Bonaccorso. E., Lentino, M. & G. Barreto. 2004. Populations of the Venezuelan Wood-quail. Pp: 69-77. In: D.M. Brooks, J. Carroll, J. Eitniear & F. Gonzalez-García. Eds. Biology and Conservation of Neotropical Galliforms in the new millenium. Misc. Pub. Center for Studies of Tropical Bird. No. 3. San Antonio. USA 84p.

Populations of the Venezuelan Wood-Quail

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ABSTRACT

The Venezuelan Wood-quail *(Odontophorus columbianus)* is an endemic ground nesting bird inhabiting cloud forests of the Northern Coastal Mountains and eastern Andes of Venezuela and occurring between 1,000 and 2,400 m amsl. Available information on the biology and conservation status of the species is very scarce, although it is generally accepted that they are monogamous and form groups of variable size like other *Odontophorus*. We used play-back techniques and direct observations to estimate population density in the vicinity of the Rancho Grande Biological Station at Henri Pittier National Park, Venezuela between July 1998 and February 1999. We established relationships between the variation in the number of responses recorded during the study period and the reproductive cycle and behavior of the species. In addition, observations of group size and composition were made. Group size was about 2-6 individuals, comprising different associations: e.g., groups of adults, 2 adults and chicks, 3 adults and chicks, or solitary individuals. Mean density was estimated as 3.4 birds/ha. Implications of flocking behavior for chicks and young success and the possibility to use playback census techniques to assess conservation status of the species are discussed.

INTRODUCTION

Genus *Odontophorus* is one of the least known groups of American gallinaceous birds. This is because species are forest-adapted and generally associated with tropical to sub-tropical communities, where opportunities for easy observation are difficult (Johnsgard, 1979; Carroll, 1995). Although available information is scarce, it is known that all species are remarkably similar in size and proportion, feeding on much of the same foods (Johnsgard, 1979). They are territorial, monogamous and form groups of variable size during the non-reproductive period (Johnsgard, 1988).

In Venezuela, genus *Odontophorus* is represented by 3 species. The Marbled Wood-quail, *Odontophorus gujanensis*, that occurs at middle elevations in the southern and southwestern regions of the country; the Black-fronted Wood-quail, *Odontophorus atrifrons*, that dwells in the north-western mountains near the Colombian border, and the Venezuelan Wood-quail, *Odontophorus columbianus*, that is endemic to the cloud forests of the Central Northern Mountains and south-eastern Andes between 1,000 and 2,400 m. amsl (Phelps and Meyer, 1994). Like other species of genus *Odontophorus*, little information has been published on the life history and biology of the

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Venezuelan Wood-quail. Schwartz and Lentino (1984) described 1 nest and the behavior of breeding birds, and Carroll and Hoogesteijn (1994) assessed the feasibility of population studies using playback techniques and reported on some observations of flocking behavior.

The aim of this study was to estimate density of individuals in the vicinity of the Rancho Grande Biological Station as a first step in assessing the population status of the species at Henri Pittier National Park, Venezuela. At present, nothing is known about the conservation status of the species. However, it has been suggested that annual fires, tourist pressure, and poaching occur frequently in the park and constitute a menace for the resident fauna (Fernandez and Ulloa, 1990). We also established relationships between variations in the number of responses recorded during the study and reproductive cycle and behavior of the species.

METHODS

Study Area

This study was conducted at Henri Pittier National Park, Venezuela. The park is located at the center of the Northern Cordillera, Aragua State. The climate is seasonal with a rainy period lasting from May to November and a dry period from December to April (Huber, 1986b). Population surveys and direct observations were done near Rancho Grande Biological Station (10° 21' N, 67° 41' W) about 1,097 m amsl. Annual rainfall averages 1,600 mm and mean temperature is 20° C.

Population Survey

The population survey was conducted from July 1998 to February 1999. To estimate quail population density, we conducted point count surveys (Colin et al., 1992; Carroll and Hoogesteijn, 1994) using playback to elicit quail responses. Two main tracks, Periquito and Guacamayo, were walked every month during 3 to 6 days from 0600 to 0900 h. Recorded calls were played at sites separated by 100 m. We established 8 point counts in the first track and 10 in the second.

The surveys consisted of aural observations during 10 minutes, 1 minute of silence before arriving to the point and 8 minutes of 3 different calls separated from one another by 30 seconds, followed by 1 minute of silence. The average distance at which quail responded to the recorded calls was estimated at 30 m. A conventional tape-recorder was used to play calls.

At each point count, we recorded the number of quail responses or number of quail groups that responded to calls, cloud cover, and wind speed. We used Kruskal Wallis tests to determine differences in number of quail responses recorded between study months. Chi-square tests were used to determine associations between the number of quail responses and cloud cover or wind speed.

Behavioral observations, number of individuals, and group composition were also recorded from 0600 to 0900 h and from 1,500 to 1,800 h. Data produced by playbacks and direct

observations (group size) gave us the number of groups in each track and the mean group size. Therefore, density was calculated as: D = (N / A x E) S where: D was density of individuals; N was the average of quail responses (groups) in a track; A was the area covered by recorded calls (30 m); E was the number of point counts in each track; and S was the mean group size.

RESULTS

Population Sampling

Quail responded readily to tape-recorded calls, although responses varied during the study. There were no significant differences in number of responses between months (Kruskal Wallis t = 10.54; P > 0.05/ t = 10.12; P > 0.05) nor significant associations between quail responses and cloud cover (X^2 = 5.25; P > 0.05) or wind speed (X^2 = 1.91; P > 0.05).

However, along the 2 tracks, both the maximum number of responses recorded during a day and the mean number of responses for the month declined from July to September. In the Guacamayo track, the mean number of responses for each month increased from October to February. The maximum number of responses registered in a day also increased, except in December. The lowest standard deviations were registered in September, December, and February (Fig. 1). In the Periquito Track, the maximum number of responses was constant from October to February, except in November. In the same period, the mean number of responses was variable. The lowest standard deviations corresponded to July, September, and February.

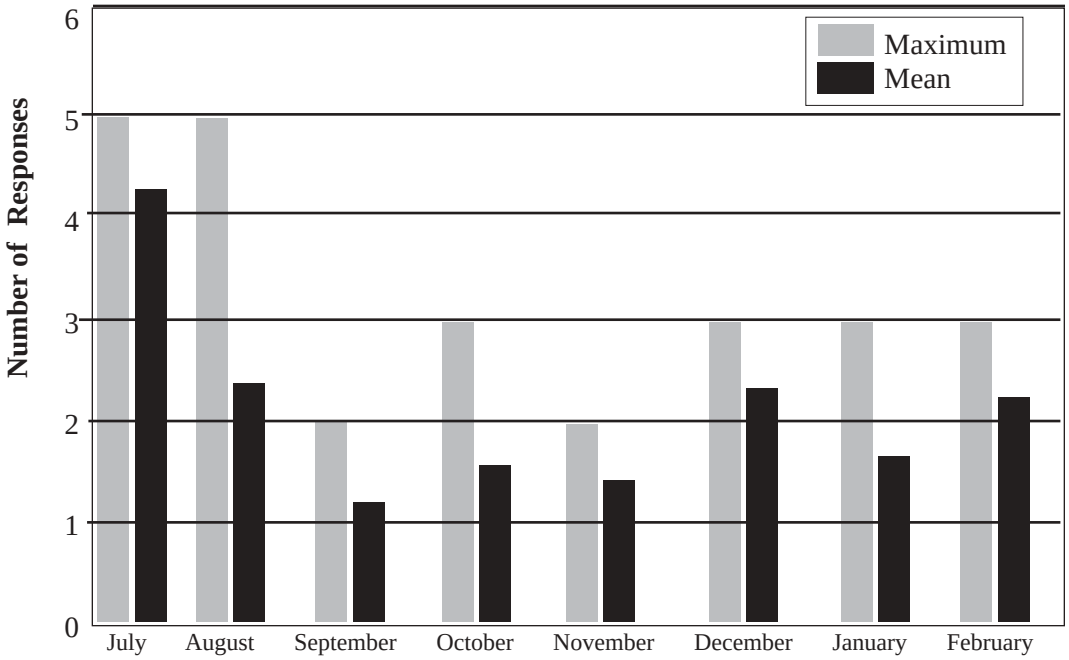

Figure 1. Maximum and mean number of responses registered in the Periquito Track

Groups and Density

We observed some associations between individuals during the study. Some associations or groups were observed at least twice in the same areas during the same month or in consecutive months. We observed a total of 19 different groups in the 2 areas (Table 1). Six individuals, 3 adults and 3 young, formed the largest group, followed by other groups consisting of 2 adults and 3 young, and 2 adults and a single chick. Groups formed by 2-4 individuals and 1 solitary individual were also observed.

The mean group size was 2.95 individuals per group, assuming solitary individuals as a group. Density of individuals was calculated using the average of the average of the number of responses registered during July and August (when number of responses were maximum). Density was 2.71 birds/ha at the Guacamayo Track (2.6 groups in 2.82 ha) and 4.35 birds/ha at the Periquito Track (3.33 groups in 2.26 ha).

Table 1. Group size and composition of Venezuela Wood-quail observed in 2 tracks at Henri Pettier national parkfrom July 1998 to February 1999. The second column shows the track where groups were found, the last one shows the method used to find the groups.

Group	Track	Month	Ind/group	Composition	Method
1	Guacamayo	July	4	?	Playback
2	Guacamayo	July	4	?	Playback
3	Periquito	July	1	Male	Playback
4	Periquito	July	1	?	Playback
5	Periquito	July	4	?	Playback
6	Guacamayo	Aug	1	Male	Without Playback
7	Guacamayo	Aug	3	Adults	Without Playback
8	Guacamayo	Aug	2	Adults	Without Playback
9	Periquito	Aug	1	Male	Without Playback
10	Periquito	Aug	3	3 adults, 1 chick	Without Playback
11	Periquito	Sept.	2	Adults	Playback
12	Periquito	Oct	4	?	Without Playback
13	Guacamayo	Nov	5	2 adults, 3 young	Without Playback
14	Guacamayo	Dec	6	3 adults, 3young	Without Playback
15	Periquito	Dec	1	Male	Playback
16	Guacamayo	Jan	3	Adults	Without Playback
17	Guacamayo	Jan	4	?	Without Playback
18	Periquito	Jan	4	?	Playback
19	Guacamayo	Feb	3	Adults	Without Playback

DISCUSSION

Life Cycle

Most birds show seasonal variations in songs that are mainly correlated with breeding activities and hormone production (Welty, 1982). Thus, knowledge of the life cycle is important in explaining variations in playback responses during the study. Schäfer and Phelps (1954) and Schwartz and Lentino (1984) observed breeding activities of quail from May to July and March to April, respectively. It is possible that breeding season changes according to the rainy season, when food for chicks is abundant (Immelmann, 1971).

Our observations of groups gave us useful information about the breeding season during 1998. Considering an incubation period of 30 days (Schwartz and Lentino, 1984), it is possible that courtship and breeding occurs between June and July. We also observed young in November and December, therefore molting could be occuring around September.

It is generally accepted that the most vocal periods occur during breeding season when birds are busy with territory establishment and courtship. In this work, the higher frequency of responses was registered in July, probably when pairs were forming. Carroll and Hoogesteijn (1994) observed that quail calls were heard throughout the year, but mostly during the rainy and presumably, breeding season.

A decrease in call frequency during August may have related to incubation. In Gray Partridge, *Perdix perdix,* postcourtship calling is lower than courtship, this being interpreted as related to territorial defense (Weigand, 1980).

In September, the low call frequency could have been associated with molting. As a rule, birds are completely silent during the molting period (Welty, 1982) and have a virtual absence of activity (see Snow, 1976) because of both the energetic loss related to molting and an increase in the vulnerability to predators (Palmer, 1972).

It is possible that stable population estimates from October to December corresponded with the young maturation period with some interactions because of territory maintenance. Figure 2 suggests a possible time-table of breeding events. However, more information is necessary on breeding synchronization, behavior, and molting and development patterns in *O. columbibianus* for more insight into its life cycle.

Finally, although we did not find relationships between number of quail responses with cloud cover and wind speed, we recommend avoiding conditions of strong winds and moderate to heavy precipitation, which may produce less accurate results. We suggest making future playback censuses in July and February, when the standard deviation was lower, and during May and June to observe the calling behavior during the mating period.

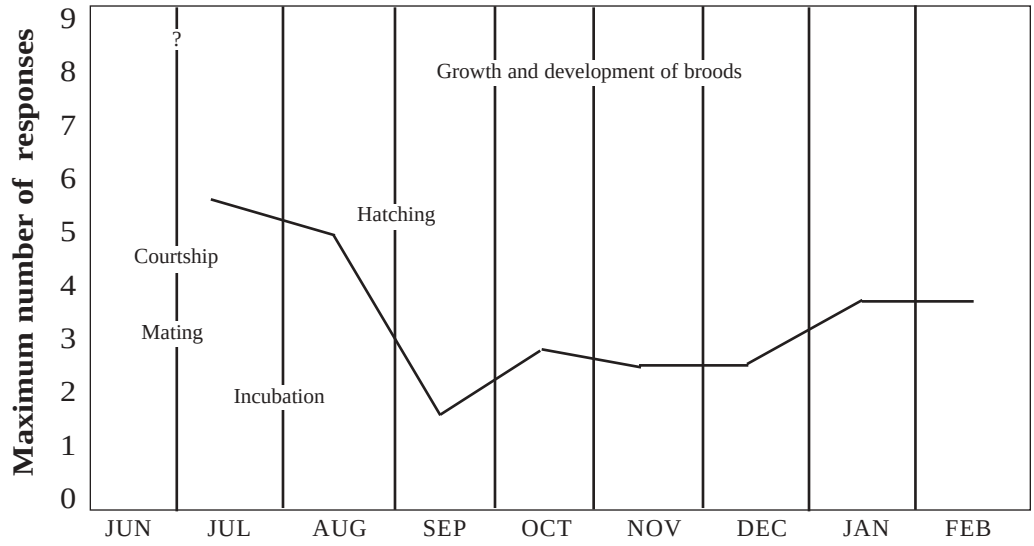

Figure 2. Hypothetic life cycle of the Venezuelan Wood-Quail based on our observations. In this figure, the "maximum number of responses" is the mean between the maximum number of responses recorded in each track.

Group Size and Composition

The largest group observed during this study comprised about 6 individuals. Carroll and Hoogesteijn (1994) observed up to 14 individuals in the same group. Several data registered in Periquito indicate that groups of 8 individuals could be seen in November (M. Lentino, pers. obs.). Gines and Aveledo (1958) reported on groups of 12 individuals and Schäfer and Phelps (1954) observed pairs and groups comprising 5-15 individuals in the same area. This great variability on group size has been reported in many other species of *Odontophorus* (Table 2).

Table 2. Group size in genus *Odontophorus.*

Species	Group Size	Reference
Gorgeted Wood-quail *O. strophium*	3 pairs + until 8 chicks	Collar et al., 1992 Romero, 1983
Marbled Wood-quail *O. gujanensis*	5 – 8	Skutch, 1947
Black-breasted Wood-quail *O. leucolaemus*	5 – 10 3 adults + clutch	Leopold, 1959 (in Johnsgard, 1988) McDonald and Winnett-Murray, 1989
Black-fronted Wood-quail *O. atrifrons*	2 – 10	Gines and Aveledo, 1958
Spotted Wood-quail *O. guttatus*	4 – 10	Stiles and Skutch, 1989
Rufous-fronted Wood-quail *O. erythrops*	2 – 10	Stiles and Skutch, 1989

It is possible that large groups result from 2 or more mating pairs joining during breeding seasons when reproductive success has been unusually low (Johnsgard, 1989). Apparently, we only observed "single family" groups of variable composition formed by the breeding pair and their chicks or young.

Although Phelps and Lentino (1984) did not mention the presence of extra pair adults around the nest, our data indicated that family groups with only 2 adults may be observed. We also observed 1 group formed by more than 2 adults and young as suggested by Carroll and Hoogesteijn (1994). Data about extra pair adults are common in Odontophoridae and Phasianidae (Jenkins, 1961; Johnsgard, 1988).

Specifically in genus *Odontophorus*, there are evidences that in Marbled Wood-quail, a mature male may associate with a nesting pair (Skutch, 1947). Also in Black-breasted Wood-quail *(O. leucolaemus),* it has been suggested that unsuccessful breeding adults might assist in nest guarding (McDonald and Winnett-Murray, 1989). It is possible that nest predation pressure in quail (Skutch, 1947; Phelps and Lentino, 1984; and Johnsgard, 1988) favored the presence of helpers that remain in the family group after breeding season.

Non-family groups could be formed by non-breeding individuals that stay together to enjoy the advantages of being in a group. In *Perdix perdix,* unsuccessfully paired males became accessories to pairs, while subadult males under similar circumstances became either accessories to established pairs or members of bachelor flocks (Weigand, 1980).

It is generally accepted that flock size is a function of predation risk, food availability and interactions between individuals (Krebs and Davis, 1993). Skutch (1947) suggested that in Marbled Wood-quail, bonds between members of a covey are strengthened by mutual assistance in finding food, by reciprocal preening, and apparently also by "the need of companionship." It is probable that in Venezuelan Wood-quail, bonds between individuals are the same, adding to those an apparent vigilance during feeding activities (this work) and the fact that individuals roost together (Carroll and Hoogesteijn, 1994; M. Lentino, pers.obs.).

Finally, we observed 5 solitary individuals (4 males). Maybe they were non-breeding males still searching for a female. It is probable that after breeding season they join to family or bachelor flocks. Evidence supporting this is the fact that the frequency of solitary males decreased after August.

Density

Higher densities at Periquito would confirm previous observations (Phelps and Meyer, 1994) which suggest Venezuelan quails are dwellers of cloud forest, the optimal habitat for the species. Accordingly Huber (1996a), Guacamayo is dominated by transitional forests where quail populations occupy suboptimal habitat. Thus, this might explain lower densities.

Schäfer and Phelps (1954) pointed out that populations of Venezuelan Wood-quail in Rancho Grande reach an optimum between 1,500 and 1, 800 m amsl. Hence, it is possible that higher densities at higher altitudes occur in the least disturbed areas in the park.

We should realize that point census methods using playback are indirect, and therefore more susceptible to errors arising from inaccurate distance estimations or from violation of assumptions about moving birds. All result in population overestimations (Colin et al, 1993). However, this overestimation may be offset by a number of birds that do not respond to calls. Marion et al. (1981) used simultaneously point count playbacks and absolute density data on Chachalacas. They found that about 50% of pairs did not respond to playback.

Finally, it is important to consider that in spite of its several limitations, the playback method seems to be the only practical way to estimate population densities of this elusive bird especially if we take in account that capture and marking techniques for this species are not standardized yet.

ACKNOWLEDGEMENTS

We wish to thank Jesus Manzanilla for allowing access to the Rancho Grande Biological Station and to the staff of the Station for their help and contribution. Martín Rada, Antonio Herrera, Yamil Madi, and Julián Mostacero assisted in the field. This study was sponsored by EcoNatura Association. and Decanato de Estudios Profesionales/Universidad Simón Bolívar. Field work was done under National Parks Institute Licence N 340/10213/98.

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