



## CONDITION OF QUALITY THE WHITE TAIL DEER HABITAT, IN RÍO BALSAS DEPRESSION-MÉXICO

Oscar Agustín Villarreal Espino Barros<sup>1</sup>, Bernardo Ortega Aguilar<sup>1</sup>, Jorge Ezequiel Hernández Hernández<sup>1</sup>, José Antonio Rivera Tapia<sup>3</sup>, Alfredo Báez Simón<sup>4</sup> and Omar Romero-Arenas\*<sup>2</sup>

<sup>1</sup>Facultad de Medicina Veterinaria y Zootecnia; Benemérita Universidad Autónoma de Puebla

<sup>2</sup>Centro de Agroecología, Instituto Ciencias, Benemérita Universidad Autónoma de Puebla

<sup>3</sup>Centro de Investigaciones en Ciencias Microbiológicas, ICUAP-BUAP

<sup>4</sup>Escuela de Ingeniería Agroforestal, BUAP

\*Corresponding author, [biol.ora@hotmail.com](mailto:biol.ora@hotmail.com)

**ABSTRACT:** It was estimated the quality of white-tailed deer habitat by vegetation types into two Management Units for the Conservation of Wildlife (UMA's), in the depression of the Rio Balsas Puebla-Mexico. The methodology used was: "transect steps direct and indirect points with the help of walking stick", 28 transects were drawn with 2 800 sampling points in 4 995.85 ha of habitat available to deer. There were three vegetation types: tropical deciduous forest (TDF), desert scrub (MX) and forest oak or Quercus (OF). The MX is the best vegetative type "base cover" (42.5 and 34.9%), followed by the DF (32.3 and 34.6%) and OF (19.9 and 25.5%). However, the OF has a higher percentage of "bare earth" (54 and 51.4%), it also has a higher percentage of "organic mulch" (27 and 23%), which is regarded as a feature which prevents erosion ground, also has a higher percentage of "organic mulch" (27 and 23%), which is regarded as a feature which prevents soil erosion. The DF vegetative type is higher on all levels (0.37, 1.6, 2.3 and 4.8 m), while the MX and OF have similar heights in all vegetative strata. The OF is the one with the best "quality of habitat condition" for white-tailed deer (56.9%), followed by the MX (50.5%), while DF have a "fair condition" (48.6), therefore, special attention should be taken in the conservation management of that vegetation. Finally, as to the quality of habitat condition, we conclude that the two UMA's, are located in the category "good", with habitat quality between 53.2 and 51%, respectively, is recommended activities habitat improvement on especially in time of drought.

**Key words:** UMA's, deer, basal cover, forest oak, desert scrub.

## INTRODUCTION

White-tailed deer (*Odocoileus virginianus*) is a wild deer is distributed naturally in America from 60 °N latitude in Canada, up to 15 °S in northern Brazil and southern Peru [1]. In Mexico is throughout except in the peninsula of Baja California. This deer, in Mexico, inhabiting temperate forests of pine, pine-oak, oak, wet and dry tropical forests, xerophytic scrub, gallery forests and secondary vegetation [2]. The subspecies "mexicanus" is distributed in central Mexico [3]: in the Mixteca Puebla, area south of the state of Puebla and is part of the Río Balsas Depression, white-tailed deer is distributed over an area of 547.550 ha [4]. That animal is part of "Mexican Whitetail Deer Super Grand Slam" sanctioned tournament by the Safari Club International (SCI). Therefore, this is considered as a trophy deer hunting regional type [5].

In México, the "Units for the Management and Wildlife Conservation" or UMA's, they fundamental objective to conserve biodiversity and diversify production in the rural sector [6], through the rational use, sustained and planned use of renewable natural resources, valuing and restoring the environmental degradation processes, providing producers and society in general, environmental, economic and social.

The deer used the habitat available to meet the needs of water, food and cover, as well as space for rest and protection from weather and predators [7]. The amount of food available and the weather conditions and vegetation cover among other factors, are crucial for the distribution of deer in habitat [8]. Food availability is essential for the abundance of animal, because the carrying capacity of the landscape, the primary vegetative type because it provides food and protection [7].

The Mixteca region in Puebla is a poor and marginalized of development, mild climate, and rangeland wild tropical deciduous forest and xeric scrub vegetation types including [9,10]. Currently in the region there are a total of 92 white-tailed deer UMA's, that handle 92 522.02 ha., where, harvest has been obtained deer hunting in the past eight seasons of sport hunting [5]. In this region, biodiversity and endemism of species of flora and fauna is very high [9,10]. Therefore, the potential of these UMA's, for the rural sector diversification by leveraging deer hunting through big game hunting, is an alternative that has been demonstrated [11]. Product diversification helps to improve the quality of life of the rural population: however, in that area of the Río Balsas Depression, unknown characteristics of deer habitat components. Therefore, the objectives of this study were to characterize the habitat of different types of vegetation: species frequency, percentage of bare soil, organic mulch and basal cover; know the height and vegetation types and strata, assessing habitat quality and status regarding regional food deer, besides knowing the species of plants that make up the vegetation in two representative UMA's Mixteca region in Puebla.

### Study site

The work was conducted in the community of Santa Cruz Nuevo, Totoltepec of Gro. Municipality, Mixteca region located in the state of Puebla (Figure 1), which is part of the geomorphology of the Rio Balsas Depression [12]. That Mixteca ethnic township is considered poor and marginalized of development [13]. The community has an area of 5 309.44 ha., where agricultural land is 313.59 ha., and 4 995.85 ha rangeland wild, the altitude ranges from 1550-2020 masl, climatic types according to Koppen modified by Garcia [14] are: semi warm humid with summer rains, with percentage winter rainfall less than 5 mm A(C) w<sub>0</sub>(W) and; temperate sub humid with summer rains, with percentage of precipitation less than 5 mm C(W<sub>0</sub>) (W) [15]. The average annual temperature is 17 to 25 ° C, annual rainfall ranges from 650-950 mm, with topography sloping escarpments bigoted and between 20 and 70% incline [15]. The main productive activities in the community are seasonal agriculture and cattle ranching and meat goats [16, 10]. Secondary sectors of the economy are: the exploitation of sand and stone for construction and grocery trade, the human population is 193 inhabitants [15].

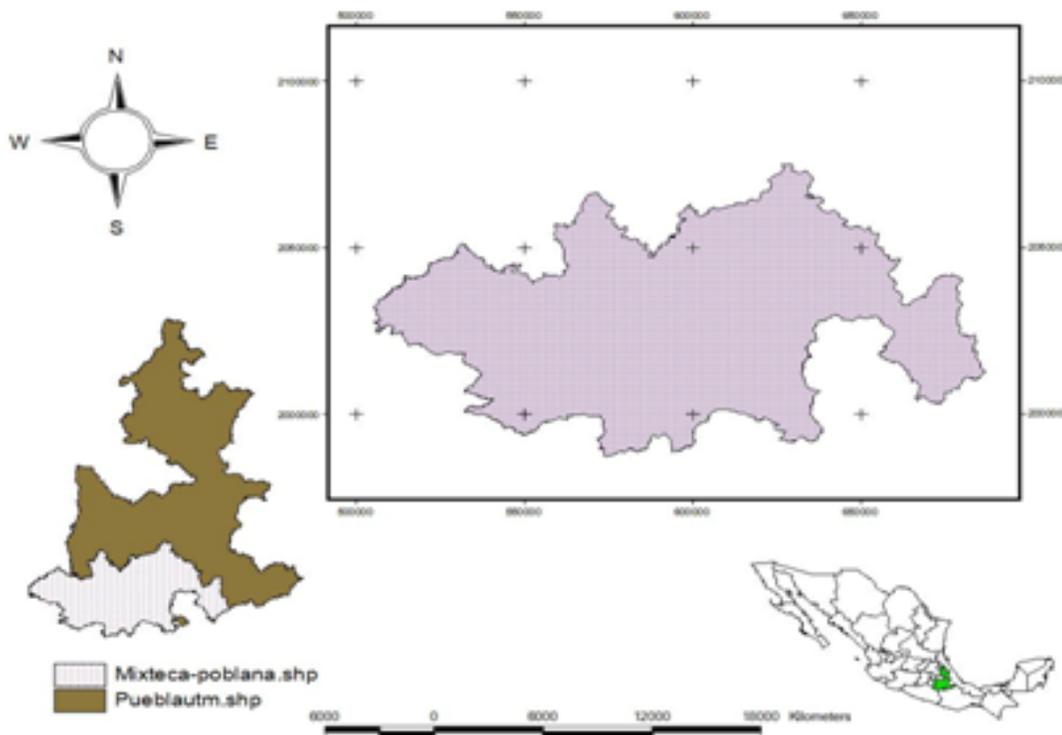


Figure 1. Geographical Location of Puebla Mixteca Region.

In the rangeland and study site, there is tropical deciduous forest and xeric shrub lands, which are the most abundant vegetation types of the Mixteca Puebla [10]. The wildlife is mainly represented by seven species of reptiles, 77 birds and 18 mammals, which include, the scorpion (*Heloderma horridum*), the elegant trogrón (*Trogron elegans*), Balsas carpenter (*Melanerpes hypopolius*), rabbits (*Sylvilagus* spp.), squirrel (*Spermophilus variegatus*), lynx or bobcat (*Lynx rufus*), cougar or mountain lion (*Puma concolor*), Mexican white tail deer (*Odocoileus virginianus mexicanus*) among other species. In the community, there are three types of land tenure: Ejido (929.76 ha), Bienes Comunales (3 491.26 ha) and small property in agricultural society (888.42 ha). In the Ejido and Bienes Comunales (which includes the Agricultural Society) UMA's are extensive, handled by the agro ecological model called Diversified Livestock; which is a silvopastoral system, combining extensive production of beef cattle, with the sustainable use of deer, other wildlife species and their habitat, in the hunting tourism and nature [10].

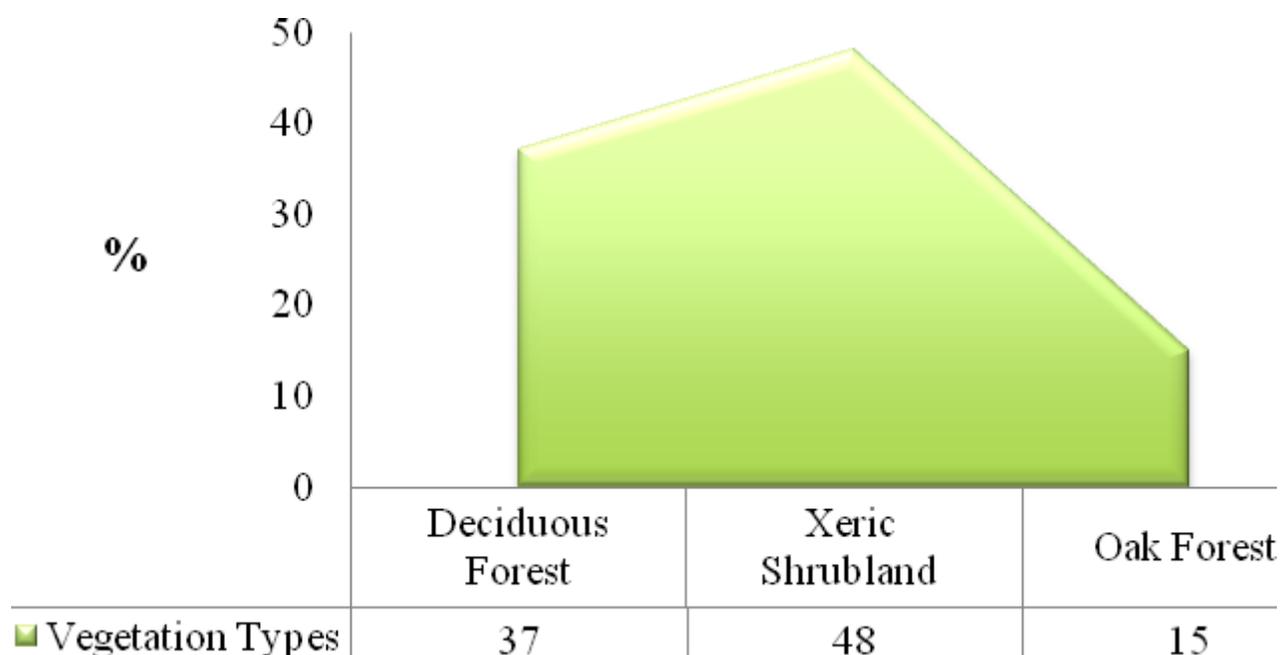
## MATERIALS AND METHODS

The methodology used was: "transect step by direct and indirect points" [17, 18] with the help of staff [10]. The advantages of this method are that it is applicable to all vegetation types: tropical, subtropical and desert. Furthermore, to determine several features of the landscape or habitat as botanical composition, species frequency, basal vegetation cover, bare area and condition of habitat quality for a given species [19, 20, 10]. For sampling proceeded as follows [17, 10]: First, the area is located within the rangeland wild of the UMA's, where is naturally distributed the white-tailed deer. Then transects were run in a straight line, where 100 points were sampled using a stick with which every third step right foot, was placed perpendicular to one meter in the direction of the transect, the site of contact of the tip of the cane was considered as direct point. That point may be direct bare soil, rock or stony, organic mulch (trash) or a species of plant. When the stick did not make contact with a plant species directly, is considered the first plant located at an angle of 180 ° at the head of his cane, as indirect point. In such a way, always in each transect were sampled 100 plants either directly or indirectly. Moreover, for each volume plant height in (m), by vegetative layer type (pastureland, herbaceous, shrub and arboreal). In the event that it was unaware of the plant species, were sampled at flowering stage and / or maturation to determine its scientific name, with the help of guides [21, 22, 23, 24, 25]. Where it was not possible to identify plants with the guides, we resorted to the Herbarium of the Benemérita Universidad Autónoma de Puebla At the beginning and end of each transect, geographic coordinates were obtained with GPS Garmin 60 Cx. Frequency is the N° of samples in which a species is found.

The percentage of plants in direct points provides basal vegetation cover per transect and / or vegetative type. The sum of the direct point of soil and stone, gives the percentage of basal coverage area or bare area, which is an indicator that may represent problems of erosion in areas with slope. Organic mulch, you get a value considered as ground cover to prevent erosion [19]. The direct points, which placed a plant species provides the percentage of basal cover, adding plants points Indirect information is obtained by vegetative strata as the average number of species in vertical projection from each sampling point through the different layers of air cover or canopy and the height of each vegetative stratum average: pasture, herbs, shrubs and trees. Furthermore, to determine the condition of habitat quality for deer, registered plants were evaluated in three categories: species desirable, less desirable species and species habitat components, according to the following types of habitat condition: desirable and less desirable species, excellent condition 76-100%, good condition 51-75%, fair condition and poor condition 26-50% and 0-25%. The classification of desirable and less desirable species was based on the diet of white-tailed deer in the region [29]. Where desirable species will be the 44 species with the highest percentage of dry matter (DM) contributes to the diet of deer, less desirable species remaining are all part of the diet. Finally, the other plants that were not part of these two categories were considered as components of the habitat. The results were statistically analyzed using the GLM procedure of SAS version 2004 for central tendency variables and  $\chi^2$  test for categorical variables or nonparametric.

## RESULTS AND DISCUSSION

Twentyeight transects were laid, nine in the Ejido UMA and 18 in the Communal Property UMA, representing a total of 2 800 sample points, with a collection of at least five sampled data at each point during the years 2009 and 2010. The surface of white-tailed deer distribution in the two UMA's is 4 995.85 ha., basically concerning the area devoted to cattle ranching, surface corresponding to 94.09% of the total community and is the habitat available to the species. Representative vegetation types are basically three: tropical deciduous forest (TDF), xeric shrubland (XS), and oak forest (OF). The (XS) extensive vegetative type (Figure 2) is distributed at latitude of 1520-2020, with elements rarely exceed 6 m high and the most representative species by their frequency are: *Agave Lechuguilla* (6), *Lippia graveolens* (3), *Acacia coultieri* (5) *Bursera arid* (7) and *Eysenhardtia polystachya* (8).



**Figure 2. Percentage of different types of vegetation in the Santa Cruz Nuevo rangeland, township of Totoltepec de Guerrero, Puebla-Mexico.**

Moreover, the (TDF) have two very distinct types of phenology during the year: one dry season (November to April) and a rainy season (May to October). This shows average altitude vegetation in tree layer of 4.8 m, distributed between 1 550 and 1 800 masl. Among the most common species of this vegetation type include: *Montanoa* spp. (7), *Turnera diffusa* (11), *Acacia* spp. (3) and *Leucaena leucocephala* (2). Of note is the presence of other species such as *Bursera* spp., *Ceiba parvifolia* and cacti of candelabriform columnar forms as *Neobuxbaumia mezcalaensis* and *Pachycereus weberi*.

The (OF) is composed of species of the genus *Quercus*, which rather resembles a kind of scrub oaks, because it has trees with an average height of 3.6 m. It is distributed in the upper parts of the hills with north-facing slopes to over 1700 masl. The most frequent species are: *Waltheria americana* (5), *Acacia subangulata* (6) and *Quercus glaucooides* (4). Other representative species are: *Quercus castanea* and *Quercus microphyla*.

The characterization of habitat for the various types of vegetation in the Ejido UMA, is presented in the Table 1, In regard to bare soil are presented significant differences in favor of the MX, in relation to the TDF and OF. In terms of organic mulch are significant differences in favor of BE (P < 0.05). Being the MX with the highest coverage with 42.5 % and the BE with the minor 19.9%. However, the latter was offset since the OF is the largest organic mulch has coverage, significant differences were found between the three vegetative types (P < 0.05).

**Table 1. Characterization habitat in the Ejido UMA of Santa Cruz Nuevo, for vegetation types.**

Vegetative Type	% Soil	% Stony	%Σ Bare Soil	% Organic Mulch	% Basal Cover
TDF	23.8 a	19.0 b	42.9 b	24.8 b	32.3 b
XS	20.2 a	16.7 b	36.9 c	20.5c	42.5 a
OF	20.0 a	34.0 a	54.0 a	27.0a	19.9 c

Literal different column (a, b, c) indicates statistical difference (P < 0.05)

On the Bienes Comunales UMA (Table 2), basal cover of the TDF and the XS is similar, presenting significant difference ( $P < 0.05$ ) compared to OF. However, as in the Ejido UMA, although OF has the lowest value (25.5%), is offset by a larger percentage of organic mulch 23% ( $P < 0.05$ ).

**Table 2. Characterization of the habitat in the Bienes Comunales UMA of Santa Cruz Nuevo, for vegetative types.**

Vegetative Type	% Soil	% Stony	% $\Sigma$ Bare Soil	% Organic Mulch	% Basal Cover
TDF	37.3 a	12.6 c	49.6 a	15.7 b	34.6 a
XS	29.8 b	18.8 b	48.7 a	16.3 b	34.9 a
OF	22.4 c	28.9 a	51.4 a	23.0 a	25.5 b

Literal different column (a, b, c) indicates statistical difference ( $P < 0.05$ ).

We conclude in both UMA's following: although the TDF and XS have a higher percentage of basal cover and lower percentage of bare soil with respect to OF, in both units the OF has a higher percentage of organic mulch, which is considered as ground cover that prevents erosion [19], reducing the water flow rate and retains the crumb structure and the aeration of the soil surface [26].

On the vegetative layer height for both UMAs (Tables 3 and 4) the weighted average ranges from 0.17 m in the grassland of OF, up to 5.1 m in the tree layer of the TDF, both in the Bienes Comunales UMA. It should be noted that the average height for the tree layer of the TDF and the XS is similar in Ejido UMA 4.6 m, significant differences ( $P \leq X$ ) with respect to OF. On the Bienes Comunales UMA are very marked differences in the tree layer by vegetative type, being the of the Ejido UMA which its lower height of tree layer presents (3 m).

**Table 3. Average height in meters vegetative stratum and type of Ejido UMA.**

Vegetative Type	Pastureland	Herbaceous	Shrubby	Arboreal	□ species vertical projection
TDF	0.5 a	2.0 a	2.1 a	4.6 a	3.5b
XS	0.5 a	2.0 a	2.1 a	4.6 a	4 a
OF	0.0 b	1.0 b	1.6 b	3.0 b	2 c

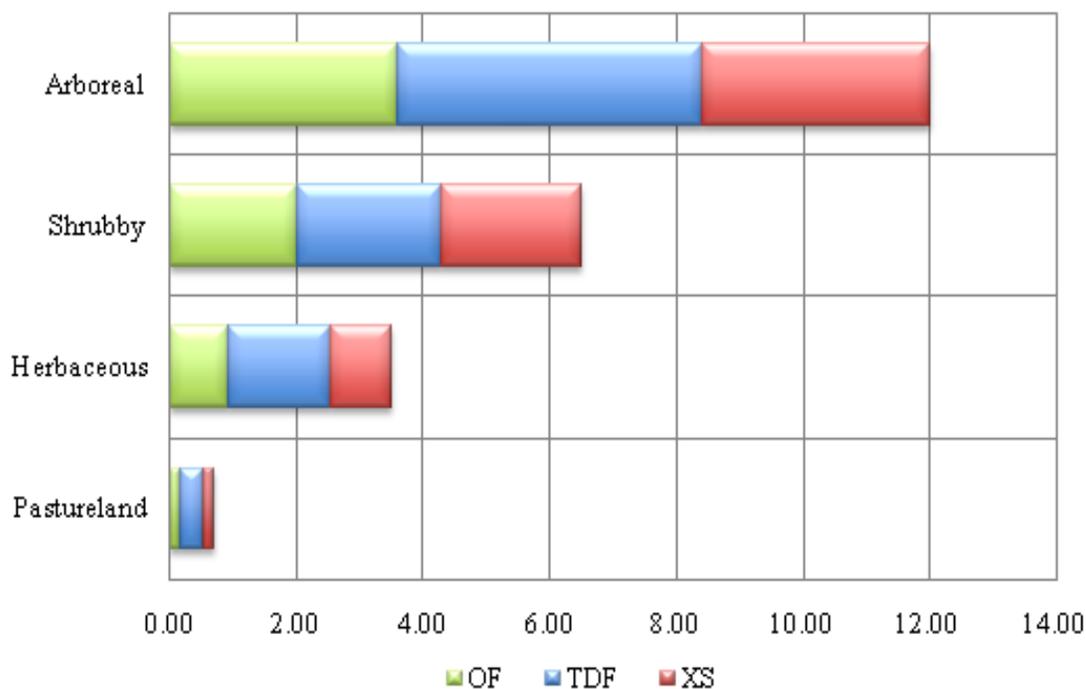
Literal different column (a, b, c) indicates statistical difference ( $P < 0.05$ ).

**Table 4. Average height in meters per stratum and vegetative type of the Bienes Comunales UMA.**

Vegetative Type	Pastureland	Herbaceous	Shrubby	Arboreal	□ species vertical projection
TDF	0.24 a	1.21 a	2.5 a	5.1 a	5.5 a
XS	00 a	1.0 a	2.12 a	3.7 b	3.3 b
OF	0.17 a	0.87 b	2.41 a	4.2 b	1.5 c

Literal different column (a, b, c) indicates statistical difference ( $P < 0.05$ )

As the average height for both UMA's vegetative layer, show the following results (Figure 3). The TDF has higher average heights on all levels, with significant differences with respect to XS and OF. Moreover, the XS and OF have similar heights in all strata, being identical in the tree layer with 3.6 m, respectively.



**Figure 3. Average height in meters vegetative layer for different vegetation types of the two UMA’s of the Santa Cruz Nuevo**

Concerning the condition of habitat quality, we took into account the 44 species of plants that provide higher percentage of DM in the diet, as desirable species (Annex-1). While less desirable species, were taken into account all other species that consumes white-tailed deer in the region (Annex-2). In both plots the OF, presents "good condition", (Tables 5 and 6), however, the type of vegetation was the highest ranking was XS, from UMA Bienes Comunales with 60.3%, though at the same site is presented "lower status" with 37.7% in the TDF (Table-6). Moreover, the overall percentage of the three types in both UMA’s vegetative condition habitats has a good (> 51%). Thus, the OF provides the best average "habitat quality" (Tables 5 and 6), 58.8% and 55% respectively. On the other hand, only the XS of the UMA Ejido and TDF in the UMA Bienes Comunales have a status of "normal habitat" (40.8% and 37.7% respectively). However, both UMA’s have on average "good habitat condition".

**Table 5. Condition habitat quality of Ejido UMA.**

Vegetative Type	Desirable %	Less Desirable %	Σ of hábitat %	Habitat Quality Status
Tropical deciduous forest (TDF)	38.7	21.2	59.9	Good
Xeric shrubland (XS)	27.3	13.5	40.8	Regular
Oak forest (OF)	37.9	20.9	58.8	Good
□ Ejido UMA	--	--	<b>53.2</b>	<b>Good</b>

Classes quality habitat condition: Excellent 76-100% Good 51-75% 26-50% Regular; Poor 0-25%. Note: Statistical analysis was not performed because the condition is classified as rightful according to the percentage obtained [27].

Table 6. Condition of habitat quality of Bienes Comunales UMA

Vegetative Type	Desirable %	Less Desirable %	$\Sigma$ of Habitat %	Habitat Quality Status
Tropical deciduous forest (TDF)	19.0	18.7	37.7	Regular
Xeric shrubland (XS)	31.4	28.9	60.3	Good
Oak forest (OF)	32.5	22.5	55.0	Good
<input type="checkbox"/> Bienes Comunales UMA	--	--	<b>51.00</b>	<b>Good</b>

Classes habitat condition: Excellent 76-100% Good 51-75% 26-50% Regular; Poor 0-25%. Note: Statistical analysis was not performed because the condition is classified as rightful according to the percentage obtained [27].

**Annex 1. Plant species with the highest percentage of MS contribute to the diet of deer, considered desirable species.**

Species	Contribution% Dry Matter (DM)	Stratum
<b>Leguminosas</b>		
<i>Acacia pennatula</i> *	3,13	Arborea
<i>Acacia subangulata</i> *	5,25	Arborea
<i>Acacia coultieri</i>	2,29	Arborea
<i>Acacia farnesiana</i>	2,22	Arborea
<i>Acacia acatlanensis</i>	2,09	Arborea
<i>Acacia bilimekii</i>	1,85	Arborea
<i>Leucaena leucocephala</i> *	5,08	Shrubby
<i>Eysenhardtia polystachya</i> *	3,27	Arborea
<i>Pithecellobium dulce</i> *	3,55	Arborea
<i>Pithecellobium acatlense</i>	0,98	Shrubby
<i>Haematoxylum brasiletto</i> *	4,13	Shrubby
<i>Herpalyce leceneriana</i> *	4,26	Herbaceous
<i>Mimosa luisiana</i> *	2,99	Shrubby
<i>Cercidium praecox</i> *	2,74	Shrubby
<i>Pachyrrhisus sp.</i> *	2,47	Herbaceous
<i>Prosopis laevigata</i>	0,98	Arborea
<i>Senna wizliezenii</i>	0,98	Shrubby
<i>Caesalpinia pulcherrima</i>	0,61	Shrubby
<b>Subtotal leguminosas</b>	<b>48.20</b>	
<i>Agave kerchovei</i> *	4,68	Cactacea
<i>Quercus glaucooides</i> *	3,55	Arborea
<i>Quercus castanea</i> *	2,47	Arborea
<i>Waltheria americana</i> *	3,14	Shrubby
<i>Montanoa sp.</i> *	2,74	Herbaceous
<i>Montanoa sp.</i> *	4,13	Herbaceous
<i>Opuntia pilífera</i> *	2,86	Cactacea
<i>Lippiagraveolens</i>	2,44	Herbaceous
<i>Erhetia tinifolia</i>	2,34	Shrubby
<i>Ceiba parvifolia</i>	2,34	Arborea
<i>Turnera difusa</i>	2,22	Herbaceous
<i>Ipomoea sp.</i>	2,09	Shrubby

<i>Castela tortuosa</i>	2,09	Shrubby
<i>Quercus microphylla</i>	1,97	Arborea
<i>Rynchelytrum repens</i>	1,50	Grass (pasture)
<i>Selaginella sp.</i>	0,98	Herbaceous
<i>Bunchosia lanceolata</i>	0,98	Arborea
<i>Dasyliirion acrotriche</i>	0,98	Shrubby
<i>Celtis iguanaea</i>	0,98	Shrubby
<i>Ferocactus platyacanthus</i>	0,83	Cactacea
<i>Jaquinia macrocarpa</i>	0,72	Shrubby
<i>Gaudichaudia karwinskiana</i>	0,51	Herbaceous
<i>Psittacanthus ariculatus</i>	0,40	Herbaceous
<i>Heliotropium afficolcicole</i>	0,40	Herbaceous
<i>Cyrtopodium macrobulbon</i>	0,30	Shrubby
<i>Oatea acuminata</i>	0,30	Grass (pasture)
<b>Total</b>	<b>100.00</b>	

Villarreal, O.; I. Cortes; R. Guevara, F. J. Franco; L. E. Campos; J. C. Castillo. 2008b. Composición Botánica de la Dieta del Venado Cola Blanca (*Odocoileus virginianus*) en la Mixteca Poblana, en; Conservación y Manejo de Fauna Cinegética de México 1. Benemérita Universidad Autónoma de Puebla: pp 65-84.

**Annex 2. List of wild plant species consumed by white-tailed deer and considered less desirable cone in Santa Cruz UMA New GroTotoltepec Township. Puebla.**

<i>Scientificname</i>	<i>Commonname</i>
<i>Dyschoriste micophylla</i> *	Hierba
<i>Agave angustifolia</i> *	Mezcal
<i>Agave lechuguilla</i> *	Lechuguilla
<i>Agave macroacantha</i> *	Espadín o esfacelante
<i>Agave marmorata</i> *	Magueypulquero, pizorra o pitzome
<i>Agave potatorum</i> *	Maguey papalota o papalometl
<i>Agave stricta</i>	Espadín o gallinita
<i>Yuca periculosa</i> *	Izote, ixiote, palmito o platanillo
<i>Nothoscordum sp.</i>	Cebolleja
<i>Ageratum sp.</i> *	Hierba
<i>Poropyllum punetatum</i>	Comida de venado
<i>Porophyllum tagetoides</i>	Pipicha
<i>Sanuntaliapro cambens</i> *	Desconocido
<i>Sclerocarpus sp.</i> *	Acahual amarillo
<i>Unbesina sp.</i>	Desconocido
<i>Tecama stans</i> *	Tronadora, campana amarilla, ixtantil
<i>Cordia curassavica</i> *	Varita prieta, San Pablito
<i>Hecthia roseana</i>	Lechuguilla
<i>Phaseolus vulgaris</i>	Frijol
<i>Vicia faba</i>	Haba
<i>Acacia cochliacantha</i> *	Cubata negra, cucharito
<i>Acacia picachensis</i>	Desconocido
<i>Leucaena esculenta</i>	Guaje rojo o de monte
<i>Mimosa goldmanni</i> *	Cierrillo o garavatillo
<i>Lysiloma divaricata</i>	Tlahuitole
<i>Senna holwayana</i>	Canelillo
<i>Sennawizliezeniivar pringeli</i>	Rompebotas

<i>Dalea leptorina</i> *	Escobilla
<i>Erythrina americana</i>	Zompantle o colorín
<i>Cyrtocarpa procera</i>	Coco de cerro o chupandía
<i>Spondias purpurea</i>	Ciruelo o ciruela de cerro
<i>Ceiba aesculifolia</i>	Pochote de aguas o tepesponcho
<i>Bursera arida</i>	Aceitillo
<i>Escontria chiotilla</i> *	Quiotilla o chiotilla
<i>Hylocereus undatus</i> *	Pitahaya
<i>Mitrocereus fulviceps</i>	Cardón pachón o huevos de león
<i>Myrtillocactus geometrizans</i> *	Garambullo
<i>Neobuxbaumia mezcalaensis</i> *	Gigante
<i>Neobuxbaumia macrocephala</i>	Cardón de zopilote
<i>Pilosocereus chrysacanthus</i> *	Cardón viejito o viejita
<i>Pachisereus webery</i> *	Órgano o candelabro
<i>Stenocereus pruinosus</i>	Pitayo de Mayo
<i>Stenocereus stellatus</i> *	Xoconostle
<i>Ferocactus flavovirens</i>	Biznaga
<i>Ferocactus robustus</i>	Biznaga piñita, chichi de conejo
<i>Mammillaria carnea</i>	Biznaga lechuda
<i>Mammillaria haageana</i> *	Biznaga blanca o cacá de burro
<i>Mammillaria sphacelata</i>	Caca de burro
<i>Opuntia depressa</i> *	Nopal rastrero
<i>Opuntia imbricata</i> *	Tencholote o tincholote
<i>Wimmeria microphylla</i>	Estoraque
<i>Commelina erecta</i>	Hierba de pollo
<i>Porophyllum ruderale</i>	Pápalo
<i>Ipomoea wolcottiana</i>	Cazahuatl blanco
<i>Ipomoea leptotoma</i> R	Temecate
<i>Melothria guadalupensis</i>	Sandillita de ratón
<i>Cnidoscolus multilobus</i>	Chichicaxtle de árbol
<i>Jatropha dioica</i> *	Zapotillo
<i>Fouquieria formosa</i> *	Guachapo, tlapacone o tlapacón u ocotillo
<i>Andropogon gayanus</i> Kunth	Pasto llanero
<i>Cenchrus ciliaris</i>	Zacate Bufell
<i>Setaria macrostachya</i> *	Zacate
<i>Bouteloua curtipendula</i> *	Zacate de camino
<i>Calamagrostis orisabae</i> *	Pasto pajón
<i>Setaria geniculata</i> *	Pasto gusano
<i>Muhlenbergia rigida</i> *	Cola de zorra
<i>Zea mays</i>	Maíz
<i>Salvia sp.</i> R	Salve real de cerro
<i>Cladocolea gracilis</i>	Bejuco de cierrillo
<i>Psittacanthus sp.</i> *	Injerto de encino negro
<i>Byrsonima crassifolia</i> *R	Nanche
<i>Malpighia mexicana</i> *	Nanche rojo
<i>Masegniaseleriana loes</i> *	Hoja ceniza
<i>Anoda cristata</i>	Alaches

<i>Herissantia crispa</i> *	Desconocido
<i>Mollisina sp.</i> *	Desconocido
<i>Ficus contifolia</i>	Texcalamate o higo
<i>Ficus goldmani</i>	Mora o amate
<i>Beaucarnea gracilis</i>	Sotolín o pata de elefante
<i>Hauya elegans</i>	Guayabo cimarrón o guayabillo
<i>Brahea dulcis</i> *	Palma de sombrero o soyatl
<i>Brahea nitida</i>	Palmón
<i>Portulaca oleracea</i>	Verdolaga
<i>Ziziphus amole</i> *	Manzanita, capulincito, nanche cimarrón o cholulo
<i>Hintonia standleyana</i>	Quina
<i>Casimiroa calderoniae</i>	Palo de zorro
<i>Zantoxylum fagara</i>	Palo hediondo
<i>Salix chilensis</i>	Sauce
<i>Cardiospermum grandiflorum R</i>	Tres costillas
<i>Bumellia laete</i> *	Tempesquistle
<i>Castilleja sp.</i> *	Hierba
<i>Ayenia jaliscana</i>	Hierba
<i>Guazuma ulmifolia</i>	Cuajilote o masacote
<i>Lantana velutina</i> *R	Manzanita

\* *Observation microhistology stool.*

R = found in rumen contents Male animals be hunted.

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Finally, we identified a total of 201 plant species belonging to 57 families. Noted for their number *Cacataceae* family with 30 species followed *Mimosidae* family with 17, third family of grasses *Panicoidae*.

### Conclusions and recommendations

As for the characterization of white-tailed deer habitat in the Santa Cruz Nuevo UMA's, can conclude the following: the XS is the best vegetative type "base cover" (42.5 and 34.9%), followed by the TDF (32.3 and 34.6%) and finally the OF (19.9 and 25.5%). However, despite the OF has a higher percentage of "bare soil" (54 and 51.4%), also has the highest percentage of "organic compost" (27 and 23%), which is regarded as a feature that prevents erosion soil, which somehow this feature partly remedied the deficiency in basal cover. The TDF is the largest type of vegetation height in all vegetative layers (0.37, 1.6, 2.3 and 4.8 m), whereas the XS and OF have similar heights in all vegetative strata. As can be concluded, that in fact the OF should be classified as a thicket of oaks, strengthens this view the following features:

- The climate type (subhumid);
- The low soil depth (> 25 cm);
- The low height of vegetative components.

As for the quality of habitat condition is concluded that both properties generally are located on the bottom of the category "good" habitat quality (53.2 and 51% respectively). However, although it is generally present a "good habitat condition" at 4.995.85 ha. Distribution and available deer habitat because they are in the low range of "good condition", always take habitat improvement activities, such as [28 and 30]:

- Reduce the number of head of cattle on pasture by 20% compared to habitat carrying capacity recommended by the COTECOCA (Technical Advisory Committee for Determining Coefficients Regional Rangeland);
- Sowing homogeneous rainfed plots
- Establish plots with legumes, such as food plots
- Supplementation of pet food and minerals in the critical period (dry season).

The OF is the vegetative type that has the best "quality of habitat condition" for white-tailed deer (56.9%), followed by the XS (50.5%), while the TDF has a "fair condition" (48.6), therefore, special attention should be taken in the conservation management of this dry forest, we must also take into account that the undesirable plants are habitat components that support biodiversity and endemism in the Río Balsas Depression, which is demonstrated by the attached plant list. It is advisable to periodically evaluate the UMA's habitat to determine if current characteristics of this work, and to relate the population density of white-tailed deer.

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