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# Monitoring of Iberian Wolf expansion in Sabugal – Malcata Region



#### Note

This report was written in english and with a scientific article structure as preparation for future work in scientific domain.

The laboratory work and genetic analyzes referred on the scholarship application were not done since there were not founded any scats with the properties needed for these analyses during the present work.

The oral presentation will be done using Power-Point program.

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# Monitoring Iberian Wolf expansion in Sabugal – Malcata Region

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## Abstract

Wind farm construction may cause an effect of repulse on the wildlife. Sabugal – Malcata region has a new wind farm in a zone where the situation of the Iberian wolf (*Canis lupus signatus*, Cabrera 1907) is considered as precarious. In this context a monitoring project was begun to assess the impact of this infrastructure on the Iberian wolf population. Here are presented the results of eight months of monitoring and some information received during the project about the wolf presence in this region. Every month, signs of wolf presence were prospected in twelve transects in the wind farm adjacent area and fourteen inquires were done to people that can contact with this predator. In all the eight months only two scats were detected and two wolf tracks after a snowfall. The presence of wolves was referred in the inquires as constant before 1990. However, some recent livestock damages were reported. The Roe deer (*Capreolus capreolus*) seems to be in expansion in this area, being reported in more than half of the inquires. This situation may reveal a new opportunity for settlement of dispersing wolves. The occurrence of the Iberian Wolf in Sabugal – Malcata region continues not to be confirmed, but the designation of probable presence is reinforced.

**Keywords:** Iberian Wolf; Sabugal – Malcata Region; Wind farm; Inquires

## Introduction

The Iberian Wolf (*Canis lupus signatus*, Cabrera 1907) is an endemic subspecies of the Iberian Peninsula classified with the Endangered Status (En) in Portugal Vertebrate Red Book (Cabral MJ *et al.* 2006), and is protected by a specific national law (Law nº 90/88 of August 13 regulated in Decree - Law nº139/90, of April 27). This subspecies is included in the Bern Convention (82/72/CEE) implemented in Portugal by Decree-Law nº 316/89, where it is included on Annex II. The species also regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Common in Iberian Peninsula during 20<sup>th</sup> century, the Iberian wolf, like other large carnivores, suffered with the destruction and fragmentation of the habitat, with human persecution and reduction of wild prey. These events led to a great decrease of the wolf distribution (Petrucci-Fonseca, 1990). In Portugal this situation caused the progressive decrease of the wolf population which is, at present, estimated about 220 – 430 individuals. Of these, 90% inhabit the North Region of Douro River forming three important population nuclei, Peneda/Gerês, Alvão/Padrela and Bragança. The other 10% are presented in central Portugal, where are identified two nuclei Arada/Trancoso and Figueira de Castelo Rodrigo/ Sabugal (Pimenta, V. *et al.*, 2005).

The Douro River South population reveals isolation problems, caused by lack of connection with others Iberian wolf populations. In the North of the country the species reveals connectivity with the wolf population in the North of Spain. This isolation can cause problems in the viability of the population in Douro River South Region.

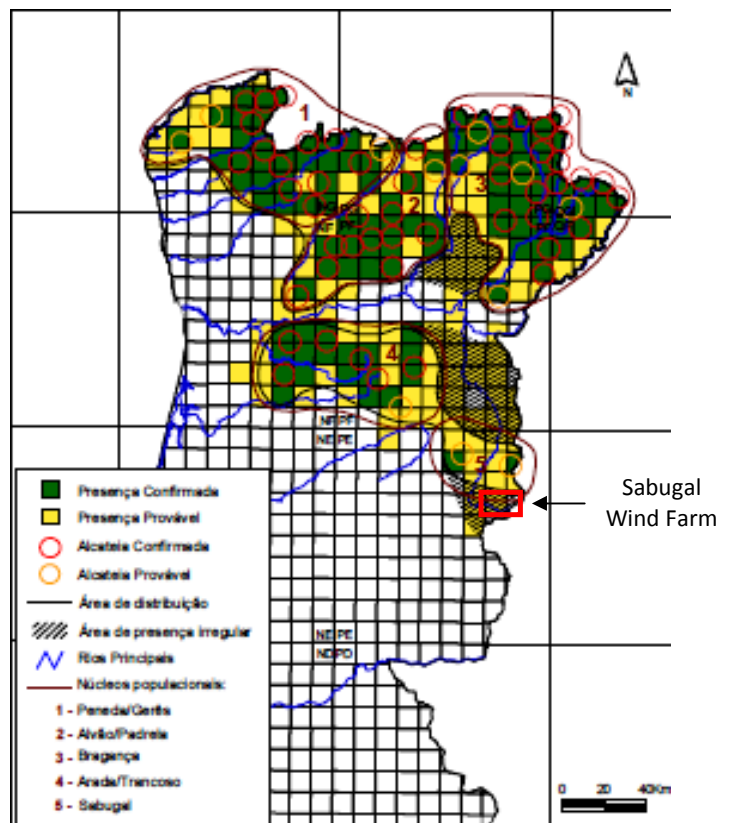
According to the 2002/2003 Wolf National Census, in Sabugal region the presence of wolf was detected and taking in consideration livestock damages confirmed by the Nature and Biodiversity Conservation Institute (ICNB), the presence of one wolf pack in this area is considered probable. As strong evidences of wolf occurrence in this region in the last decade, it is referred one wolf hit by a car on April 2000 near this area in El Bódon, Salamanca province, Spain.

The Malcata natural reserve area is also a probable local for the existence of a wolf pack according to Pimenta, V. *et al.*, (2005), that refer the direct observation of one wolf in the Malcata Natural Reserve area in 1999. However, the same authors refer a very low density of indirect signs of wolf presence in this area.

It is important to mention that these two areas are historical areas of wolf presence and the species disappearance in adjacent areas is estimated around 1980-1990 (Cândido *et al.*, 2000). Moreover in 1996, Bessa Gomes, calculated a wolf Habitat Suitability Index (HSI) for this region and verified that in terms of roads net, population density, density of goat herd and forested area, this region is classified as good or excellent, in fact the number of goats and cattle is higher when compared with the remaining areas of wolf distribution in south of Douro River (Censo geral da Agricultura, 1999). However in relation to sheep density and uncultivated area surface the region is classified as median suitability. Moreover, Grilo *et al.*, (2002) classified the area as priority III level, meaning that this area has potential for wolf expansion

Due to its reduced permeability it is important to take into account the presence of Aveiro – Vilar Formoso highway (IP5) a physical barrier, between the two wolf nuclei (Arada/Trancoso and Figueira de Castelo Rodrigo - Sabugal). However the proximity to Sierra da Gata in Spain can allow a possible connection with the Spanish wolf population for there are no big barriers for the dispersion of the species. Nevertheless, the information in that area is reduced and only Llaneza & Blanco, 2001 in Pimenta, V. (2005) refer the occasionally presence of the wolf, and considered that these events were justified by dispersion movements of the wolves from the Portuguese nucleus Figueira de Castelo Rodrigo – Sabugal.

In what concerns to wolf wild prey are not to present in Sabugal – Malcata region, except the wild boar (*Sus scrofa*) that exist in significant abundance and the Roe Deer (*Capreolus capreolus*) a recent introduced species that appear to be in an expansion situation, which probably may help to a possible settlement of wolves in dispersion movements.



**Figure 1** – Wolf distribution (UTM 10x10 km) and Sabugal wind farm location. Regular presence (green) and irregular presence (yellow). Adapted from Pimenta *et al.*, 2005.

The wolves suffered with human activity in this region and Cândido A.T. (2000) mentions a very hard persecution in Figueira Castelo Rodrigo/Almeida area, even after the 1988 protection Law, referring the

1995 year, when an adult female and a juvenile male were killed by shot, with the suspect of a third wolf dead, days later and poison attempts are also mentioned. In Sabugal zone the wolf persecution was designated as “ferocious” and “merciless”, adding that in 1992/93 – 2000 period seven wolves were killed. Thereby, all conservation efforts are needed in this area.

The construction of an infrastructure like road net or a wind farm can cause some negative impacts on the local fauna, so it becomes important to check the impact of an infrastructure as a wind farm that could implicate more perturbation in this unstable situation, principally because of the noise generated by the aerogenerators. This noise can originate an effect of repulsion and can consequently be avoided by fauna. In addition the easiest accesses to the hills, caused by the creation and improvement of the pathways where normally the wind farms are constructed, cause an increase of people circulation, in particular during the construction process. These inaccessible hills are many times used by wolves as a refuge from anthropogenic actions thus the destruction and easy access to these locals could cause the lost of vital areas of wolf habitat. Knowing that the wolf is a species that avoids human perturbation when it has that possibility, monitoring these infrastructures reveals to be extremely important, in particular with the main goal to detect zones of major impact with the aim of create mitigation and compensation measures.

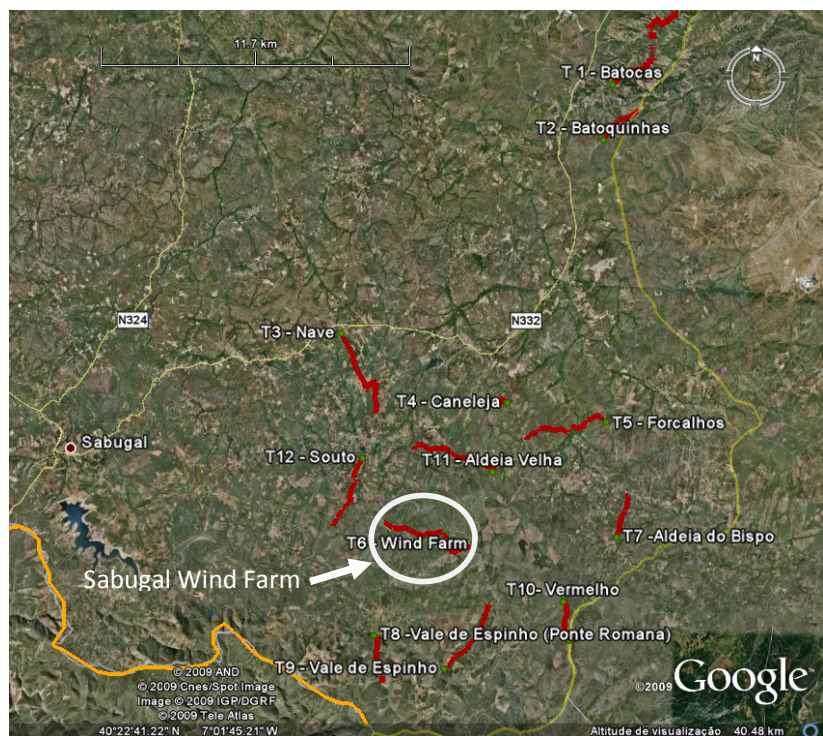
Evidences of wolf presence founded in wind farm areas could indicate if wolves use the accesses constructed for these infrastructures for their daily movements. Thus monitor Serra do Homem de Pedra wind farm, a new project in construction phase in Sabugal county, can reveals the importance of investigating the presence of the wolf in this area and the impact of this project on the Iberian wolf. The present work, intend to respond if the Iberian Wolf is (1) present in the area of Serra de Homem de Pedra wind farm and (2) if the presence is confirmed what are the main locals used by the wolves.

## Methodology

From September 2008 to July 2009 the presence of wolf in Sabugal wind farm was monitored.

## Study area

Sabugal wind farm (40°19'01N 6°54'16W) is located in Serra do Homem de Pedra, Sabugal county, Souto and Foios, in Beira-Interior Region on East of Portugal. The altitude varies between 907m and 1135m and the precipitation is on average about 700-800mm per year, with snowfalls occurring sporadically in winter. The annual range temperature is around 10°C and 12.5°C (Atlas Digital do Ambiente - Instituto do Ambiente). The study



**Figure 2** - Study area. Location of Sabugal wind farm (white circle), sampling paths (red) and the limit of Malcata Natural Reserve (orange).

area is mainly by cambisols and the landscape is dominated by Pyrenean oak (*Quercus pyrenaica*), *Erica* sp., *Cytisus* sp., and gum rock -rose (*Cistus ladanifer*) as well, the introduced tree, eucalyptus (*Eucalyptus globosus*). In what concerns the fauna, the area presents a varied number of species of all animal groups. The study area also has a low roads and human density, about 18.06 Hab./Km<sup>2</sup> (DGAL, 2001). The main access to the study area is the regional road nº233. The local economy is based by the agriculture and husbandry.

## Field Methods

To identify the wolf presence in the area it was used 12 sampling transects (figure 2) in to searching indirect evidence, scats and tracks, of the wolf presence in this area. These sampling paths were on average of 3 km in length and each sampling path has been covered one time per month during the work period, with an interval of at least 20 days. To search indirect signs of wolf presence, the sampling paths were covered by car at 10-15km/h speed and in each road crossing the search was done by foot in a 50meters distance from the crossing center, in each crossing branch. The scat identification was based on morphological aspect, smell and location, criteria used by Pettruci-Fonseca (1990); Álvares (1995); Roque (1999); Costa (2000); Pereira (2003); Guerra (2004).

To assess the wolf presence in this region were also done 14 inquiries, to local people founded during the sampling paths, to one ICNB Park Warden and in some local villages near the study area. These inquires were done as an informal conversation, during which people were inquired about the actual presence of the wolf in the region, the historical presence, evidences of wolf breeding, presence of the main wolf prey, in particular wild boar and roe deer and the occurrence of livestock damages caused by wolves.

## Data Analyses

Data obtained during the transect are used to calculate Evidence Concentration Index (IC) (Llaneza *et al.* in Roque, 1999), which gives a notion of zones more and less used by wolves. The presence of the wolf was registered in a five year interval periods, and the presence of wild prey was registered as present or absent.

## Results

### Transects

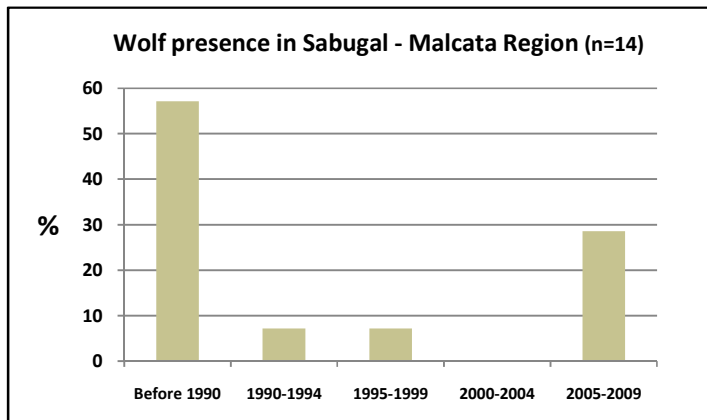
In October and February we identify two scats as wolf scats. The first, detected out of wind farm transects, but near transect 10 did not presented good conditions for genetic analyze. The second scat was founded in T10 but was not genetic analyzed. Also near T10 and in January, were detected two wolf tracks after a snowfall.

### Inquires

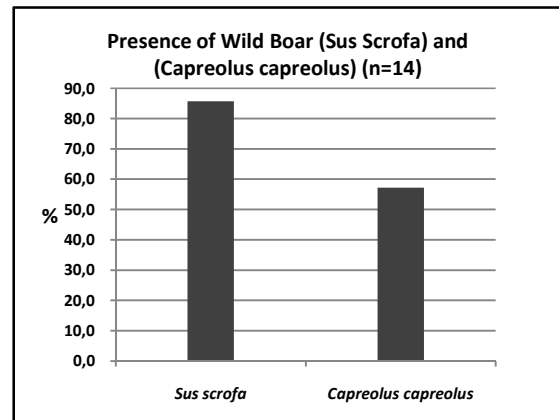
On the present work, about 57,1% of people who answered to the inquires mention the wolf presence that the wolf existed in the Sabugal - Malcata Region before 1990 and 28,7% say that the wolves still exist in the region; 14% refer the species presence for the period from 1990 to 2000. During the 2000-2005 period wolf presence, and was not mentioned in any inquiry the wolf presence.

Concerning the occurrence of the wild boar (*Sus scrofa*) and the roe deer (*Capreolus Capreolus*), the two species are present in the area, being referred respectively in 85.7% and 57.1% of the inquires.

It was also mentioned (35.7%) the occurrence of livestock damages in wind farm adjacent area. Three wolf attacks were reported as confirmed by the ICNB: one in 2006 at Lageosa; and two in 2009 at Carvalhal . Besides these information another wolf damage on livestock was reported (November 2008) at Alfaiates. We also received two information concerning to wolves observation: two wolves were observed crossing the regional road nº538 near Martim Rei (January 2009); and one wolf was observed crossing the National road nº 332 between Aldeia da Ponte and Nave-de-Haver (June 2009).



**Figure 3** – Percentage of wolf references on different periods of time.



**Figure 4** – Percentages of references of wild boar and Roe Deer in Sabugal – Malcata area.

## Discussion

Evidence of the wolf occurrence in Sabugal wind farm was only detected in transect 10, with one wolf scat and two wolf snow tracks founded, although the scat genetic analyze is not yet concluded, reason why is not possible to confirm the presence of wolf. Due to these signs is probable the occasionally occurrence of this predator in the study area but note that in eight months of monitoring only were detected two scats not confirmed. Being present in this zone, the species will probably occur in a low density since it is not detected by population in general and probably will have a tendency to avoid the wind farm area, for the reason that was verified some human circulation, a consequence of aerogenerators implementation. It was also noted some car circulation for off road activities and to visit a new observation point created in wind farm. All these activities create disturbance, in addition to that generated by the aerogenerators and will probably create an effect of repulse on wolves, as in all the fauna. Is important to refer that with the probable low density that this predator occur in this region, the marking of territory can be less intense, since this behavior is used for avoid conflicts and delimit the area of one wolf patch, behavior that in this hypothetical situation is not so necessary. If this occur, transects methodology for detect wolves signs may not be efficient as in a normal situation, not permitting to detect the real use of this area. To difficult this process the main soil in the study area is very rocky, not allowing find wolf tracks easily in the absence of snow, one limitation to the application of transects methodology.

Inquires results confirm an accentuated decrease of wolf presence in this region after 1990 being in agreement with Cândido (2000) that points the eighties for the strong disappearance of Iberian wolf in this area. References of the wolf in the last five years may indicate an increase of density, although is important have the notion that latest livestock damages are more fresh in people memories, and that in some inquires people mentioned the presence of wild dogs that can also attack livestock. This datum not allow input all the damages in wolves but in the mean time four attacks were confirmed by the Nature and biodiversity



Conservation Institute, and the observation of one wolf crossing the national road not very distant from the area where occurred the livestock damages. It is also an area, not very distant from where in April 2000 was founded one young male was hit by a car in El bodon village, Spain. Thus these data, seems belong to the Sabugal patch, a group that possibly occupies the region between Nave de Haver, Alfaiates and Fuenteguinaldo village and that is classified as probable in Pimenta, V. (2005) but distant from the wind farm area.

Colónia-Agricola information is near the Malcata reserve border and is inserting on other area where presence of wolf is also considered as probable by the same author. Thereby it seems that information collected corresponds to two different situations and like in last wolf National Census, the area of Malcata Reserve shows less references of activity, strengthening the idea that prevails in a more precarious state, comparing with the Sabugal patch.

Nevertheless do not exist a concrete and recent proof of Iberian wolf presence in any of these areas and since both of them are near the border, wolves could occupy this area and having a connection with a possible Spanish group, unfortunately the inexistence of data from Spain did not allow to have more references to help locate these groups. The presence of the species is for this reason considered as irregular.

The habitat in this area appears to have suitability to the species, but the numbers of wolves that arrive to this area have to be higher due to the existent barriers.

Wild boar and roe deer seems occur in the area and the data collected point to an increase of roe deer abundance since it is increasingly seen by the population. If this scenario is correct this could be an important fact for wolf recovery in this region, allowing the settlement of wolves in movements of dispersion coming from other areas. These individuals could establish in unoccupied zones and consequently reinforce the genetic pool in Sabugal – Malcata region.

Ours objectives were achieved but we suggest application of other methodologies as camera traps with movement and temperature sensor cameras in locals where the data were collected and where livestock damages occurred. Also to confirm the wolf presence in this region is necessary to invest in methods like howling simulation and waiting stations, especially after the breeding season when the number of individuals is greater, if reproduction occurs, and would be important to have a monthly contact with the Nature an biodiversity Conservation Institute park wanders to optimize the use of the mentioned methods. It would also be appropriate cooperation with the responsible Spanish authorities, to complement the Portuguese data.

## **Final Considerations**

Wolf occurrence is not confirmed in the Sabugal wind farm area, as in the entire region. The possibility of wolf presence in the wind farm area will probably be in low density and the use of Serra do Homem de Pedra by wolves could be affected by factors as car circulation. Evidences of wolf presence were stronger in the area attributed to the probable Sabugal wolf patch and in Malcata region, where wind farm is inserted, the wolf references are scattered. The probable wolf presence could justifies the application of other methodologies in this region with the intention of confirm the evidences obtained until now.

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## Annexes

Month	Transept	Extension (K.m.)	Nº evidences of Presence - Confirmed	Nº evidences of Presence - not confirmed	Evidence Concentration Index (I.C.) - confirmed	Evidence Concentration Index (I.C.) - not confirmed
October	T1 -Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
November	T1 -Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
December	T1 -Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00

	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
<b>January</b>	T1 - Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
<b>February</b>	T1 - Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho ( Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	1,00	0,0	0,53
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
<b>March</b>	T1 - Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
<b>April</b>	T1 - Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00

	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
May	T1 - Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00
June	T1 - Batocas	4,0	0,0	0,00	0,0	0,00
	T2 - Batoquinhas	4,0	0,0	0,00	0,0	0,00
	T3 - Nave	3,1	0,0	0,00	0,0	0,00
	T4 - Caneleja	1	0,0	0,00	0,0	0,00
	T5 - Forcalhos	3,9	0,0	0,00	0,0	0,00
	T6 - Wind Farm	4,2	0,0	0,00	0,0	0,00
	T7 - Aldeia do Bispo	3,9	0,0	0,00	0,0	0,00
	T8 - Vale de Espinho (Ponte Romana)	2,5	0,0	0,00	0,0	0,00
	T9 - Vale de Espinho	3,2	0,0	0,00	0,0	0,00
	T10 - Vermelho	1,9	0,0	0,00	0,0	0,00
	T 11 - Aldeia Velha	3,6	0,0	0,00	0,0	0,00
	T 12 - Souto	3,1	0,0	0,00	0,0	0,00

**Table 1** – Evidence Concentration Index in each transect.

André Pinto da Silva



Francisco Petrucci- Fonseca

(Orientador)

