AVIFAUNA DIVERSITY ASSESSMENT IN THE COMMUNAL NATURAL PROTECTED AREA EL GAVILÁN, CENTRAL COAST OF OAXACA, MEXICO

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Tropical dry forest (TDF) is an ecosystem with a pronounced seasonality and high animal diversity. It is threatened by a wide variety of anthropogenic activities such as human population growth, deforestation rate, tourism development, forest fires, overhunting, and wildlife trade. One of the strategies for this biodiversity conservation is the creation of Communal Natural Protected Areas (CNPA), which are poorly explored. The aim of this study was to supply an assessment of the avian diversity in the CNPA El Gavilán on the Central Coast of Oaxaca (Mexico) during two seasons (dry and rainy). Sampling has been carried out at two localities (named as Centre and Mountain) between November 2018 and September 2019, using a point count method. At each locality, we sampled one transect varying in length, but with five-point counts separated by a minimum of 200 m. We made monthly two visits per transect. Birds were counted from a fixed raising position within a circle of 50-m radius for a specific period (10 min.) at every point. In total, 85 species were recorded, which belong to 65 genera, 24 families, and 13 orders. The most representative order was Passeriformes with 53 species. Most species (83) were considered very rare, and two species (*Aratinga canicularis* and *Calocitta formosa*) were rare. Regarding the avian diversity, ^0D, the Centre locality had 74 species (19 exclusive species), while the Mountain locality had 65 species (11 exclusive species). The dry season had a higher diversity (H′ = 3.44) than the rainy season (H′= 3.41), but there were no significant differences (Hutcheson t = 0.365, d.f. = 1, p > 0.05). Eighty-two percent (70 species) were considered residents, 15.3% (13 species) were winter migrants, 1.2% (one species) were summer migrants, and 1.2% (one species) were transient. Of the total registered taxa, 50 species were principally insectivorous, 14 species were grain-frugivorous, eight species were omnivorous, six species were carnivorous, and six species were nectarivorous. The avifauna of CNPA El Gavilán shows that a marked effect does not exist in the species composition between seasons. Due to the species richness recorded and estimated there, the study area should be considered in conservation policies, particularly because this territory is under intense pressure due to changes in land use.

Key words: abundance, insectivorous, migrant, resident, richness, transects, transient, trophic guild

Introduction

In Mexico, tropical dry forest (TDF) is an ecosystem with a pronounced seasonality and high animal diversity (Dirzo & Ceballos, 2010; Meave et al., 2012). However, this ecosystem is threatened by a wide variety of anthropogenic activities (Trejo, 2010), like growth of the human population, deforestation rate, tourism development, wildfires, overhunting, and wildlife trade (Olson & Dinerstein, 2002). Particularly, TDF occupies 16% of the territory of Oaxaca state and exists as two forest types, namely deciduous tropical forests and semi-deciduous tropical forests (Torres-Colín, 2004; Trejo, 2010). In this ecosystem, the animal diversity is high. Particularly in the Planicie Costera del Pacífico (central coast) and Sierra Sur, the overall species richness is the highest in the Oaxaca state (González-Pérez et al., 2004).

Besides the Protected Areas as the main strategy to preserve biodiversity (Monterrubio-Solís, 2019), another effective area-based conservation measure for the protection of TDF is the creation of Communal Natural Protected Areas (CNPAs) (Peña-Azcona et al., 2022). In Oaxaca state, CNPAs operate as a mechanism for the conservation of biodiversity and local natural resources through the participation of local human communities (Rodríguez-Luna et al., 2011). One of them is the CNPA El Gavilán, which was certified in 2011 and located in the transition zone between Planicie Costera del Pacífico and Sierra Sur of Oaxaca state.

Among the vertebrate species affected by the loss of TDF and by the seasonal fluctuations in this ecosystem, birds represent one of the most important biological groups because they are involved in many ecological processes (Gonzalez-Christen, 2010). The structure of ecological communities varies with respect to the season and temporal changes (Modena et al., 2013; Falcão et al., 2014). Therefore, there is a growing concern to protect the biodiversity of this ecosystem (Dirzo & Ceballos, 2010). In addition, the avifauna monitoring in TDF provides valuable information on the ecological health and status of these ecosystems. Taking it into account, the avifauna of TDF acts as an indicator of ecosystem quality because birds are very sensitive to deforestation and land-use change (Rurangwa et al., 2021).

In Mexico, the avifauna is characterised by a high species diversity, with 1123 bird taxa recorded (Navarro-Sigüenza et al., 2014). So, avian studies have benefited from extensive data already accumulated over decades (Peterson et al., 1998), and these generate more detailed analyses (Peterson et al., 1993, 1998).

In the Oaxaca state, although avifauna studies have increased in recent years (Vázquez et al., 2009; Bojorges-Baños, 2011a,b; Santos-Benítez et al., 2013; Lavariega et al., 2016; Ruiz Bruce Taylor et al., 2017; Ruiz et al., 2019; Lavariega et al., 2020), there are still poorly explored regions. For example, the transition zone between Planicie Costera del Pacífico and Sierra Sur of Oaxaca has not been studied thoroughly, while the Pacific coast of Oaxaca has a higher number of studies (Vázquez et al., 2009; Bojorges-Baños, 2011a,b; Santos-Benítez et al., 2013; Lavariega et al., 2016, 2020; Ruiz Bruce Taylor et al., 2017; Ruiz et al., 2019). Moreover, the knowledge of how the structure of ecological communities varies with respect to season and temporal changes remains poorly documented in the previously described transition zone (Ceccon et al., 2006). The TDF is among the ecosystems most affected by deforestation and other human activities (Dirzo et al., 2011). It is important to understand the richness and seasonal variation in the assemblages of birds to guide successful conservation efforts.

Most avian inventories have been carried out on the central and southwestern coast of Oaxaca state, while no assessment of the avian diversity is available in CNPA El Gavilán. Moreover, in recent years, this area is under pressure due to various anthropogenic activities, such as high deforestation, overhunting, and human population growth around this site. Therefore, this study was aimed to supply an assessment of avifauna diversity between two seasons and two localities with different vegetation conditions in CNPA El Gavilán. Thus, we expect that this work will serve as a point of reference for later studies on the conservation, ecology, and distribution of birds, and contribute to better planning strategies for the conservation of bird species in the transition area between the Planicie Costera del Pacífico and Sierra Sur of Oaxaca state.

Material and Methods

Study area

The fieldwork has been conducted in the CNPA El Gavilán (Fig. 1), located in the municipality of Santa María Tonameca on the central coast of Oaxaca state, Mexico. This site is situated in the transition zone between the coastal plain and the Sierra Madre del Sur physiographic province. The study area is located at an altitudinal gradient of 250–1100 m a.s.l., with pronounced slopes that make it difficult to transit vertically.

The climate is warm and sub-humid, with an annual mean temperature of 26.8°C. The annual mean precipitation is 2245 mm (García, 1973), with a long period of drought from November to May, and a short period of rains (Trejo, 2010). Some dominant tree species in this region are *Ceiba aesculifolia* subsp. *parvifolia* (Rose) P.E.Gibbs & Semir, *Lysiloma divaricatum* (Jacq.) J.F.Macbr., and *Plumeria rubra* L. (Torres-Colín, 2004). In forests formed by these trees, the main plants are shrubs, vines, and cacti (Trejo, 1998). Among them, the predominant species are *Vachellia campeachiana* (Mill.) Seigler & Ebinger, *V. farnesiana* (L.) Wight & Arn., *V. cornigera* (L.) Seigler & Ebinger, *Guaiacum coulteri* A.Gray, and *Opuntia decumbens* Salm-Dyck (Salas-Morales et al., 2003).

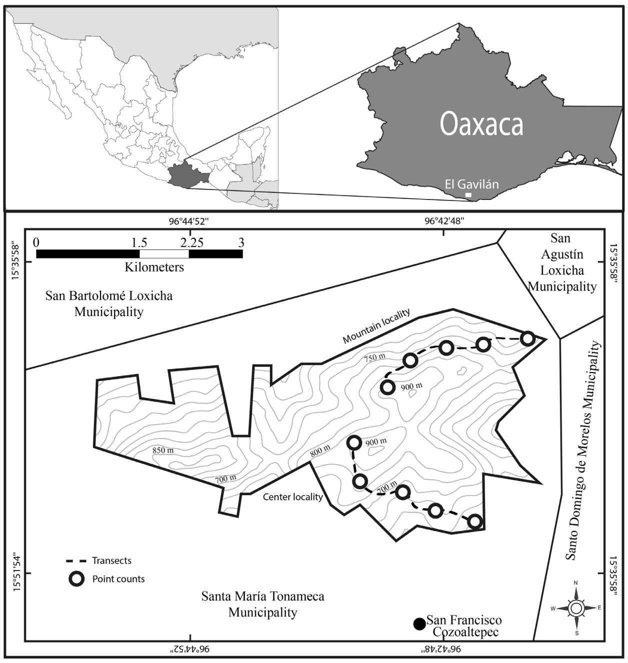

Fig. 1. The location of Communal Natural Protected Area El Gavilán in Santa María Tonameca municipality, Oaxaca state, Mexico.

We divided the CNPA El Gavilán into two localities (Centre and Mountain) according to their ecological and topographic characteristics and principal vegetation types. In the Centre locality, TDF dominate, while the Mountain locality is a transition zone from the TDF to the pine-oak (*Pinus* sp., *Oak* sp.) forest. Another reason for this division was due to logistical facilities and access to the study sites.

Data collection in the field

Sampling has been carried out between November 2018 and September 2019, during the dry season (November – May) and the rainy season (June – September). It was aimed to document the avian diversity using a point count distance sampling method (Reynolds et al., 1980). At each locality, one transect varying in length was set ranging from 250 m a.s.l. to 1000 m a.s.l., covering various altitudes and, overall, involving the dominant vegetation. Each transect was composed of five-point counts separated by a minimum altitude at 200 m a.s.l. Each monthly visit had duration of four days, i.e. two days per each locality. During each visit to a locality, two rounds of surveys have been conducted in the morning (06:00–11:00 h) and the afternoon (16:00–19:00 h) (Lloyd & Marsden, 2008), that covers the bird activity schedules (Navarro-Sigüenza et al., 2014); but it was only during hours of suitable weather (i.e. in the absence of rain or strong wind). During the rounds and at each point count, birds have been counted from a fixed raising position within a circle of 50-m radius for a specific period (10 m). Bird species were mainly recorded visually using Nikon (10 × 50 mm) binoculars, but also by songs, whenever possible photographs were taken with a Canon camera and lens 70–300 mm. The same procedures were realised in both seasons.

Alternately, in both seasons, five mist nets (12 × 6 m length) were put in each established transect, along pathways, edges, vegetation fragments, and near streams. The nets were open under the same scheme of schedules and the time as in the case of transects described above. They were checked every 30 min. to ensure that the birds remained alive and in good condition. The use of both methods (point counts and mist nets) in combination was expected to increase the number of bird species recorded (Zakaria & Rajpar, 2010). But the species registered by the mist net technique were excluded from the relative abundance analysis because this method is not suitable to assess relative abundance (Hutto et al., 1986). No specimens were collected after being identified and photographed. All specimens were released in the same area where they were caught.

Identification of birds was done by using field guides (Howell & Webb, 1995; Van Perlo, 2006; Bojorges-Baños, 2012). Taxonomic nomenclature and resident status were based on Chesser et al. (2022).

Data analysis

To estimate the total species richness, species accumulation curves were plotted to assess the completeness of the species inventory for each locality, using nonparametric estimators Chao 2 and Bootstrap, which are based on presence estimates (Hortal et al., 2006; Colwell, 2009). So, both estimators have been shown to be reliable for relatively small sampling units (i.e. circular plots, mist nets; Hortal et al., 2006). In addition, the combination of sampling methods increases the likelihood of detecting species, allowing for a higher number of species to be recorded. Regarding this, Bojorges-Baños & López-Mata (2006) demonstrated the importance of performing this type of combined samplings to achieve better results.

The species richness was estimated for each locality. In addition, the species richness was compared by calculating the effective numbers of species per season based on the sample coverage (Jost, 2006), which is the probability that the next recorded organism will be of the same species as the previously recorded one. The species richness is the number of species present in an area (Dettmers et al., 1999).

Alpha diversity was obtained in terms of equivalent numbers (Chao et al., 2010) from diversity orders, considering the ${}^{0}D$ order diversity (species richness) and ${}^{1}D$ order diversity (common species) (Jost & González-Oreja, 2012) for each locality and season. In addition, to know the significant differences between locality and season diversity, the Shannon-Wiener index (H′) was obtained as a baseline to examine differences in bird diversity between seasons, and between localities and seasons using the t-test modified by Hutcheson (1970). Analyses were performed using PAST ver. 4.08 (Hammer et al., 2001).

The relative abundance (n/N) of bird species per locality, where n is the total number of birds of a particular species and N is the total number of birds of all species, was obtained considering the percentage frequency of records, according to Resendiz-Cruz et al. (2017) categories, namely very abundant (90–100%), abundant (65–89%), common (31–64%), rare (10–30%), and very rare (1–9%).

Bird species were assigned to six trophic guilds (insectivore, frugivore, nectarivore, granivore, omnivore, and ground-feeding) based on primary diet items (Allen & Hoekstra, 1990; Arizmendi et al., 1990). In addition, seasonality was determined according to Arizmendi & Espinosa de los Monteros (1996), and Navarro-Sigüenza et al. (2014) criteria, and assigned as: 1) permanent resident (R), 2) winter migrant (Wm), 3) summer migrant (Sm), and 4) transient (T). In terms of endemism, birds have been classified to endemic species (species with a geographical distribution limited to one country), quasi-endemic (species with geographic distribution extends outside Mexico), and semi-endemic (species endemic to the country for a time of the year) (González-García & Gómez de Silva, 2003). We assigned conservation risk categories for each species based on Mexican Official Norm (NOM-059-SEMARNAT-2010; DOF, 2010) and the Global IUCN Red List (IUCN, 2019).

Results

In total, we recorded 85 species from 65 genera, 24 families, and 13 orders. Passeriformes had the highest species (53; 62%), followed by Apodiformes (7%) and Columbiformes (7%). Tyrannidae (12 species) and Cardinalidae (nine species) have the highest number of taxa. The genera *Vireo* and *Icterus* were the richest by species (Appendix).

Species accumulation curves according to Chao 2 and Bootstrap predicted an asymptote in 97 species and 95 species, respectively. In this research survey, this means that 87.62% and 89.47% of the estimated total richness were recorded (Fig. 2).

In the study area, most of the species (83) were considered very rare and two species (*Eupsittula canicularis* (Linnaeus, 1758) and *Calocitta formosa* (Swainson, 1827)) were rare. Regarding the avian diversity, ^0D, the Centre locality had 74 species (19 exclusive species), while the Mountain locality had 65 species (11 exclusive species). For avian diversity index, ^1D, the Centre locality showed 3.66 effective species, and the Mountain locality demonstrated 3.02 effective species. There was no significant difference in species richness between localities (X^2 = 0.578, d.f. = 1, p = 0.092). According to the avian diversity found between seasons in the CNPA El Gavilán, the dry season had a little more diversity (H′ = 3.44) than the rainy season (H′ = 3.41), but there were no significant differences between them (Hutcheson *t* = 0.365, d.f. = 1, p = 0.086; Fig. 3). Regarding the diversity between localities (Fig. 4), the Centre locality had a higher diversity in the dry season than the rainy season (dry: H′ = 3.51; rainy: H′ = 2.77), and the Mountain had a higher diversity (H′ = 3.05) in the dry season than in the rainy season (H′ = 2.77).

According to the seasonality, 82.4% birds (70 species) are considered residents, 15.3% (13 species) are winter migrants, one species (1.2%) is a summer migrant, and one species (1.2%) is transient. Among the localities, the Centre locality had seven species, and one winter migrant species more than the Mountain locality.

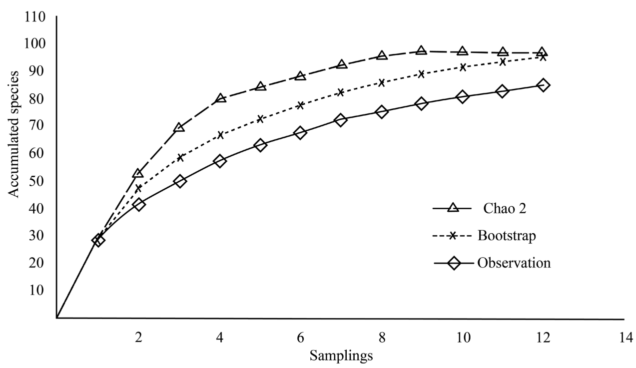

Fig. 2. Species-accumulation curve for avian species in the Communal Natural Protected Area El Gavilán, Oaxaca state, Mexico.

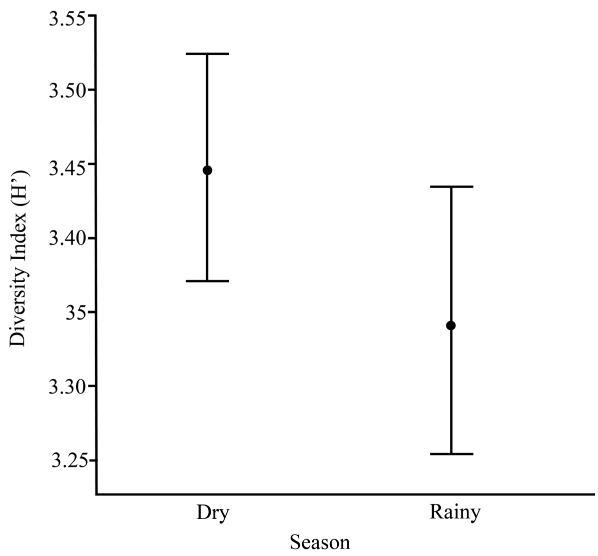

Fig. 3. Avian diversity between seasons (dry and rainy) in the Communal Natural Protected Area El Gavilán, Oaxaca state, Mexico.

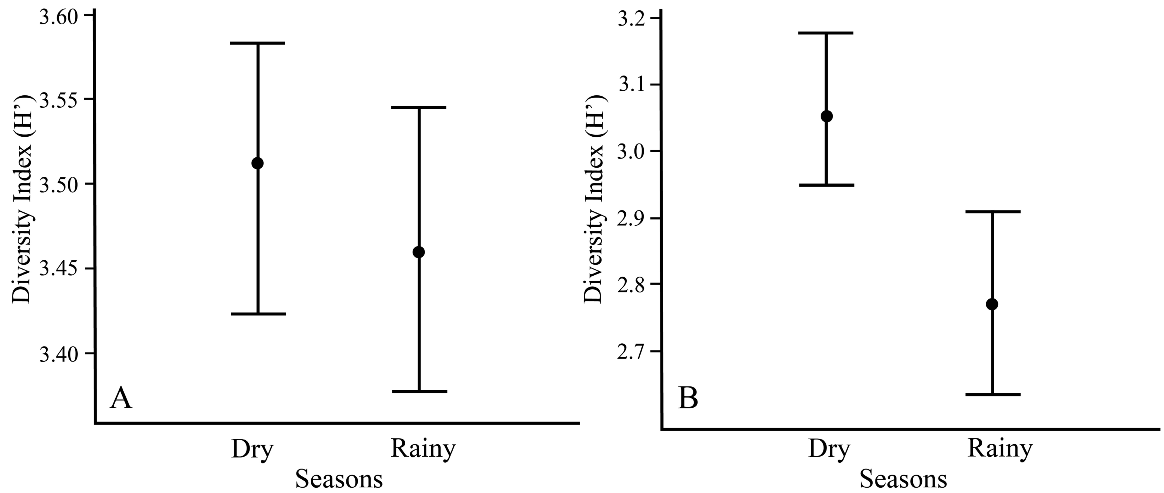

Fig. 4. Avian diversity between localities (A – Centre, B – Mountain) and seasons in the Communal Natural Protected Area El Gavilán, Oaxaca state, Mexico.

In the CNPA El Gavilán, nine species (10.58 %) are in some conservation category in the Official Mexican law. One species (*Amaurospiza concolor* Cabanis, 1861) is categorised as «Endangered», another species (*Glaucidium palmarum* Nelson, 1901) is categorised as «Threatened». Seven species (*Aulacorhynchus prasinus* (Gould, 1833), *Campephilus guatemalensis* (Hartlaub, 1844), *Aratinga canicularis* (Linnaeus, 1758), *Heliomaster longirostris* (Audebert & Vieillot, 1801), *Passerina ciris* (Linnaeus, 1758), *Trogon collaris* Vieillot, 1817) are classified as «Special Protection». The Global IUCN Red List (IUCN, 2019) includes only one species (*Passerina ciris* (Linnaeus, 1758)), classified as Near Threatened. Ten species (*Saucerottia beryllina* (Deppe, 1830), *A. rutila* (Delattre, 1843), *Archilocus colubris* (Linnaeus, 1758), *Cynanthus latirostris* Swainson, 1827, *Heliomaster longirostris* (Audebert & Vieillot, 1801), *Phaetornis mexicanus* Hartert, 1897, *Falco rufigularis* Daudin, 1800, *F. sparverius* Linnaeus, 1758, *Aratinga canicularis*, *Glaucidium palmarum*) are included in Appendix II of CITES.

Only nine species (10.71%; *Glaucidium palmarum*, *Melanerpes chrysogenys* (Vigors, 1839), *Granatellus venustus* Bonaparte, 1850, *Ortalis poliocephala* (Wagler, 1830), *Phaetornis mexicanus*, *Pheugopedius felix* (P.L.Sclater, 1860), *Trogon citreolus* Gould, 1835, *Turdus rufopalliatus* Lafresnaye, 1840, *Vireo hypochryseus* P.L.Sclater, 1863) were recorded as endemic to Mexico, four species (4.71%, *Cynanthus latirostris*, *Dryocopus lineatus* (Linnaeus, 1766), *Empidonax difficilis* S.F.Baird, 1858, *E. occidentalis* Nelson, 1897) are semi-endemic, and two species (2.35%, *Cacicus melanicterus* (Bonaparte, 1825), *Momotus mexicanus* Swainson, 1827) are quasi-endemic (Appendix).

Finally, the avian community of the CNPA El Gavilán was grouped into various guilds. Of them, 50 species are insectivorous principally, 14 species are grain-frugivorous, eight species are omnivorous, six species are carnivorous, and six species are nectarivorous. Regarding the abundance of these guilds between sites, carnivore birds showed no significant differences (X^2 = 0.088, d.f. = 1, p = 0.065), like nectarivorous birds (X^2 = 0.315, d.f. = 1, p = 0.062), omnivorous birds (X^2 = 0.528, d.f. = 1, p = 0.071), grain-frugivorous birds (X^2 = 0.140, d.f. = 1, p = 0.068), and insectivorous birds (X^2 = 0.140, d.f. = 1, p = 0.072).

Discussion

Mexico has a remarkable richness and diversity of species of many biological groups (Jiménez-Sierra et al., 2014). Recently, the avifauna of several regions in Oaxaca state has been studied to better understand the number of birds that each one contains (Bojorges-Baños, 2011a,b; Santos-Benítez et al., 2013; Lavariega et al., 2016), including the coast of Oaxaca state, but with a tendency to bird community associated with wetlands (Bojorges-Baños, 2011a,b; Ruiz Bruce Taylor et al., 2017). Therefore, little information exists for the Sierra Sur and Planicie Costera sub-provinces in Oaxaca state. For those reasons, this study supplies valuable information about the bird diversity in the transition zone between the Planicie Costera del Pacífico sub-province and Sierra Madre del Sur province, highlighting the importance of the micro-basin about the regional avifauna richness.

The avifauna of the CNPA El Gavilán represents 7.6% of the 1123 species recorded in Mexico (Navarro-Sigüenza et al., 2014; Berlanga et al., 2015), 11.3% of 754 species recorded in Oaxaca state (Berlanga et al., 2008), and 24.3% of 350 species estimated for the coast of Oaxaca state (Bojorges-Baños, 2011a). Although, the species richness in Mexico may vary from latitudinal, altitudinal, and even vegetation situations as a product of the topographic and physiographic complexity of its landscapes (Wilson et al., 2013). This has been used as an indicator of biodiversity in mainland environments (Hortal et al., 2009) and for understanding the comparisons among communities (Gotelli & Chao, 2013). The high species richness obtained here can be explained by the presence of a high percentage of resident species. The physiognomy of vegetation could have influenced this presence with intrinsic factors such as food and plant composition (Hutto, 1985; Hewson et al., 2011).

According to Chao 2 and Bootstrap estimators, the species accumulation curve reached more than 85% of the intended species, providing that the inventory is reasonably complete. Although specific criteria have not been established to determine whether an inventory is complete or not, most occasions often establish arbitrary limits such as the fact that over 80% of the estimate of richness species is an acceptable value (Jiménez-Valverde & Hortal, 2003). One of the reasons is probably the sampling type (combination of methods) that was recommended for more records (Bojorges-Baños & López-Mata, 2006).

Avian feeding guilds are important for understanding the complexity of ecosystem structure and for supplying updated information on each type of habitat in the ecosystem (Azman et al., 2011). In TDF of southwestern Mexico, insectivorous birds were more abundant in the dry season (Almazán-Núñez et al., 2018) in response to the change in arthropod abundance (Tovar-Sánchez et al., 2004; Vega-Rivera et al., 2010) in the two seasons of a year. In consequence, many birds are more generalists in their diet (Almazán-Núñez et al., 2018). The insectivorous guild was the principal group recorded in the CNPA El Gavilán followed by the grain-frugivorous guild.

In the CNPA El Gavilán, the species composition is characterised by a considerable number of species with little abundance. However, this is consistent with the general pattern of avifaunal communities, where rare or uncommon species exist, and few species are abundant (Rurangwa et al., 2021). Probably, these species may be responding to the habitat structure and not to climatic conditions. Then, they occupy more than one type of habitats during the year (Goetz et al., 2014).

Although TDF exhibits a marked seasonality that produces physiological stress in the organisms, which inhabit it (Ceccon et al., 2006), the structure of ecological communities varies with respect to the season and temporal changes in the availability of resources (Modena et al., 2013; Falcão et al., 2014). But the CNPA El Gavilán does not show a marked variation in its plant phenology between seasons. Therefore, there is no variation in the composition of bird species. A possible explanation is related to the high number of resident species found during both seasons, probably due to bird species adapted to the few phenological variants of the habitat (Peters et al., 2010; Morales-Betancourt et al., 2012; Mulwa et al., 2012; Almazán-Núñez et al., 2015). This pattern of ecological community structure has already been demonstrated in other regions of southwestern Mexico with similar vegetation conditions (Almazán-Núñez et al., 2018). Inside the CNPA El Gavilán, there are critical components that supply ideal ecological conditions for food processes, refuge, thermoregulation, resources that provide energy, and the permanence of vegetation, as well as water bodies.

Nine out of the 85 species found in this study are endemic to Mexico. All of them are listed under the species at risk of extinction category by the Mexican Ministry of Environment (DOF, 2010). This proportion of endemic, semi-endemic, and quasi-endemic birds is like the one observed in Oaxaca state (10.19% according to Navarro-Sigüenza et al., 2014), and it reflects the pattern occurring in Mexico, with a higher number of endemic species in mountain ecosystems (Navarro-Sigüenza et al., 2014). This underscores the need to secure the protection of these and other sites along the Central Pacific Coast of the Oaxaca state. Nonetheless, due to the species richness recorded and estimated here, this area should receive more attention from government authorities, particularly because this region is under intense pressure due to changes in land use around it (Salas-Morales & Casariego-Madorell, 2010). The promotion of more voluntary areas for conservation as local initiatives under the program of Áreas Certificadas para la Conservación de Oaxaca state would probably slow down the threats of deforestation of the TDF on the coast of Oaxaca state (Ortega et al., 2010; Salas-Morales & Casariego-Madorell, 2010). Therefore, this program could benefit the survival of species, mainly those that are endemic to Mexico or nationally threatened.

Conclusions

The avifauna of the CNPA El Gavilán shows that a marked effect does not exist in the species composition between seasons. The most representative order was Passeriformes.

The insectivorous guild was the principal group recorded, followed by the grain-frugivorous guild. Due to the species richness found and estimated here, the study area should be considered in conservation policies, particularly because this region is under intense pressure due to changes in the land use.

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Appendix. Bird species recorded in the Communal Natural Protected Area El Gavilán, state Oaxaca, Mexico in 2018–2019.

Order	Family	Species	n	RA	Sst	NOM-059	IUCN	End	CITES
Galliformes	Cracidae	*Ortalis poliocephala*	55	vr	R		LC	En	
Accipitriformes	Cathartidae	*Cathartes aura*	2	vr	R		LC	ne	
		Coragyps atratus	22	vr	R		LC	ne	
	Accipitridae	*Buteogallus anthracinus*	2	vr	R	UP	LC	ne	
		Buteo plagiatus	8	vr	R		LC	ne	
Columbiformes	Columbidae	*Patagioenas flavirostris*	11	vr	R		LC	ne	
		Columbina inca	1	vr	R		LC	ne	
		Columbina passerina	15	vr	R		LC	ne	
		Columbina talpacoti	5	vr	R		LC	ne	
		Leptotila verreauxi	7	vr	R		LC	ne	
		Zenaida asiatica	24	vr	R		LC	ne	
Cuculiformes	Cuculidae	*Crotophaga sulcirostris*	37	vr	R		LC	ne	
		Morococcyx erythropygus	3	vr	R		LC	ne	
		Piaya cayana	30	vr	R		LC	ne	
Strigiformes	Strigidae	*Glaucidium palmarum*	2	vr	R	Th	LC	En	II
Caprimulgiformes	Caprimulgidae	*Nyctidromus albicollis*	30	vr	R		LC	ne	
Apodiformes	Trochilidae	*Phaethornis mexicanus*	7	vr	R		LC	En	II
		Cynanthus latirostris	10	vr	R		LC	Se	II
		Amazilia rutila	90	vr	R		LC	ne	II
		Saucerottia beryllina	2	vr	R		LC	ne	II
		Heliomaster longirostris	3	vr	R	UP	LC	ne	II
		Archilochus colubris	7	vr	Wm		LC	ne	II
Trogoniformes	Trogonidae	*Trogon citreolus*	36	vr	R		LC	En	
		Trogon collaris	1	vr	R	UP	LC	ne	
Coraciiformes	Momotidae	*Momotus mexicanus*	30	vr	R		LC	Qe	
Piciformes	Ramphastidae	*Aulacorhynchus prasinus*	53	vr	R	UP	LC	ne	
	Picidae	*Melanerpes chrysogenys*	18	vr	R		LC	En	
		Dryocopus lineatus	1	vr	R		LC	Se	
		Campephilus guatemalensis	6	vr	R	UP	LC	ne	
Falconiformes	Falconidae	*Falco sparverius*	1	vr	R		LC	ne	II
		Falco rufigularis	4	vr	R		LC	ne	II

Psittaciformes	Psittacidae	*Aratinga canicularis*	170	r	R	UP	LC	ne	II
Passeriformes	Furnariidae	*Xiphorhynchus flavigaster*	31	vr	R		LC	ne	
	Tyrannidae	*Empidonax minimus*	1	vr	Wm		LC	ne	
		Empidonax difficilis	1	vr	Wm		LC	Se	
		Empidonax occidentalis	10	vr	R		LC	Se	
		Myiozetetes similis	2	vr	R		LC	ne	
		Pitangus sulphuratus	9	vr	R		LC	ne	
		Myiodynastes luteiventris	8	vr	Sm		LC	ne	
		Megarynchus pitangua	5	vr	R		LC	ne	
		Tyrannus melancholicus	6	vr	R		LC	ne	
		Myiarchus cinerascens	5	vr	Wm		LC	ne	
		Myiarchus nuttingi	39	vr	R		LC	ne	
		Myiarchus tyrannulus	12	vr	R		LC	ne	
		Attila spadiceus	2	vr	R		LC	ne	
	Tityridae	*Tityra semifasciata*	19	vr	R		LC	ne	
		Pachyramphus aglaie	3	vr	R		LC	ne	
	Vireonidae	*Vireo solitarius*	1	vr	Wm		LC	ne	
		Vireo huttoni	3	vr	R		LC	ne	
		Vireo hypochryseus	47	vr	R		LC	En	
		Vireo gilvus	9	vr	R		LC	ne	
		Vireo olivaceus	6	vr	T		LC	ne	
	Corvidae	*Calocitta formosa*	241	r	R		LC	ne	
	Hirundinidae	*Stelgidopteryx serripennis*	9	vr	R		LC	ne	
	Troglodytidae	*Campylorhynchus rufinucha*	83	vr	R		LC	ne	
		Thryophilus pleurostictus	6	vr	R		LC	ne	
		Pheugopedius felix	3	vr	R		LC	En	
	Polioptilidae	*Polioptila caerulea*	14	vr	R		LC	ne	
		Polioptila albiloris	9	vr	R		LC	ne	
	Turdidae	*Catharus ustulatus*	11	vr	Wm		LC	ne	
		Turdus rufopalliatus	3	vr	R		LC	En	
	Fringilidae	*Euphonia affinis*	4	vr	R		LC	ne	
	Icteriidae	*Icteria virens*	2	vr	R		LC	ne	
	Icteridae	*Cacicus melanicterus*	43	vr	R		LC	Qe	
		Icterus graduacauda	7	vr	R		LC	ne	
		Icterus gularis	32	vr	R		LC	ne	
		Icterus pustulatus	1	vr	R		LC	ne	
		Icterus spurius	5	vr	R		LC	ne	
	Parulidae	*Mniotilta varia*	2	vr	Wm		LC	ne	
		Oreothlypis ruficapilla	5	vr	Wm		LC	ne	
		Setophaga ruticilla	4	vr	Wm		LC	ne	
		Setophaga pitiayumi	1	vr	R		LC	ne	
		Setophaga petechia	16	vr	R		LC	ne	
		Basileuterus lachrymosus	4	vr	R		LC	ne	
	Cardinalidae	*Piranga rubra*	1	vr	Wm		LC	ne	
		Piranga ludoviciana	4	vr	Wm		LC	ne	
		Habia rubica	42	vr	R		LC	ne	
		Granatellus venustus	1	vr	R		LC	En	
		Cardinalis cardinalis	1	vr	R		LC	ne	
		Amaurospiza concolor	3	vr	R	D	LC	ne	
		Cyanocompsa parellina	2	vr	R		LC	ne	
		Passerina cyanea	1	vr	Wm		LC	ne	
		Passerina ciris	1	vr	Wm	UP	NT	ne	
	Thraupidae	*Saltator atriceps*	7	vr	R		LC		
		Volatinia jacarina	6	vr	R		LC		

Note: n (number of individuals registered), RA (Relative Abundance, va – very abundant, a – abundant, c – common, r – rare, vr – very rare), Sst (Seasonality, R – resident, Wm – Winter migrant, Sm – Summer migrant, T – transient), NOM-059 (NOM-059-SEMARNAT-2010, UP – Under protection, Th – Threatened, D – Danger of extinction), IUCN (LC – Least Concern, NT – Near Threatened), End (Endemism, En – Endemic, Se – Semi-endemic, Qe – Quasi-endemic, ne – Non endemic), CITES (II – Appendix II).

ОЦЕНКА РАЗНООБРАЗИЯ ОРНИТОФАУНЫ НА ОБЩЕСТВЕННОЙ ОСОБО ОХРАНЯЕМОЙ ПРИРОДНОЙ ТЕРРИТОРИИ ЭЛЬ ГАВИЛАН, ЦЕНТРАЛЬНОЕ ПОБЕРЕЖЬЕ ШТАТА ОАХАКА, МЕКСИКА

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Тропический сухой лес – экосистема с ярко выраженной сезонностью и высоким разнообразием животных. В качестве угроз для нее выступает широкий спектр антропогенной деятельности, такой как рост населения, темпы обезлесения, развитие туризма, лесные пожары, чрезмерная охота и торговля дикими животными. Одной из стратегий сохранения этого биоразнообразия является создание малоизученных общественных особо охраняемых природных территорий (КООПТ). Цель данного исследования состояла в том, чтобы дать оценку разнообразия фауны птиц в КООПТ Эль Гавилан на центральном побережье штата Оахака (Мексика) в течение двух сезонов (засухи и дождей). Сбор данных проводился в двух локациях (условно названных Центр и Гора) с ноября 2018 г. по сентябрь 2019 г. методом точечного подсчета. В каждой локации было заложено по одной трансекте разной длины, но с пятиточечными учетами, разделенными минимум 200 м. Каждая трансекта ежемесячно посещалась дважды. Учет птиц производился с фиксированного места на подъеме в пределах окружности радиусом 50 м в течение определенного времени (10 мин.) в каждом пункте. Всего было зарегистрировано 85 видов, относящихся к 65 родам, 24 семействам и 13 отрядам. Отряд Passeriformes был наиболее богатым с 53 видами. Большинство таксонов (83) были оценены как очень редкие, а два вида (*Aratinga canicularis* и *Calocitta formosa*) как редкие. Относительно видового разнообразия, ^{0}D, в локации Центр было отмечено 74 вида (в том числе 19 эксклюзивных, отмеченных только там, видов), а в локации Гора – 65 видов (в том числе 11 эксклюзивных видов). Сезон засухи отличался более высоким разнообразием ($H' = 3.44$), чем сезон дождей ($H' = 3.41$), хотя достоверных различий не было (Hutcheson $t = 0.365$, d.f. = 1, $p > 0.05$). К неперелетным видам было отнесено 70 видов (82.0%), 13 видов (15.3%) являются зимними перелетными, один вид (1.2%) – летним перелетным и один вид (1.2%) – пролетным. Из общего числа зарегистрированных таксонов 50 видов были преимущественно насекомоядными, 14 видов – зерноядными, восемь – всеядными, шесть – плотоядными и шесть – нектароядными. Изучение орнитофауны КООТП Эль Гавилан показало, что заметных различий в видовом составе между сезонами не наблюдается. Поскольку видовое богатство было зарегистрировано и оценено на данной территории, эту информацию следует учитывать в природоохранной политике, особенно потому, что эта территория находится под сильным давлением из-за изменений в землепользовании.

Ключевые слова: видовое богатство, насекомоядный вид, неперелетный вид, обилие, перелетный вид, пролетный вид, трансекты, трофическая группа