

## The Avifauna of Ses Fontanelles, Palma Bay (Mallorca, Balearic Islands)

Zeeba KHAN <sup>1\*</sup>, Juan Miguel GONZÁLEZ <sup>2</sup>

and Anna TRAVESET <sup>1</sup>

**SUMMARY.**- *The Avifauna of Ses Fontanelles, Palma Bay (Mallorca, Balearic Islands).* Ses Fontanelles is all that remains of a large wetland area that once covered an extensive part of the Bay of Palma. Despite heavy modification and urban development pressures, it still remains an area of interest for bird conservation. Censuses were made during the spring of 2009 and 2010 and during autumn 2009. A total of 46 species were found to be using the area, 23 of these could be year-round residents. This number is augmented each year by passing migrants, as well as summer and winter visitors. Those habitats considered to be the most important for conservation are the reed beds and the inundated areas. The bird species considered to be the most important for conservation is the water rail *Rallus aquaticus*. It is hoped that the findings of this study will inform decision making on the eventual restoration of the area.

*Key words:* Ses Fontanelles, *Rallus aquaticus*, wetland, Palma beach, conservation.

**RESUM.**- *L'Avifauna de ses Fontanelles, Badia de Palma (Mallorca, Illes Balears).* Ses Fontanelles és el que queda d'un gran zona humida que van cobrir una àmplia zona de la badia de Palma. Tot i la greu modificació i les pressions de desenvolupament urbà, segueix sent una àrea d'interès per a la conservació de les aus. Els censos es van realitzar durant la primavera de 2009 i 2010 i durant la tardor de 2009. 46 espècies es van trobar amb la zona, 23 d'ells com residents tot d'any. Aquest nombre s'incrementa cada any que passa pels migrants, així com els visitants d'estiu i d'hivern. Els hàbitats considerats com els més importants per a la conservació són els canyissars i les zones inundades. L'espècie d'au que es considera

més important per a la conservació és la polla de ropit *Rallus aquaticus*. S'espera que els resultats d'aquest estudi contribuiràn a la presa de decisions sobre l'eventual restauració de la zona.

*Paraules claus:* Ses Fontanelles, *Rallus aquaticus*, zona humida, platja de Palma, conservació.

<sup>1</sup> Grup d' Ecologia Terrestre. Dept. Biodiversitat i Conservació, IMEDEA (CSIC-UIB). Miquel Marquès  
21. Esporles, 07190. Illes Balears. e-mails: zeebakhan@gmail.com and atraveset@uib.es

<sup>2</sup> e-mail: oenanthe@hotmail.es C/ Manuel Sanchis Guarner 10. 07004. Palma. Illes Balears

\* corresponding author.

## INTRODUCTION

Ses Fontanelles is a coastal site of approximately 32 hectares located five kilometres to the southeast of the city of Palma and falls within the municipality (31SDD7676). A combination of sand, clay and organic matter form the soils and a number of salt water lagoons are present. These are fed by subterranean marine flows, rainwater and fresh water from the Sant Jordi canal (AMENGUAL & RAMIS, 2002). Around the lagoons lie communities of salt marsh plants, other distinct plant communities and attendant wildlife.

Part of the *Prat de Sant Jordi*, Ses Fontanelles is the last fragment of a wetland area that once covered an extensive part of the Bay of Palma. In the 1840s a number of large scale civil engineering projects began, leading to the drainage of the *Prat de Sant Jordi*. While many of the surrounding areas were drained with some success, Ses Fontanelles was never completely dried out, due to it being located only marginally above sea level, and was later converted into salinas (AMENGUAL & RAMIS, 2002).

Aerial photographs from 1956 onwards show the evolution of the zone in the latter part of the 20<sup>th</sup> century. As the practice of harvesting salt was abandoned, the traditional salt marsh communities began to re-establish themselves. Photos from the 1970s onwards show how the effects of the construction of the neighbouring airport, motorway and hotels around the area affected the site. Large quantities of building materials and debris were illegally dumped on site reducing the wetland extension dramatically. This has

probably had a considerable impact on the hydrology of the area (AMENGUAL & RAMIS, 2002). The later construction of the Palma aquarium has also impacted negatively on the site, reducing the dimensions of Ses Fontanelles somewhat further. Currently, the original habitat occupies less than half of the entire extension (KHAN & TRAVESET, 2009).

The development of the site is now under review by the Consortium “Playa de Palma”. Proposals have been put forward for the regeneration of the zone as a site of nature conservation interest combined with a recreational use (West 8, 2009).

In this paper, we aim to distinguish the different habitats found on site and present the diversity of avifauna that can be found in them. It is hoped that this will inform decision making on the eventual restoration of the area.

## METHODS

### *Characteristics of the study site*

The distribution of the dominant habitat communities present in Ses Fontanelles can be observed in Fig. 1. While there exist a number of microhabitats within the area, five dominant communities can be elucidated and were used in this study.

a) Reed beds. This zone occupies an area of c. 31 130 m<sup>2</sup> and is found along the boundaries of the inundated areas. There exist three main areas of reed beds and *Phragmites australis* is the dominant species here. There are also a few small isolated patches located within the inundated area that are not marked on Fig. 1. This area is growing in extension (KHAN & TRAVESET, 2009). Other species in this habitat are *Atriplex halimus*, *Rubia peregrina* and *Carduus tenuiflorus*.

b) Nitrophilous communities. With an area of c. 139 400 m<sup>2</sup>, this is the area with the largest extension and greatest diversity of plant species. Formally part of the original wetland extension, this is a highly

modified environment and the result of decades of waste dumping and human caused disturbance. There are several communities present here. According to the Braun-Blanquet system of phytosociological classification, these would include: *Chenopodietum muralis*, *Resedo albae-Chrysanthemetum coronarii* and *Soncho tenerrimi*, amongst others (BOLÒS, 1996). There are also numerous exotic invasive species present including *Caprobrotus* spp, *Oxalis pes-caprae* and *Mesembryanthemum crystallinum*.

c) Inundated area. Covering an area of c. 79 540 m<sup>2</sup>, this wetland area originally covered the entire site at Ses Fontanelles (AMENGUAL & RAMIS, 2002). Present here are classic saltmarsh communities with dominant species including *Sarcocornia fruticosa*, *Suaeda vera* and *Arthrocnemum macrostachyum*. At the fringes of the wetland area are located the *Limonietalia* zones. These are given priority status by the European Natura 2000 system (DE LA CRUZ, 2009) and are the site of the critically endangered sea lavender *Limonium barceloi* (BAÑARES *et al.*, 2009), which is endemic to the site. Also found on the borders of the wetland area are groupings of *Tamarix* spp. protected under local legislation (Decreto 75/2005).

d) Forest. A forest fringe extends around much of the site and covers an area of some c. 28 060 m<sup>2</sup>. There are areas of degradation and large numbers of exotic species present. The dominant tree species is *Pinus halepensis* with accompanying species including *Pistacio lentiscus*, *Juniperus phoenicea* subsp. *turbinata*, *Rubia peregrina*, *Lavatera arborea*, *Anagallis arvensis* and *Geranium molle*.

e) Cultivated zone. With an area of c. 50 550 m<sup>2</sup>, the cultivated zone around the site is usually sown with cereal crops. When not in cultivation, dominant species include *Chrysanthemum coronarium*, *Papaver* spp. and *Rapistrum rugosum*.

### ***Bird censuses***

Censuses were taken on five dates for a period covering eleven months and were carried out in periods considered important for bird activity in the zone. These dates were 05/05/09, 18/06/09, 30/09/09, 08/12/09 and 20/04/10. The censuses were undertaken in the morning and on one occasion, on 18/06/09, in the evening. The site was divided into different habitat areas and transects were completed. These transects were walked and several strategic stops made in different habitat areas. Birds were recorded in the area if they were seen or heard during the censuses.

The bird data were correlated with the habitat data to reveal patterns of abundance. A bibliographic search was undertaken to establish status of the species at a Mallorcan level (GONZALÉZ *et al.*, 2009) and additional literature searches yielded information on protected species status (Council of Europe, 1979; Conselleria de Medi Ambient, 2005; Ministerio de Medio Ambiente, 2007; CITES, 2010).

## RESULTS

A total of 46 bird species were recorded, which were present in some or all of the five habitats. Table 1 presents the entire list of bird species censused, the habitats they were censused in, and their current conservation status at a Balearic, national and international level.

Some 50% of the species censused are considered to be sedentary in Mallorca. The extent to which they are sedentary in Ses Fontanelles is unknown at this time and further studies could be undertaken to establish the exact nature of their status and how they use the site. A large number of species also use the zone for reproduction during short period periods of time (see Table 1). The greatest numbers of species per hectare were seen using the forest areas, followed by those that use the cultivated zone (see Table 2). This could reflect a greater and more complex structural diversity seen within the habitats; however, further studies would be needed to confirm this.

The area with the least number of species was the reed bed, with just 12 species thought to using this area. However, 8 of those, that is to say, some 67%, receive some legislative protection or are covered by an international convention for conservation. This figure is even higher for the inundated area,

here, 79% of species receive inclusion in protected species legislation or convention (see Fig. 2). In total, 23 (50%) of the total number of species censused on site are considered protected species. The two species with classification at national level as being in danger of extinction are *Numenius arquata* and *Ardeola ralloides*. These were seen using the inundated part of the site sporadically during the summer months. Of the three species included in the local legislation, Decreto 75/2005, (*Numenius arquata*, *Vanellus vanellus* and *Rallus aquaticus*), *Rallus aquaticus* is the sole species to be nesting on the site.

## DISCUSSION

The data reveals that Ses Fontanelles is widely used by bird species. There is a substantial number who depend on the site throughout the year and another large number who use the site during periods of reproduction. There are also a large number of migrant species using the area. The presence of the two “rare/scarce” species, *Numenius arquata* and *Ardeola ralloides* also show that the site provides an important stop for species in danger of extinction which are uncommon in the area. The habitats considered the most important for conservation purposes were the reed beds and the inundated area. Their conservation importance is reflected in the general problem of the destruction of these habitats at a global level (GIBBS, 2000). The reed beds and wetland areas of Ses Fontanelles are particularly important as there is no similar habitat elsewhere in the bay of Palma. The numbers of birds considered important for their conservation status is probably higher than that reflected in this analysis, as legislation often takes several years to reflect current population declines (RODRIGUEZ *et al.*, 2006).

## CONCLUSION

Ses Fontanelles is an area that supports a moderate number of bird species and is a site used by residents and migrants alike. Further studies would be needed to establish population sizes on the site. However, over 50% of the species detected in the censuses are protected by conservation legislation or convention. The reed beds and inundated habitats are considered the most important habitats for bird

conservation as they support the highest percentage of conservation important species, 67% and 79% respectively. A species considered to be particularly important at a Balearic level and nesting on site is *Rallus aquaticus*. As there is no similar habitat in the surrounding area, it would therefore be wise to conserve Ses Fontanelles for its bird conservation value. Further, any move to restore and manage the area in question would undoubtedly have a positive impact on bird communities.

## ACKNOWLEDGEMENTS

We are grateful to Manuel Suárez for his continued support of our work in the study area. The project was financed by the Consortium Playa de Palma.

## BIBLIOGRAPHY

- AMENGUAL, L. & RAMIS, X. 2002. Anàlisi de Ses Fontanelles i del seu entorn i propostes d'actuació, planificació i gestió per tal de millorar la qualitat ambiental d'aquest espai. Unpublished report. University of the Islas Baleares.
- BAÑARES, A., BLANCA, G., GÜEMES, MORENO, J. C. & ORTIZ, S. eds., 2009. Atlas y Libro Rojo de la Flora Vasculare Amenazada de España. Adenda 2008. 154 pp. O.A.P.N., Ministerio de Medio Ambiente y Medio Rural y Marino, Madrid.
- BOLÒS, O., 1996. La vegetació de les Illes Balears. Institut Català de Bibliografia.
- CITES, 2010. <http://www.cites.org/eng/resources/species.html>. Consulted 15.05.10.
- Conselleria de Medi Ambient, 2005. Catàleg Balear d'Espècies Ame naçades i d'Espècial Protecció, les Àrees Biològiques Crítiques i el Consell Assessor de Fauna i Flora de les Illes Balears'. Decret 75/2005.
- Council of Europe, 1979. Convention on the Conservation of European Wildlife and Natural Habitats Bern/Berne, 19.IX.1979. <http://conventions.coe.int/Treaty/FR/Treaties/Html/104-2.htm> Consulted 12.03.10.

- DE LA CRUZ, M., 2009. 1510 Estepas salinas mediterráneas (Limonietalia). In: *Bases ecológicas preliminares para la conservación de los tipos de hábitat de interés comunitario en España*. Ministerio de Medio Ambiente, y Medio Rural y Marino. 78 p.
- GIBBS, J. P. 2000. Wetland loss and biodiversity conservation. *Conservation Biology*, 14(1) 314 – 317.
- Ministerio de Medio Ambiente. 2007. Ley 42/2007. Gobierno de España. [http://www.mma.es/secciones/biodiversidad/legislacion\\_convenios/legislacion/pdf/leypatrimonionaturalybiodiv14\\_12\\_07.pdf](http://www.mma.es/secciones/biodiversidad/legislacion_convenios/legislacion/pdf/leypatrimonionaturalybiodiv14_12_07.pdf). Consulted 14.10.09.
- GONZALÉZ, J. M., LÓPEZ-JURADO, C, MUNTANER, J., REBASSA, M., SUNYER, J. & VICENS, P. 2009. Annex II: Estatus de Avifauna Balear. *Anuari Ornitològic de les Balears*. 23. GOB. Palma.
- IUCN, 2001. IUCN Categories and criteria, version 3,1. Consulted 14.10.09.
- IUCN, 2010. IUCN Red List of Threatened Species. Version 2010.1. [www.iucnredlist.org](http://www.iucnredlist.org). Status: *Numenius arquata*. Consulted 14.10.09.
- IUCN 2010. IUCN Red List of Threatened Species. Version 2010.1. [www.iucnredlist.org](http://www.iucnredlist.org). Status: *Ardeola ralloides*. Consulted 14.10.09.
- KHAN, Z & TRAVESET, A. 2009. Biodiversidad terrestre. In *La Adaptación al cambio climático y la preservación de ecosistemas naturales, terrestres y marinos en el marco del proyecto estratégico de recalificación integral de la Playa de Palma*. Unpublished report. IMEDEA. 74p.
- RODRIGUES, A.S.L., PILGRIM, J.D., LAMOREUX, J.F., HOFFMANN, M. & BROOKS, T.M. 2006. The value of the IUCN Red List for conservation. *Trends in Ecology & Evolution*. 21(2): 71 – 76
- West 8, 2009. Plan director de reconversión integral de la Platja de Palma. Unpublished report. 74p.



**Tables and Figures**

Espècie	Hàbitat	Estatus (GONZALÉ Z <i>et al.</i> , 2009)	Protegits per legislació		Protegits per conveni			
			BALEARS (Decreto 75/2005)	ESPANYA (Ley 42/2007)	UICN (IUCN , 2010)	ANNEX BERNA (Council of Europe, 1979)	APÈND. CITES (CITES, 2010)	
<i>Alectoris rufa</i> (Perdiu)	c,n	Sa						
<i>Anas crecca</i> (Sel•la rossa)	I	Ha, Mm						
<i>Anas platyrhynchos</i> (Coll blau)	c,n	Sm, Ha						
<i>Anthus pratensis</i> (Titina sorda)	tot	Ha, Ma						
<i>Apus apus</i> (Falzia)	tot	Ea, Ma		E	LC	III		
<i>Apus melba</i> (Falzia reial)	tot	Ee, Mm		E	LC	II		
<i>Ardea cinerea</i> (Agró)	I	Ee, Hm, Mm		E	LC	III		
<i>Ardea purpurea</i> (Agró roig)	I	Em, Mm		E	LC	III		
<i>Ardeola ralloides</i> (Toret)	I	Er, Me		P	LC	II		
<i>Burhinus oedicephalus</i> (Sebel•lí)	c,i,n	Sa, He, Me		E	LC	II		
<i>Carduelis cannabina</i> (Passarell)	c,n	Sa, Ha, Ma						
<i>Carduelis carduelis</i> (Cadernera)	c,n	Sa, Ha, Ma						
<i>Carduelis chloris</i> (Verderol)	b,c,n	Sa, Ha, Ma						
<i>Cettia cetti</i> (Rossinyol bord)	cn,i	Sa		E	LC	II		
<i>Charadrius dubius</i> (Tiruril•lo menu)	I	Se, He, Mm		E	LC	II		
<i>Cisticola juncidis</i> (Brusac)	c,n	Sa						
<i>Columba palumbus</i> (Tudó)	b,c,n	Sa, Hm						
<i>Delichon urbica</i> (Cabot)	tot	Ea, Ma		E	LC	II		
<i>Egretta garzetta</i> (Agró blanc)	I	Ee, Hm, Mm		E	LC	II		
<i>Erithacus rubecula</i> (Ropit)	c,n,b	Ha, Ma		E	LC	II		
<i>Falco tinnunculus</i> (Xoriguer)	tot	Sa, He, Mm		E	LC	II		I
<i>Ficedula hypoleuca</i> (Matamosques negre)	b,n	Ma						
<i>Fringilla coelebs</i> (Pinçà)	b	Sa, Ha, Ma						
<i>Fulica atra</i> (Fotja)	i	Sa, Ha, Me						
<i>Gallinago gallinago</i> (Cegall)	i	Ha, Mm				III		
<i>Gallinula chloropus</i> (Polla garau)	i	Sa, He, Me						
<i>Himantopus himantopus</i>	i	Em, He,		E	LC	II		

(Avisador)		Mm					
<i>Hirundo rupestris</i> (Cabot de roca)	tot	Sa, Hm					
<i>Hirundo rustica</i> (Oronella)	tot	Em, Ma		E	LC	II	
<i>Lanius senator</i> (Capsigrany)	c,n	Ea, Ma					
<i>Luscinia megarhynchos</i> (Rossinyol)	b,n	Ea, Ma					
<i>Merops apiaster</i> (Abellerol)	tot	Ee, Ma		E	LC	II	
<i>Muscicapa striata</i> (Matamosques)	b	Ea, Ma		E	LC	II	
<i>Numenius arquata</i> (Curlera reial)	i	He, Me	X	P	NT	II	
<i>Oenanthe oenanthe</i> (Primavera)	c,n	Er, Ma		E	LC	II	
<i>Passer domesticus</i> (Teulader)	b,c,cn,n	Sa Er no reprod.					
<i>Phylloscopus collybita</i> (Ull de bou)	b,c,cn,n	Ha, Ma		E	LC	II	
<i>Rallus aquaticus</i> (Polla de ropit)	i	Sm	X	E	LC	II	
<i>Saxicola torquata</i> (Vitrac)	c,n	Sa, Hm, Mm Sa, Ha, Ma		E	LC	II	
<i>Serinus serinus</i> (Gafarró)	b						
<i>Sturnus vulgaris</i> (Estornell)	b,c,cn,n	Ha					
<i>Sylvia melanocephala</i> (Busqueret de cap negre)	n	Sa, He, Me		E	LC	II	
<i>Tachybaptus ruficollis</i> (Setmesó)	i	Sm, He Sa, Hm, Mm		E	LC	II	
<i>Turdus merula</i> (Mèrlera)	b,c,n						
<i>Turdus philomelos</i> (Tord)	b,c,n	Ha, Ma					
<i>Upupa epops</i> (Puput)	c,n	Sa, Me		E	LC	II	
<i>Vanellus vanellus</i> (Juia)	i	Ha, Mm	X	E	LC	II	

Table 1. List of bird species detected, with their status and habitat. *Key*: hàbitat: c- cultivated zone, n- nitrophilous zone, i-inundated area, b-forest, cn- reed bed, tot-all habitats; Estatus: S-sedentary, H-winter visitor, E-summer visitor, M-migrant visitor, r-rare, e-scarce, m-moderate, a-abundant, no reprod-not reproducing; Balears: X-inclusion in the Balearic Catalogue; Espanya: E-species of special interest, P-species in danger of extinction; UICN (International Union for the Conservation of Nature) LC-least concern, NT-near threatened; Annex Berna II-inclusion in appendix II, III-inclusion in appendix III; CITES (Convention on International Trade in Endangered Species) I-inclusion in appendix I.

Taula 1. Espècies d'aus amb estatus i habitat. *Clau:* hàbitat: c- zona cultiu, n- comunitats nitròfil·les, i- zona inundada, b-bosc, cn-canyissar, tot-tots els hàbitats; Estatus: S-sedentari, H-hivernant, E-estival, M-migrant, r-rar, e-escàs, m-moderat, a-abundant, no reprod-sense criar; Balears: X-inclusió en el Catalog Balear; Espanya: E-espècies d'interès especial, P-espècies en perill de extinció; UICN (Unió Mundial per a la Conservació de la Natura) LC-risc mínim, NT-gairebé amenaçada; Annex Berna II-inclusió en l'apèndix II, III-inclusió en l'apèndix III; CITES (Conveni sobre comerç internacional d'espècies salvatges de fauna i flora en perill) I-inclusió en l'apèndix I.

<b>Zona</b>	<b>Area en hectàrees</b>	<b>Nombre d'espècies/ hectare</b>	<b>Nombre d'espècies emprant la zona</b>	<b>% d'espècies emprant la zona i protegit per llei o conveni</b>
<b>Com.</b>	13,940	2,08	29	45
<b>Nitròfil·les</b>				
<b>Zona inundada</b>	7,954	3,01	24	79
<b>Zona de cultiu</b>	5,055	5,14	26	46
<b>Canyissar</b>	3,113	3,85	12	67
<b>Bosc</b>	2,806	7,13	20	45

Table 2. Bird and habitat data for Ses Fontanelles, 2009-2010.

Taula 2. Data sobre les aus i els hàbitats a ses Fontanelles, 2009-2010.

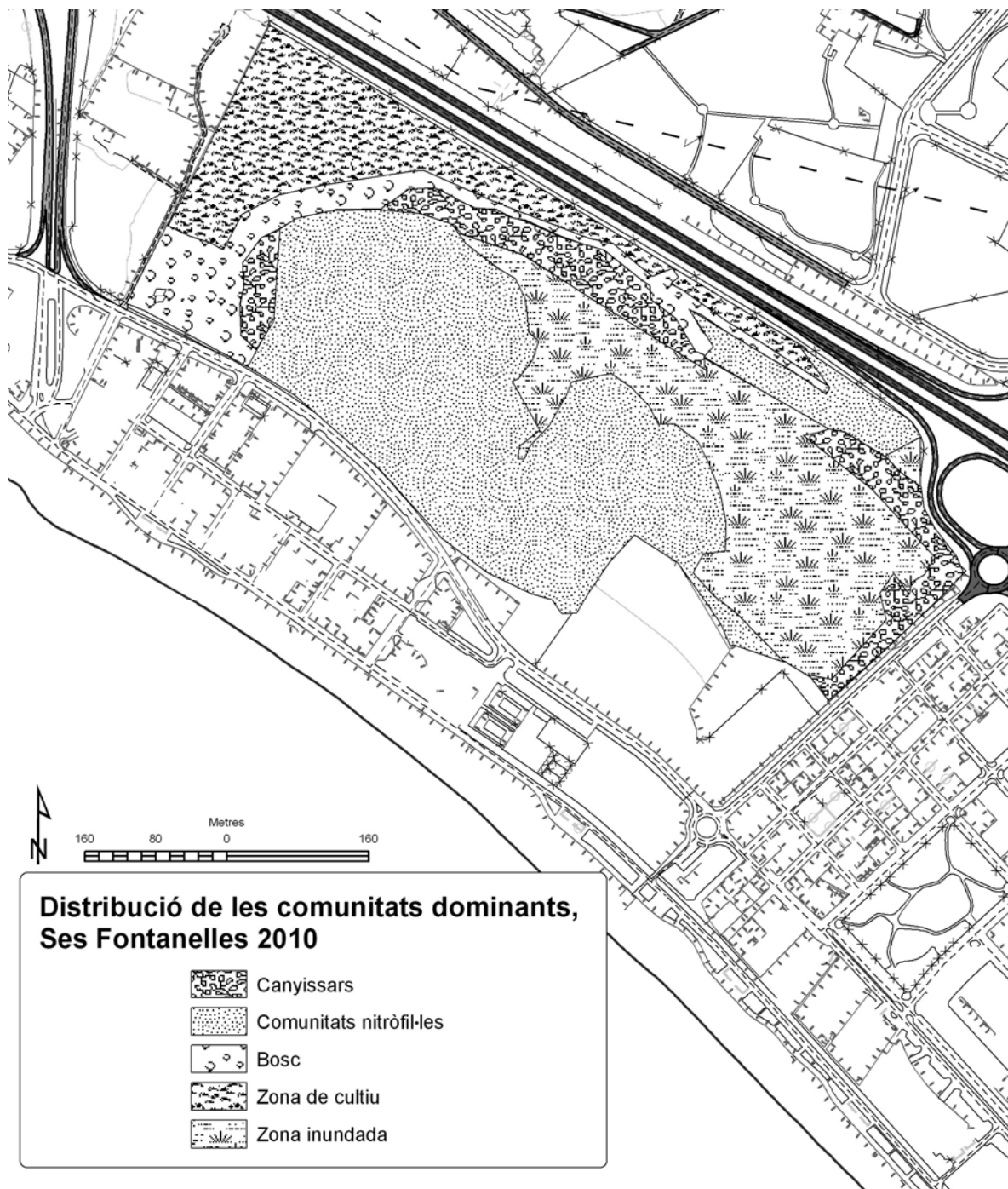


Fig. 1. Distribution of dominant habitats, Ses Fontanelles, 2010.

Fig. 1. Distribució de les comunitats dominants, ses Fontanelles, 2010.

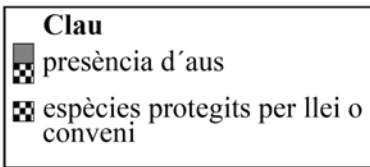
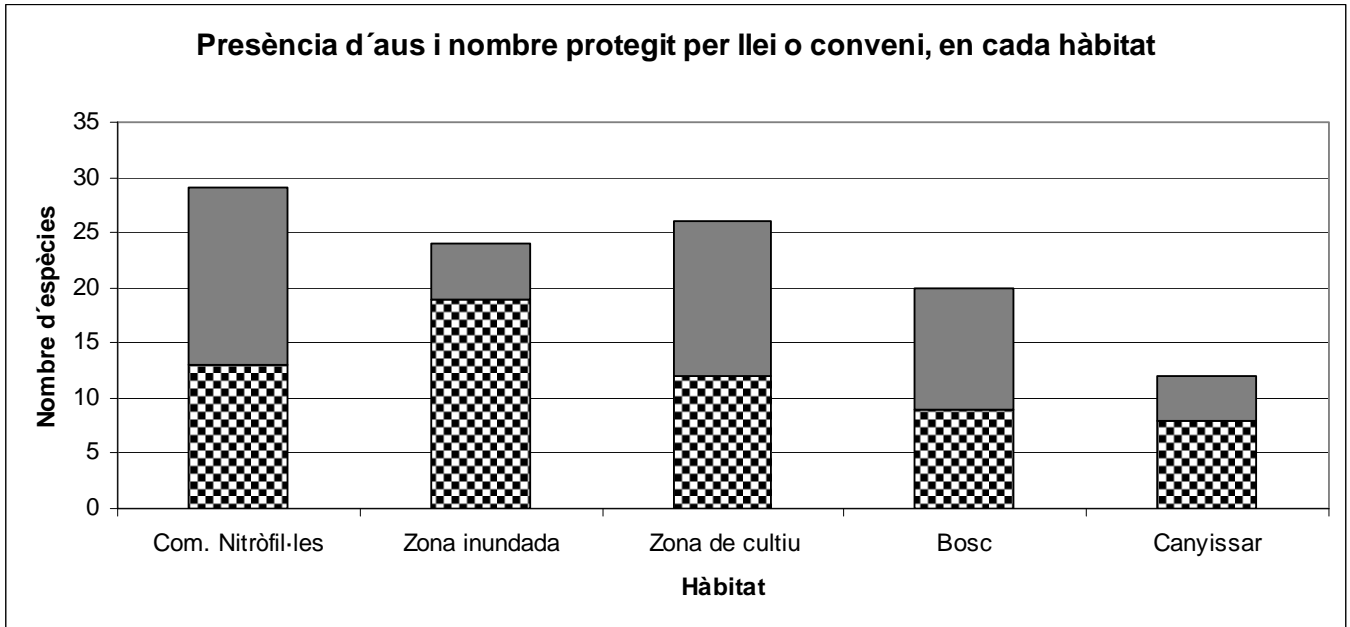


Fig. 2. Presence of birds and number protected by legislation or convention, in each habitat.

Fig 2. Presència d'aus i nombre protegit per llei o conveni en cada hàbitat.