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Managing Black-throated Bobwhite for Sustainability in Belize: Preliminary Results of a Population Study

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The Black-throated Bobwhite (*Colinus nigrogularis*), a close relative of the Northern Bobwhite (*C. virginianus*), has a distinctive black throat and eye-stripes with both bounded by white. Black-throated Bobwhites occur in three distinct geographically isolated populations. Currently no limits or seasons are in place and a hunting license is the only requirement for harvesting this species in Belize. Little is known about Black-throated Bobwhite populations in Belize and data on the impact of hunting on this species is lacking. Because of its restricted distribution, it was recommended that Black-throated Bobwhites should be removed from the list of legally hunted species pending a better understanding of its population dynamics. In 2006 we initiated a long-term study of Black-throated Bobwhite biology at the 469 km² Manatee Forest Reserve (henceforth MFR). Data collected at the end of the wet season indicated a population of 0.072-0.144 quail per hectare, which was appreciably lower than the density reported in the heneguen growing region of Yucatan, Mexico. Such densities predictably decreased throughout the dry season (breeding season).

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Key words: black-throated bobwhite, Belize, *Colinus nigrogularis*, population estimate

Introduction

The Black-throated Bobwhite (*Colinus nigrogularis*) is a close relative of the Northern Bobwhite (*C. virginianus*) but is easily distinguished from the Northern Bobwhite by a distinctive black throat and eye-stripes, both bounded by white (Johnsgard 1988). Black-throated Bobwhites occur in three distinct geographically isolated populations (Figure 1; Johnsgard 1988). Both *C. n. caboti* and *C. n. persicus*, inhabit grasslands within the states of Campeche, Quintana Roo, and Yucatan, Mexico (Ornat et al. 1989). *C. n. nigrogularis* inhabits pine coastal savannas of central Belize and eastern Guatemala (Jones and Vallely 2001) and *C. n. segoviensis* occurs in pine savannas of the Mosquitia on the Honduran/Nicaraguan border (Howell 1971, Roberto Gallardo personal communication).

Under the Wildlife Protection Act of 1981, the

Black-throated Bobwhite is one of six bird species legally hunted in Belize. Currently no limits or seasons are in place and a hunting license is the only requirement for harvesting this species. Little is known about Black-throated Bobwhite populations in Belize and data on the impact of hunting on this species are lacking. Because of its restricted distribution, Miller and Miller (1997) recommended that Black-throated Bobwhites should be removed from the list of legally hunted species pending a better understanding of its population dynamics.

Study Area

In 2006 we initiated a long-term study of Black-throated Bobwhite population biology at the 469 km² Manatee Forest Reserve (henceforth MFR). The MFR (N 16° 40.8' W 088° 25' 34.8') is in the Tropical Moist Forest Life Zone (Holdridge 1967, Figure 1, Figure 2) of Belize. Forests on this coastal

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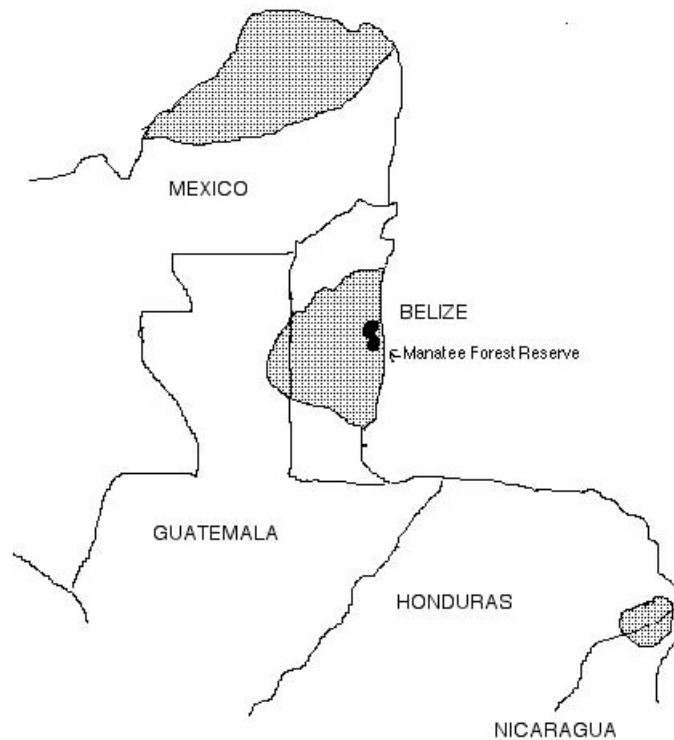


Figure 1: Distribution of Black-throated Bobwhite and location of Manatee Forest Reserve.

plain consist of, a mosaic of species predominantly determined by soil type, drainage and fire. While broadleaf forests occur near rivers, nearby soil fertility and poor drainage result in a range of forest types from mixed pine-broadleaf forest to sparse pine-palm, and grassland savanna (Johnson and Chaffey 1974). Rainfall in the central region of Belize is seasonal, generally receiving 2000-2700 mm annually, with less than 100 mm/month during the dry season, January through May (Walker 1973).

Methods

Field Procedures

For our preliminary sampling, we randomly established four stratified sampling grids in the MFR on the basis of accessibility. Grids consisted of five 500-m lines spaced 300 m apart. Numbered stakes and GPS readings delineated beginning, middle and end points of each line. Each quadrant is described

by vegetative composition (Table 1). We estimated density by taking the largest number of quail observed during any single survey and divided by the total area of each quadrant. We maintained a 150-m observational buffer around each quadrant. This protocol allowed us to estimate relative population size and detect seasonal changes in the Black-throated Bobwhite quail population density.

Once during the end of the wet season (January) and twice monthly during the dry season an observer walked each transect, within each quadrant, and recorded all quail visually observed. Because the grasses are of the “bunch grass” variety, with open spaces between bunches, we feel confident the majority of quail within the buffer area were noted. Auditory counts were not included (unless the bird was visually located) because of high observer variability and subsequent bias. For each quail observed, the location, number of quail



Figure 2: Black-throated Bobwhites walking along dirt road in Manatee Forest Reserve, Belize during 2006.

observed, and the distance and angle to the point where a quail was initially sighted were recorded. We used a laser rangefinder to determine distances to observed quail and a compass to determine the angle from the transect. Start times and weather conditions were also recorded. To avoid temporal bias, each survey was conducted in a reverse order from the previous survey. For example, quadrants 1, 2, 3, 4, were sampled and then the sequence was

reversed (4, 3, 2, 1) within the quadrant. The observer also reversed the direction walked (i.e., traveling line 1, 2, 3, 4 then reversing the order at the next survey). We also used the amount of time (minutes) required to record the total number of observations (total amount of time spent/number of quail observed) averaged from March-June as a measure of unit effort.

Table 1: Black-throated Bobwhite observations by month during January-June 2006 in Manatee Forest Reserve, Belize.

Month	Total Observations	Total # Quail	Average quail/observation
January	4	36	9
February	0	0	0
March	5	6	1.2
April	7	15	2.1
May	16	24	1.5
June	5	10	2
Average	7.4	13.75	1.7

Table 2: Four quadrants of the Manatee Forest Reserve, Belize with habitat descriptions during 2006 surveys.

Quadrant	Quail/Ha.	Quadrant Description
Quadrant 1 UTM 1911667	0.144	Northern portion Caribbean pine, prickly plants and shrubs. Central area savanna. South end swampy with tall grass during dry season. Area burned in 2004
Quadrant 2 UTM 1910141	0.112	Western area open savanna with patches of Palmetto palm. Gallery forest runs lengthwise in the central area. Eastern section is open savanna with scattered Caribbean pine. Eastern edge dense shrub.
Quadrant 3 UTM 1910836	0.08	Western edge Caribbean pine with shrubby undergrowth, patches of open grass. Eastern section fewer pines with more shrub and grasses. Selectively logged in 2004 and burned in 2005.
Quadrant 4 UTM 1911605	0.072	Western area Caribbean pine with shrubby, prickly undergrowth. From central area to eastern area pine is mixed with oak. More dense undergrowth than other quadrants. Selectively logged in 2004 and burned in 2005

Results

Preliminary density estimates of Black-throated Bobwhite, quadrant location, and vegetative components were determined for the first season of monitoring (Table 2). While the number of observations (4.0 versus average 7.4) in January (end of wet season/beginning of the dry season) was low the total number of quail was greatest (36.0 versus average 13.75) during this period (compared to the remainder of the dry season). While the total number

of observations of quail showed an increasing linear trend, throughout the dry season, the number of quail, per observation, varied across all periods.

Discussion

Little has been published on the population status of this species (Table 3). Klass (1968) reported that during June a henequen (*Agave fourcroydes*) field near Merida, Yucatan had a quail density between 2-4 birds per hectare. Tramer (1974) worked in an area,

Table 3: Overview of Black-throated Bobwhite density estimates from Mexico and Central America.

Location	Density (Quail/ha)	Source
Yucatan, Mexico	4.11/ha	Tramer 1974
Yucatan, Mexico	2-4/ha	Klass 1968
Manatee FR, Belize	0.1/ha	Eitniear et al. This paper
Waspam, Nicaragua	0.02/ha (0.01 territories/ha)	Howell 1971



Figure 3: Habitat conditions within Manatee Forest Reserve, Belize after 13 April 2006 burn.



Figure 4: Flooding in Manatee Forest Reserve, Belize just prior to June 2006 scheduled survey forcing it to be cancelled.

during the dry season, near henequen fields and calculated a density of 2.43 quail per hectare. However, monoculture agricultural fields like henequen, while proving abundant food resources and protection from predators (the plant's leaves are tipped with spines), may not be representative of habitat

throughout the remainder of the species range. In Nicaragua, Howell (1971) visited areas suitable for Black-throated Bobwhite throughout the year. While avoiding areas recently burned he determined the number of quail territories to be 0.012 per hectare (0.02 quail per hectare). Our preliminary estimate

of 0.1 quail per hectare represents what we believe is more typical of densities found in suitable habitat. The greater quail density reported by Howell (1971) may be the result of a more robust sample size.

Several factors may have both immediate and long-term effects on quail populations at our sites. While the coastal plain has been shaped by fire, the immediate impact on quail numbers due to fire is unknown. Undoubtedly the long-term impact on local quail populations will be the result of how fire shapes vegetative communities. Such changes will likely depend on the diversity of plants at the site prior to the fire and the frequency of fires. Anecdotal evidence suggests that areas adjacent to the reserve are burned frequently (every 1-2 years) to promote new growth of grasses that attract deer, which are then hunted. Areas that sustain annual or biannual fires have evolved into grassland with few trees and a sparse shrub layer. Within the MFR all quadrants have been documented to have burned, at least partially, in the past three years. Two events during data collection in 2006 should be considered when interpreting our results. On 24 April a fire burned about 50% of quadrant 1 and on 13 April a fire burned a strip of vegetation from the northwest to southeastern corner of quadrant 2. Given that data were collected on these quadrants on 13 and 27 April the possible impact of a recent burn on local quail populations should be considered when interpreting survey data (Figure 3). Finally, a second survey in June was cancelled because of the onset of the rainy season (Figure 4). These various factors make maintaining surveying a challenge.

Conclusions

Preliminary results support statements by Leopold (1972) that Black-throated Bobwhite quail exist in coveys during the wet season breaking up into smaller groups for breeding in the dry season. Data collected at the end of the wet season (January) indicated a population of 0.072-0.144 quail per hectare which was appreciably smaller than the density reported in the henequen growing region of Yucatan, Mexico. Such densities predictably decreased

throughout the dry season (breeding period). Flooding, and to a lesser extent fires, are a seasonal occurrence. Their immediate impact on quail numbers needs to be explored.

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