentage of the time. The effect of time of day on chachalaca densities may be more apparent than real. They are more active during the morning than in the evening. In addition, this study was undertaken in human-impacted areas, where there is usually more disturbance during the evening caused by the movement of people. Chachalacas may be more hesitant to call when more people are present.

Although hunters in northern Venezuela apparently prefer other cracids to Rufous-vented Chachalacas because of their larger size and less dense meat, the latter are still exposed to high hunting pressure. This is due to declines in populations of larger cracids, such as curassows and guans (Silva & Strahl 1991). Local hunters report that when other cracids are extirpated from an area, chachalacas are easier to find and kill. The Rufous-vented Chachalaca has become the most hunted cracid in northern Venezuela (Silva & Strahl 1991).

Rufous-vented Chachalacas may seem unaffected by urban expansion as they can still be seen around and even inside large Venezuelan cities, such as Caracas. Nevertheless, their suitable habitat is decreasing in area and

becoming progressively more fragmented. It is not known whether or to what extent chachalacas are able to move between patches of suitable habitat. Finally, remnant patches of chachalaca habitat around big cities may not be large enough to maintain viable populations.

ACKNOWLEDGMENTS

I thank Dr. Stuart Strahl for his enthusiastic support and trust. This study was financed by the Wildlife Conservation Society (Wildlife Conservation International at the time), a division of the New York Zoological Society. In Venezuela, the Ministerio del Ambiente y los Recursos Naturales Renovables, Instituto Nacional de Parques, Amigos del Parque Nacional Henry Pittier, Instituto de Producción Animal, and Centro Nacional de Investigaciones Agropecuarias provided logistical support. I thank Dr. John Eisenberg and Prof. Eduardo Lander for their advice, and extend appreciation to Ramón Rivero, Marcos Cabrera, and Alfredo Mena Ornés for field assistance. I thank Dr. Allison V. Andors and Dr. François Vuilleumier for substantial assistance with editorial matters.

REFERENCES

Delacour, J., & D. Amadon. 1973. Curassows and related birds. American Museum of Natural History, New York.

Friedmann, H., & F. D. Smith.1955. A further contribution to the ornithology of northeastern Venezuela. Proc. US Natl. Mus. 104: 463–524.

Homerstad, G. 1988. Chachalacas, Volume 1. Federal Aid in Wildlife Restoration Act, Texas. Upland investigations. The Texas Park and Wildlife Department, Austin, Texas.

Lapham, H. 1970. A study of the nesting behavior of the Rufous-vented Chachalaca (*Ortalis ruficauda*) in Venezuela. Bol. Soc. Venez. Cienc. Nat. 28: 291–329.

Marion, W. R. 1974. Status of the Plain Chachalaca in south Texas. Wilson Bull. 86: 200–205.

Marion, W. R., T. O'Meara, & D. S. Maehr. 1981. Use of playback recordings in sampling elusive or secretive birds. Stud. Avian Biol. 6: 81–85.

Ocampo, C. 1981. General remarks on cracids in Colombia. Pp. 161 *in* Memorias del Primer simposio internacional de la familia Cracidae. Univ. Nacional Autónoma de México, Cocoyoc, Morelos, México.

Ojasti, J. 1983. Patrones de utilización de la fauna silvestre: La caza de subsistencia. Memorias III Congreso venezolano de conservación, Guanare, Venezuela.

Ojasti, J., G. Febres, & M. Cova. 1983. Consumo de fauna por una comunidad indígena en el Estado Bolívar, Venezuela. Pp. 45–50 *in* Simposio conservación y manejo de fauna silvestre, Lima, Peru.

Phillips, A. R. 1981. The decline of the Cracidae. Pp. 216–222 *in* Memorias del primer simposio internacional de la familia Cracidae. Univ. Nacional Autónoma de México, Cocoyoc, Morelos, México.

Porras, J., & I. Arriaga. 1981. Aspects on the conservation of cracids in Venezuela. Pp. 116–155 *in* Memorias del primer simposio internacional de la familia Cracidae. Univ. Nacional Autónoma de México, Cocoyoc, Morelos, México.

Ramia, M. 1981. Fenología de árboles en el bosque deciduo tropical. Mem. Soc. Cien. Nat. La Salle 41: 9–33.

Redford, K. H., & J. G. Robinson. 1987. The game of choice: patterns of Indian and colonist. hunting in the Neotropics. Am. Anthropol. 89: 650–667.

Reynolds, R. T., J. M. Scott, & R. A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. Condor 82: 309–313.

SAS Institute Inc. 1988. SAS/STAT user's guide. Release 6.03 edition. SAS Institute Inc., Cary, North Carolina.

Schaefer, E. 1953. Estudio bioecológico comparativo sobre algunos Cracidae del norte y centro de Venezuela. Bol. Soc. Venez. Cienc. Nat. 15: 30–63.

Schaefer, E. 1954. Der Vogel mit dem Stein auf dem Kopf. Kosmos 50: 9–13.

Schmitz-Ornés, A. 1998. Group size and nesting

in the Rufous vented Chachalaca (*Ortalis ruficauda*) in north and central Venezuela. Ornitol. Neotrop. 9: 177–184.

Schmitz-Ornés, A. 1991. The Rufous-vented Chachalaca (*Ortalis ruficauda*), and the effects of man-induced changes on its habitat. M.Sc. thesis, Univ. of Florida, Gainesville, Florida.

Silva, J. L., & S. D. Strahl. 1991. Human impact on populations of chachalacas, guans, and curassows (Galliformes: Cracidae) in Venezuela. Pp. 36–52 *in* Robinson J. G., & R. Redford (eds.). Neotropical wildlife: use and conservation. Univ. of Chicago Press, Chicago.

Strahl, S. D., & A. Grajal. 1991. Conservation of large avian frugivores and the management of Neotropical protected areas. Oryx 25: 50–55.

Strahl, S. D., & J. L. Silva. 1989. Familia Cracidae: Las aves mas amenazadas en América Latina. Natura 87: 23–29.

Teixeira, D., & H. Sick. 1981. Notes on Brazilian Cracidae: the Red-billed Curassow, *Crax blumenbachii* Spix 1825, and the Wattled Curassow, *Crax globulosa* Spix, 1825. Bol. Mus. Nac. Rio J. 299: 1–31.

Vaurie, C. 1968. Taxonomy of the Cracidae Aves. Bull. Am. Mus. Nat. Hist. 138: 1–259.