Evolution and distribution of the common crane (*Grus grus*) population in Extremadura.

José A. Román Álvarez (Grus Extremadura)

Extremadura is be the principal wintering area for Iberian cranes, being home to between 51% and 54% of Spanish cranes. The first studies of these birds made in this region (Pérez Chiscano & Fernández Cruz 1971) already showed the importance of Extremadura within Iberia, when they were then very dependent on the dehesas and rain-fed cereal crops. The climatic conditions and dehesas, as well good roost sites, were the key to wintering until the middle of the 20th Century, when a drastic agricultural transformation took place, in which they lost thousands of hectares of rain-fed crops and dehesas to irrigated land, and therefore a radical change of land use. This change, with ever-increasing areas dedicated to maize and rice, was beneficial to cranes over time, which as good opportunists knew how to take advantage of the stubble fields, re-arranging their distribution in the region.

Image no. 1: Cranes beside Almorchón castle, on the border with Córdoba province, one of the best-known populations since the end of the 1960s. Photo: José A. Román

The most intensively transformed zones were the Vegas Bajas and Vegas Altas (lower and upper plains) of the River Guadiana. In the Central Zone in the east of the region, spanning both provinces, as the area of tomatoes, maize and rice increased, so did the number of cranes, which quickly found easy and abundant feeding there, without neglecting the dehesas. The dehesas continue to be

important, especially in the second half of the winter, when consuming acorns allows cranes to take in great quantities of calories, which are very important to them for making a rapid pre-breeding migration. The December censuses generally produce higher figures in irrigation areas, lowering in January when more are foraging in the dehesas.

Cranes in Extremadura are distributed throughout the region, and all nuclei are interconnected, as well as the peripheral ones being shared with other provinces, such as Ciudad Real, Córdoba and Toledo, as well as Portugal. This means that 65% of the Iberian cranes are found in the south-west of the Peninsula, with approximately 160,000 birds, Extremadura being at the centre of this great nucleus (Figure no. 2).

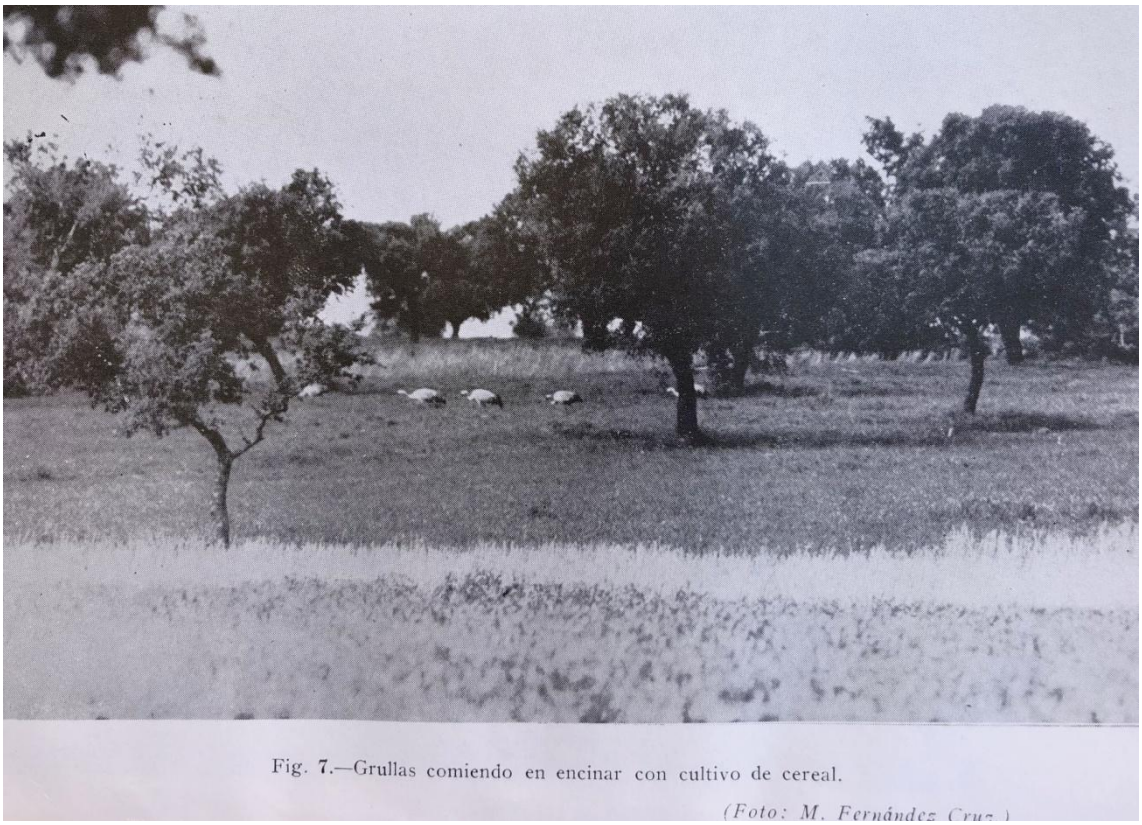


Fig. 7.—Grullas comiendo en encinar con cultivo de cereal.

(Foto: M. Fernández Cruz.)

Image no. 2: A flock of cranes in dehesa in 1968. Photo: Manuel Fernández Cruz (ARDEOLA 1971)

Extremadura´s population of cranes has been well known since the 1970s (Fernández Cruz & Pérez Chiscano 1971), when the region´s importance for the species had already been demonstrated. Pérez Chiscano was the first to describe and study the crane nuclei in the Vegas Altas del Guadiana and La Serena, counting 3,350 in these regions during 1969. The first census that can be considered to be relatively complete was undertaken in 1979 under the Grus Project, when 12,883 cranes were counted in 12 nuclei in the Tajo catchment area and 17 in the Guadiana catchment area, which represented up to 90% of the Spanish cranes known at that time.

After that, ADENEX organized systematic censuses focused in the La Serena region, as well as the Orellana reservoir and the other most important areas (without ignoring the other nuclei as far as possible) and studies of the species in these areas.

In 1986/87 ADENEX, the Government of Extremadura and the University of Extremadura censused 23,923 cranes in the region in 12 nuclei in the Tajo catchment area and 22 in the Guadiana catchment area. This indicated that the number of individuals had doubled compared to 1979, which is clearly not true, as cranes pair up at 4 or 5 years of age, and those that breed successfully have a maximum of 1.2 chicks per breeding pair, which makes it impossible for a the population to double in such a short time. Without doubt, the better knowledge of the crane nuclei, as well as the availability of more observers and teams, enabled a better knowledge of the true wintering population.

Image no. 3: A family group of cranes in Gorbea dehesa, Navalvillar de Pela (BA) in January 1990. Photo: José A. Román

A catalogue of all the crane wintering areas in Extremadura was made between 1989 and 1991, collecting demographic data and habitat usage data for feeding and resting, collected under the “Conservation Project ACMA 2422 ADENEX-CEE”. This report also collected all the information about the conservation problems for the species caused by agricultural transformation and other public works, such as the nuclear power plant at Valdecaballeros and electricity power lines.

43 wintering areas were mapped in Extremadura, 14 of them in the being in Cáceres province (Tajo catchment area) and 29 in Badajoz province (Guadiana catchment area). The great majority were censused between 1987/88 and 1988/89 in four coordinated censuses (November, December, January and February), although not all nuclei could be counted despite the help of Environment Department rangers. Although the results of these censuses were not made public, the report does contain detailed information from these, and in

January 1988 29,347 cranes were counted in Extremadura, of which 7,224 were found in the Tajo catchment area and 22,123 in the Guadiana catchment area. The census confirmed the wintering population was around 30,000 birds at the end of the 1970s

In 1992 the Government and University of Extremadura estimated some 42,200 wintering birds (Sánchez *et al* 1993). In the following years ADENEX took charge of coordinating these, censusing 47,491 cranes in 1995/96 (Fernández *et al* 1996), 40,000 in 1999 (Ferrero & Valiente), 58,150 in 2002 (ADENEX 2003),57,000 in 2004 (de la Cruz & Montoya 2008) and 79,833 in 2007 (Prieta & del Moral 2008).

Until then, the censuses were organized for between one and five dates during the winter. When it was decided to do a single count, this was done in November, however in 2012 (Román *et al*) we initiated a series of counts based on two specific dates, one in December and the other in January.

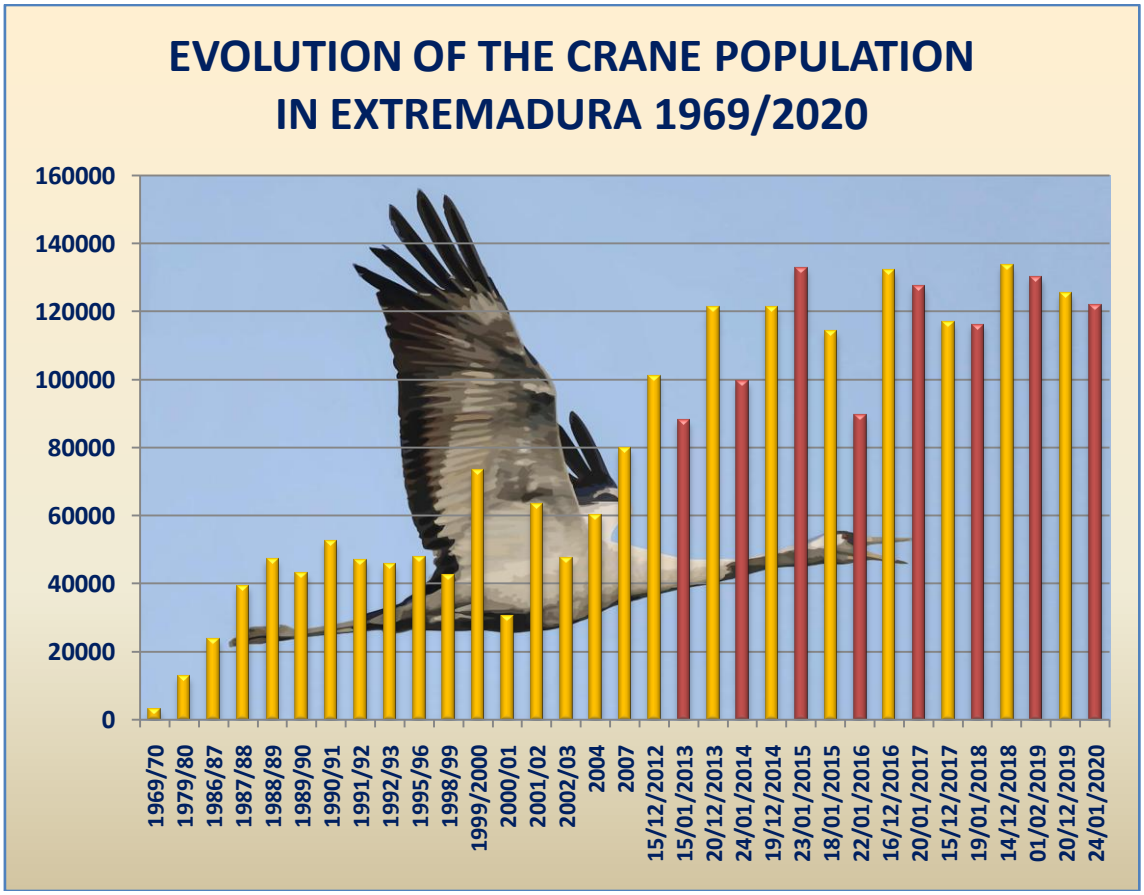
We counted: 101,282 in December 2012 (exceeding the figure of 100,000 cranes in the region for the first time) and 88,244 in January 2013; 121.341 in December 2013 and 99,451 in January 2014; 120,161 in December 2014 and 132,902 in January 2015: 114,198 were censused in December 2015, with 89,733 in January 2016; 132,174 in December 2016 and 127,513 in January 2017; 116,975 were counted in December 2017, and 116,171 in January 2018. In December 2018, 133,865 birds were counted in December 2018 (the record to date) with 130,203 in the census on 1 February. 125,558 were counted in December 2019, with 121,733 in January 2020.

The evolution of the population is growing, similar to the total in Spain, having increased by more than 50,000 individuals compared to the 2007 census. The number had already exceeded 100,000 birds in the first census of 2012, and although there have been more modest numbers in others, we estimate that the population of Extremadura regularly exceeds this figure, being between 120,000 and 130,000 (Graphic no. 11).

Historically, the Central Zone has been the channel for all these wintering birds (and for migration) due to the great availability of food resources. Traditionally, cranes arrived in the dehesas and occupied adjacent ones as they ate up the resources, moving to La Serena and northern Córdoba in the middle of December to take advantage of the acorns. However, the transformation of over 100,000 hectares since the 1960s to irrigated crops changed the distribution and the number of individuals present during the winter as the number of hectares dedicated to maize and rice increased. The wintering population continued to increase over the years and they re-colonized former wintering areas, such as Valdehornillos (BA), where they used to be present before the agricultural transformation and where they had almost disappeared from.

Image no.4: Family of cranes inirrigated area,Palazuelo (CC) José A. Román

Certainly these changes have favoured the species, but in especially dry years, when the stubbles are worked early (and the feeding resources therefore disappear), cranes occupy the adjacent dehesas in significant numbers, demonstrating that the dehesa continues to be a vitally important resource for the species.



Graphic no.1:Evolution of the wintering crane population in Extremadura from 1968 to 2019. January censuses in burgundy.

Currently, for the censuses, we break down the information according to the sectoral model proposed by Sánchez et al (1993), although we have renamed some of the sectors:

-1: Alagón Sector: in the north-west of Cáceres, with two main nuclei constituted of the Gabriel y Galán and Borbollón reservoirs, with some smaller locations. The cranes feed mostly in dehesas near to each reservoir, although they also feed in maize and rice stubble south of Borbollón (Huélaga). 70% of the cranes counted in the sector are in the area around this reservoir.Gabriel y Galán continues to maintain the dehesas that survived the reservoir, although there is a plan to increase the amount of hectares under irrigation. At Borbollón, all the dehesas to the south of the reservoir were transformed and many cranes feed in the maize stubble, as well as in the holm oak woods.

-2: Campo Arañuelo (Navalmoral de la Mata) Sector: in the north-east of Cáceres province, between the Tiétar and Tajo rivers, it consists of three principal nuclei: Valdecañas reservoir, Palancoso lagoon and Tiétar Monfragüe, to the north of the national park. In all of them, the majority of cranes use dehesas and rain-fed cereal crops, although they also take advantage of maize stubbles around Rosarito and Monfragüe. Besides these reservoirs, there are some areas with roosts in lagoons or ponds in dehesas. Within this sector,

feeding areas and some roosts are shared with Rosarito and dehesas in Toledo province. The current construction of photovoltaic mega-projects could affect the distribution and number of wintering birds in the future.

-3: Llanos de Brozas and Alcántara Sector: in the south-west of Cáceres province, this is a nucleus with several roosts, whose cranes spread through dehesas and grasslands between Brozas, Membrío and Salorino, which presents some difficulty as each year there may be changes to the roost sites, making them hard to find. The population trend is decreasing.

-4: Ayuela (Aldea del Cano) Sector: in the south of Cáceres province, located in dehesas, grasslands, sown fields and cereal stubbles surrounding Aldea del Cano and Casas de Don Antonio, crossed by the River Ayuela and is small tributaries.

-5: Almonte/Tozo Sector: located in the centre of Cáceres province, north of Trujillo in two main nuclei, Talaván/Monroy and Trujillo/Torrecillas de la Tiesa. The cranes use dehesa and traditional cereals, with a decreasing trend, although numbers pick up in particularly dry years. The flock at Talaván reservoir causes concern, as there are fewer birds each year because of disturbances at this small wetland, mainly by anglers, as well as photovoltaic macro projects which are significantly reducing the feeding habitat and day-time roosts.

-6: Las Tiendas/Morantes (North Badajoz) Sector: situated in the Vegas Bajas del Guadiana with irrigated crops (maize and rice), dehesas and dry grasslands between Mérida, Badajoz and the south of Cáceres province, with three nuclei. The most important location is Los Canchales reservoir which has been increasing ever since its construction by concentrating the cranes from neighbouring dehesas at roosts here. The other nucleus consists of the dehesas around Roca de la Sierra, using Morantes reservoir as the main roost site, although there another small one between Villardel Rey and Puebla de Obando. These cranes roost in farm ponds and at Peña del Águila reservoir. Finally, a third nucleus near the border with Campomaior (Zangallón), has feeding areas in Portugal.

-7: Guadiana/Cuncos (South Badajoz) Sector: situated in the south-west of Badajoz province, composed of five nuclei: in the north, the lagoons of Albuera, Las Merinillas and a new one to the west, on the border with the River Guadiana (Villareal). In the centre, a new one has appeared following the creation of Villalba de los Barros reservoir, hosting a small but steadily growing population. In the south is the nucleus in the Cuncos dehesas, which has experienced a significant change as a result of the creation of Alqueva reservoir in Portugal, and the consequent agricultural change (super-intensive), modifying the routines and with new roost sites appearing on some of the reservoir shores. All of these cranes move between the two countries.

-8: Matachel/Matanegra (Alange) Sector: in the centre of Badajoz province, with four nuclei: Alange, El Moral and Los Molinos reservoirs, and the Matanegra area. This is a very agricultural area, with many olive and vine groves,

increasingly with super-intensive planting, which is seriously threatening the species, and already some localities, such as Hinojosa and Usagre, run the risk of disappearing as wintering areas.

-9: Central Zone Sector: hosting the bulk of Extremadura´s wintering population, with up to 65% of the total, this is the most important wintering area in Spain. It is situated in both provinces, in the Vegas Altas del Guadiana, with more than 100,000 hectares under irrigation and with dehesas in sharp decline, with an increasing presence of super-intensive crops, primarily of olives and fruit trees. Because of the significant number of birds present and the high number of roost sites, this sector is censused by feeding areas, which requires significantly fewer participants, greatly facilitating the census. To this end, we have divided the sector into 11 sub-sectors:
1):LogrosánSector, located between the town and the provincial border, with birds in dehesa and irrigated crops;
2): Madrigalejo/Obando Sector (between the two towns and provinces), almost all occupied by irrigation with a little bit of holm oak;
3):Valdehornillos/Búrdalo Sector is located between Santa Amalia and Miajadas. Totally transformed to irrigated crops;
4):Villar de Rena/Alcollarín Sector between Campo Lugar and Villar de Renaisunderirrigation;
5):Palazuelo/La Mata Sector between Valdivia and Palazuelo, also irrigated crops.
6): Acedera/Puercas Sector between Acedera and Valdivia, with cranes in irrigated land and dehesas (continuing to be converted);
7): Las Rañas/El Alandre Sector between Casas de Don Pedro and Puebla de Alcocer, primarily in dehesas and pasture, but also some irrigated land;
8): Moheda/Vegas Altas Sector between Navalvillar de Pela and Vegas Altas village, where there is still a good area of dehesa but most is irrigated crops, which are expanding;
9): Los Guadalperales Sector between this village and the Orellana Canal;
10): Yelbes/Medellín Sector between Medellín and the River Búrdalo, where all the area has been transformed;
11): Guadámez/Búrdalo Sector between both rivers as far as Cornalvo, also extensively transformed (Figure no. 1).

Figure no.1:Sectors of the Central Zone of Extremadura.

-10: Guadalemar/Guadalupejo Sector, situated between Valdecaballeros, Siruela, Puebla de Alcocer and the head of La Serena Reservoir. This sector was previously included in the Central Zone, but we have separated it on account of its geographic characteristics and distance. It is a traditional area and all the cranes are found in dehesas, pasture and rain-fed cereals.

-11: La Serena Sector, which is located in this district in Eastern Badajoz, with dehesas, wide grasslands and cereal crops. One of the most traditional and best known and studied sectors (Fernández Cruz & Pérez Chiscano 1971, Calderón 2000). It has up to 8 nuclei, almost all associated with holm oak dehesas, the most important being in the dehesas of Badija (Castuera) and Monterrubio de la Serena, with some roost sites shared with cranes from Córdoba and La Mancha. Its situation and characteristics mean it is one of the last areas to be occupied.

-12: Campiña Sur Sector (Azuaga) in the south-east of Badajoz, with two principal nuclei, one in Arroyo Conejos and San Pedro dehesa to the west, and the other between Azuaga, Granja de Torrehermosa and Peraleda del Zaucejo to the east. It is made up of dehesas and rain-fed cereals. Some cranes may go to roost in Córdoba province, or vice-versa.

In recent years we have been witnessing a feverish race to change crops, replacing maize and rice, fundamentally, for new super-intensive crops, with thousands of hectares of olive and fruit trees. In addition, some of the mis-managed dehesas of this area are being planted illegally with these new crops. This is an unstoppable act, and if it continues at this rate it could mortgage the future of the species, and it is possible that cranes could disappear from wide areas of the Central Zone when there could be insufficient food resources.

Regarding the sectors in Cáceres, there is growth in the Alagón and Campo Arañuelo sectors, with stability in Almonte/Tozo and Ayuela, although their populations fluctuate and move around each winter according to the availability of food and roost sites. The Llanos de Brozas and Alcántara sector shows a decreasing trend without there having been a significant habitat change, the dispersal of cranes and availability of roost sites does not make counting them easy, and this is not always completed properly.

Of the Badajoz populations, there is concern especially over the situation in the Matachel/Matanegra sector, where the Hinojosa del Valle nucleus is in steep decline due to the serious transformation that is happening with super-intensive crops (fruit trees and vines) as well as the construction of a major photovoltaic site (where two already have been built), which could very negatively affect the species, so that this nucleus could certainly disappear in the future.

In the Guadiana/Cuncos sector, the Cuncos nucleus is also affected by super-intensive fruit tree plantations, which is affecting the cranes´ distribution, their range already dimisnished by the creation of the Alqueva reservoir.

Another nucleus, at the Albuera lagoons, has been dry for a few years due to the decrease of the aquifer, caused by the continued drilling of wells for watering new crops of olives and trellised vineyards (which affects the cranes and other steppe species). Un this situation, the cranes are currently roosting at Valdelagrana reservoirs and others have moved to the Villalba de los Barros reservoir.

The La Serena and Campiña Sur sectors are showing a decreasing trend, although it depends on the situation in the Central Zone each winter, so the numbers may vary from year to year.

The Las Tiendas/Morantes sector shows an upward trend, especially the Los Canchales reservoir which is becoming more important each year as a rest area, due to its strategic position. Another increasing sector is the Guadalupejo/Guadalemar sector, basically around the latter river as the cranes use the shores of the La Serena reservoir to roost.

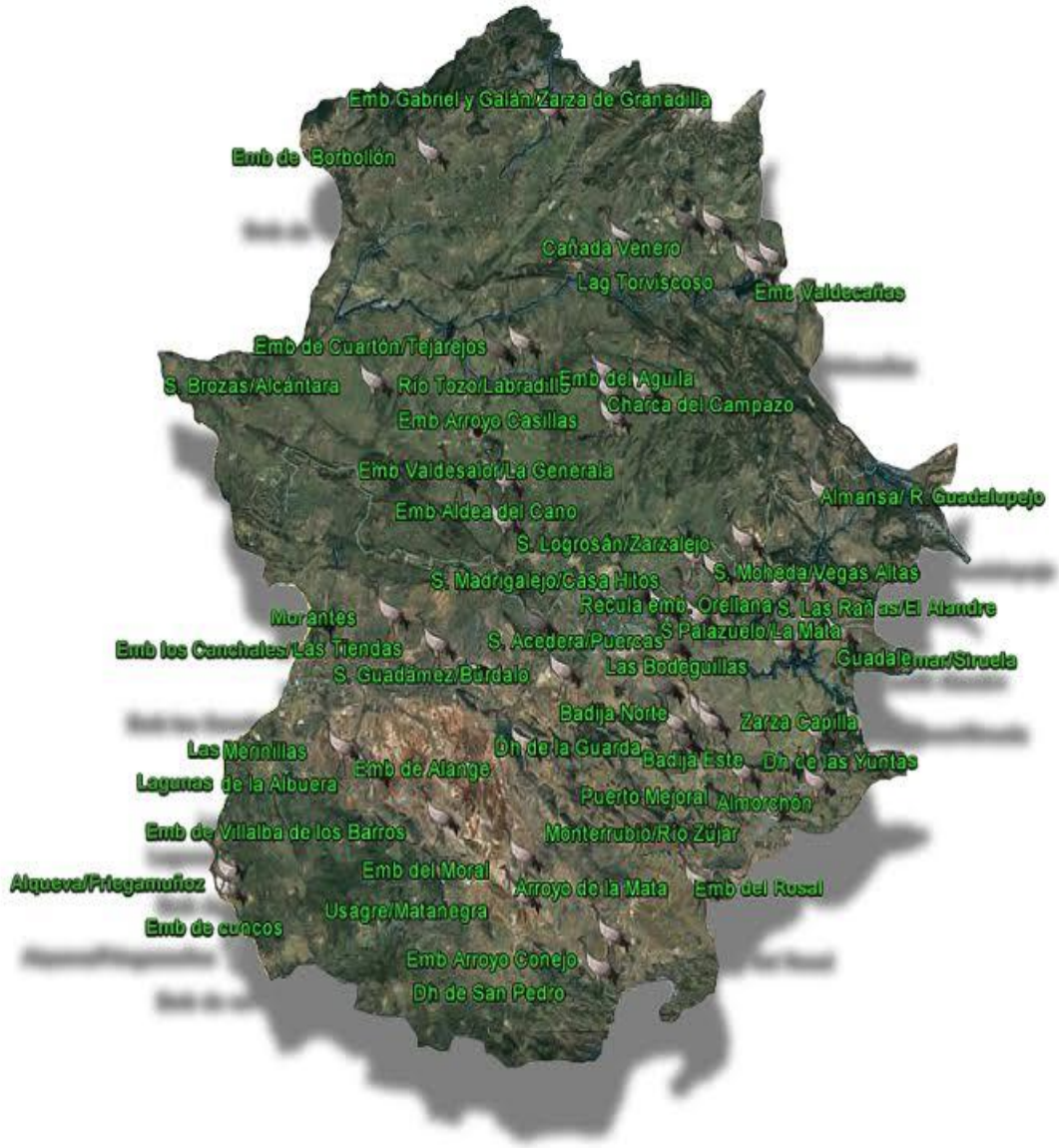


Figure no.2: Crane wintering locations in Extremadura.

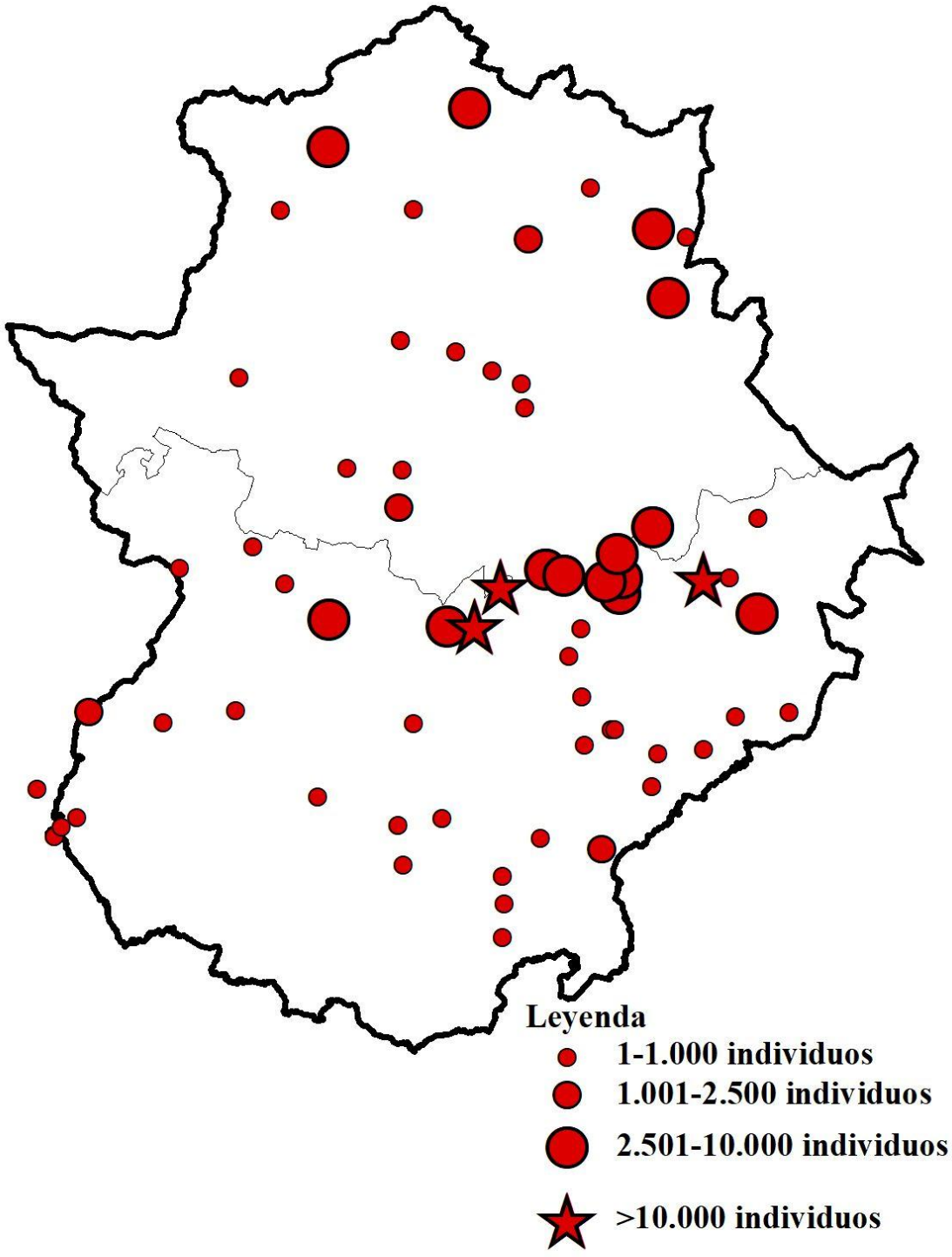


Figure no. 3: Distribution of the wintering population of cranes in Extremadura in 2018/19. Source: Román, J.A. La grulla común en España, población invernante en 2018/19 y método de censo. SEO/BirdLife.

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