Marteloscope
Pinar de Talayuela

Field guide

GOBIERNO DE ESPAÑA
VICEPRESIDENCIA TERCERA DEL GOBIERNO
MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO

JUNTA DE EXTREMADURA
Consejería de Agricultura, Desarrollo Rural, Población y Territorio

Integrate Network
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Dehesa Boyal de Talayuela forest

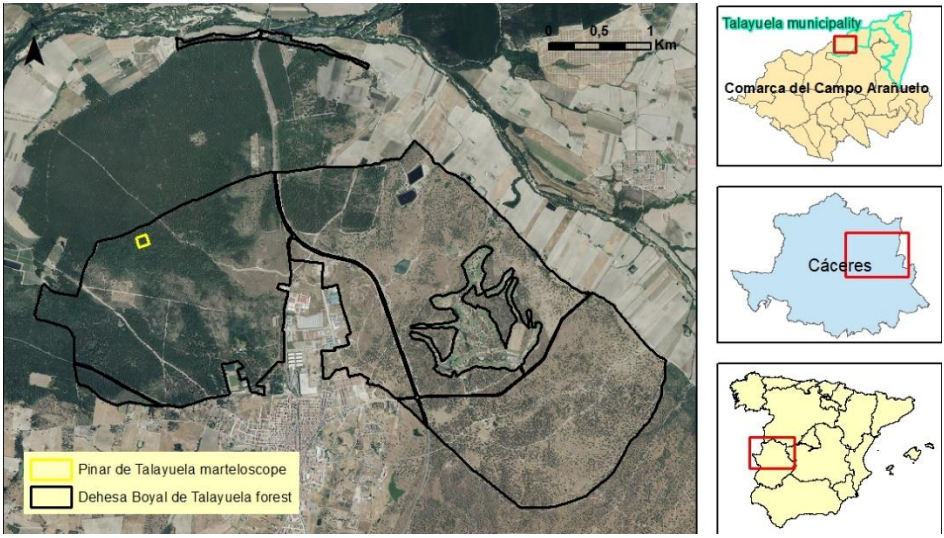
The forest of Dehesa Boyal de Talayuela is located in the valley of the Tiétar River, at the bottom of the southern slope of Sierra de Gredos. It is a public forest in the municipality of Talayuela (Cáceres, Extremadura), being owned by Talayuela's city council and managed by the Servicio de Ordenación y Gestión Forestal de la Consejería de Agricultura, Desarrollo Rural, Población y Territorio (Junta de Extremadura).

The orography of the area is uniform, with slopes between 0-5%; therefore, erosive phenomena do not appear easily. There is no dominant orientation.

The climate is dry-subhumid continental Mediterranean, with an average summer drought period of 4.5 months.

The forest is divided into two plots. "Plot A" includes almost the entire forest area and is closer to the urban area of Talayuela. "Plot B", which barely accounts for 1% of the total area of the forest, is located next to the bed of the Tiétar River. In the western half of Plot A, where the marteloscope is located, the predominant forest stand is a pine forest of *Pinus pinaster*, accompanied by *Quercus pyrenaica*. In the eastern half, mixed stands of holm oak-Pyrenean oak with a dehesa structure are predominant, with good pastures (sheepfold grassland) dedicated to grazing. The soil is quite frugal, with little water retention capacity and difficulties for the colonization and regeneration of the vegetation cover.

Location of the Pinar de Talayuela marteloscope.

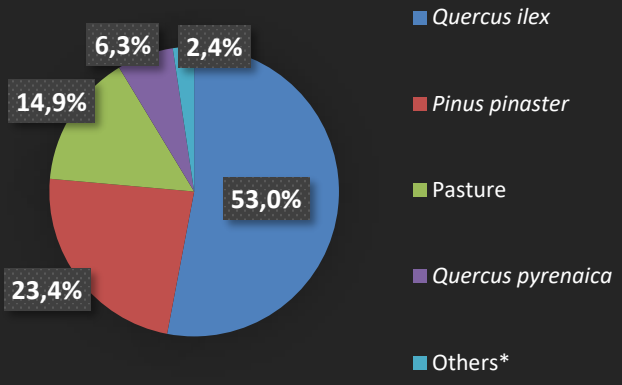


...in figures

1067 ha
Total forest area

3.4 m³/ha
Annual increment

95.1 m³/ha
Actual average stock



* Non-inventoriable areas (water, buildings, roads, etc.), firebreaks, thickets and riparian vegetation.

2335 m³
Annual allowable cut of the pine stands

305 trees/ha
Tree density

29 % conifers
71 % broadleaves

1.05 %
of the forest area is occupied by firebreaks

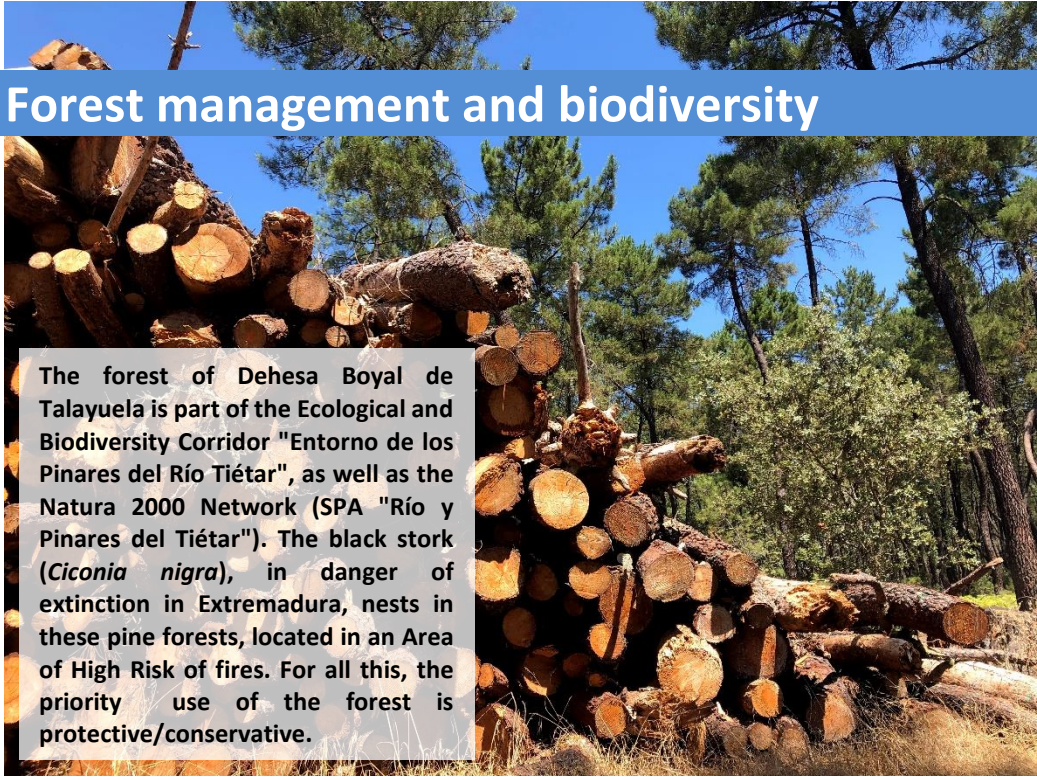
71.2 €/ha
Annual income for the rent of pasture use

1.4 €/ha
Annual income for the rent of small game permission

49 km
Roads and trails length

459 m/ha
Roads and trails density

Forest management and biodiversity



The forest of Dehesa Boyal de Talayuela is part of the Ecological and Biodiversity Corridor "Entorno de los Pinares del Río Tiétar", as well as the Natura 2000 Network (SPA "Río y Pinares del Tiétar"). The black stork (*Ciconia nigra*), in danger of extinction in Extremadura, nests in these pine forests, located in an Area of High Risk of fires. For all this, the priority use of the forest is protective/conservative.

Surrounded by a highly anthropized environment, the pine forest of Talayuela is protected to 80% of its extent. Almost all the few cuts made are preventive against forest fires, and have important limitations in areas of nesting and breeding of protected bird species, given the great ornithological interest of this forest.

Within the pine forest, there is a recreational centre where educational, cultural and nature enjoyment activities are carried out. Among these, the collection of mushrooms and asparagus is remarkable, which lacks management for the moment.

Regarding the pasture, its grazing use is important (mainly for cattle). Here the holm oak decline syndrome “La Seca” represents a phytosanitary problem, causing the death of several specimens and clearing large areas of dehesa forest.

The urbanizing activity, favoured by the proximity of Talayuela’s town, can become a risk to the forest. Since 1963 there has been a reduction in the area of this public forest of 13.8%. In 2002, for example, 60 ha of the forest (outside the protected areas) were converted into a golf course.

36.7 %

of the forest belongs to protected areas

8675.4 m^3

of deadwood from *P. pinaster*

30 **bird species**

7 **bat species**

4 **Odonata species**

83.6 %

of the forest area are habitats of community interest (HCI)

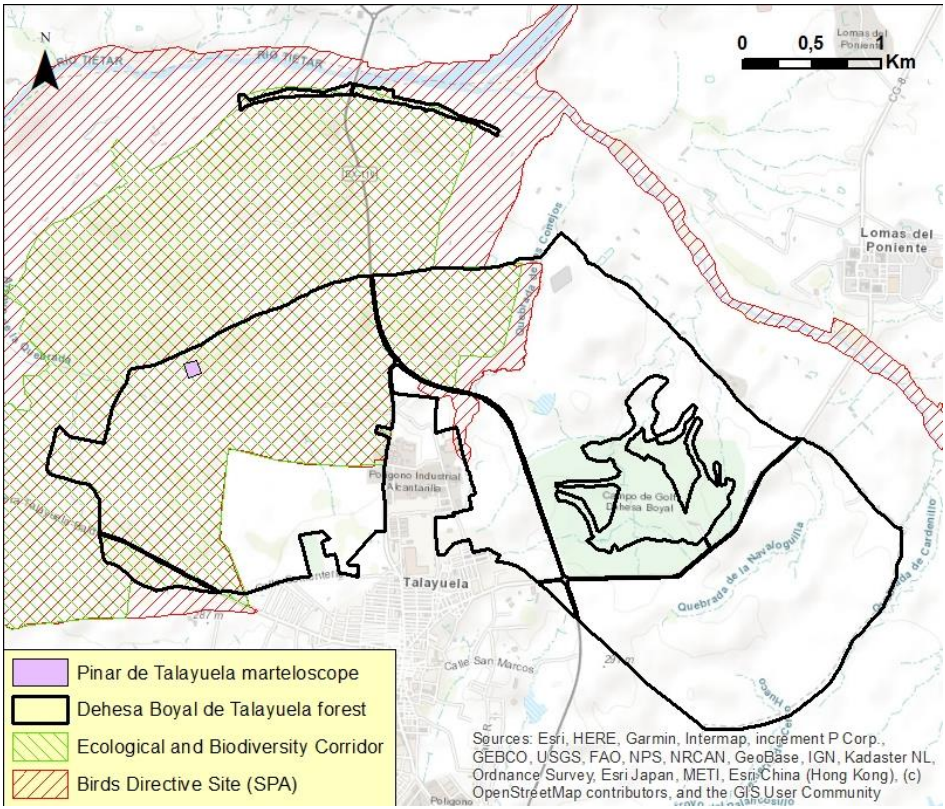
260.4 ha **of HCI 9540 "Mediterranean pine forests of endemic *Pinus pinaster*"**

67.3 ha **of HCI 9230 "Mediterranean-Ibero-Atlantic and Galaico-Portuguese oak woods of *Quercus robur* and *Quercus pyrenaica*"**

563.3 ha **of HCI 6310 "Dehesas with evergreen *Quercus spp*."**

1.2 ha **of priority HCI 3170 "Mediterranean temporary ponds"**

Protected areas in Dehesa Boyal de Talayuela forest.

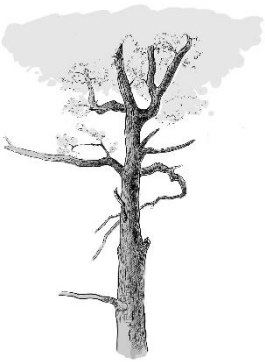


Habitat structures

Large quantities of deadwood and a high density of old microhabitat-bearing trees are characteristic elements of natural forests, especially of the old-growth phases. These phases are often absent or rare in managed forests, even in forests under close-to-nature management. Also in selective harvests and thinnings, 'defective' trees referring to these old-growth phases (hollow, dead and languishing trees) are often removed. Yet, an important share of forest biodiversity is strictly or primarily dependent on these elements for their survival, especially 'saproxylic' species, those are species depending on deadwood.

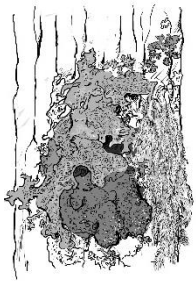
Most species dependent on old-growth elements and phases have become threatened. Conservation of biodiversity in commercial forest stands is mainly a question of conservation of adequate amounts of deadwood and retention of such microhabitat structures.

DE11: Longer than 50 cm branches with diameter between 10 - 20 cm, sun exposed.



Dead branches and limbs / crown deadwood *(DE11 & DE12)*

DE12: Longer than 50 cm branches with diameter bigger than 20 cm, sun exposed.



Tree trunk covered by foliose and fruticose lichens (often in association with bryophytes) *(EP32)*

Bark loss / exposed sapwood *(IN11)*

Most common habitat structures in the marteloscope.

...and biodiversity

Ciconia nigra

Lacerta schreiberi

Lepiota procera

Cerambyx cerdo

Anax parthenope

Mauremys leprosa

Pictures by

Ángel Sánchez (*Ciconia nigra*, *Lacerta schreiberi* y *Cerambyx cerdo*)

Domingo Rivera (*Anax parthenope*, *Lepiota procera* y *Mauremys leprosa*)

Site conditions

Coordinates (X;Y):	**275,638; 4,431,477 (ETRS 89 UTM Zone 30N).**
Type of forest:	**Colline pine forest of *Pinus pinaster mesogenensis* with *Quercus pyrenaica*.**
Soil:	**Distric arenosol.**
Geology:	**Siliceous sedimentary rocks, formed by sandstones and conglomerates.**
Altitude:	**264 m.a.s.l.**
Mean annual temperature:	**15 °C.**
Annual precipitation:	**850 mm.**
Summer precipitation (1st June - 31st August):	**50 mm.**
Mean period of drought:	**4.5 months (mid June - late September).**

The vegetation in the area is a regular stand of *Pinus pinaster mesogenensis* with a marked deformity of stems, typical of the pines in this region. Thermal inversion occurs, explaining the presence of *Quercus pyrenaica*, which usually lives above 600 meters. This species is predominant in diametric classes below 20 cm, protected from insolation and retaining moisture under the canopy of pine trees.

The shrubby understory is not very dense. It includes *Cytisus scoparius, Erica australis, Calluna vulgaris, Cistus salvifolius, Cistus psiloseoalus, Cytisus multiflorus, Daphne gnidium, Retama sphaerocarpa* and *Asparagus acutifolius*; and, in the wettest areas, *Pteridium aquilinum, Arbutus unedo* and *Ruscus aculeatus*.

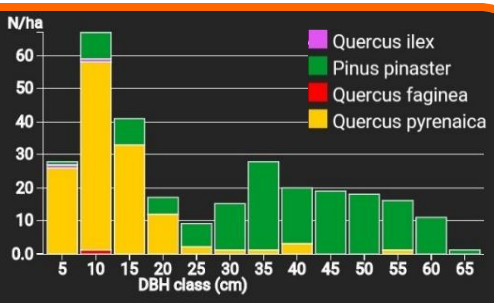
Grassland appears in the clearings of the pine forest, where the tree density becomes lower.

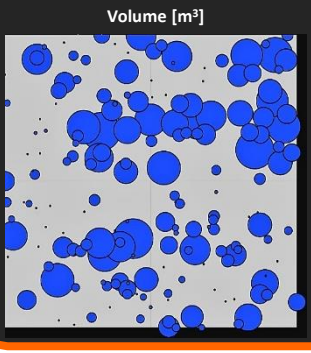
Stand characteristics

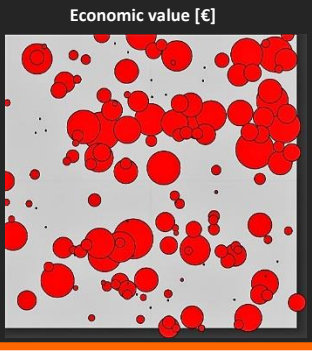
To the northwest of the Dehesa Boyal de Talayuela forest is located the **Pinar de Talayuela** marteloscope. It is a semi-irregular pine stand with a substory of coppice Pyrenean oak and, to a lesser extent, holm oak. Although in the short term the persistence of the pine forest seems assured, there is a need to favour its regeneration, especially when it is restricted by the regrowth of the Pyrenean oak.

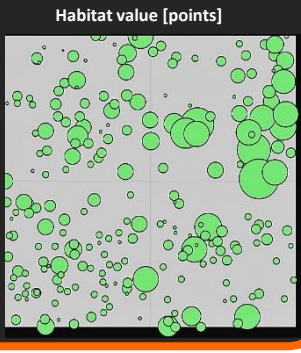
Stand data

N [stems/ha]	290
BA [m²/ha]	24.6
Volume [m³/ha]	153.3
Habitat value [points]	4,808
Economic value [€]	10,269
Standing deadwood [m³/ha]	0.1
Lying deadwood [m³/ha]	0.1









The **economic value** (in €) is estimated for each tree based on volume, stem quality and corresponding local timber price lists.

The **habitat value** (in points) is assessed for each tree based on tree microhabitats, taking into account the rarity of each habitat and duration for it to develop.

The evaluation of the habitat value is based on a comprehensive catalogue of tree microhabitats. It comprises 23 saproxylic and epixylic f eatures such as cavities, large dead branches, cracks and loose bark, epiphytes, sap runs, or trunk rot characteristics. Tree microhabitats are of prime importance for specialized and often endangered forest species of flora and fauna.

Ecological value assessment

Each tree-related microhabitat represents a habitat structure. There are three variables related to each of them, given values from 1 (minimum significance for that given variable) to 5 (maximum relevance).

These three variables are:

Score: Importance of habitat structure as a refuge for biodiversity.

Rarity: Infrequency or scarcity.

Development: Time needed for its growth.

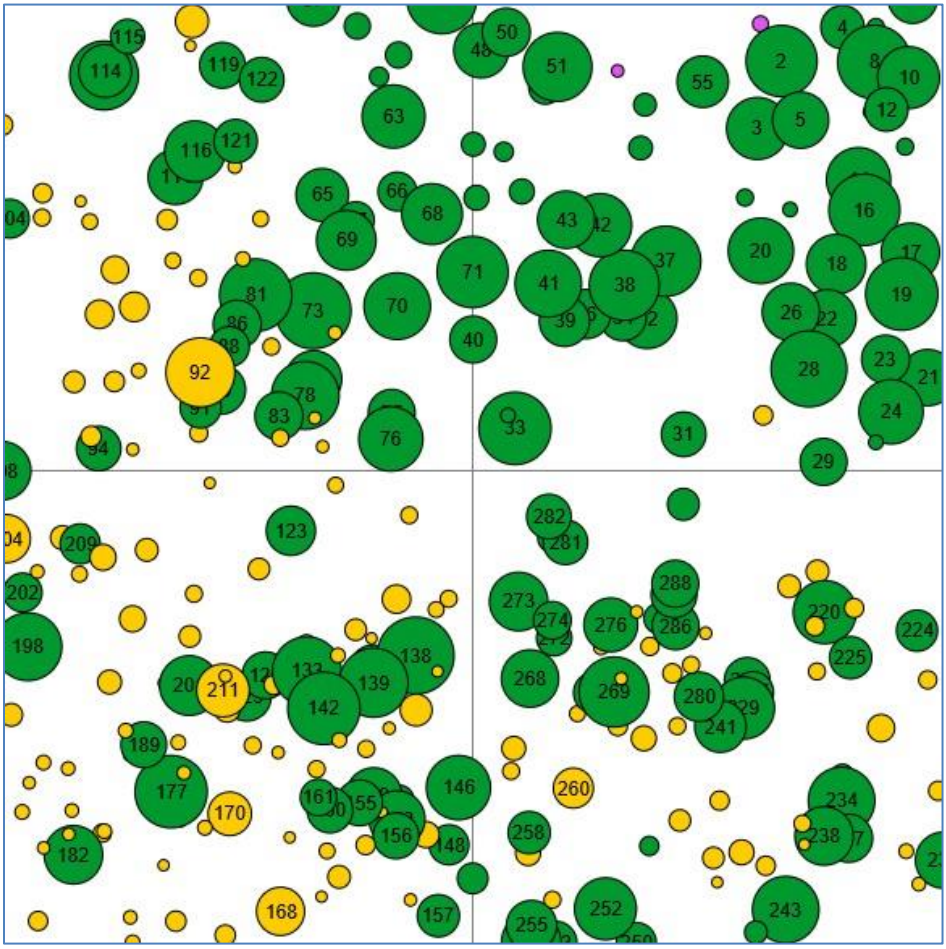
Example of DE11, DE12 and NE12 found in the marteloscope.

The ecological value of each habitat structure is therefore calculated by **adding the rarity and development values, and multiplying that sum by the score value**. The ecological value of a tree will therefore be the addition of the values of each of its habitat structures.
Finally, the total ecological value of the marteloscope, would be either the addition of the values of all the trees, or the addition of the value of all the structures (there can be several per tree).

Table used for the calculation of the ecological value. Due to space limitations, only the 10 highest values are displayed. For more details about microhabitats see Kraus et al. (2016).

	Habitat structure code	Score	Rarity	Development	**Habitat structure value**	Nº of trees with this structure	**Ecological value**
Saproxylic microhabitats	**CV21**	**2**	**5**	**5**	**20**	15	300
	CV51	**1**	**3**	**1**	**4**	5	20
	IN11	**1**	**1**	**3**	**4**	20	80
	IN12	**2**	**1**	**3**	**8**	1	8
	DE11	**1**	**3**	**4**	**7**	156	1092
	DE12	**2**	**3**	**4**	**14**	80	1120
Epixylic microhabitats	**GR32**	**2**	**2**	**2**	**8**	1	8
	EP32	**2**	**4**	**2**	**12**	128	1536
	NE12	**1**	**2**	**2**	**4**	1	4
	OT11	**4**	**5**	**3**	**32**	20	640

Marteloscope tree map



The size of these circles is a relative representation of the diameters of the different trees. In no case is it their actual diameter.

- *Pinus pinaster*
- *Quercus pyrenaica*
- *Quercus faginea*
- *Quercus ilex*

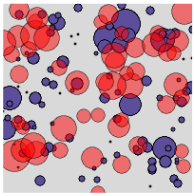
Example of interventions

A comparison of two interventions is shown as a result of a virtual tree selection exercise in the **Pinar de Talayuela** marteloscope. Following the guidelines of this forest management plan, two seed cuttings with a removal purpose are proposed. The objective in both exercises is to select 50-60% of the stock keeping at least 50 to 80 trees/ha densities. In addition, 5% of the trees with the highest habitat value are retained for both cases.

Scenario 1: The proposed cutting optimizes the economic return. Trees are selected from the highest to the lowest economic value until the objective is met. The best quality wood is extracted (≥78€/pie).

Scenario 2: The proposed cutting optimizes the ecological value of the remaining microhabitats. Trees are selected from the lowest to the highest value of habitats until the objective is met. Trees with habitat values ≤32 ecopoints are extracted.

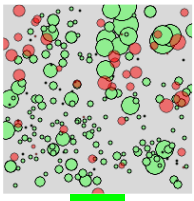
Economic value [€]



Scenario 1

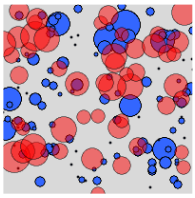
5681 € obtained

Ecological value [points]



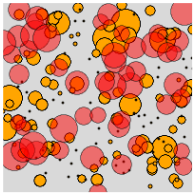
3813 remains

Volume [m³]



Removal 81,2 m³

Basal area [m²]

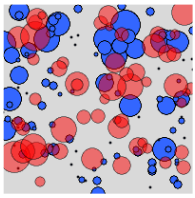


13,3 m² remains

Scenario 2

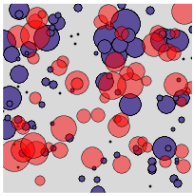
5286 € obtained

Volume [m³]

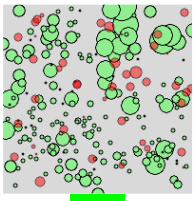


Removal 75,5 m³

Economic value [€]

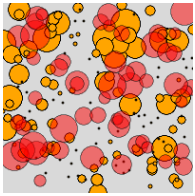


Ecological value [points]



3991 remains

Basal area [m²]



13,7 m² remains

References

Photographs: Ángel Sánchez (*Ciconia nigra*, *Lacerta schreiberi* y *Cerambyx cerdo*) y Domingo Rivera (*Anax parthenope*, *Lepiota procera* y *Mauremys leprosa*).

The different graphs, tables, screenshots, and other exercise results were created using the 'I+' software:

1) iplus.efi.int

2) Schuck, A., Kraus, D., Krumm, F., Held, A., Schmitt, H., 2015. Integrate+ marteloscopes – Calibrating silvicultural decision making. Integrate+ Technical Paper No. 1. 12 p.

Balbuena, E., Blanco, J., 2015. Primera Revisión del Proyecto de Ordenación del Monte de U. P. nº 82 "Dehesa Boyal" de Talayuela (Cáceres). Consejería de Medio Ambiente y Rural, Políticas Agrarias y Territorio. Dirección General de Medio Ambiente. Junta de Extremadura. Tragsatec. 182 p.

Garcia, E., (2015): Observatorio de precios de productos forestales, RedFor, Confederación de organizaciones de selvicultores de España. https://selvicultor.net/redfor/wp-content/uploads/Observatorio-de-precios-Completo_Sep-2015_Final.pdf

Kraus, D., Bütler, R., Krumm, F., Lachat, T., Larrieu, L., Mergner, U., Paillet, Y., Rydkvist, T., Schuck, A., and Winter, S., 2016. Catalogue of tree microhabitats – Reference field list. Integrate+ Technical Paper. 16p.

The Integrate Network is an alliance of representatives of different European countries that promotes the integration of nature conservation into sustainable forest management at the policy, practice and research level. Forest management challenges related to nature conservation are rather similar across Europe. The Integrate Network promotes the exchange of successful management practices and experiences amongst its Members. The European Forest Institute (EFI) accompanies the process in its role as facilitator and scientific advisor.

Rojo Serrano, L., Balbuena Gutiérrez, E., Ramírez-López, M., García-Lanchares, C., Martínez Ruiz, A., Dregorio Aguilar, A., 2022. The Pinar de Talayuela marteloscope field guide. Integrate Network Technical Paper. 14 p.

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