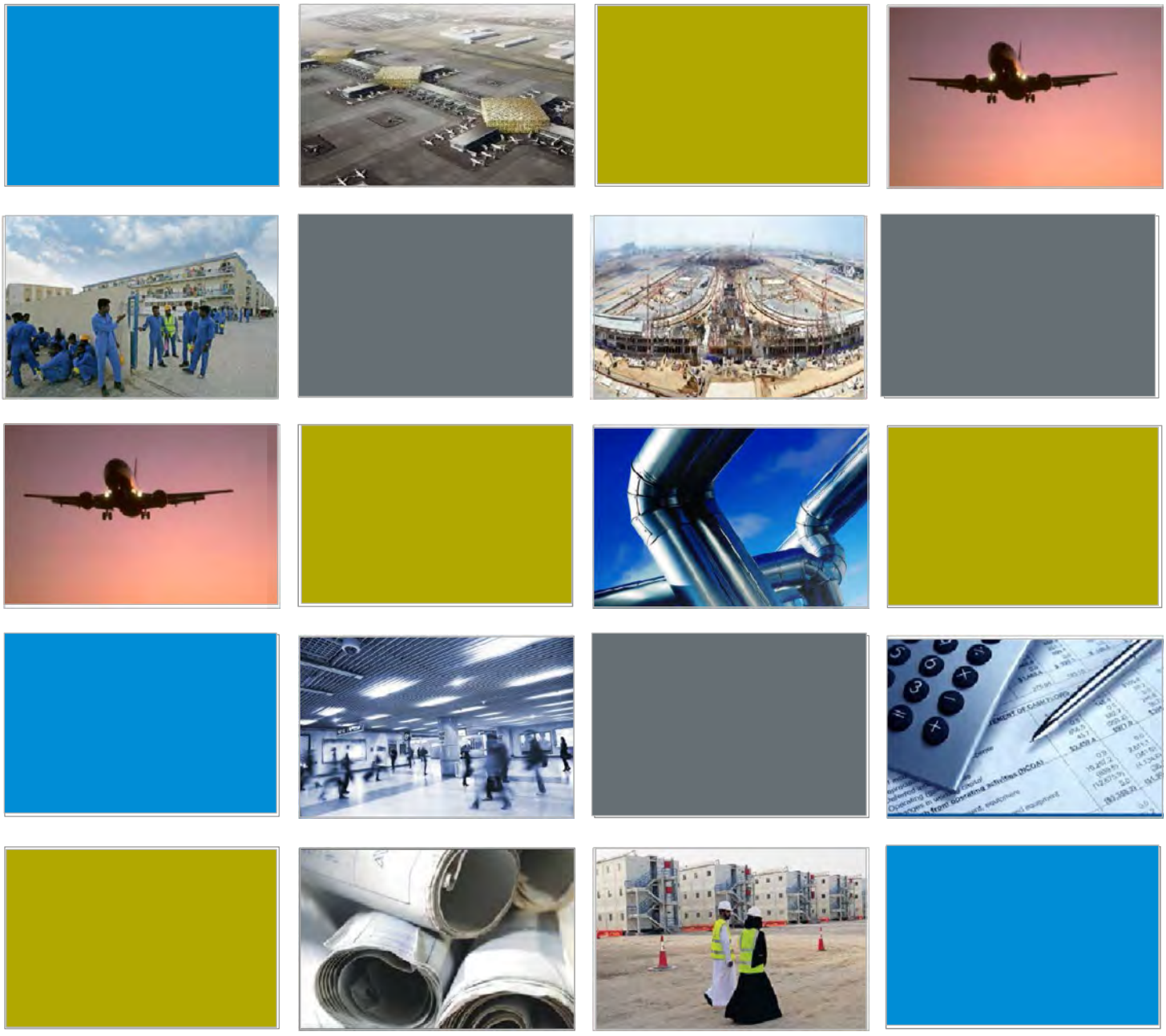


AVIFAUNA STUDY FOR THE ACAJUTLA-AHUACHAPÁN ROW OF "LNG TO POWER" PROJECT TRANSMISSION LINE, ENERGÍA DEL PACÍFICO, EL SALVADOR

March 05th, 2018

TABLE OF CONTENTS

EXECUTIVE SUMMARY **1**

INTRODUCTION **1**

1. STUDY AREA **2**

2. METHODOLOGY **4**

3. RESULTS **9**

3.1. Area of sugarcane cultivation and grasslands 9

3.2. Shade coffee crops with patches of natural forest and live barriers 14

4. CONCLUSIONS **22**

5. RECOMMENDATIONS **24**

6. BIBLIOGRAPHY **25**

7. APPENDIX **26**

TABLES INDEX

TABLE 1 SPECIES OF BIRDS IDENTIFIED AT SUGARCANE CULTIVATION AREAS, FLOODED GRASSLANDS, OPEN ZONE AND PATCHES OF NATURAL FOREST FOUND IN POINTS 1 TO 9, FEBRUARY 2018 11

TABLE 2 SPECIES OF BIRDS IDENTIFIED AT SHADE COFFEE CROPS WITH PATCHES OF NATURAL FOREST AND LIVE BARRIERS FOUND IN POINTS 10 TO 35, FEBRUARY 2018 16

TABLE 3 SPECIES FOUND ALONG THE TRANSMISSION LINE PROJECT ACAJUTLA-AHUACHAPÁN, FEBRUARY 2018 26

FIGURES INDEX

FIGURE 1 STUDY AREA OF ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018 3

FIGURE 2 LOCATION OF THE SAMPLING POINTS FOR THE IDENTIFICATION OF BIRDS AT ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018 6

FIGURE 3 LOCATION OF THE SAMPLING POINTS AT THE SUGAR CANE CULTIVATION ZONE AND PASTURES, AT ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018. 7

FIGURE 4 SAMPLING POINTS AT SHADOW COFFEE CROPS , PATCHES OF NATURAL FOREST AND LIVING BARRIERS AT ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018. 8

FIGURE 5 SEASONALITY OF THE SPECIES OF BIRDS IDENTIFIED AT SUGARCANE CULTIVATION AREAS, FLOODED GRASSLANDS, OPEN ZONE AND PATCHES OF NATURAL FOREST FOUND IN POINTS 1 TO 9, FEBRUARY 2018 11
FIGURE 6 SEASONALITY OF THE SPECIES OF BIRDS IDENTIFIED AT SHADE COFFEE CROPS WITH PATCHES OF NATURAL FOREST AND LIVE BARRIERS FOUND IN POINTS 10 TO 35, FEBRUARY 2018 16
FIGURE 7 SPECIES–ACCUMULATION CURVES BY FRECUENCE OF OBSERVATION DURING THE SAMPLES CARRIED OUT AT THE PROJECT SITES FEBRUARY 2018 22

EXECUTIVE SUMMARY

An avifauna study was carried out for the Acajutla-Ahuachapán ROW[1] of the "LNG TO POWER" project transmission line, ENERGÍA DEL PACÍFICO, in the month of February 2018. A total of 161 bird species were recorded along the transmission line route within sugar cane cultivation areas, grazing areas, coffee plantations and a natural forest patch. *Accipiter striatus chionogaster, Spizaetus tyrannus, Tilmatura dupontii, Aulacorhynchus prasinus, Psittacara strenuous, Eupsittula canicularis, Brotogeris jugularis, Chiroxiphia lineatis and Passerina ciris* are registered in some of the risk categories established by the Ministry of the Environment and Natural Resources of El Salvador and international organizations. The area of coffee plantations and natural forests have a greater diversity of species than open areas such as pastures. More than 25% of the registered species belong to the migratory category, while the remaining 75% have a resident category. A series of recommendations are made to mitigate the impact of the development of the project throughout the different phases of execution.

INTRODUCTION

The rational use of natural resources can meet the needs of a population and generate long-term economic and social development that is friendly to the environment. In this way, social development projects seek to improve the quality of life of citizens and therefore cannot ignore the environmental field. Therefore, it is essential to take into account the necessary measures to minimize impacts on the natural environment, in order to guarantee ecosystem services that provide response to human needs.

Among the daily life necessities of a society, is the access to electric power, since various activities depend on it. Due to the demand for this service in various sectors of the country where access is limited, projects have been developed that generate the conditions to provide this good to the most isolated territories. For this reason, proposals for this type of project must be feasible and present measures to reduce environmental impacts.

The impacts on the sites where electric power projects are carried out can cause damage to the surrounding wildlife, due to the installation of networks and wiring that interfere in the natural environment and can disturb the habitat conditions of many species of flying organisms, as is the case with birds. Therefore, it is important to know about the species of birds that use certain areas over others, in order to provide recommendations on the best management of this type of fauna, as well as compensation measures for damages caused by the development of the projects.

[1] Right of Way.

The "Transmission line of Energía del Pacífico S.A. de C.V" project is intended to be developed in the vicinity of the mountain range "Sierra de Apaneca", southwest of El Salvador, in the departments of Sonsonate and Ahuachapán. In these areas, different types of ecosystems are present within a highly fragmented landscape matrix, as a result of the constant change in land use, where sugarcane, basic grains and livestock farming predominate. In contrast, large areas of shade coffee plantations are located, an activity that generates conditions that favor housing biodiversity within the different taxonomic groups at the country level. Becoming a priority ecosystem for conservation in the absence of large areas of forest. Therefore, the objectives of the present study were to identify the species of birds in the types of habitat within the area of influence of the project, to analyze the diversity richness, identify the threatened species and to define relevant mitigation measures for the execution of the project.

1. STUDY AREA

The area of influence of the study includes part of the western section of Sierra de Apaneca mountain range, this part is located in the Apaneca-Ilamatepec biosphere reserve (Figure 1), which includes several Natural Protected Areas (ANP)[2], including the Green Lagoon, Las Ninfas Lagoon, Las Ranas Lagoon, El Águila Mountain; among others, all located within the department of Ahuachapán. On its part, the department of Sonsonate includes ANP such as El Zope, Los Cóbanos Complex, etc. This area has the largest coffee growing landscape in El Salvador, and still maintains important patches of natural forest, commonly known as shade-grown coffee. In the 1950s, this area was considered one of the best lands for growing coffee owned by our country, for its rich lands and climate, but nowadays the fall in coffee prices has forced the owners to sell them or not to use them for coffee production and consequently to abandon them.

[2] After the Spanish initials "Área Natural Protegida".

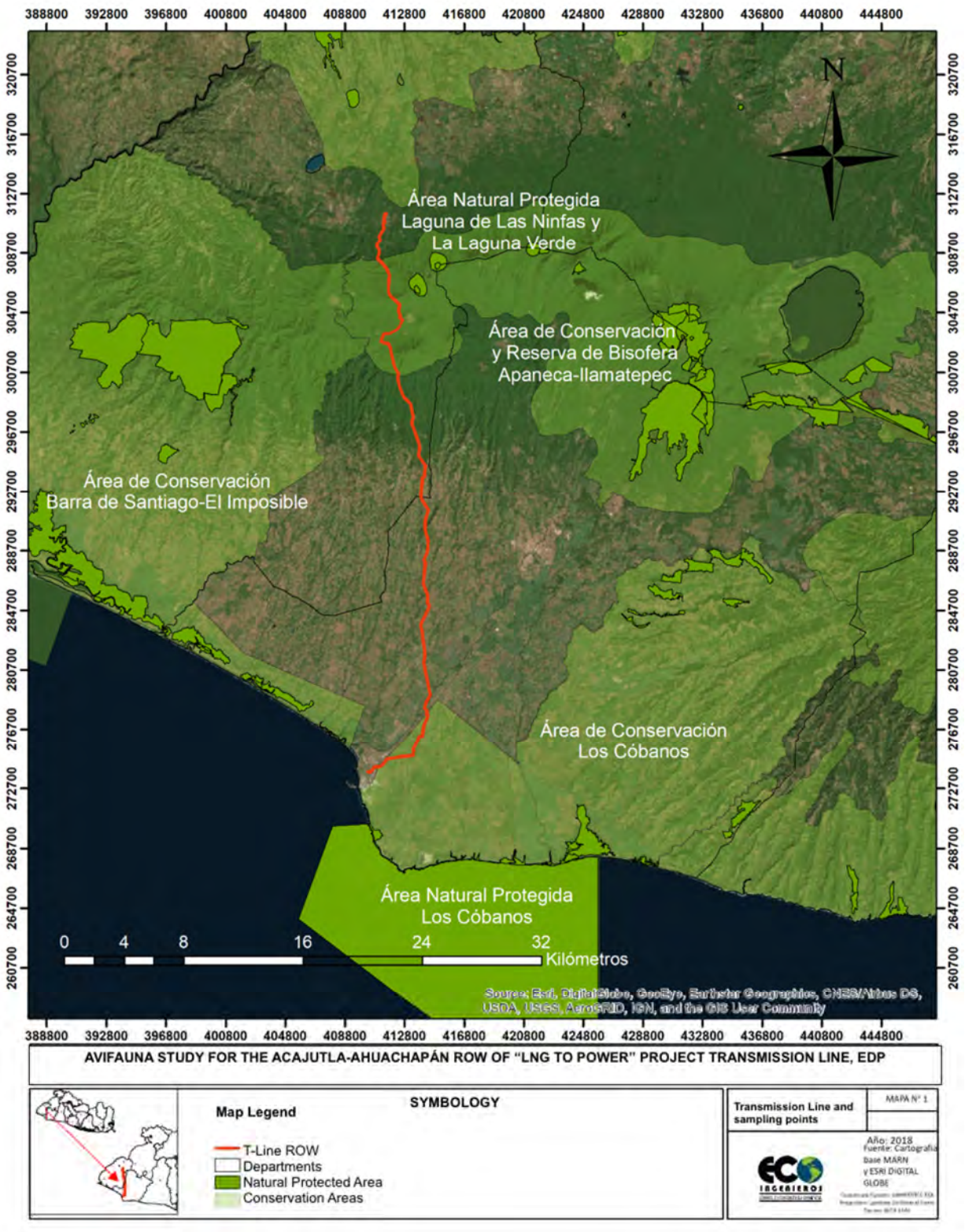


FIGURE 1 STUDY AREA OF ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018

2. METHODOLOGY

The bird identification study was carried out in the areas where the Acajutla-Ahuachapán ROW of the "LNG TO POWER" project transmission line of ENERGÍA DEL PACÍFICO is to be carried out. The points were previously selected throughout the study area where the transmission line will be, therefore, it was decided to carry out samplings for seven full days with two repetitions in the 35 proposed points of greatest influence of birds in the area (Figure 2).

The ecosystems found in the vicinity of the Transmission Line include open areas, sugarcane crops, coffee plantations, remnants of low deciduous forest and patches of natural perennial forest with natural barriers breaking winds. Therefore, they were grouped to obtain two types of ecosystems, which were characterized by areas of sugarcane cultivation with flooded grasslands (Figure 3) and areas with shade coffee crops with natural forest patches and live barriers (Figure 4).

For the bird identification study, the point count method described by Ralph et al. (1996) was used. The samplings were carried out at 6:00 in the morning ending at 10:00 am, and the second one began at 15:00 ending at 18:00 hours, during those periods of time the points were traversed and the birds were counted/registered through observation or recognition of birds' singing in a time period of 20-25 minutes per point, with an observation radius of 25 m for woodland areas and 50 m for open areas (cultivation, secondary roads) or neighborhood).

The points were established with the help of a Garmin eTrex 30 GPS brand, since these were scattered in different ecosystems. To identify the species, a Nikon prostaf magnification 10x42 binoculars were also used, as well as a Fujifilm camera and support from the specialized field for bird identification: "Field Guide to Birds of Northern Central America (Fagan y Komar, 2017)", "Birds of El Salvador (Quiteño et al., 2017)", and "Raptors of Mexico and Central America (Clark y Schmitt, 2017)".

For the data collection, a notebook was used for field notes, in which bird species and their abundance in the area were recorded. For the analysis and data processing, Microsoft Excel 2010 was used along with the statistical program Past3.exe; to extract alpha diversity and richness we the Shannon-Wiener, Simpson indexes were used and elaboration of species accumulation curve graphs to measure how effective was the man-made effort, determining the degree of completion of the inventory in the investigation and inferring that the sampling carried out may be complete.

Tables were also prepared with the taxonomic classification of the species identified in the research, organized by: family, gender and species with the most recent taxonomic classification

(eBird y American Ornithologist Society, 2018). The residence status of the birds was determined using the classification detailed by the MARN (2009), where the species are characterized according to their seasonal presence. To determine important sites for birds the category of risk for avifauna based on the List of Threatened and Endangered Species of MARN (2015) and according to UICN 2018 criteria as: Extinct (EX), Extinct in the Wild (EW), Critical Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD), Not Evaluated (NE).

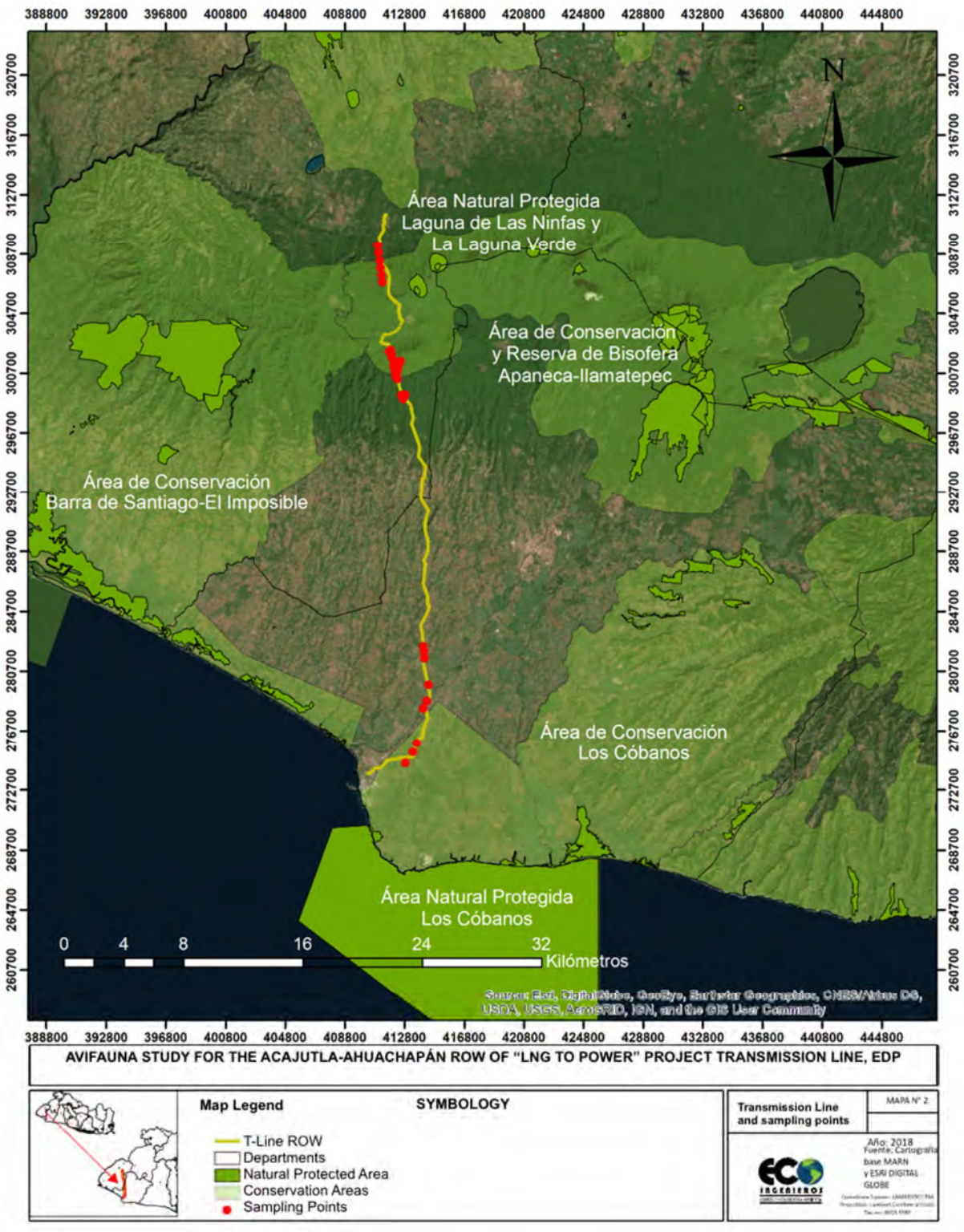


FIGURE 2 LOCATION OF THE SAMPLING POINTS FOR THE IDENTIFICATION OF BIRDS AT ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018.

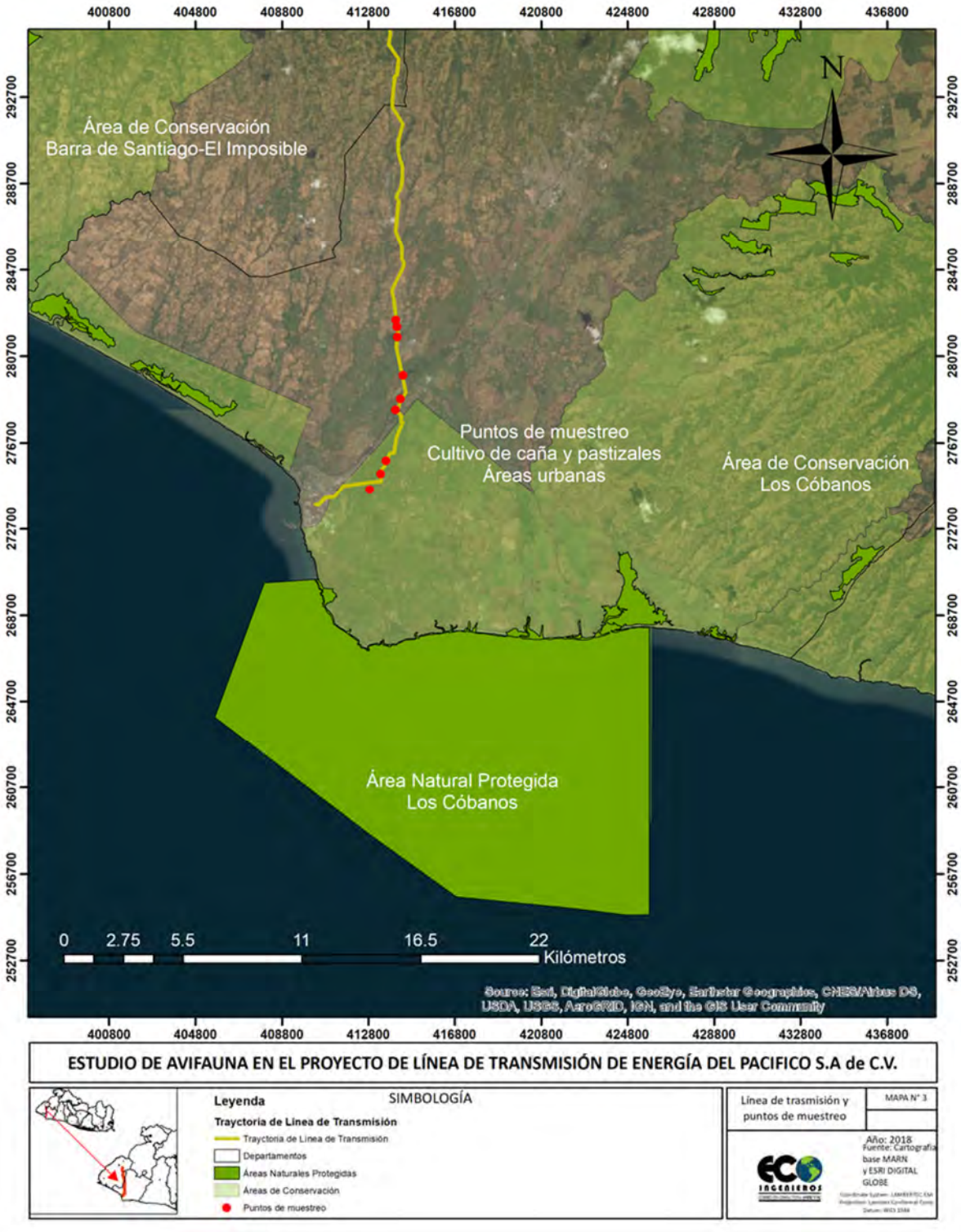


FIGURE 3 LOCATION OF THE SAMPLING POINTS AT THE SUGAR CANE CULTIVATION ZONE AND PASTURES, AT ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018.

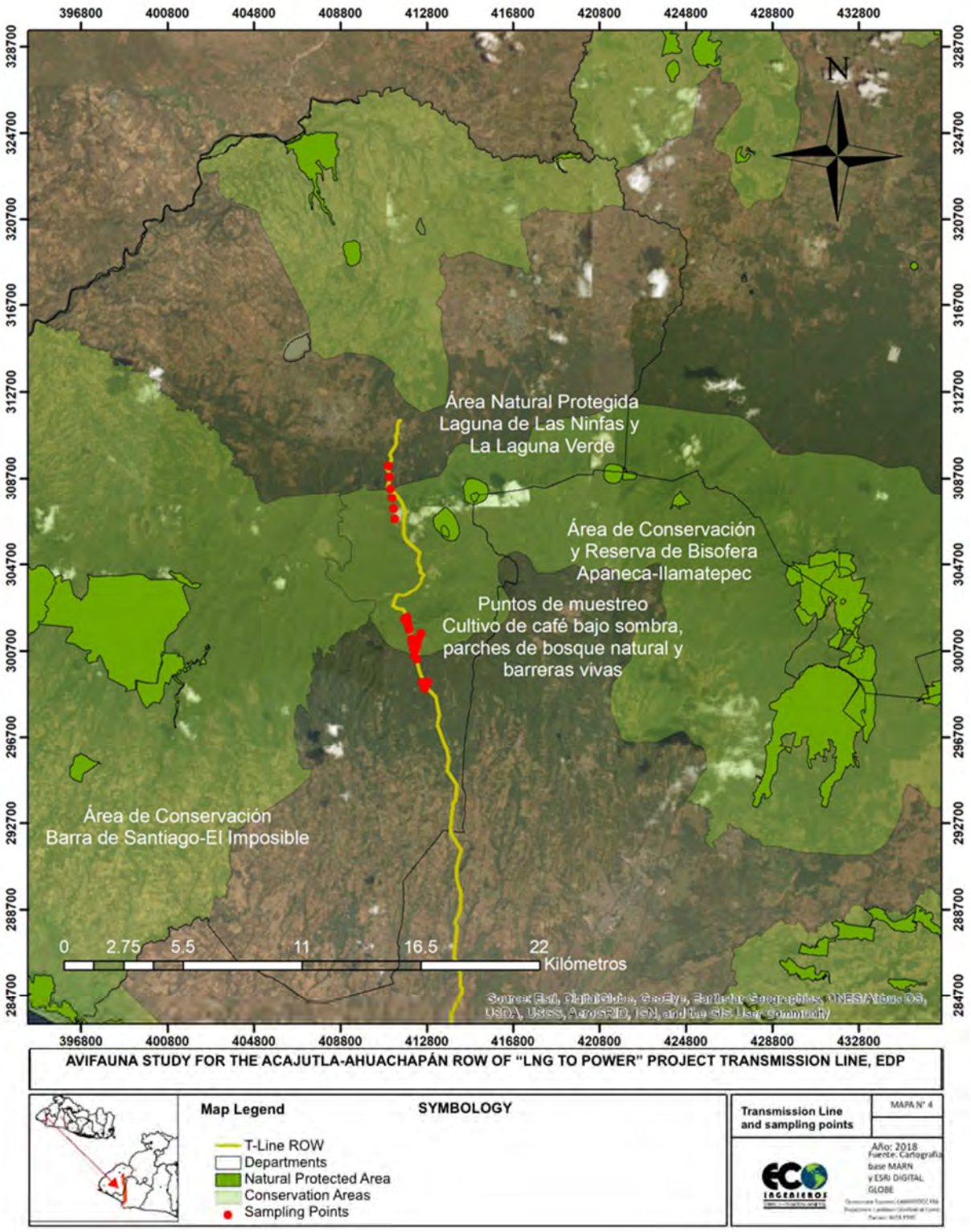


FIGURE 4 SAMPLING POINTS AT SHADOW COFFEE CROPS , PATCHES OF NATURAL FOREST AND LIVING BARRIERS AT ENERGÍA DEL PACÍFICO TRANSMISSION LINE PROJECT, FEBRUARY 2018.

3. RESULTS

The ecosystems found in the vicinity of the Transmission Line include open areas, sugarcane crops, coffee plantations, remnants of low deciduous forest and patches of natural perennial forest with natural barriers breaking winds. Therefore, with the purpose of simplifying data analysis, two types of ecosystems were differentiated: (1) characterized by areas of sugarcane cultivation with flooded grasslands and (2) areas with shade coffee crops with patches of natural forest and live barriers. In these areas, the bird species identified are reported in the following sections.

3.1. Area of sugarcane cultivation and grasslands

This area covers points 1-9, characterized by open areas that flood at certain times of the year and where sugarcane cultivation predominates, as well as live fences (or hedges) and small patches of natural forest (Figure 5). In this area, a total of 856 individuals belonging to 32 families were found, which are divided into 79 species (Table 1). The most abundant families were: *Tyrannidae e Icteridae* with 11 and eight species respectively, followed by families *Columbidae* and *Cardinalidae* both with five species respectively, Accipitridae and Falconidae with four species each. The most abundant species were: *Icterus gálbula* (33 individuals), *Icterus spurius* (30 individuals), *Passerina ciris* (31 individuals), *Quiscalus mexicanus* (41 individuals), *Volatinia jacarina* (50 individuals).

PHOTO 1 OPEN ZONES WITH CULTIVATION OF SUGAR CANE AND PASTURES CIRCUNDANT TO THE PROJECT, FEBRUARY 2018.

According to the analyzes carried out for the data obtained from the sugarcane-grasslands zone, the Simpson index value shown is of 0.97, indicating that the dominance of species is low. On the other hand, the value of Shannon is 3.84 which indicates that the diversity of species is high in this zone.

According to the conservation categories, three species of birds were identified within a vulnerability category proposed by the Ministry of the Environment and Natural Resources (MARN, 2015), including: *Eupsittula canicularis*, *Brotogeris jugularis* y *Passerina ciris*, the latter is also registered under the category of Near Threatened (NT) by the International Union for Conservation of Nature (UICN, 2018).

Base on the seasonality dynamics of the birds (Figure 6), three categories are reported according to MARN classification (2008), of which Resident is the most represented with 56 species, equivalent to 71% of the records. This data reflects that most of the birds use this sites for feeding activities, among others. The next category was Migratory with 20 species, representing 25% of the birds registered in the zone, that are characterized for visiting our country while winter passes at their breeding sites in North America, using the area to carry out activities such as feeding and

resting. The Resident-Migratory category presented two species, representing 4% that use the site as a foraging, breeding and resting areas.

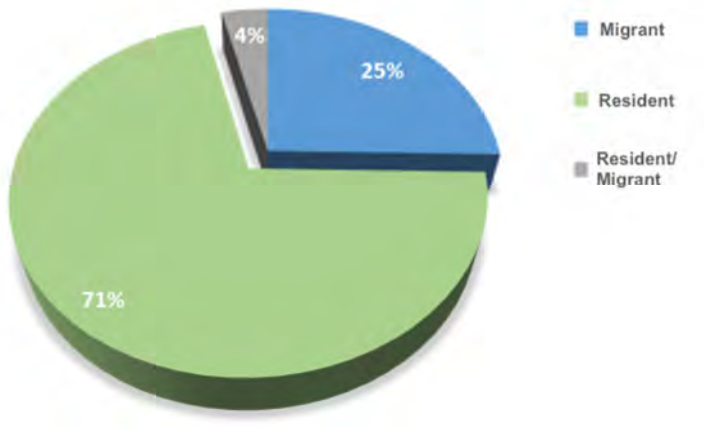


FIGURE 5 SEASONALITY OF THE SPECIES OF BIRDS IDENTIFIED AT SUGARCANE CULTIVATION AREAS, FLOODED GRASSLANDS, OPEN ZONE AND PATCHES OF NATURAL FOREST FOUND IN POINTS 1 TO 9, FEBRUARY 2018

TABLE 1 SPECIES OF BIRDS IDENTIFIED AT SUGARCANE CULTIVATION AREAS, FLOODED GRASSLANDS, OPEN ZONE AND PATCHES OF NATURAL FOREST FOUND IN POINTS 1 TO 9, FEBRUARY 2018

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
Cracidae	*Ortalis leucogastra*	chachalaca vientre blanco	Resident	YES			4
Odontophoridae	*Colinus cristatus*	codorniz crestada	Resident	YES			5
Ardeidae	*Ardea herodias*	garzón cenizo	Migratory	NO			1
	Bubulcus ibis	garza garrapatera	Resident	YES			29
	Butorides virescens	garza verde	Resident	YES			2
Cathartidae	*Coragyps atratus*	zope cabeza negra	Resident	YES			11
	Cathartes aura	Zope cabeza roja	Resident/ Migratory	YES/NO			19
Accipitridae	*Elanus leucurus*	gavilán piscucha	Resident	YES			1

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
	Buteogallus anthracinus	gavilán cangrejero	Resident	YES			1
	Rupornis magnirostris	gavilán de los caminos	Resident	YES			7
	Buteo plagiatus	gavilán gris	Resident	YES			4
Charadriidae	*Charadrius vociferus*	chorlito tildío	Migratory	NO			7
Jacanidae	*Jacana spinosa*	gallito de agua	Resident	YES			3
Columbidae	*Patagioenas flavirostris*	paloma morada	Resident	YES			2
	Zenaida asiatica	paloma aliblanca	Resident	YES			30
	Columbina inca	paloma colilarga	Resident	YES			25
	Columbina passerina	paloma común	Resident	YES			4
	Columbina talpacoti	paloma rojiza	Resident	YES			10
Cuculidae	*Morococcyx erythropygus*	chonte bobo	Resident	YES			1
	Crotophaga sulcirostris	pijuyo	Resident	YES			18
Strigidae	*Glaucidium brasilianum*	aurora	Resident	YES			4
Caprimulgidae	*Nyctidromus albicollis*	pucuyo	Resident	YES			1
Trochilidae	*Anthracothorax prevostii*	colibrí mango	Resident	YES			3
	Amazilia rutila	colibrí canelo	Resident	YES			5
	Archilochus colubris	colibrí garganta de rubí	Migratory	NO			2
Momotidae	*Eumomota superciliosa*	torogoz	Resident	YES			5
Alcenidae	*Chloroceryle amazona*	martin pescador amazonico	Resident	YES			1
	Chloroceryle americana	martin pescador verde	Resident	YES			2
Picidae	*Melanerpes aurifrons*	cheje	Resident	YES			22
Falconidae	*Micrastur semitorquatus*	halcón selvatico	Resident	YES			1
	Caracara cheriway	caracara	Resident	YES			2
	Falco sparverius	lis-lis	Migratory	NO			2
	Falco columbarius	esmerejon	Migratory	NO			1
Psittacidae	*Eupsittula canicularis*	chocoyo	Resident	YES	Threatened		3
	Brotogeris jugularis	catalnica	Resident	YES	Threatened		4

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
Tyrannidae	*Camptostoma imberbe*	papamosca bigotudo	Resident	YES			3
	Tolmomyias sulphurescens	pico plano ojiblanco	Resident	YES			6
	Empidonax minimus	papamosca minimus	Migratory	NO			4
	Myiarchus tuberculifer	copetón triste	Resident	YES			2
	Myiarchus tyrannulus	copetón tirano	Resident/ Migratory	YES/NO			2
	Pitangus sulphuratus	cristo fue	Resident	YES			19
	Megarynchus pitangua	luis pico grueso	Resident	YES			8
	Myiozetetes similis	chio	Resident	YES			26
	Tyrannus melancholicus	tyrano melancólico	Resident	YES			36
	Tyrannus verticalis	tirano occidental	Migratory	NO			10
	Tyrannus forficatus	tijereta rosada	Migratory	NO			37
Tytiridae	*Pachyramphus aglaiae*	copeton degollado	Resident	YES			7
Vireonidae	*Vireo flavifrons*	vireo garganta amarilla	Migratory	NO			1
Corvidae	*Calocitta formosa*	urraca	Resident	YES			4
Hirundinidae	*Progne chalybea*	golondrina pechigris	Resident	YES			3
	Stelgidopteryx serripennis	golondrina aliserrada	Resident	YES			12
	Hirundo rustica	golondrina ranchera	Migratory	NO			20
Troglodytidae	*Campylorhynchus rufinucha*	guacalchia	Resident	YES			26
Polioptilidae	*Polioptila caerulea*	perlita	Migratory	NO			2
Turdidae	*Turdus grayi*	chonte	Resident	YES			32
Parulidae	*Oreothlypis peregrina*	chipe peregrino	Migratory	NO			2
	Setophaga petechia	chipe amarillo	Migratory	NO			23
	Parkesia noveboracensi	chipe charquero	Migratory	NO			3
Thraupidae	*Thraupis episcopus*	azulejo	Resident	YES			2
	Thraupis abbas	azulejo aliamarilla	Resident	YES			1
	Saltator coerulescens	dichosofuii	Resident	YES			8
Emberizidae	*Volatinia jacarina*	volatin	Resident	YES			53
	Sporophila torqueola	corbatin	Resident	YES			31
	Peucaea ruficauda	chichihuitero	Resident	YES			6

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
Cardinalidae	*Piranga rubra*	tangara veranera	Migratory	NO			4
	Pheucticus ludovicianus	puñalada	Migratory	NO			6
	Passerina caerulea	pico grueso azul	Resident/ Migratory	YES/NO			19
	Passerina cyanea	colorin azul	Migratory	NO			5
	Passerina ciris	siete colores	Migratory	NO	Threaten ed	Near Threatened	31
Icteridae	*Agelaius phoeniceus*	sargento	Resident	YES			13
	Sturnella magna	zacatero común	Resident	YES			3
	Dives dives	tordo cantor	Resident	YES			19
	Quiscalus mexicanus	zanate-clarinero	Resident	YES			41
	Icterus spurius	chiltota castaña	Migratory	NO			30
	Icterus pustulatus	chiltota espalda rayada	Resident	YES			9
	Icterus gularis	chiltota de altamira	Resident	YES			6
	Icterus galbula	chiltota de baltimor	Migratory	NO			33
Fringillidae	*Euphonia affinis*	eufonia	Resident	YES			3
Estrildidae	*Lonchura malacca*	capuchino tricolor	Resident	YES			3

Source: Eco Ingenieros Consulting Team, February 2018

3.2. Shade coffee crops with patches of natural forest and live barriers

This zone covers points 10 to 35, where greater emphasis was kept, as it consist of patches of typical forests in the area. The area consists of evergreen forests at the two seasons of the year with predominance of shade coffee crops, some farms with low productivity and some cases being completely neglected (Figure 7). These characteristics provide good sites for bird diversity. In this zone a total of 1,635 individuals belonging to 34 families were found, which are divided into 121 species (Table 2). The most abundant families were: *Trochilidae, Tyrannidae* with 12 species respecting, *Parulidae* 11, and *Icteridae* with nine species. According to the abundance of individuals, *Oreothlypis peregrina* has 206 individuals, *Cyanocorax melanocyaneus* with 123 individuals, *Cardellina pusilla* with 81 individuals, *Setophaga townsendi* with 42 individuals, *Streptoprocne zonaris* with 60 individuals and *Cathartes aura* with 73 individuals.

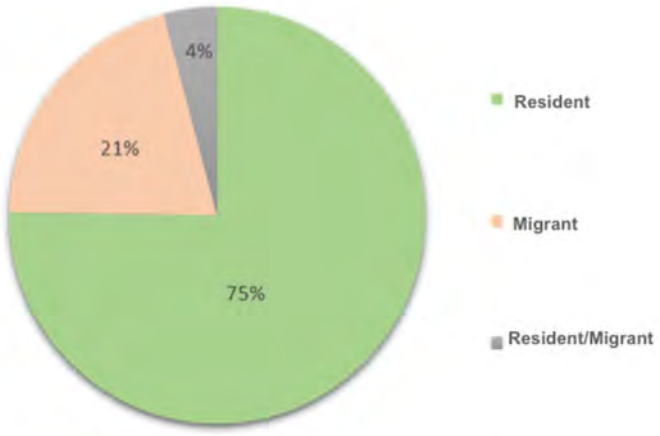
Source: Eco Ingenieros Consulting Team, February 2018

PHOTO 2 SHADE COFFEE CROPS WITH PATCHES OF NATURAL FOREST AND LIVE BARRIERS FOUND IN POINTS 10 TO 35, FEBRUARY 2018

According to the data obtained at the zone of shade coffee crops with patches of natural forest, the value of the Simpson index was 0.96, this indicates that the dominance of species is low. However, the value of Shannon is 4.0, this indicates that the diversity of species is high in this zone. According to the conversation categories, three species of bird with vulnerability category of Endangered were recorded: *Accipiter striatus chionogaster*, *Spizaetus tyrannus* ***and*** *Tilmatura dupontii*, and six species in the category of Threatened proposed by the Ministry of the Environment and Natural Resources (MARN, 2015) which were: *Aulacorhynchus prasinus*, *Psittacara strenuus*, *Eupsittula canicularis*, *Brotogeris jugularis*, *Chiroxiphia linearis* and *Passerina ciris*,

the latter also registered under the category of Near Threatened (NT) by the International Union for Conservation of Nature (UICN, 2018).

Based on the seasonality of the birds (Figure 8), according MARN classification (2008), three categories were reported of which Resident was the most represented with 91 species, equivalent to 75% of the total birds for in the analyzed zones. This data shows that most of the birds use these sites for feeding activities, among others. The next category was Migrant with 25 species representing 21% of birds registered in the zone, that are characterized for visiting our country while winter passes at their breeding sites in North America, using the area to carry out activities such as feeding and resting. The Resident-Migrant category presented two species, equivalent to 4%, which use the site as a foraging, breeding and resting area and have both residents and migratory populations.



Source: Eco Ingenieros Consulting Team, February 2018

FIGURE 6 SEASONALITY OF THE SPECIES OF BIRDS IDENTIFIED AT SHADE COFFEE CROPS WITH PATCHES OF NATURAL FOREST AND LIVE BARRIERS FOUND IN POINTS 10 TO 35, FEBRUARY 2018

TABLE 2 SPECIES OF BIRDS IDENTIFIED AT SHADE COFFEE CROPS WITH PATCHES OF NATURAL FOREST AND LIVE BARRIERS FOUND IN POINTS 10 TO 35, FEBRUARY 2018

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
Tinamidae	*Crypturellus cinnamomeus*	tinamú	Resident	YES			1
Odontophoridae	*Dactylortyx thoracicus*	codorniz silbadora	Resident	YES			1
	Dendrortyx leucophrys	gualchoca	Resident	YES			6
Cathartidae	*Coragyps atratus*	zope de cabeza negra	Resident	YES			33
	Cathartes aura	zope de cabeza roja	Resident-Migratory	YES			73

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
Accipitridae	*Accipiter striatus chionogaster*	gavilán pechiblanco	Resident	YES	Endangered		3
	Buteogallus anthracinus	gavilán cangrejero	Resident	YES			1
	Buteo platypterus	gavilán aludo	Migratory	NO			12
	Buteo plagiatus	gavilán gris	Resident	YES			5
	Buteo brachyurus	gavilan colicorta	Resident-Migratory	YES/NO			5
	Buteo albonotatus	gavilán aura	Resident-Migratory	YES/NO			1
	Buteo jamaicensis	gavilán cola roja	Resident-Migratory	YES/NO			10
	Spizaetus tyrannus	águila tirana	Resident	YES	Endangered		2
Columbidae	*Patagioenas flavirostris*	paloma morada	Resident	YES			18
	Patagioenas fasciata	paloma collareja	Resident	YES			5
	Zenaida asiatica	paloma aliblanca	Resident	YES			21
	Leptotila verreauxi	paloma arroyera	Resident	YES			32
Cuculidae	*Piaya cayana*	cuco ardilla	Resident	YES			21
	Crotophaga sulcirostris	pijuyo	Resident	YES			9
	Morococcyx erythropygus	chonte bobo	Resident	YES			1
Strigidae	*Glaucidium brasilianum*	aurora	Resident	YES			2
Apodidae	*Streptoprocne rutila*	vencejo cuellorufo	Resident	YES			8
	Streptoprocne zonaris	vencejo cuelloblanco	Resident	YES			60
	Chaetura vauxi	vencejo de vauxi	Resident	YES			16
Trochilidae	*Campylopterus rufus*	colibrí rufo	Resident	YES			9
	Campylopterus hemileucurus	fandangero morado	Resident	YES			1
	Colibri thalassinus	colibrí oreja violeta	Resident	YES			1
	Chlorostilbon canivetii	colibrí esmeraldo	Resident	YES			13
	Amazilia beryllina	colibrí de birilo	Resident	YES			20
	Amazilia rutila	colibrí canelo	Resident	YES			7

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
	Lampornis viridipallens	colibrí gorjiverde de montaña	Resident	YES			4
	Eugenes fulgens	colibrí magnifico	Resident	YES			2
	Heliomaster longirostris	colibrí piqui largo	Resident	YES			1
	Heliomaster constantii	colibrí	Resident	YES			1
	Tilmatura dupontii	colibrí de dupont	Resident	YES	Endangered		1
	Archilochus colubris	colibrí gorjirubi	Migratory	NO			17
Trogonidae	*Trogon caligatus*	coa pechiamarillo	Resident	YES			3
	Trogon elegans	coa pechirojo	Resident	YES			1
Momotidae	*Momotus lesonii*	talapo	Resident	YES			24
Ramphastidae	*Aulacorhynchus prasinus*	tucán verde	Resident	YES	Threatened		16
	Pteroglossus torquatus	tucán pico de navaja	Resident	YES			3
Picidae	*Melanerpes aurifrons*	Cheje	Resident	YES			16
	Colaptes rubiginosus	carpintero verdidorado	Resident	YES			14
	Dryocopus lineatus	carpintero lineado	Resident	YES			1
Falconidae	*Micrastur ruficollis*	halcón selvatico	Resident	YES			2
	Micrastur semitorquatus	halcón collarejo	Resident	YES			2
	Herpetotheres cachinnans	guas	Resident	YES			2
	Falco peregrinus	halcón peregrino	Migratory	NO			1
Psittacidae	*Psittacara strenuus*	pericon verde	Resident	YES	Threatened		5
	Eupsittula canicularis	chocoyo	Resident	YES	Threatened		5
	Brotogeris jugularis	catalnica	Resident	YES	Threatened		2
Thamnophilidae	*Thamnophilus doliatus*	batara rayada	Migratory	NO			6
Furnariidae	*Xiphorhynchus flavigaster*	trepatronco pico de marfil	Resident	YES			1
Dendrocolaptidae	*Lepidocolaptes affinis*	trepador cabecipunteado	Resident	YES			1

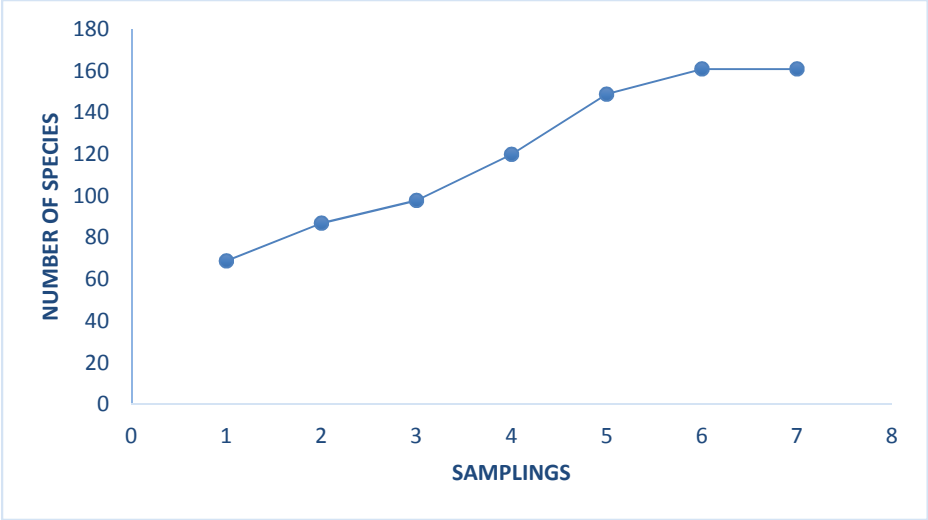
Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
Tyrannidae	*Elaenia frantzii*	elaenia de montaña	Resident	YES			4
	Zimmerius vilissimus	mosquero cejigris	Resident	YES			11
	Tolmomyias sulphurescens	pico plano ojiblanco	Resident	YES			3
	Contopus cinereus	pibi tropical	Resident	YES			1
	Empidonax flaviventris	mosquero vientreamarillo	Migratory	NO			11
	Empidonax minimus	mosquero minimus	Migratory	NO			4
	Myiarchus tuberculifer	copetón triste	Resident	YES			10
	Myiarchus crinitus	copetón viajero	Migratory	NO			6
	Pitangus sulphuratus	cristofue	Resident	YES			2
	Myiozetetes similis	chio	Resident	YES			2
	Tyrannus melancholicus	tirano melancolicó	Resident	YES			3
	Tyrannus forficatus	tijereta rosada	Migratory	NO			1
Pipridae	*Chiroxiphia linearis*	toledo	Resident	YES	Threatened		2
Tytiridae	*Tityra semifasciata*		Resident	YES			27
Vireonidae	*Vireo solitarius*	vireo solitario	Migratory	NO			3
	Vireo gilvus	vireo gorjeador	Migratory	NO			10
	Pachysylvia decurtata	verdillo común	Resident	YES			2
	Cyclarhis gujanensis	vireón cejirufo	Resident	YES			7
Corvidae	*Calocitta formosa*	urraca	Resident	YES			17
	Cyanocorax melanocyaneus	chara	Resident	YES			123
Hirundinidae	*Atticora pileata*	golondrina cabecinegra	Resident	YES			3
	Tachycineta thalassina	golondrina verde violacea	Migratory	NO			2
	Stelgidopteryx serripennis	golondrina alicerrada	Resident	YES			3
Troglodytidae	*Campylorhynchus rufinucha*	guacalchia	Resident	YES			21
	Pheugopedius maculipectus	saltapared vientre barrado	Resident	YES			6

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
	Thryophilus rufalbus	salta pared/arriero rufiblanco	Resident	YES			9
	Cantorchilus modestus	sinsivirín	Resident	YES			4
	Troglodytes aedon	gurrumiche	Resident	YES			20
Turdidae	*Myadestes occidentalis*	guardabarranco	Resident	YES			9
	Catharus aurantiirostris	zorzal piquinaranja	Resident	YES			7
	Catharus ustulatus	zorzal swainson	Migratory	NO			3
	Turdus grayi	chonte	Resident	YES			48
	Turdus assimilis	zorzal gorjiblanco	Resident	YES			5
Mimidae	*Melanotis hypoleucus*	mulato pechiblanco	Resident	YES			3
Parulidae	*Mniotilta varia*	chipe trepador	Migratory	NO			32
	Oreothlypis peregrina	chipe peregrino	Migratory	NO			206
	Geothlypis tolmiei	chipe de tolmei	Migratory	NO			19
	Setophaga magnolia	chipe de magnolia	Migratory	NO			22
	Setophaga petechia	chipe amarillo	Migratory	NO			7
	Setophaga townsendi	chipe de townsend	Migratory	NO			42
	Setophaga virens	chipe dorsoverde	Migratory	NO			10
	Basileuterus lachrymosus	chipe roquero	Resident	YES			1
	Basileuterus rufifrons	chipe de cejirufo	Resident	YES			10
	Cardellina pusilla	chipe de wilson	Migratory	NO			81
	Myioborus miniatus	pavito	Resident	YES			5
Icteriidae	*Icteria virens*	griton pechiamarillo	Migratory	NO			2
Thraupidae	*Thraupis abbas*	tangara aliamarilla	Resident	YES			15
	Cyanerpes cyaneus	mielero patirojas	Resident-Migratory	YES/NO			22
	Saltator coerulescens	dichosofuii	Resident	YES			8
	Saltator atriceps	chepito	Resident	YES			31

Family	*Scientific Name*	Common Name	Seasonality	Nesting	MARN Category	UICN Category	Frequency
Passerellidae	*Aimophila rufescens*	zacatonero rojizo	Resident	YES			1
Cardinalidae	*Piranga rubra*	tangara veranera	Migratory	NO			24
	Piranga leucoptera	tangara aliblanca	Resident	YES			7
	Piranga ludoviciana	tangara occidental	Migratory	NO			15
	Pheucticus ludovicianus	puñalada	Migratory	NO			20
	Passerina ciris	siete colores	Migratory	NO	Threatened	Near Threatened	5
Icteridae	*Dives dives*	tordo cantor	Resident	YES			32
	Quiscalus mexicanus	zanate-clarinero	Resident	YES			8
	Molothrus aeneus	tordo ojos rojo	Resident	YES			10
	Icterus maculialatus	chiltota guatemalteco	Resident	YES			2
	Icterus chrysater	chiltota dorsidorado	Resident	YES			28
	Icterus pustulatus	chiltota espalda rayada	Resident	YES			10
	Icterus pectoralis	chiltota pechomanchado	Resident	YES			5
	Icterus gularis	chiltota de altamira	Resident	YES			20
	Amblycercus holosericeus	cacique pico amarillo	Resident	YES			1
Fringillidae	*Euphonia affinis*	eufonia gorjinegro	Resident	YES			3
	Euphonia hirundinacea	eufonia garganta amarilla	Resident	YES			11

Source: Eco Ingenieros Consulting Team, February 2018

The species accumulation curves (Figure 9), shows that the human effort made in the bird inventory shows an increasing trend in the first five sampling, then it takes a line shape that resembles an asymptote. However, this does not reflect that the sampling is completes, since there is a margin of probability of increasing the list of species when implementing others techniques or greater sampling effort, such as, for example, greater number of replications, extension of sampling periods, among others.



Source: Eco Ingenieros Consulting Team, February 2018

FIGURE 7 SPECIES–ACCUMULATION CURVES BY FRECUENCE OF OBSERVATION DURING THE SAMPLES CARRIED OUT AT THE PROJECT SITES FEBRUARY 2018.

4. CONCLUSIONS

The intensive use and changes in land use are evident at the lower zone of the study area, mainly due to the intensive use of sugarcane production, basic grain crops and livestock. These conditions have generated an alteration in a large part of the landscape and ecosystems studied, evidencing forest fragmentation and little connectivity in a large part of the study area and generally in the country, with exception of the zone established for cultivation of coffee, consisting of areas that represent a high priority for biodiversity in general, in the particular case of El Salvador (Crespin y Simonetii 2015, 2016).

In spite of this, a great diversity of birds register high adaptability to the current conditions of the landscape, evidence of which, was the observation of many species of birds in the zone of crops and pastures. In the case of open areas in the present study, for example sugar cane and livestock, activities such as foraging and food search were observed from members of species of the family *Tyrannidae* (papamoscas), the family *Columbidae* (palomas) and family *Cardinalidae* that were feeding of grains or insects. Even, some species of the family *Accipitridae* and *Falconidae* were observed in open areas feeding on insects and small rodents, probably the high abundance of these groups of birds is caused by the ease and availability of food on cleared land. For the present study, the high occurrence of *Icterus gálbula* (33 individuals), *Icterus spurius* (30 individuals), *Passerina ciris* (31 individuals), *Quiscalus mexicanus* (41 individuals) and *Volatinia jacarina* (50 individuals) may be due to the fact that they are generalist species that occupy open areas for

foraging, feeding and resting and the patches of scattered forests or living fence trees generate condition for their development in these areas.

71% of the birds found in the open zones (sugar cane crops and grassland) correspond to the resident category. These results reflects that most of the birds use this sites for feeding, reproduction and refuge activities. While 25% of the birds registered in the open zones correspond to the category of migrants, which are characterized for visiting our country while winter passes at their breeding sites in North America, using the area to carry out activities such as feeding and resting. On the other hand, the remaining 4% identified in these opens zones corresponds to the Resident-Migrant category, these birds occupy the site as nesting and foraging since they have two populations: one that visits all years during the months of September to October and travel up north of the continent from March-April, while the others reside throughout the year at the study areas.

In the sector of the open zones such as sugar cane and livestock, threes species were found under the category of Threatened according to MARN criteria and one Near threatened according to UICN criteria which were *Eupsittula canicularis, Brotogeris jugularis* and *Passerina ciris* these species are under threat due to degradations of their habitat and illegal hunting that suffer constantly either by their striking colors or because people want to have a parrot as a pet, with that thought in mind chicks are extracted from their nests.

On the others hand, zones such as coffee plantation and small forest patches identified mainly in the high zone of the Apaneca-Ilamatepec mountain range, signify conditions that favor other groups of species, including specialist species from closed areas. The most abundant families in this sector were the family *Trochilidae, Parulidae* and *Icteridae*, their high abundance may correspond to the flowering period of *Inga sp,* a tree that is planted for coffee shade and is very abundant in this zone. Another prolific family in this zone was the *Tyrannidae* family and its high abundance may be related to the availability of trees for foraging and resting sites. Due to its abundance of individuals the following species are identified: *Oreothlypis peregrina* (206 individuals), *Cyanocorax melanocyaneus* (123 individuals), *Cardellina pusilla* (81 individuals), *Setophaga townsendi* (42 individuals), *Streptoprocne zonaris* (60 individuals), *Cathartes aura* (73 individuals). The high occurrence of these species may be due to fact that they are forest specialists and occupy these areas to feed and rest because of the protection that this area offers them.

Birds identified at the zone of shade coffee crops with patches of natural forest, consist of 75% categorized as resident, these birds occupy the zone to complete their full biological cycle and foraging. Followed by 21% of birds that were categorized as migratory, which visit our country on specific seasons fleeing the low temperatures of the north of the continent and then return to their breeding site in North America the rest of the year. The Resident-migratory category

presented 4% of the species and they have two different populations: one that carries out its complete biological cycle in this zone and the others uses the site as a foraging and resting areas.

According to conservation categories, three species of birds with *Endangered* category were recorded which are: *Accipiter striatus chionogaster, Spizaetus tyrannus and Tilmatura dupontii,* and six *Threatened* species according to the Ministry of the Environment and Natural Resources (MARN, 2015) these are: *Aulacorhynchus prasinus, Psittacara strenuus, Eupsittula canicularis*, *Brotogeris jugularis* , *Chiroxiphia linearis* and *Passerina ciris,* the latter also under the category of *Near threatened* for UNICN (UNICN, 2018). All these species are cataloged because there is a decline in their populations due to loss and fragmentation of their natural habitat because of aggressive practices not very friendly to the environment such as coffee plantation and due to the illegal trafficking of birds that is not fought and remains in impunity. (Birdlife, 2008)

The total number of birds found along the transmission line zone was of 161 species of birds, and the zone of coffee plantations-patches of natural forest was the place that registeres the largest number of bird species with 121 species. Within this type of habitat some important points for birds were recognized (Points 17, 18, 19, 20, 25, 27, 28 and 29) which shows species that are listed as category as *Threatened*, also noted in points 29, 30 and 31 where a flock of migratory birds of prey of approximately 3 thousand *Cathartes aura*, that went of the south and with direction to the north was identified. The ecosystems of shadow coffee and patches of natural forest presented a high diversity of species due to different food resources and different refuges that are presented for the birds in the zone. These zones represent refuge conditions that are not found in other areas although there is high fragmentation of habitat, birds have developed important adaptations that allow them to coexist with human, however, these conditions favored by the coffee plantations, are very fragile because the conservation of these habitats depend on market conditions or property rights of farm owners, so it is necessary to create new conditions of patch connectivity and forest protection along this landscape, so that circumstances are created to sustain the biodiversity of the area.

5. RECOMMENDATIONS

Electric transmission lines can have a significant impact in the environments, during the construction and operations of the project, due mainly factors such as electromagnetic fields, deforestation, habitat fragmentation, and landscape alteration that comes with the installation of high voltage towers. Also, due to the high numbers of birds identified for the project area, that include residents as migratory birds, flight routes may be affected, also the threat of finding nesting or resting sites in these infrastructures, including the low visibility that can generated during adverse weather conditions, in some cases, the transmission line may not be seen by some birds and causing direct impacts and causing permanent damage or even death of some of them.

So, it's recommended to use different distances between conductors, different types of insulators, increase the visibility of the line with striking devices such as spirals or "Bird Flight Diverters" of highly contrasting colors placed along the transmission lines. This will allow to diminish the impact of collision of birds, mainly the groups of raptors, aquatic birds, and groups of migratory birds, which are the species that achieve high flight elevations and long trips on the landscape.

Due to the destruction of habitat for the installation of the towers it is suggested to restored native vegetation areas corresponding to the live zone or corresponding ecosystem type, as well as the corresponding monitoring along the plantation establishment. It is important to incorporate trees that favor the feeding, forage and nesting of the different species of birds. Likewise, it is advisable to establish a constant monitoring along the ROW of the transmission line during all phases of the project, in order to keep a record on potential damage, damage effect or in the effectiveness of the deterrent mechanisms to prevent bird mortality. With this, it is guaranteed to reduce the amount of impacts or modify strategies to reduce the impacts.

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7. APPENDIX

TABLE 3 SPECIES FOUND ALONG THE TRANSMISSION LINE PROJECT ACAJUTLA-AHUACHAPÁN, FEBRUARY 2018.

Family	*Scientific Name*	Common Name	Seasonality	MARN Category
Tinamidae	*Crypturellus cinnamomeus*	tinamu	Resident	
Cracidae	*Ortalis leucogastra*	chachalaca vientre blanco	Resident	
Odontophoridae	*Colinus cristatus*	codorníz crestada	Resident	
	Dactylortyx thoracicus	codorniz silbadora	Resident	
	Dendrortyx leucophrys	gualchoca	Resident	
Ardeidae	*Ardea herodias*	garzon cenizo	Migratory	
	Bubulcus ibis	garza garrapatera	Resident	
	Butorides virescens	garza verde	Resident	
Cathartidae	*Coragyps atratus*	zope de cabeza negra	Resident	
	Cathartes aura	zope de cabeza roja	Resident- Migratory	
Accipitridae	*Elanus leucurus*	gavilán piscucha	Resident	

Family	*Scientific Name*	Common Name	Seasonality	MARN Category
	Accipiter striatus chionogaster	gavilán pechiblanco	Resident	Endangerment
	Buteogallus anthracinus	gavilán cangrejero	Resident	
	Rupornis magnirostris	gavilán de los caminos	Resident	
	Buteo platypterus	gavilán aludo	Migratory	
	Buteo plagiatus	gavilán gris	Resident	
	Buteo brachyurus	gavilan colicorta	Resident- Migratory	
	Buteo albonotatus	gavilán aura	Resident- Migratory	
	Buteo jamaicensis	gavilán cola roja	Resident- Migratory	
	Spizaetus tyrannus	águila tirana	Resident	Endangerment
Charadriidae	*Charadrius vociferus*	chorlito tildío	Migratory	
Jacanidae	*Jacana spinosa*	gallito de agua	Resident	
Columbidae	*Patagioenas flavirostris*	paloma morada	Resident	
	Patagioenas fasciata	paloma collareja	Resident	
	Zenaida asiatica	paloma aliblanca	Resident	
	Columbina inca	paloma colilarga	Resident	
	Columbina passerina	paloma común	Resident	
	Columbina talpacoti	paloma rojiza	Resident	
	Leptotila verreauxi	paloma arroyera	Resident	
Cuculidae	*Piaya cayana*	cuco ardilla	Resident	
	Crotophaga sulcirostris	pijuyo	Resident	
	Morococcyx erythropygus	chonte bobo	Resident	
Strigidae	*Glaucidium brasilianum*	aurora	Resident	
Caprimulgidae	*Nyctidromus albicollis*	pucuyo	Resident	
Apodidae	*Streptoprocne rutila*	vencejo cuellorufo	Resident	
	Streptoprocne zonaris	vencejo cuelloblanco	Resident	
	Chaetura vauxi	vencejo de vauxi	Resident	
Trochilidae	*Campylopterus rufus*	colibrí rufo	Resident	
	Campylopterus hemileucurus	fandangero morado	Resident	
	Colibri thalassinus	colibrí oreja violeta	Resident	
	Chlorostilbon canivetii	colibrí esmeraldo	Resident	
	Anthracothorax prevostii	colibrí mango	Resident	
	Amazilia beryllina	colibrí de birilo	Resident	
	Amazilia rutila	colibrí canelo	Resident	
	Lampornis viridipallens	colibrí gorjiverde de montaña	Resident	
	Eugenes fulgens	colibrí magnifico	Resident	
	Heliomaster longirostris	colibrí piqui largo	Resident	
	Heliomaster constantii	colibrí	Resident	
	Tilmatura dupontii	colibrí de dupont	Resident	Endangerment
	Archilochus colubris	colibrí gorjirubi	Migratory	

Family	*Scientific Name*	Common Name	Seasonality	MARN Category
Trogonidae	*Trogon caligatus*	coa pechiamarillo	Resident	
	Trogon elegans	coa pechirojo	Resident	
Momotidae	*Momotus lesonii*	talapo	Resident	
	Eumomota superciliosa	torogoz	Resident	
Alcenidae	*Chloroceryle amazona*	martin pescador amazonico	Resident	
	Chloroceryle americana	martin pescador verde	Resident	
Ramphastidae	*Aulacorhynchus prasinus*	tucán verde	Resident	Threatened
	Pteroglossus torquatus	tucán pico de navaja	Resident	
Picidae	*Melanerpes aurifrons*	Cheje	Resident	
	Colaptes rubiginosus	carpintero verdidorado	Resident	
	Dryocopus lineatus	carpintero lineado	Resident	
Falconidae	*Micrastur ruficollis*	halcón selvatico	Resident	
	Micrastur semitorquatus	halcón collarejo	Resident	
	Herpetotheres cachinnans	guas	Resident	
	Caracara cheriway	caracara	Resident	
	Falco sparverius	lis-lis	Migratory	
	Falco columbarius	esmerejon	Migratory	
	Falco peregrinus	halcón peregrino	Migratory	
Psittacidae	*Psittacara strenuus*	pericon verde	Resident	Threatened
	Eupsittula canicularis	chocoyo	Resident	Threatened
	Brotogeris jugularis	catalnica	Resident	Threatened
Thamnophilidae	*Thamnophilus doliatus*	batara rayada	Migratory	
Furnariidae	*Xiphorhynchus flavigaster*	trepatronco pico de marfil	Resident	
Dendrocolaptidae	*Lepidocolaptes affinis*	trepador cabecipunteado	Resident	
Tyrannidae	*Camptostoma imberbe*	papamosca bigotudo	Resident	
	Elaenia frantzii	elaenia de montaña	Resident	
	Zimmerius vilissimus	mosquero cejigris	Resident	
	Tolmomyias sulphurescens	pico plano ojiblanco	Resident	
	Contopus cinereus	pibi tropical	Resident	
	Empidonax flaviventris	mosquero vientreamarillo	Migratory	
	Empidonax minimus	mosquero minimus	Migratory	
	Myiarchus tuberculifer	copetón triste	Resident	
	Myiarchus crinitus	copetón viajero	Migratory	
	Myiarchus tyrannulus	copetón tirano	Resident- Migratory	
	Megarynchus pitangua	luis pico grueso	Resident	
	Pitangus sulphuratus	cristofue	Resident	
	Myiozetetes similis	chio	Resident	
	Tyrannus melancholicus	tirano melancolicó	Resident	
	Tyrannus verticalis	tirano occidental	Migratory	

Family	*Scientific Name*	Common Name	Seasonality	MARN Category
	Tyrannus forficatus	tijereta rosada	Migratory	
Pipridae	*Chiroxiphia linearis*	toledo	Resident	Threatened
Tytiridae	*Pachyramphus aglaiae*	copeton degollado	Resident	
	Tityra semifasciata		Resident	
Vireonidae	*Vireo solitarius*	vireo solitario	Migratory	
	Vireo gilvus	vireo gorjeador	Migratory	
	Vireo flavifrons	vireo garganta amarilla	Migratory	
	Pachysylvia decurtata	verdillo común	Resident	
	Cyclarhis gujanensis	vireón cejirufo	Resident	
Corvidae	*Calocitta formosa*	urraca	Resident	
	Cyanocorax melanocyaneus	chara	Resident	
Hirundinidae	*Atticora pileata*	golondrina cabecinegra	Resident	
	Progne chalybea	golondrina pechigris	Resident	
	Tachycineta thalassina	golondrina verde violacea	Migratory	
	Stelgidopteryx serripennis	golondrina alicerrada	Resident	
Troglodytidae	*Campylorhynchus rufinucha*	guacalchia	Resident	
	Pheugopedius maculipectus	saltapared vientre barrado	Resident	
	Thryophilus rufalbus	salta pared/arriero rufiblanco	Resident	
	Cantorchilus modestus	sinsivirín	Resident	
	Troglodytes aedon	gurrumiche	Resident	
Polioptilidae	*Polioptila caerulea*	perlita	Migratory	
Turdidae	*Myadestes occidentalis*	guardabarranco	Resident	
	Catharus aurantiirostris	zorzal piquinaranja	Resident	
	Catharus ustulatus	zorzal swainson	Migratory	
	Turdus grayi	chonte	Resident	
	Turdus assimilis	zorzal gorjiblanco	Resident	
Mimidae	*Melanotis hypoleucus*	mulato pechiblanco	Resident	
Parulidae	*Mniotilta varia*	chipe trepador	Migratory	
	Oreothlypis peregrina	chipe peregrino	Migratory	
	Geothlypis tolmiei	chipe de tolmei	Migratory	
	Setophaga magnolia	chipe de magnolia	Migratory	
	Setophaga petechia	chipe amarillo	Migratory	
	Setophaga townsendi	chipe de townsend	Migratory	
	Setophaga virens	chipe dorsoverde	Migratory	
	Basileuterus lachrymosus	chipe roquero	Resident	
	Basileuterus rufifrons	chipe de cejirufo	Resident	
	Parkesia noveboracensi	chipe charquero	Migratory	
	Cardellina pusilla	chipe de wilson	Migratory	
	Myioborus miniatus	pavito	Resident	

Family	*Scientific Name*	Common Name	Seasonality	MARN Category
Icteriidae	*Icteria virens*	griton pechiamarillo	Migratory	
Thraupidae	*Thraupis abbas*	tangara aliamarilla	Resident	
	Thraupis episcopus	azulejo	Resident	
	Cyanerpes cyaneus	mielero patirojas	Resident- Migratory	
	Saltator coerulescens	dichosofuii	Resident	
	Saltator atriceps	chepito	Resident	
Passerellidae	*Aimophila rufescens*	zacatonero rojizo	Resident	
Emberizidae	*Volatinia jacarina*	volatin	Resident	
	Sporophila torqueola	corbatin	Resident	
	Peucaea ruficauda	chichihuitero	Resident	
Cardinalidae	*Piranga rubra*	tangara veranera	Migratory	
	Piranga leucoptera	tangara aliblanca	Resident	
	Piranga ludoviciana	tangara occidental	Migratory	
	Pheucticus ludovicianus	puñalada	Migratory	
	Passerina ciris	siete colores	Migratory	Threatened
	Passerina caerulea	pico grueso azul	Resident- Migratory	
	Passerina cyanea	colorin azul	Migratory	
Icteridae	*Agelaius phoeniceus*	sargento	Resident	
	Sturnella magna	zacatero común	Resident	
	Dives dives	tordo cantor	Resident	
	Quiscalus mexicanus	zanate-clarinero	Resident	
	Molothrus aeneus	tordo ojos rojos	Resident	
	Icterus spurius	chiltota castaña	Migratory	
	Icterus maculialatus	chiltota guatemalteco	Resident	
	Icterus chrysater	chiltota dorsidorado	Resident	
	Icterus pustulatus	chiltota espalda rayada	Resident	
	Icterus pectoralis	chiltota pechomanchado	Resident	
	Icterus galbula	chiltota de baltimor	Migratory	
	Icterus gularis	chiltota de altamira	Resident	
	Amblycercus holosericeus	cacique pico amarillo	Resident	
Fringillidae	*Euphonia affinis*	eufonia gorjinegro	Resident	
	Euphonia hirundinacea	eufonia garganta amarilla	Resident	
Estrildidae	*Lonchura malacca*	capuchino tricolor	Resident	
	161 especies			

PHOTOGRAPHS OF BIRDS

Left side *Jacana spinisa*, right side *Charadrius vociferus*, observed in flooded grasslands. February 2018.

Left side *Lonchura malacca* and right side *Passerina ciris* observed in the livestock area. February 2018.

Left side *Setophaga magnolia* and right side *Cardellina pusilla*, observed in a coffee farm. February 2018.


Left side *Buteo brachyurus* and right side *Mniotilta varia*, forest patch-with coffee farm. February 2018.


Left side *Aulacorhynchus prasinus,* and right side *Passerina ciris* observed in a coffee farm with forest patch. February 2018.


Left side *Campylopterus rufus*, and right side *Chlorostilbon canivetii,* in a patch of natural forest. February 2018.

Left side *Cyanerpes cyaneus*, and right side *Zimmerius vilissimus* part of natural forest remnant and the zone of coffee plantations. February 2018