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Seasonal abundance of waterfowl for hunting in the southern portion of the Malaga wetland, Durango, Mexico

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ABSTRACT

Objective: To estimate the composition and winter abundance of waterfowl for hunting in a Wildlife Conservation Management Unit (UMA), within the Malaga wetlands complex, Durango, Mexico.

Design/Methodology/Approach: In the winter of 2019, waterfowl for hunting were identified and quantified in an UMA of the Malaga wetlands complex, Durango, Mexico. The birds were counted with the point count methodology in five repetitions, in order to estimate their specific richness and abundance in each one. These variables were compared using the Kruskal-Wallis test ($p<0.05$).

Results: A total of 21,620 birds from 18 species were registered. The most frequent families were the Anatidae, Rallidae, and Gruidae. *Anser albifrons*, *A. caerulescens*, and *Anas crecca* were the most abundant species. This abundance increased according to the number of tests. Therefore, the highest proportion of birds was recorded in the last sampling ($p<0.05$).

Study Limitations/Implications: This study provides baseline demographic information for this group of birds that inhabits the Durango wetlands. However, long-term monitoring is necessary to determine the demographic dynamics of these species.

Findings/Conclusions: The study site is diverse and important for the waterfowl for hunting that spend the winter in Durango, Mexico.

Keywords: Durango wetlands, demography, Anatidae, Rallidae, Gruidae.

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INTRODUCTION

All over the world, wetlands provide outstanding environmental services (flood control, carbon capture, filtration and cleaning of water bodies, among others) and host diverse fauna and flora species (Wetlands International, 2006). One of the wetland-dependent

Image by Astrid Zellmann at Pixabay

biological groups are waterfowls (Blanco, 1999; Fonseca *et al.*, 2012; Lovvorn and Crozier, 2022) which consume and contribute organic matter and take shelter in these ecosystems (Blanco, 1999).

In Mexico, migratory waterfowl use wetlands during their winter stay (Chacón de la Cruz *et al.*, 2017; eBird, 2021), generating diverse landscapes, as well as diversity and abundance patterns (Chacón de la Cruz *et al.*, 2017). During this period, some species are exploited for hunting purposes and can provide, through the Wildlife Conservation Management Units (SEMARNAT, 2000), an economic benefit for rural Mexican communities (Segovia-Castillo *et al.*, 2010). In this sense, the presence of species with greater hunting interest is associated with the habitat conditions and the characteristics of the birds (Gatto *et al.*, 2005; Chacón de la Cruz *et al.*, 2017); therefore, their study is an important element for wetlands conservation. However, despite the decrease in their extension in recent years, knowledge about these ecosystems in intercontinental territory is scarce, especially those found in northern Mexico (Landgrave and Moreno-Casasola, 2012).

The study of some wetlands in the state of Durango is limited to the floristic (Heynes-Silerio *et al.*, 2017), geological (Quiroz-Jiménez and Roy, 2017), avifaunal (Chacón de la Cruz *et al.*, 2017), and environmental governance description (Madrazo and Ortiz, 2018). The small Malaga wetlands complex stands out from the rest as a host of great biological diversity (Heynes-Silerio *et al.*, 2017); consequently, it is considered to be of high ecological, environmental, and economic value. Additionally, its resources can be put to good use. However, despite its importance, there is scarce knowledge about waterfowl for hunting associated with this environment and their description could represent a valuable input for this site. Therefore, the objective of this work was to estimate the composition and winter abundance of waterfowl for hunting in an Wildlife Conservation Management Unit, located within the Malaga wetlands complex, Durango, Mexico.

MATERIALS AND METHODS

Study area

The study was conducted at the "Los Álamos" Wildlife Conservation Management Unit (UMA) (SEMARNAT–UMA EX–0097–DGO) in Durango City (Figure 1). This site is a 275-ha marshy wetland located in the southern portion of the Malaga wetlands complex, whose tributaries derive from the city's wastewater treatment plant and dry up during the dry season. This area is associated with anthropogenic livestock activities and has two types of vegetation: xeric scrub (genera *Acacia*, *Prosopis*, and *Sporobolus*) and aquatic vegetation layers of the genus *Eichhornia*.

Sampling

The determination and quantification of waterfowl for hunting was carried out during the pre-hunting season of the winter of 2019. The birds were identified using the point count methodology (Ralph *et al.*, 1996; Gerardo-Tercero *et al.*, 2010), with the help of 10×42 Nikon® and 10×42 Eagle Optics® binoculars and with the support of the identification keys proposed by Sibley (2014). The observations were made between 6:00 a.m. and 12:00 p.m. in five monitoring sessions (October 5, 12, 19, 26, and November 2, 2019); only those

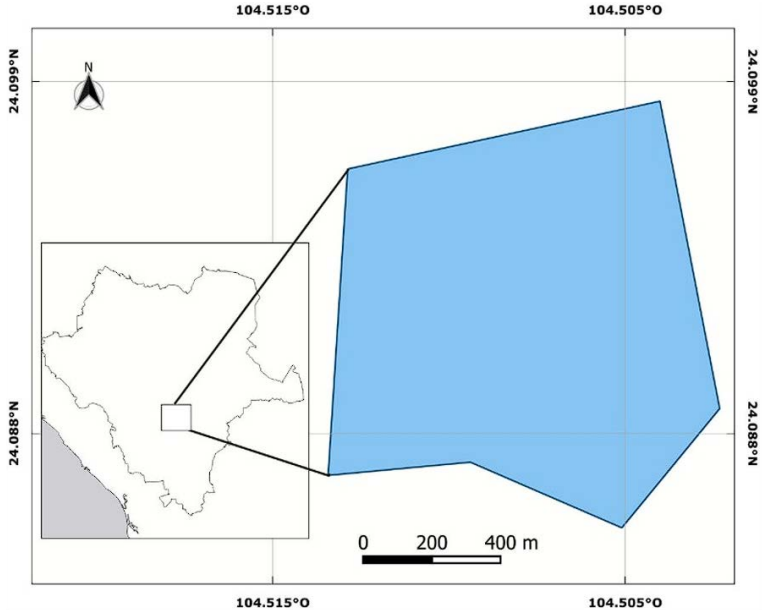

Figure 1. Location of the "Los Álamos" Wildlife Conservation Management Unit, Durango, Mexico.

species that strictly belong to the aquatic orders Anseriformes and Gruiformes, as well as the families Anatidae, Rallidae, and Gruidae, were included. The classification and nomenclature system proposed by the American Ornithologist Union (AOU, 2016) was used.

Data analysis

Specific richness (number of waterfowl species of hunting interest) and proportional abundance (proportion of records of each species with respect to the total number of records obtained) were estimated in each sampling. The species richness mean values of each sample were compared using the Kruskal–Wallis test ($p<0.05$). This analysis was conducted using the Vegan package (Oksanen *et al.*, 2007), of the R 4.0.5 software (R Core Team, 2021).

RESULTS AND DISCUSSION

In the "Los Álamos" UMA of Durango City, 21,620 waterfowl ($\bar{x}$ =4324; Table 1) of 18 species of interest to hunters were registered during the five samplings (Figure 2). The most representative family was Anatidae (16 species), followed by Rallidae and Gruidae. The most abundant species was *Anser albifrons* with an average of 870 records (20.12% of the total number of birds observed), followed by *Anser caerulescens* with 846 (19.57%), and *Anas crecca* with 827 (19.14%). In contrast, the species that obtained fewer records were *Dendrocygna autumnalis* and *Aix sponsa* (Table 1).

These abundance results are higher than the records for larger wetlands located in central-southern Mexico (Fonseca *et al.*, 2012; Ayala-Pérez *et al.*, 2013; Mera-Ortiz *et al.*, 2016). Although the description of waterfowl for hunting that winter in northern Mexico has been little studied and these results, therefore, cannot be compared with

Table 1. Proportional abundance of waterfowl for hunting registered in the "Los Álamos" UMA, during five samplings.

Family species	Code*	Samplings					Abundance (%)
		1	2	3	4	5	
Aix sponsa	WODU	0	0	0	0	6	0.03
Anas acuta	NOPI	53	428	293	304	169	5.77
Anas crecca	GWTE	240	982	679	626	1611	19.14
Spatula cyanoptera	CITE	139	162	341	265	103	4.67
Anas discors	BWTE	96	224	149	231	337	4.80
Anas diazi **	MEDU	363	227	215	482	807	9.69
Anser albifrons	GWFG	0	501	638	2020	1192	20.12
Anser caerulescens	SNGO	0	35	146	609	3440	19.57
Aythya affinis	LESC	0	3	6	7	36	0.24
Aythya collaris	RNDU	0	0	14	23	24	0.28
Anser rossii	ROGO	0	2	68	0	292	1.67
Dendrocygna autumnalis	BBWD	4	7	3	0	3	0.08
Mareca americana	AMWI	2	163	53	172	74	2.15
Mareca strepera	GADW	0	79	22	138	351	2.73
Oxyura jamaicensis	RUDU	29	42	86	82	70	1.43
Spatula clypeata	NSHO	121	246	213	212	204	4.61
Rallidae *Fulica americana* **	AMCO	48	201	90	89	162	2.73
Gruidae *Antigone canadensis*	SACR	0	0	0	47	19	0.31
Total records		1095	3302	3016	5307	8900	100

*American Ornithologist Union. ** Resident birds

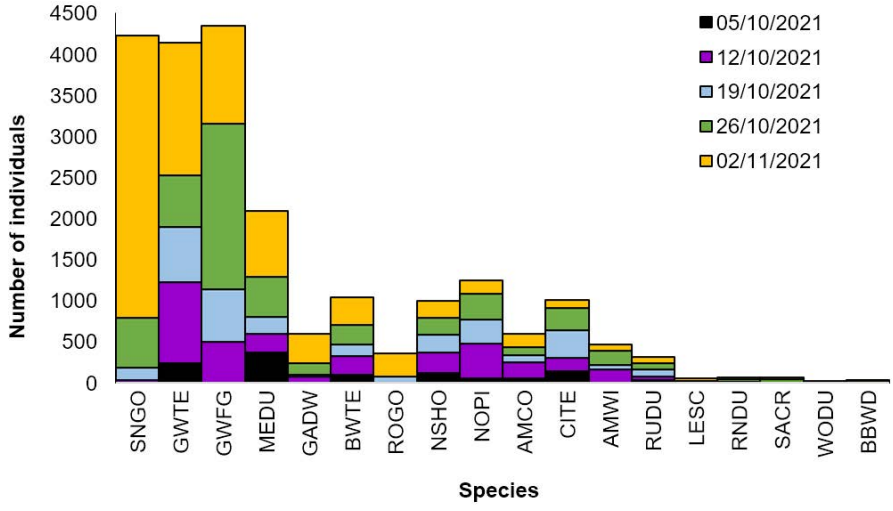

Figure 2. Seasonal abundance of waterfowl for hunting in the "Los Álamos" UMA, Durango, Mexico, during five samplings. SNGO: *Anser caerulescens*; GWTE: *Anas crecca*; GWFG: *Anser albifrons*; MEDU: *Anas diazi*; GADW: *Mareca strepera*; BWTE: *Anas discors*; ROGO: *Anser rossii*; NSHO: *Spatula clypeata*; NOPI: *Anas acuta*; AMCO: *Fulica americana*; CITE: *Spatula cyanoptera*; AMWI: *Mareca americana*; RUDU: *Oxyura jamaicensis*; LESC: *Aythya affinis*; RNDU: *Aythya collaris*; SACR: *Antigone canadensis*; WODU: *Aix sponsa*; BBWD: *Dendrocygna autumnalis*.

studies carried out in similar places and conditions, this study site can be considered as abundant and diverse.

The abundance of birds increased as more samples were obtained. Consequently, the last sampling recorded the highest bird proportion ($p<0.05$; 41.17%; Figure 1). This abundance increase pattern can be associated with normal migratory movements during the winter period (Recher, 1996), habitat characteristics such as the water body size (Colwell and Taft, 2000), or food availability (Taft *et al.*, 2002; Kingsford *et al.*, 2004). In addition, this group of birds stands out from others that inhabit the same ecosystem, given the sustained demographic growth that its populations have experienced (Rosenberg *et al.*, 2019).

Meanwhile, cryptic birds (such as *A. sponsa*) were recorded in lush and inaccessible areas of the UMA; therefore, their abundance in the site might be underestimated. It should be noted that hunters are more interested in this species and consequently a more intensive monitoring is recommended.

Finally, most of the aquatic species that were recorded in the "Los Álamos" UMA have been observed in larger wetlands in Durango (Sullivan *et al.*, 2009) and in other larger water bodies in Mexico (Mera-Ortiz *et al.*, 2016; Hernández-Colina *et al.*, 2018). Therefore, the diversity and abundance in the study site can be attributed to the high floristic diversity of the surrounding areas (Heynes-Silerio *et al.*, 2017), rather than to its extension. This phenomenon probably extends to diverse biological groups.

CONCLUSIONS

The demographic information of the avifauna provided by this research is a reference for the state of Durango and recognizes the study site as diverse and important for waterfowl of hunting interest. However, to determine seasonal diversity and demographic patterns, birds monitoring in the study area is recommended, before, during, and after the hunting season.

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