VARIAÇÕES NATURAIS

A VOYAGE THROUGH THE LANDSCAPES OF PORTUGAL

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Câmara Municipal de Lisboa
Direção Municipal de Ambiente, Espaços Verdes, Clima e Energia

LISBOA
CÂMARA MUNICIPAL

LISBOA
CAPITAL VERDE EUROPEIA 2020

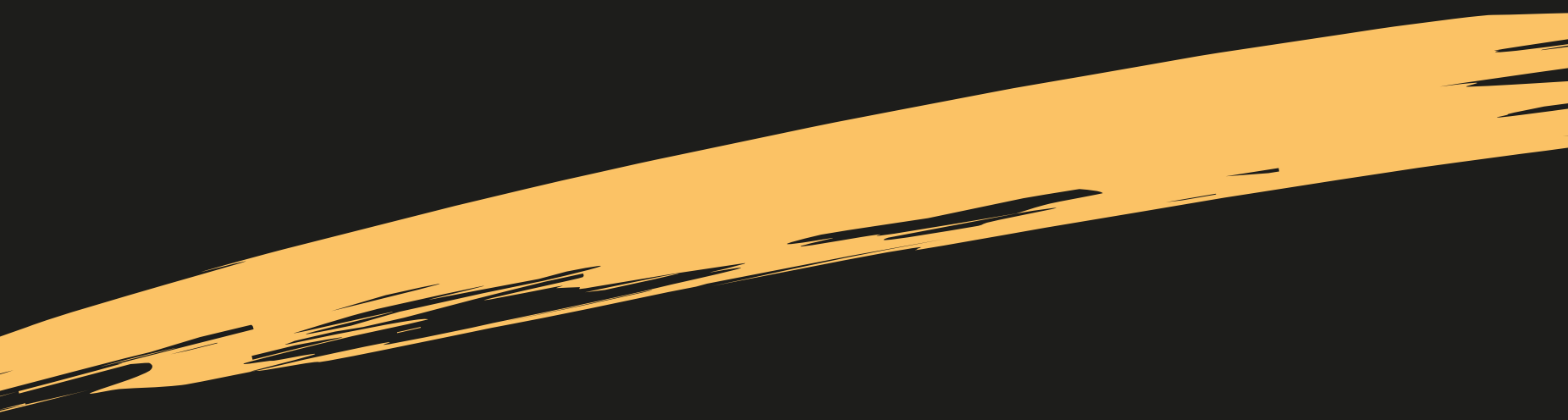
U LISBOA | UNIVERSIDADE DE LISBOA

MUSEU NACIONAL DE HISTÓRIA NATURAL E DA CIÊNCIA

Ciências ULisboa

ICNF
Instituto da Conservação da Natureza e das Florestas

Cofinanciamento:
FUNDO AMBIENTAL
Ministério do Ambiente



500 copies printed

Depósito Legal
486367/21

ISBN
978-989-53143-4-8

Contents

José Sá Fernandes
at a Municipal tree planting
in Lisbon.

[1]**Translator's note:**
"Montado" is a human managed ecosystem that combines forestry, agriculture and grazing.
For more on this ecosystem, see page 43.

José Sá Fernandes
Lisbon Deputy Mayor for the Environment, Green Infrastructure, Climate and Energy

The exhibition and book/catalogue, **Variações Naturais** ("Natural Variations") present an excellent portrait of the geography and nature of Portugal. Due to dedication, commitment, knowledge, and intelligence, it has been made possible to navigate, in one journey, the country's existing ecosystems, its various parks, reserves and protected landscapes, while here and there identifying, zoological and botanical species of interest. Furthermore, this is all presented simply, but with scientific rigor and extraordinary aesthetic, graphic and editorial quality.

This journey begins where most of us live and where most of us are anonymous. "Suddenly you spoke, and I heard. Outside, the sparrow landed on a branch and a yellow flower fell and fluttered to the river below. Everything anonymous in the city: me, you, the sparrow and the rosewood."

And, wrapped in this anonymity, with the solemn hoots of the Eurasian Eagle-owl, we climb our mountains, which are not giants, but where the vistas are far ranging like those of the Golden Eagle and stretch beyond the horizon. On the summits of Gerês, Corno do Bico, Montesinho, Alvão, Serras da Estrela, Gardunha, Açor, São Mamede, Malcata, Aire and Candeeiros, Socorro and Archeira, and Montejunto, we feel the wind and breeze, always different, that choose our best descent, among mosses, lichens, lavender, rosemary, thyme, brooms, heather, bushes, and forests of varied greens.

Leaning against granite blocks, scrambling over schist slopes, strolling through limestone caves or crossing paths between rocky crevices, we sense and even hear the howl of the wolf, the sonorous and furtive call of the Iberian lynx, the damp smell of marshes, where sometimes the endemic Spanish heath butterfly, and the fantastic heath spotted-orchid appear.

Within caves we cannot see, the Frade-cave spider, the tiniest of them all, but as soon as we emerge, away from the bats, strange sounds, and low light, we are met by the murmur of the nascent springs of our streams and rivers that carry the purity and sounds of all those places with their fast-flowing waters. It is this pristine flow that merges into the slow waters of the international reserves of the Douro and Tagus or into the Azibo reservoir, which passes through wetlands (Arzila and Tornada) and lagoons (St. André and Sancha), the last refuge of various species, and that then culminate in the waters of magnificent estuaries. In those of the Tagus, Sado and Douro, where the animal world congregates and the marshes form, the inexplicable continually transpires. And if we wonder why the pied avocet, the flamingo, or the black-tailed godwit, among so many other birds, fly hundreds of kilometres to winter in this haven, no one has yet been able to explain why all the eels in Europe reproduce in the Sargasso Sea and then go to the various fresh water courses, including ours, from the river Minho to the Guadiana reserve, where, on arrival, they slither through the salt marshes of Vila Real de Santo António and Castro Marim.

We also have the unique wealth of our montado[1], where the cork oak and the holm oak rule, the black Iberian pig makes itself known, the cowbells ring out, cork is queen and ham is king, and where the great bustard and the little bustard land.

Encountering the Benémola springs and the Pena rock, following the footsteps of the wild boar' in the forests of the Tua valley and Faia Brava, or those of the Egyptian Mongoose in the Agolada or Monte da Barca reservoirs, allows us to discover the territory. Following the fossil records of dinosaurs at Pedra da Mua, Lagosteiros, the Avelino quarry, or between Ourem and Torres Novas, gives us an understanding of the evolution of the ancient world, without humans, in which Pangea separated into continents and, after millions of transformations, extinctions, times of misfortune, but also of hope, the Atlantic Ocean, that now bathes us, was formed.

Before going to our islands, let us marvel at the rugged rocky coasts of Sintra, Cascais, Arrábida, Southwest Alentejo, the Vicentina coast, Berlengas and Cape Mondego, or the Fossil Cliffs of the Caparica coast, where rare flowers and life hangs among the cliffs, like colourful trapeze artists of the air, while down below, on the beaches and in the sandy dunes of São Jacinto, Ria Formosa, Vila do Conde and Mindelo, a universe exists twixt sea and land.

A simple tide pool shows us the movement of ebb and flow, of life and death, where everything is unique and beautiful, bringing smiles to the young and memories to the mature, as if the world momentarily, there, between us and nature, is perfection.

On the islands of Madeira and the Azores, we plunge into the wild seas, with whales, and into the Laurel Forest, with an ancient past, mists, and unique life.

Finally, by way of thanks, to His Excellency Mr. João Pedro Matos Fernandes, Minister of Environment, and to the Environmental Fund, which has in part, financed this entire initiative, I am reminded that none of this can be overlooked, and that there is still much to be achieved and further assistance is necessary.

And although I feel great pride, I am humbled, like the forgotten and threatened *Narcissus fernandesii* in the Boquilobo marsh, and I would like to emphasise my thanks to those, of whom there were so many, who accomplished this, for the merit is theirs, from the researchers to the companies who conceived, assembled, and edited the exhibition/book, from the splendid team of the National Museum of Natural History and Science to the extraordinary employees of the Institute for the Conservation of Nature and Forests, and especially, the tireless and inspiring Marise Francisco, from my office, and the curator Cristina Branquinho, from the Faculty of Sciences of the University of Lisbon, who, with everyone else, created this masterpiece.

Thanks

João Pedro Matos Fernandes
Minister for the Environment and Climate Action of the XXII Constitutional Government of Portugal

It is with great pleasure that I present you with this brief message regarding the exhibition **Variações Naturais, A Voyage Through the Landscapes of Portugal**, which I had the privilege of inaugurating in November 2020, and is open to the public at the University of Lisbon's National Museum of Natural History and Science.

The Municipality of Lisbon, the Public Institute for Nature and Forest Conservation, and the University of Lisbon are to be congratulated for their joint organization of this integrated initiative of "Lisbon, European Green Capital 2020", with the support of the Environmental Fund, administered by the Ministry of Environment and Climate Action.

This exhibition, as I have myself experienced, is in fact a museological tour through the diverse and abundant ecosystems of Portugal, seeking to promote public knowledge and awareness, of the landscapes, ecosystems, habitats, and species present and in close harmony with a vast cultural heritage.

This exhibition is a voyage through the natural heritage of our country, from north to south, from the city to the rural world, experiencing its richness, with art and skill, a sensory experience, which can be seen, touched, heard, and smelled. Therefore, it is more than justified that this exhibition now has its own catalogue.

Justifiably, I would say that this exhibition, in its entirety, is a vibrant and explicit invitation to a genuine and essential journey exploring our country *in situ*.

Portugal is of unquestionable importance, and due to its location, geomorphology, and human occupation, is effectively a country rich in biodiversity, and in natural, terrestrial, and marine heritage. In their turn, the existing protected areas in Portugal combine the most representative collection of valuable natural and landscape heritage, establishing indispensable infrastructure for the specific purpose of nature conservation.

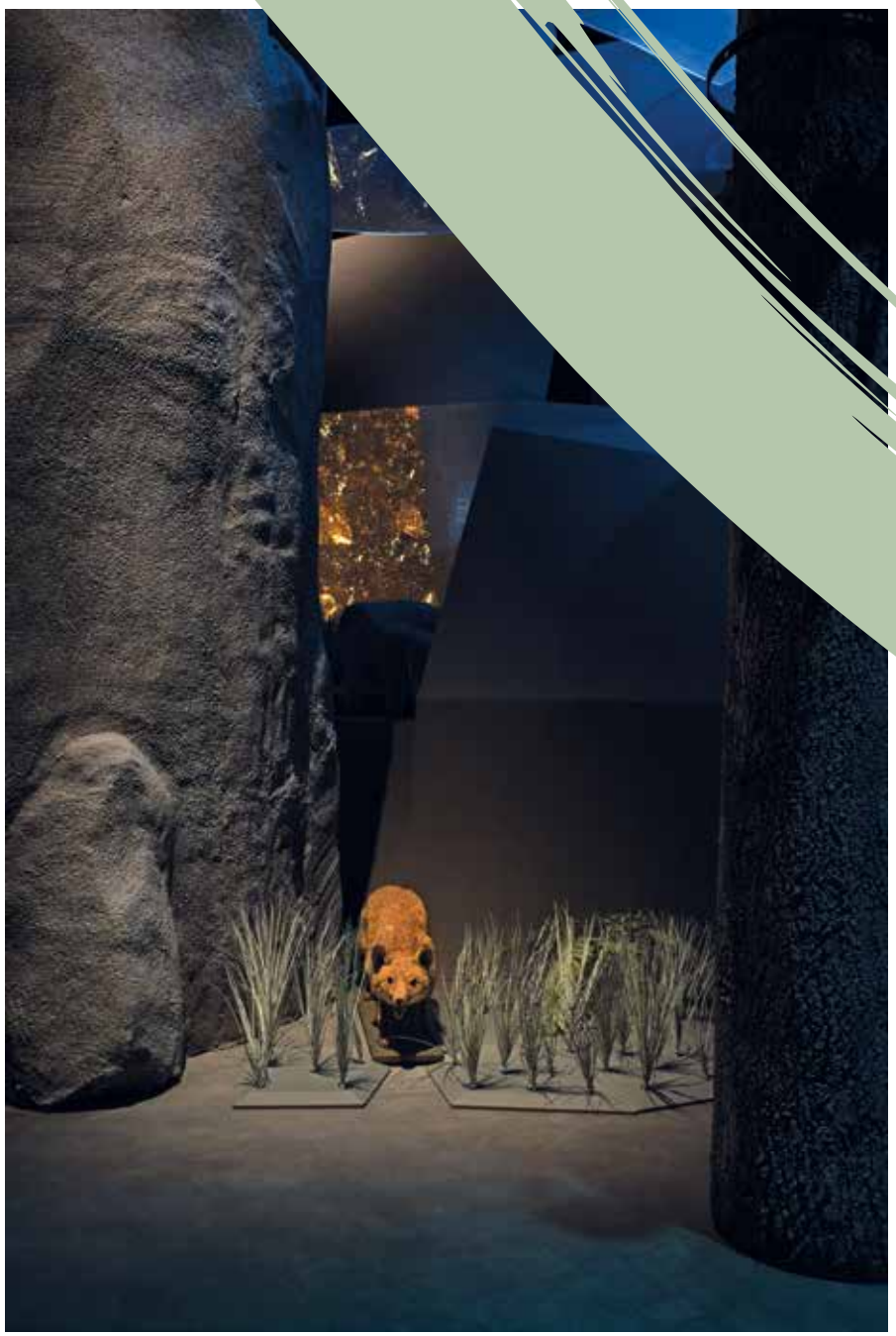
I would like to hereby offer a public invitation to discover the magnificence of these territories.

I have no doubts that it is upon natural and social capital that the guarantees of future generations are based.

I take my leave with a very simple final message; the goal of conserving nature and biodiversity is a shared challenge that is of importance to us all. However, above all, we need, to increase our knowledge of our own country, what is ours, and what makes Portugal so rich a land in natural heritage.

A view over representations
of sandy and rocky coast ecosystems,
with illuminated tide lines.

A red fox lurks in the exhibition area dedicated to mountain ecosystems.



[1]**Translator's note:**
For "Montado" see translator's note on page 4.

António Cruz Serra
Rector of the University of Lisbon

Portugal has spectacular natural landscapes that are worth visiting. And although there is nothing that can replace hiking in Arrábida or Gardunha, until now there was no place that brought together, for our delight and education, the most important Portuguese natural ecosystems. In other words, we no longer need to walk and walk, through beaches, hills, and valleys, in order to discover the biodiversity and geodiversity of Portugal's natural landscapes, their stories, legends and secrets, and also the risks they are facing today.

The exhibition **Variações Naturais, A Voyage Through the Landscapes of Portugal**, which is the result of a close and fruitful partnership between the University of Lisbon — through the Faculty of Sciences and the National Museum of Natural History and Science — the Municipality of Lisbon and the Institute for the Conservation of Nature and Forests, invites us to a unique journey through ten ecosystems in our country: urban, mountainous, forest (including woodland, montado[1] and steppe), limestone massifs (including caves), aquatic systems (fast waters, slow waters, wetlands), estuaries, sand and rocky coast, ocean and the ecosystems of the Azores and Madeira.

This is the first time that an exhibition with this geographical scope has been presented in Portugal. The exhibition is also unique in the sophistication of its scenography, which ranges from monumental and ultra-realistic landscape displays to sounds and images of fauna and flora, the intelligent and immersive presentation of natural phenomena, as well as several dozen specimens from the Museum's collections. The exhibition and the complementary program articulate, in an intelligent and diversified way, educational content accessible to all with the best research that is done today in our country.

The University of Lisbon, with its four magnificent green spaces in the city, all recently renovated — the Lisbon Botanical Garden, the Tropical Botanical Garden, the Ajuda Botanical Garden and the Tapada da Ajuda — had no choice but to enthusiastically welcome this proposal from the Lisbon Municipality, through Deputy Mayor José Sá Fernandes. My support was immediate and unreserved. I am grateful to the vast team that diligently worked for many months on the exhibition's development. I also thank the Institute for the Conservation of Nature and Forests, as well as the Portuguese Environmental Fund for their financial support.

Finally, I invite everyone to embark on the memorable voyage that **Variações Naturais** represents, in the expectation of a growing awareness, so necessary in present times, of the importance of Portuguese natural heritage.

Once we leave the montado, we enter the cereal plains that form the Portuguese pseudo-steppes ecosystems.

Preface

The challenge posed by Lisbon Deputy Mayor for the Environment, Green Infrastructure, Climate and Energy, José Sá Fernandes, for an exhibition celebrating "Lisbon, European Green Capital 2020", was both fascinating and complex: an immersive exhibition about the landscapes of Portugal that would enchant visitors and leave a lasting impression.

The diversity of landscapes and natural values that result from the combination of multiple variations in geology, altitudes and climate are made even more extraordinary considering Portugal's small size. These **Variações Naturais** create a diversity of habitats where unique species exist. It is within these variations that the landscape has been shaped by our activities and predilections. The current landscape is the joint result of our actions with that of nature, accentuating local culture. Although influenced by humanity, these landscapes have high natural value.

The presentation of these **Variações Naturais** was organized in informative terms, by grouping communities of organisms that interact within given physical environments, the ecosystems. Each ecosystem corresponds to protected areas that we can visit on mainland Portugal, and in the archipelagos of Madeira and the Azores. A certain sensation and dynamic was associated to each ecosystem, creating an immersive environment. To illustrate how the environment stimulates us culturally, literary quotes have been selected for each landscape presented.

Specialists in each ecosystem shared knowledge, ideas and curiosities that were then selected by the exhibition's concept and coordination team. Most of the about 60 researchers involved come from the the Faculty of Sciences and the National Museum of Natural History and Science of the University of Lisbon, and the Institute for Nature Conservation and Forests.

The exhibition's journey begins where most of us live, in the City. Here we dominate as a species and, for species that do not like our company, cities are "new ecosystems" to which they have not yet had time to adapt. It is from here that we journey on to other landscapes of Portugal. We can climb to the top of a Mountain, identify several species in a Forest, leave impressions on Limestone, follow a river's course from source to mouth, observe the ebb and flow of the tides in an Estuary, understand Dunes in depth, and peek into life on a Coastal Cliff. Finally, we are invited to dive into the Sea and emerge on Islands. On our journey we encounter over a hundred and forty species that we may examine in detail.

Throughout the exhibition, we can observe some of our interactions with nature, such as: Lameiros, which are semi-artificial mountain pastures; Fojos, traditionally constructed traps that testify to our relationship with the wolf; the Montado, an ecosystem that would not exist without us; Chocalhos, meaning livestock bells which allow the location of different animals and are designated UNESCO Intangible Cultural Heritage; plains of cereals that resemble steppes; and the Saltpans producing white gold in our estuaries.

After this journey we are confident that visitors will be enchanted by the landscapes of Portugal and will want to explore them further. For this purpose, we offer the module "Places to visit" which, via Natural.PT, provides all the necessary information for further tours.

We realized this project by bringing a diverse and extensive team together of elements from the promoters of the exhibition: the University of Lisbon (the Faculty of Sciences and the National Museum of Natural History and Science), the Institute for Nature and Forest Conservation and the Lisbon City Council. This team worked closely with the Toyno team, which translated the shared knowledge into very creative exhibition experiences. Our appreciation also goes to all the production and preparator teams involved, for their professionalism and commitment.

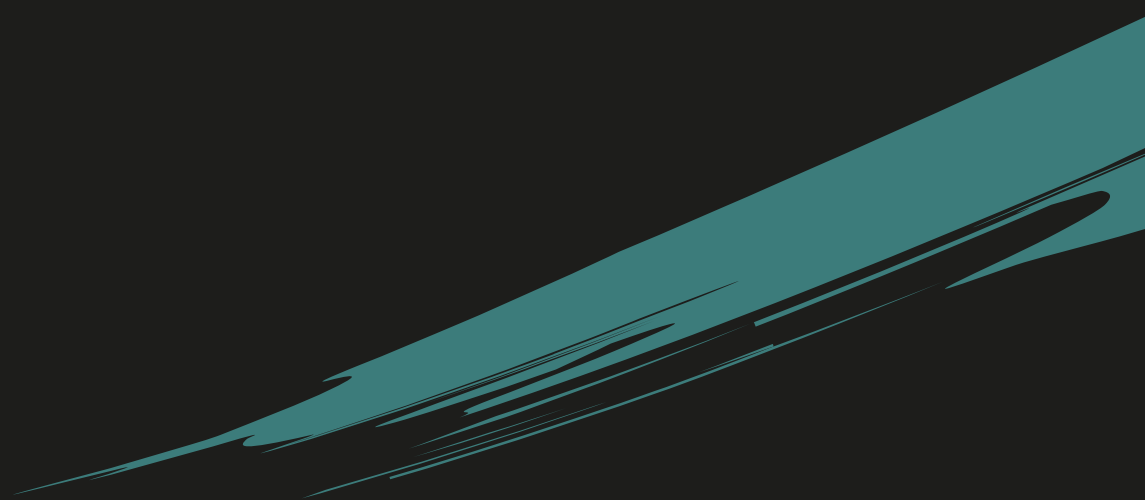
Finally, two special thanks. To the inspiring Deputy Mayor, José Sá Fernandes for having dreamed, enabled, and resolutely persisted in the idea of this exhibition. To Professor José Manuel Pinto Paixão for his trust and support.

Cristina Branquinho (Curator), Anabela Trindade, Filipa Vala, João Carlos Farinha, Judite Alves and Marise Francisco

Lisbon, November 2020

“So much landscape. A man could spend his whole life wandering here and never find himsel, if he was born lost.”

José Saramago



THE EXHIBITION

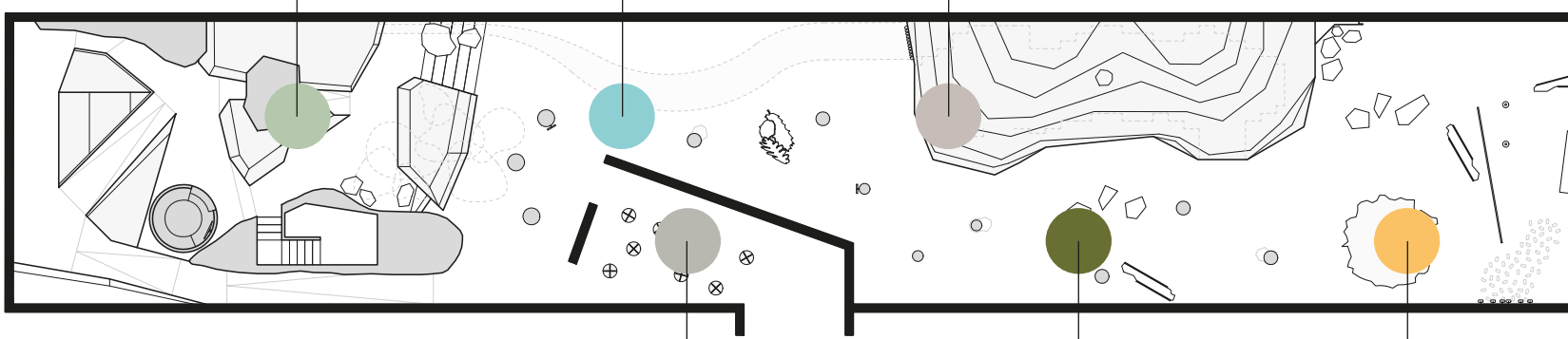
Voyage

This exhibition affords you an impossible expedition.

To experience the variations of the climate the rocks and landscape of Portuguese protected areas in the mainland and the islands, the diversity of life that inhabits them and to look at the relationships that these living beings maintain with each other, with their environment, and with us — all in one journey.

“After all, the best way to travel is to feel” wrote Álvaro de Campos. We hope that the sensations provided to you here, do not suffice. Rather, at the end of your visit, we would like you to conclude that the best really is to journey there yourself.

The ecossystems



Ecossystem
Fast water

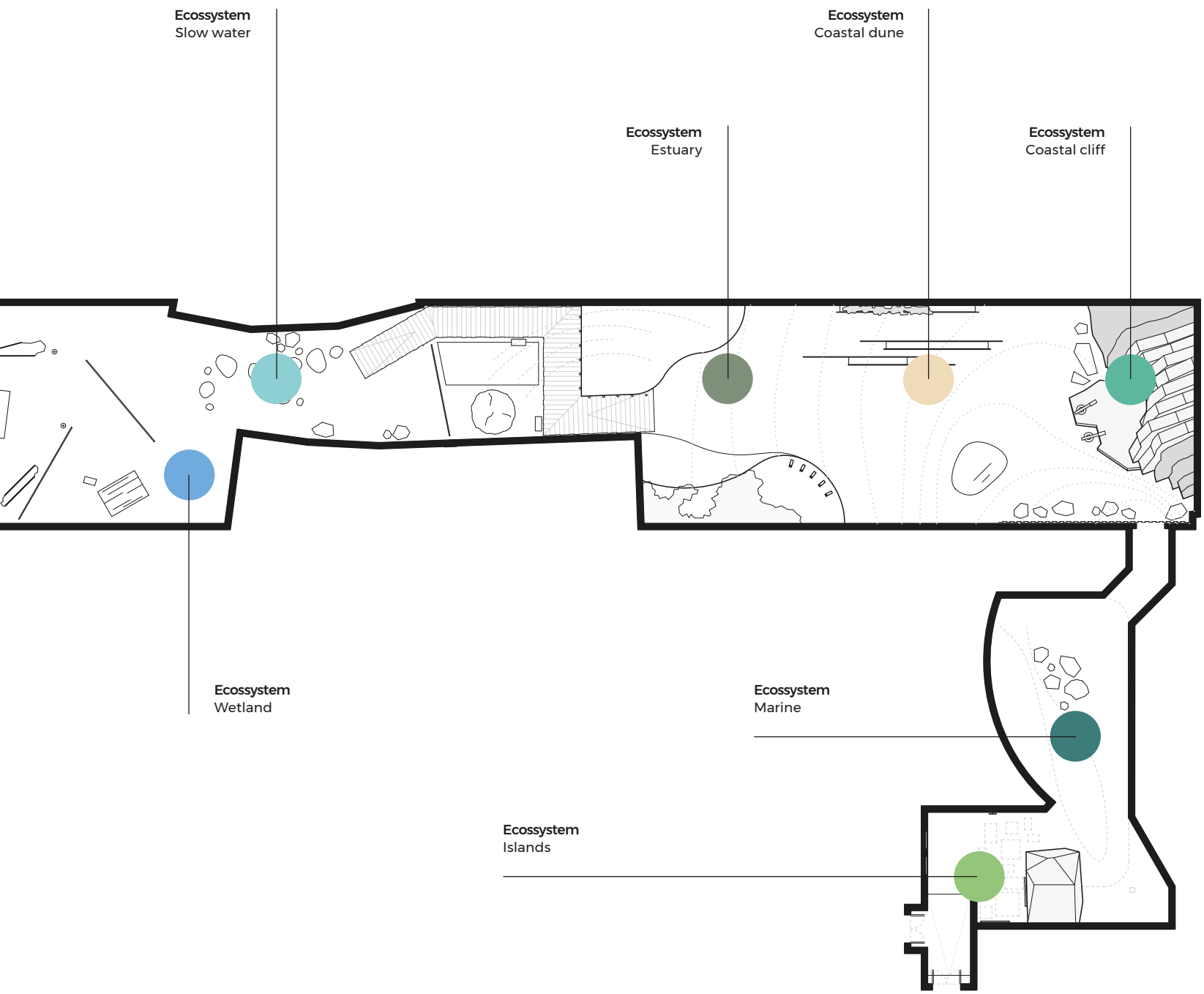
Ecossystem
Mountain

Ecossystem
Limestone

Ecossystem
Forest

Ecossystem
City

Ecossystem
Shrubland, montado, steppe


Ecossystem
Slow water
Ecossystem
Estuary
Ecossystem
Coastal dune
Ecossystem
Coastal cliff
Ecossystem
Wetland
Ecossystem
Marine
Ecossystem
Islands

The house sparrow (*Passer domesticus*) is one of the most cosmopolitan species on the planet.

We’re not alone: the city is full of life

It starts with a house, then another and another... And suddenly, a city is born. Nature retreats but does not disappear: amongst our human hustle and bustle, other inhabitants share our city.

To acquire a residence card these other species must overcome the challenges of urban habitats: warmer and drier environments due to the concentration of buildings and roads, reduced vegetation, air pollution, noise, and light at night.

Compared to their country relatives, non-human city residents have particular characteristics. They are more tolerant of humans and better at exploiting urban resources to their advantage. Sparrows sing louder due to the noise, bats take shelter in buildings and bridges, and rats scavenge for food in the garbage and litter.

The reduced diversity of species in cities is balanced by the abundance of individuals within those species, which may be huge: just think in terms of cockroach and pigeon numbers.

A closer look at our surroundings, shows us we’re not alone: our cities are shared habitats.

“Suddenly, you spoke and I listened. Outside a sparrow landed on a branch and a yellow flower fel, fluttering down to the river. Everying is anonymous, everything is the city: me, you, the sparrow and the tipu tree.”

Anonimous

A jacaranda in Lisbon.

Jacaranda
Jacaranda mimosifolia

Native to South America, where it is now classified as threatened, the Jacaranda was introduced as an ornamental tree in Portugal. It grows quickly and may reach up to 15 meters in height. It adapts to new places, resists pollution, and has deep roots that do not damage pavements: which is why it is so commonly seen flanking urban streets. It blossoms in spring and its purple-bluish flowers have a characteristic aroma.

Conservation:
Global | Vulnerable

NE DD LC NT **VU** EN CE EW EX

Night lighting is a distinctive characteristic of urban spaces.

The night shift

Bats are the only mammals that fly, and they are a major part of the urban night shift.

Bats use echolocation. They emit ultrasounds, which are inaudible to us, and sense the echo produced to navigate and locate objects, animals, or plants.

Despite their infamy, only three species of bats feed on blood, and none of those are found in Portugal. Few people will have noticed the diversity of bat species in Portuguese cities — Grey long-eared bat (*Plecotus austriacus*), Serotine bat (*Eptesicus serotinus*), Common pippistrele (*Pipistrellus pipistrellus*), Soprano pippistrele (*P. pygmaeus*), Kuhl's pippistrele (*P. kuhlii*): and they're all insectivorous, feeding mainly on insects.

The night shift does useful work: it helps to keep nocturnal insect populations, like the Silver Y moth, under control.

What goes out hunting moths at night?

No two mountains are alike

Mountains are formed by powerful geological forces, such as the collision of tectonic plates and the eruption of volcanoes.

On a mountain, the climate changes as altitude increases: temperatures cool, and wind intensity increases. These factors determine the diversity of species we encounter as we climb. The wind keeps rock outcroppings exposed and a scarcity of vegetation, allowing birds of prey to enjoy high perches from which to spy on their prey.

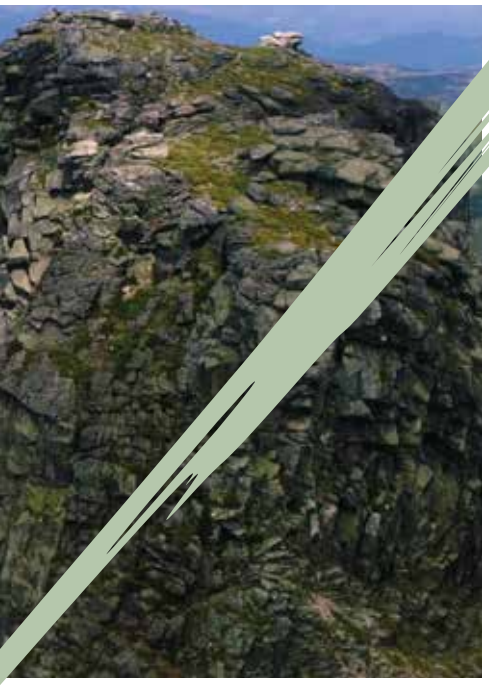
There is also variability between mountains. Soil types vary, as they depend on the predominant rock. Ocean proximity determines humidity levels. These factors influence species diversity, creating variability between mountains.

Each mountain is a unique habitat. No two mountains are alike.

Gliding over mountains.

Serra da Estrela Nature Park
(Parque Natural da Serra da Estrela)

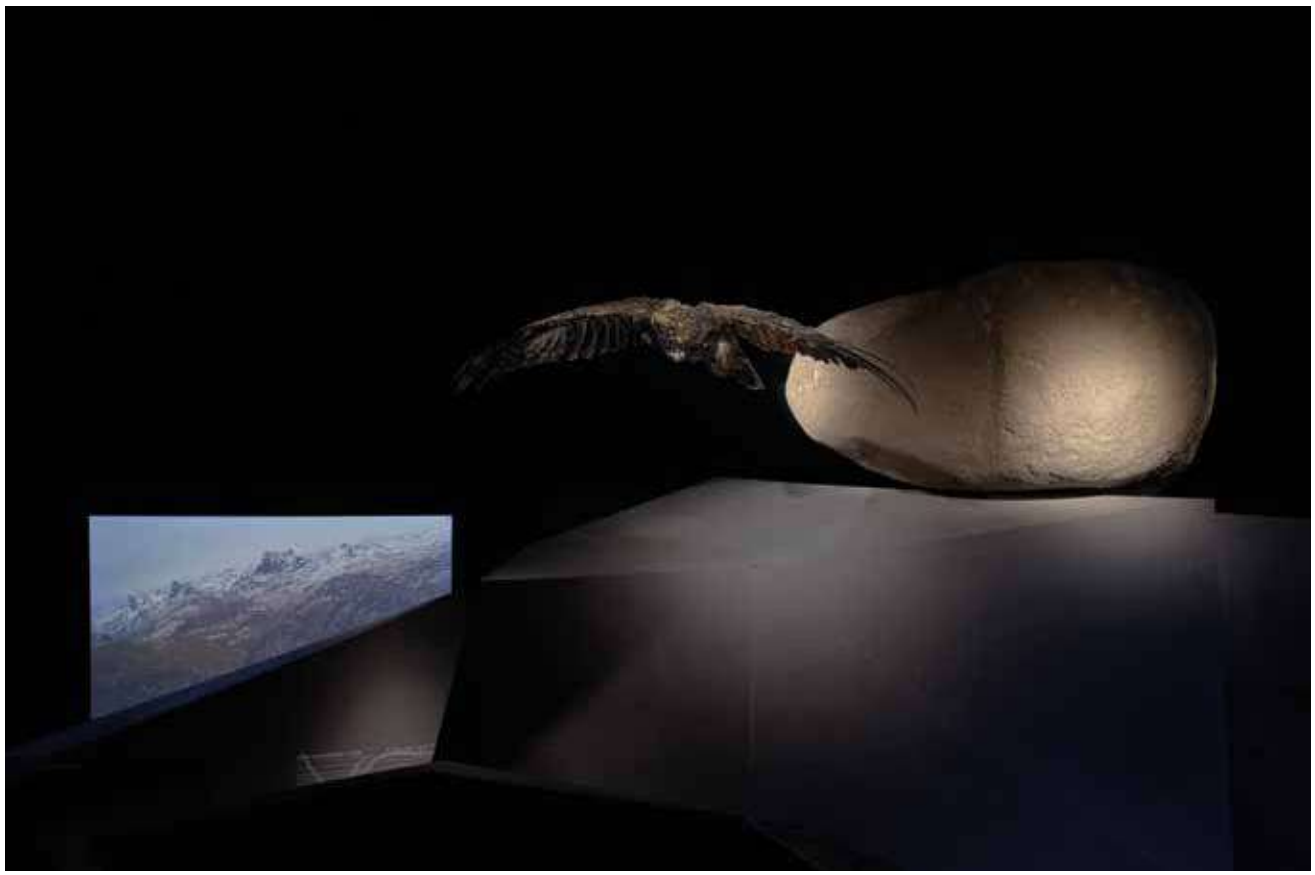
Peneda-Geres National Park
(Parque Nacional da Peneda Gerês)



Alvão Nature Park
(Parque Natural do Alvão)

Peneda-Geres National Park
(Parque Nacional da Peneda Gerês)

A golden eagle (*Aquila chrysaetos*) glides over granite cliffs at the exhibition.



“The air is clean, without the vice of a mist. Serene, the mountain opens itself to universal accord, its forehead held high, its eyes steady.”

Vergílio Ferreira

Eurasian eagle-owl
(*Bubo bubo*).

Hoots and howls on the mountain.

Armeria beirana.

Eurasian eagle-owl
Bubo bubo

Ear tufts, orange eyes and vocalizations ("oooh-hu") heard mainly between November and February, are distinctive features of this nocturnal predator. The Eurasian eagle-owl preys on small mammals, but also on other birds, and breeds in rocky, steep cliffs. The species occurs throughout Asia and Europe, and in mainland Portugal, predominantly in remote inland areas.

Conservation:
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX

Armeria beirana
(*Armeria beirana*)

This plant occurs in the western Iberian Peninsula, in perennial meadows growing in acidic soils, in mountainous locations.

Conservation:
Global | Not evaluated | Endemic to the IP

NE DD LC NT VU EN CE EW EX

Muddy meadows

"Lameiros" are semi-natural meadows or mountain pastures that appeared during the Middle Ages, between the 5th and 11th centuries. They derive their name from "lama", which means mud. Such meadows were created following fires or the destruction of shrubland near water streams. Their fertile soils would support several families through agriculture or livestock — activities that continue until today.

Lameiros are important because they minimize soil erosion and retain water, inhibiting fire propagation. They exist in the north of Portugal, at altitudes above 700 metres, and shelter plants and animals, such as the heath spotted--orchid and the Spanish heath butterfly.

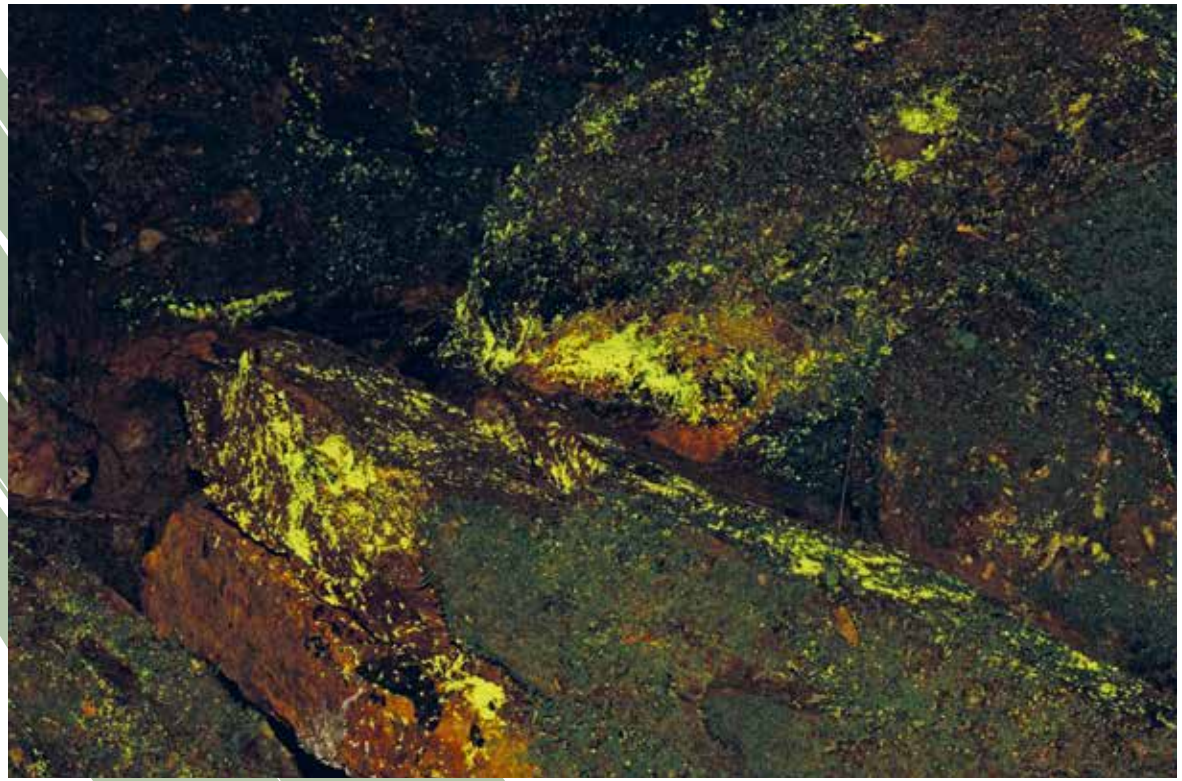
A “lameiro” in Vale do Sabor near the village of França.

Luminescent moss
Schistostega pennata

This moss occurs throughout North America, Europe, China, and Japan. Its habitat is the entrance of dimly lit caves or mines. The luminescent moss glows in greenish-gold tones due to specialized spherical cells that act as lenses, concentrating light.

Conservation:
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX



Luminescent moss (*Schistostega pennata*) in the Arga Mountain (Serra de Arga), Minho.

A mountain crevasse.

“I mined the crags where the sun and the snow
Painted panoramas at the surface.
And from the soul of the mountain, fresh and light,
Sprouted this flow I now carry. (...)”

Miguel Torga

A trap: the “fojo” ('fo3u)

These traps testify our relationship with wolves.

Fojos were built from the 15th century onwards, in the north of the Iberian Peninsula. Constructing a fojo involved one or more villages, and there were different types. For example, a stone wall, over two metres high, with a single entrance. Wolves were lured in by placing a goat inside or driven into the fojo in a chase.

Wolves are still pursued in Portugal because they attack herds due to the scarcity of natural prey. Policies have been developed to promote our coexistence, but despite these efforts the species is still declining.

António Rebelo, nature conservation and forest technician at Parque Nacional da Peneda-Gerês

Humberto Figueiredo, shepherd and shepherd dog breeder

On our, not always peaceful, coexistence with wolves

Francisco Fonseca, researcher and president
of Grupo Lobo

Gilberto Tomás, former President
of São Julião dos Palácios Civil Parish

José Dimas, shepherd
and shepherd dog breeder

José Rodrigues,
hunting ground manager

A wolf howls on a granite block.

“(...) When the sun hits the eastern hills of this mountain range, one might say olive oil and honey flow there. And no, it is wild land, of wolves and aimless men. (...)”

Aquilino Ribeiro

Greens for all seasons

There are greens for all tastes in Portugal: from oak forests, to woodlands and shrublands, to ecosystems actively managed by humans, such as the Montado (mõ'tadu), and the pseudo-steppes of grain-crop plains. All in all, almost 70% of the country's territory is covered in green.

The Atlantic Ocean to the west, and the Mediterranean and North Africa, to the Southeast make Portugal a country with various climates. Average temperature is lower in the north than in the south; temperature amplitude is larger inland than on the coast; and humidity increases with ocean proximity.

In response to these variations, vegetation varies and in response to this, animals vary too.

From north to south, predominant oak species change from Pyrenean oak, and English oak to Portuguese oak, which extends further south.

Tree density varies from north to south, as the forest gives way to steppe-like vegetation on the arid plains of the Alentejo, where grain crops grown for food are the predominant herbaceous species.

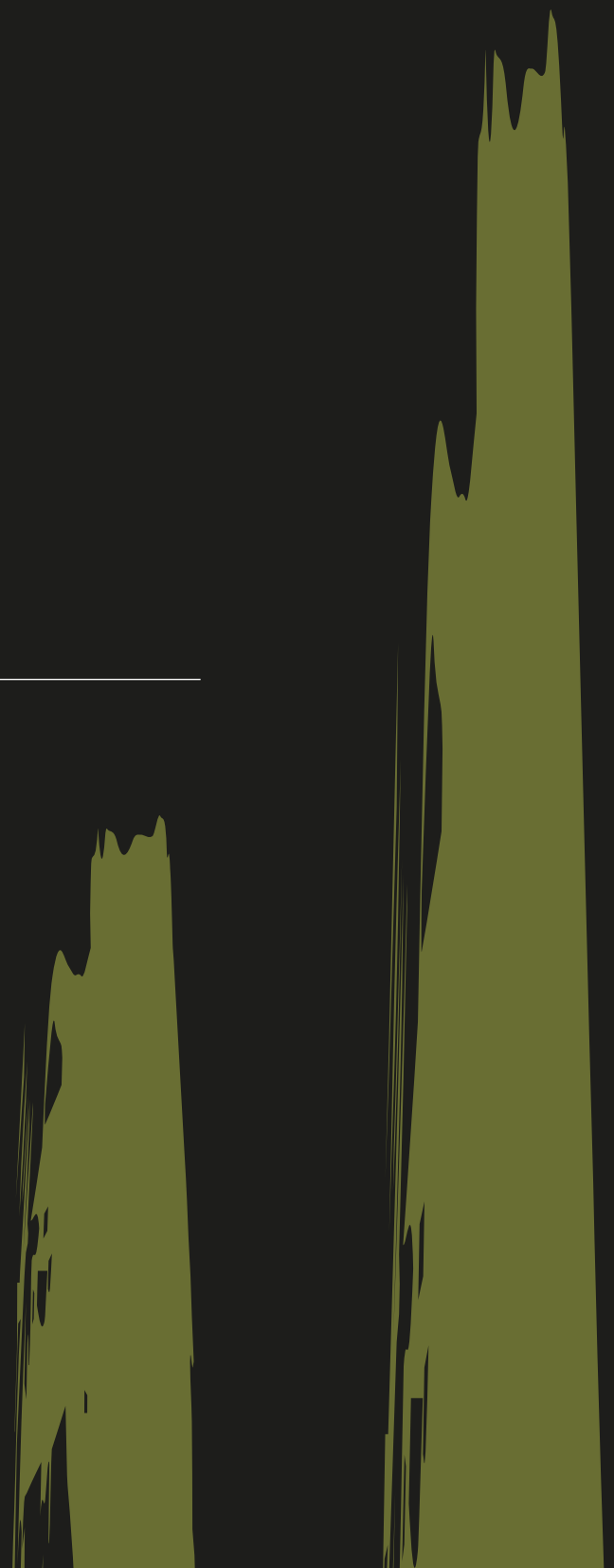
We don't all root for Sporting in Portugal... But we have greens for all tastes.

A magnifying glass in the forest area allows visitors to discover details of the red beard lichen (*Usnea rubicunda*).

The forest ecosystem with the montado in the background.

“In the foreground, immense trees wave with their open arms (...)”

Angelina e Raul Brandão



Leaf strategies

Is it better to have larger or smaller leaves?

And is it better to have smooth edged or rough leaves?

Large, lobbed, or toothed leaves are observed in hot and humid climates, and have larger surfaces available to cool by evapotranspiration, keeping leaf temperature below air temperature. In hot and dry climates, leaves are generally small and smooth in shape, and so reduce the surface available to lose water. Leaves lose heat in the cold winter nights of colder climates and, to avoid freezing, they are smaller and less lobbed.

Variations in leaf shape, their geometry, responds to challenges posed by the environment the plant inhabits.

What climate are these leaves suited to?
The climate is warm and dry.

Evergreen oak
Quercus rotundifolia

A Mediterranean species, in mainland Portugal it predominates inland, in dryer regions, woodlands, shrubland and montados. Its acorns ripen from late autumn and are an important part of the diet of mammals, including wild boar, black Iberian pig, and small rodents. A great diversity of insects inhabit its branches and bark, attracting insectivorous birds.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

What climate are these leaves suited to?
The climate is of mild temperature and humidity.

Portuguese oak
Quercus faginea

The Portuguese oak predominates between the Mondego and Tagus rivers. The leaves remain withered on the tree until they are replaced by new leaves in the spring. Many animals feed on its fruit, the acorn. Some bury them for the winter, but they do not always recover them, contributing to the natural dispersion of this oak. The wood mouse (*Apodemus sylvaticus*) and the Eurasian jay (*Garrulus glandarius*) are among the most efficient acorn dispersers.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

What climate are these leaves suited to?
The climate is cool and humid.

Pyrenean oak
Quercus pyrenaica

The Pyrenean oak prefers acidic soils, and altitudes from 400 to 1500 metres. It grows throughout mainland Portugal with the exception of inland Baixo Alentejo and coastal Algarve. The leaves remain withered on the tree without falling, for much of the winter. When pasture begins to become scarce, animals such as the roe deer eat the fallen leaves and fruits and the new shoots that arise from the roots.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

Livestock bells of different sizes have been used to locate domestic animals for two millennia. The bells of this installation were kindly provided by the Municipality of Viana do Alentejo.

The Montado wouldn't exist without us

Montados only exist in the Mediterranean. They require active human management of grazing and agriculture to be maintained.

The Cork oak, montado's most abundant tree species, provides cork. Next in abundance is the Holm oak which predominates in the drier Portuguese inland. This ecosystem combines trees with meat production, like porco preto (black Iberian pig), which feeds on acorns, and the holm oak's lower branches when grass becomes scarce. Herbs, shrubs, and trees provide habitats to other species — lichens, insects, birds and mammals, including the Iberian lynx. The level of biodiversity is high.

Montados were created by clearing Mediterranean woodlands around 9000 years ago. Montados were developed to produce food in semi-arid areas: they are adapted to water scarcity and poor soils — which they help to preserve.

This ecosystem offers resilience to climate change and biodiversity loss which is why it is protected.

Livestock bells

Portuguese cowbells, called "chocalhos" (\ shü'kal(ˌ)yü \), were awarded UNESCO's Intangible Cultural Heritage in Need of Safeguarding status in 2015.

At least 2000 years old, the art of chocalhos first appears in the Iberian Peninsula's archaeological record in the first century BCE, associated with Celtiberian civilizations. Iron bells and clappers of different sizes produce different sounds used to keep track of free-ranging livestock: cattle, sheep, goat, ass, and turkey.

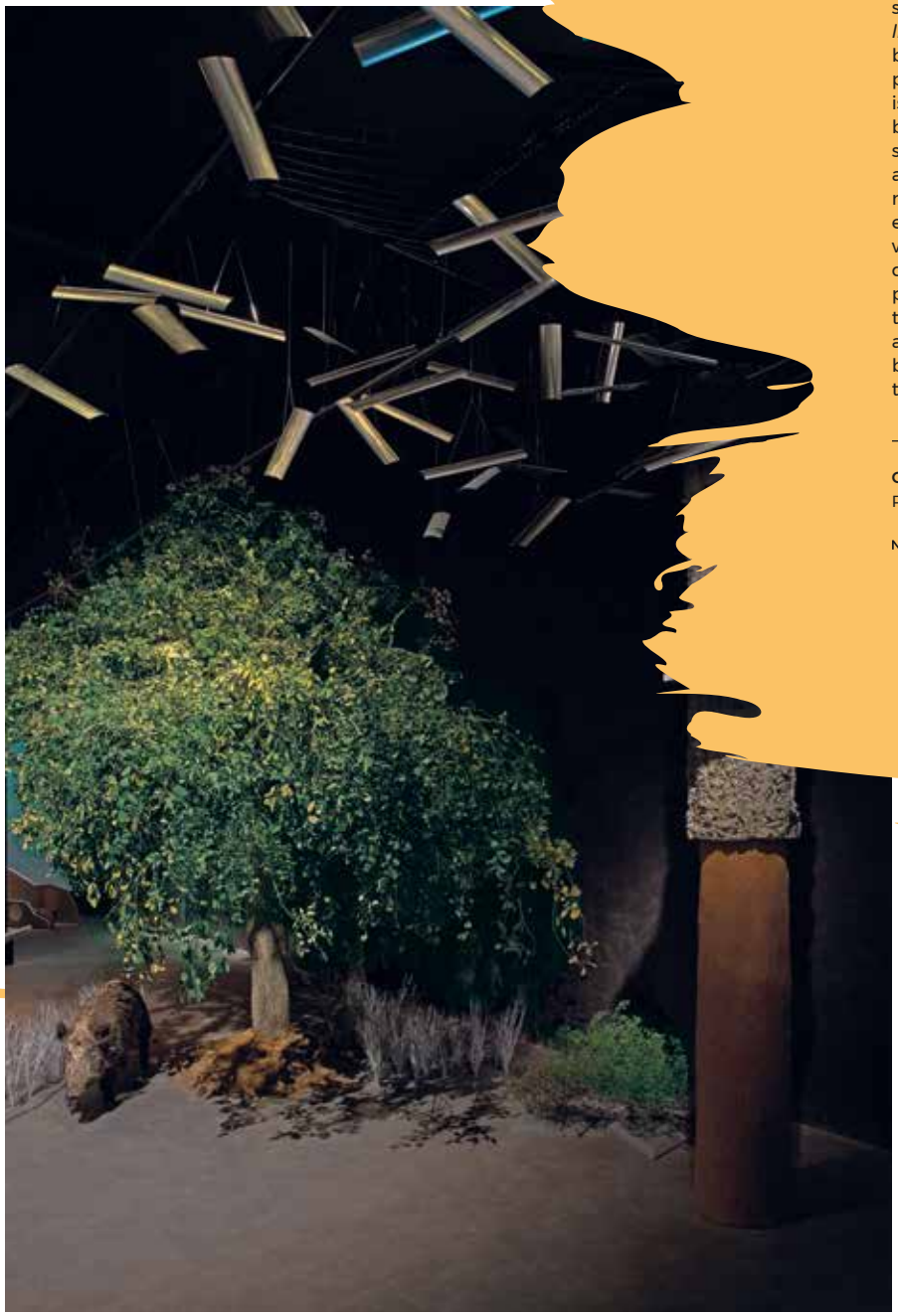
There remain about 13 Chocalheiro masters in Portugal, the most being in the Alentejo, but also in Tomar, Cartaxo and Bragança, and one on Terceira island, in the Azores. The chocalhos displayed here are from two masters, Guilherme Maia and Francisco Cardoso (both of atelier Chocalhos Pardalinho), from Alcáçovas, in the Municipality of Viana do Alentejo.

“And I grew up on the ‘monte’[1] among men and beasts of the countryside, among mysteries and wonders, ardent summers and winters of sun and frost, sometimes damp, with rain riding the wind through faint olive groves or over the montado.”

Urbano Tavares Rodrigues

The colors of the montado throughout the year.

A wild boar under the shade of a holm oak signals we have arrived to the montado.



Wild boar
Sus scrofa

Wild boar is a game mammal. In mainland Portugal the Mediterranean subspecies occurs, *Sus scrofa meridionalis*. Its abundance has increased mainly because of the decline of its natural predator, the wolf. Excess of wild boar is a burden to crops as they seek food by digging up the ground with their snouts. Omnivorous, wild boar prefer acorns, chestnuts, and potatoes, but may hunt smaller mammals and even eat eggs. Active at night and twilight, wild boars take refuge in holes and dense vegetation. Boars remove their parasites by rolling in mud. Once dry, the mud immobilizes the parasites and the boar rubs itself against tree bark making the mud, with parasites trapped in it, fall off.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

[1]**Translator's note:**
[1]'Monte' appears between quotation marks in the original text: in the region of Alentejo the word designates a large farm and all its infrastructures (similar to a "ranch" but with mixed crop-livestock farming)

Cinereous vulture
Aegypius monachus

Although the last two decades have seen the return of nesting couples to Portugal, there are only an estimated 2000 couples left in the Iberian Peninsula. The Cinereous vulture occurs in the same type of habitat as the Iberian Lynx — shrublands, and holm oak and cork oak woodlands —, nesting in trees. Because it feeds on carrion, this bird serves as a "cleaner", reducing the risk of spreading diseases.

Conservation:
PT | Critically endangered

NE DD LC NT VU EN **CE** EW EX

European rabbit
Oryctolagus cuniculus

Introduced all over the world, the European rabbit is native to the Iberian Peninsula. In Portugal, rabbits occur throughout the territory, in shrublands, open fields and meadows, neighbouring crops and woodlands. They feed mainly on leaves and shoots. Rabbits are prey to humans and other mammals, such as the Iberian Lynx, and to birds of prey, such as the Golden Eagle: hence, their decline impacts the abundance of other species negatively. Rabbits live in families and excavate breeding burrows, tunnels that end in nests lined with grass, moss, and belly fur, contributing to aeration of the soil.

Conservation:
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX

Egyptian mongoose
Herpestes ichneumon

Egyptian mongoose offspring follow their mother by placing their snout under the tail of the preceding sibling, forming a line, hence the name "sacarrabos" (literally "bum pullers" in Portuguese). Originating in Africa, they occur in the Iberian Peninsula in shrublands, amongst reeds on the banks of lagoons and salt flats, rocky terrain with vegetation, and farmed areas. The mongoose is the only carnivore in Portugal active during the day, hence its success. Mongooses live in families, and may hunt in groups, feeding on juvenile rabbits, rodents, birds, snakes, eggs, insects, and occasionally, fruits and berries. In open areas they will occupy burrows abandoned by rabbits and badgers.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

While they remain rare, couples of the cinereous vulture (*Aegypius monachus*) have returned to Portugal.

Presently distributed worldwide, the rabbit (*Oryctolagus cuniculus*) is originally from the Iberian Peninsula.

The egyptian mongoose (*Herpestes ichneumon*) is a predator from Africa.

Grain crop plains are not what they used to be!

In Portugal, steppe-like habitats are called “pseudo-steppes”: they are associated with cereal crops and cattle produced for food. Without human management, these fields would revert back to shrubland and woodlands.

These cereal crop plains, fallows and pastures are home to birds typically found in European steppes, such as the great bustard and the little bustard. Birds find food in abundance here: plants, insects, and small mammals.

While not true steppes, these fields have become biodiversity sanctuaries. Their conservation depends crucially on traditional agriculture practices.

Little bustard (*Tetrax tetrax*) nests are vulnerable to predators because this bird nests on the ground.

Cereal steppe-like ecosystems across the seasons.

Little bustard
Tetrax tetrax

The little bustard nests from Mediterranean regions to Iran. In mainland Portugal, the species occurs mostly in Alentejo's steppe-like regions. Little bustards feed on plant shoots, leaves and flowers, preferring legumes, such as beans and crucifers, such as cabbage. Chicks are fed with insects. This bustard flocks to feed, except during reproduction, nesting on the ground – where their eggs are predated by several animals.

Conservation:
PT | Vulnerable

NE DD LC NT **VU** EN CE EW EX

Great bustard
Otis tarda

The Iberian Peninsula has the largest European population of the great bustard. In Portugal, the species breeds mainly in the steppe-like regions of the Alentejo, vast plains without trees, with traditional rainfed grain crops, interspersed with fallows, and pastures. It feeds on grains, leaves, fruits, and stems of different plant species, but also on geckos and wood mice. Chicks feed on insects. Corpulent, great bustard males are the heaviest birds in Europe.

Conservation:
PT | Endangered

NE DD LC NT VU **EN** CE EW EX

The largest European population of the great bustard (*Otis tarda*) occurs in the Iberian Peninsula.

French lavender
Lavandula pedunculata

It occurs in the Mediterranean region. In Portugal it is found in dry and exposed environments, in poor soils. The French lavender has a great ecological amplitude, colonizing low scrub, shrubland clearings, and poor pastures. A very aromatic plant, the oil extracted from its flowers is used in perfumery. Lavender's flowers and leaves are used to repel insects. It is one of the most important melliferous (honey source) Portuguese plants.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Rosemary
Rosmarinus officinalis

Rosemary occurs throughout the Mediterranean region. In Portugal, the species is found mostly in the southern, centre, and interior mainland, and in the Douro valley. It is found in open bushland and woodland, sometimes under the cover of pine forests, and in exposed, dry, and hot environments. Rosemary's leaves are used in perfumery and for cooking, and are highly melliferous (honey source).

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

Mastic thyme, Spanish marjoram
Thymus mastichina

This plant is endemic to the Iberian Peninsula and occurs in mainland inland Portugal and along the southern coast. Mastic thyme occurs in shrubland clearings, roadsides, abandoned agricultural fields, pine forests, cork oak forests, and in rocky areas, preferring siliceous soils. This thyme's abundantly produced small flowers look like cotton balls stuck on toothpicks, and are traditionally burned together with rosemary at bonfires of the Popular Saints celebrations.

Conservation:
Eur | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Common myrtle
Myrtus communis

This plant can be found in Southern Europe, the Mediterranean, in the archipelagos of Madeira, the Azores, Cape Verde and the Canary Islands, central Asia and the Near East. Myrtle fruits are used to produce liquor, and the species is grown for its essential oil, used in perfumery, as a medicinal plant and, also, in cooking. It may also be grown to prevent soil erosion.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

In addition to the use of its oil in the perfume industry, French lavender (*Lavandula pedunculata*) is used to season several dishes.

Myrtle (*Myrtus communis*) fruits are used to produce liquor and its oil is used in the perfume industry.

Airborne

Essential oils and flower fragrances are composed of volatile substances, extracted using specific techniques. Typically, the number of essential oil components surpasses 100.

The components of the oil, rather than the oil itself, play roles in the living plant. These components are frequently called “secondary metabolites” because they are not involved directly in plant growth but are responses to specific challenges posed by the plant’s environment.

Some secondary metabolites trap free radicals providing oxidative stress tolerance. Others inhibit microbial growth providing antimicrobial defence, or deter herbivores through toxicity, providing antiherbivore strategies. Some secondary metabolites are used to communicate with other plants and with animals. information is conveyed through volatile signal molecules.

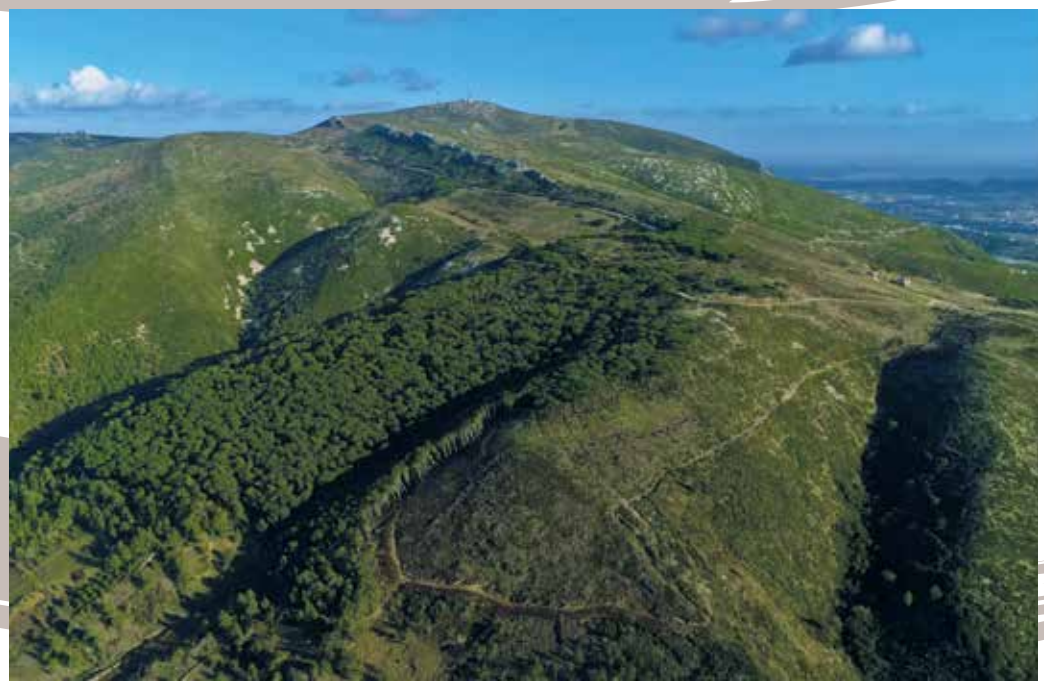
Cork, and what shall we do with you?

Portugal has the largest population of cork oak and is the world's largest cork exporter.

Light, flexible, waterproof, temperature resistant and insulating, cork was used in Egyptian, Greek and Roman civilizations. As a main component, or in combination with other materials, cork is presently used in various industries: as thermal and sound insulator in walls, as floor cover, in interior and furniture design, jewellery, clothing, footwear, in the aerospace industry...

And, as always, as wine stoppers, of course.

Cork oak tree bark: in the Mediterranean cork has been used since the Egyptian, Greek and Roman civilizations.



Protected Landscape of the Montejunto Mountains
(Paisagem Protegida da Serra de Montejunto)

Arrabida Nature Park
(Parque Natural da Arrábida)

Aire and Candeeiros Mountain Ranges
Nature Park – Fórnea (Parque Natural das Serras
de Aire e Candeeiros – Fórnea)

Aire and Candeeiros Mountain
Ranges Nature Park (Parque Natural
das Serras de Aire e Candeeiros)

Impressions from the past

Limestone is a favourite of amateur fossil collectors. These rocks were formed from sediments deposited at the bottom of lakes and shallow seas, accumulating traces of past ecosystems.

In Portugal there are limestone massifs of different ages: older ones, such as those of the Serra da Arrábida, and of the Serras de Aire e Candeeiros; and more recent ones, such as those of the Tagus and Sado basin. Their fossils tell very different stories. In the Jurassic limestones, the period that started 201 million years ago (mya) and ended 145 mya, we find dinosaur fossils; in the Pleistocene, which started 2.6 mya, we find fossils of bears and elephants.

Limestone is also a favourite of cave explorers. The main mineral in limestones is calcite, which rainwater, seeping through cracks and crevices, dissolves. Over thousands of years this process excavates caves and tunnels inhabited by species adapted to humidity and darkness.

Ah! And limestone is also a preferred rock for pavers: this easy to cut sedimentary rock provides Portuguese sidewalks with their white cobblestones.

The surprising shapes of limestone massifs.

Drip, drip, drip...

... water seeps into rock cracks and crevices. Slowly, it travels underground, carrying calcite and other minerals. In time, stalactites and stalagmites emerge.

Water dripping from the ceiling progressively deposits the materials dissolved in it, growing stalactites. They look like cones that grow vertically from the cave's ceiling to the ground. Some water reaches the ground growing columns in the opposite direction, called stalagmites.

Growing very slowly in both directions, stalactites and stalagmites sometimes meet up. Beautiful columns are formed one drop at a time.

"Stern cathedrals, rigid limestones
Bright stained glass thrusting into space (...)"

Manuel Vaz de Carvalho

The entrance to a cave
in a limestone massif.

Frade-cave Spider
Anapistula ataecina

First described in 2009, this troglobite, a species that lives exclusively in caves, is the smallest spider in Europe and one of the smallest in the world. The Frade cave spider weaves webs but its diet remains unknown. Tinny, half a millimetre long *Anapistula ataecina* occurs only in the Frade-cave System, in the Serra da Arrábida, in an area of less than three km^2. Visitation and limestone quarries are major threats to conservation of this species and its further study.

Conservation:
PT | Critically endangered | Endemic to PT

NE DD LC NT VU EN **CE** EW EX

The Frade-cave spider (*Anapistula ataecina*) is the smallest spider in Europe.

Common rustyback fern
Asplenium ceterach

This fern occurs in temperate climates of western and central Europe, the archipelagos of the Azores, Madeira, Cape Verde and the Canary Islands, and Asia. It grows in shady spots in crevices of rocks and stonewalls, on basic soils but also in limestone. In Mediterranean countries the species is used as an expectorant, diuretic, and to treat kidney stones and haemorrhoids.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

"Algares" are pits excavated by the action of water over time: in this algar grow several specimens of common rustyback fern.

Little strokes fell great oaks

The slow but continuous process of rainwater seeping into limestone may give rise to the formation of pits. In Portugal we call such pits "Algares".

Algares are usually vertical and grow from the surface down, excavated by the chemical and mechanical action of water. The resulting pits may reach over 40 meters in depth, draining water that excavates further underground, developing tunnel and cave systems.

In these underground systems, Algares combine specific conditions: high humidity and some light, depending on their diameter. They shelter ferns such as the rustyback and rare invertebrates such as the millipede *Cylindroiulus villumi* from the Algar do Pena caves.

Tracing footprints

167 million years ago, a dinosaur walked at low tide searching for carrion. We know that it was so because this megalosaurid left a trail of fossilized footprints.

Like the trails we leave walking on mud, or the handprints we stamp into sand, past animals left footprints on humid terrain. Over millions of years, the swampy areas and shallow-bottom waters travelled by these animals turned into limestone massifs that sometimes preserved these trails.

Portugal has an impressive record, both of fossilized remains, such as skeletons, leaves, shells, and eggs , and of trace fossils, such as footprints and tracks.

Today, we trace these footprints to discover how animals moved, their shape, how much they weighted and whether they wandered alone or in groups.

Sauropod footprint
168 million years

This is the largest known footprint of a sauropod in Portugal, made in limestone-rich muds during the Middle Jurassic period, around 168 million years ago (mya). The trail is visible today at the Serras de Aires e Candeeiros Natural Park. Large herbivorous dinosaurs, characterized by their long necks and tails, sauropods walked on four limbs. Animals studied only through trace fossils (*"ichnos"* in Greek) are grouped into species (ichnospecies) or groups of species, forming a genus (ichnogenus). This sauropod belongs to the ichnogenus *Polyonyx*.

Extinct species

The largest and smallest known dinosaur footprints in Portugal: a sauropod (largest) and a megalosaurid.

Megalosaurid footprint
167 million years

Found in the Vale de Meios, in the Serras de Aires e Candeeiros Natural Park, this is the smallest well-preserved dinosaur footprint in Portugal. This spoor was made by a megalosaurid about 167 million years ago (mya), during the Jurassic. Megalosaurus are therapod dinosaurs: carnivores, they had hollow bones, "hands" and "feet" with three fingers and used their hind limbs ("legs") to walk, as they were longer and stronger than their forelimbs ("arms"). This therapod belongs to the ichnogenus *Megalosauripus*.

Extinct species

Of these two mammals, only one can still (hopefully) be seen in Portugal — the brown bear. The straight-tusked elephant became extinct 28 thousand years ago.

Straight-tusked elephant
Palaeoxolodon antiquus

These herbivores could be longer than four meters and weigh up to 15 tons. They foraged for food and water in small groups. This footprint is part of a trail discovered in Vila Nova de Milfontes in sediments from the end of the Pleistocene, estimated to be 40 thousand years old. It likely records the last of their kind in continental Europe before extinction. The trail also confirms their presence in Portuguese territory over several climatic periods until the last Ice age, as well as their coexistence with the first human settlements of the Iberian Peninsula, including the last Neanderthals.

Extinct species
781 thousand - 28 thousand years

Brown bear
Ursus arctos

This brown bear footprint was discovered in Almograve... But it was made by a bear that lived more than 11 thousand years ago! The subspecies *Ursus arctos pyrenaicos,* the Iberian brown bear, inhabited the entire Iberian Peninsula, and had been considered extinct in Portugal since the 19th century. However, in 2019, a fresh trail was found in the Montesinhos Natural Park, left by a dispersing male from Spain. The bear that left this fossil footprint is an ancestor of modern brown bears. Omnivorous, brown bears are mainly vegetarian, but eat carcasses to accumulate fat, before hibernation.

Extant species
500 thousand years - present

An endemic species of the Iberian Peninsula, the Iberian midwife toad (*Alytes cisternasii*) has this name because the males carry the eggs.

Iberian midwife toad
Alytes cisternasii

The Iberian midwife toad occurs mainly south of the Tagus River. More active at night, this small amphibian prefers bushland and montado, requiring humid habitats, such as streams, to reproduce. Males carry the eggs on their backs. Their characteristic calls can be heard at dusk in winter. They feed on a wide variety of invertebrates — ants, spiders, or beetles.

Conservation:
PT | Least concern | Endemic to the IP

NE DD LC NT VU EN CE EW EX

A waterfall lies just arount
the limestone massif.

Back to the surface

Rain and snow water seeps into the soil until it hits a barrier — an impermeable rock —, and accumulates. The return of such underground water to the surface is a spring.

Mountains springs are frequently exploited for spring and mineral water. They sustain specific species communities and feed streams, lakes and rivers all year round, even in the absence of rain fall.

Speeding up the river

Where a riverbed narrows or a slope becomes more pronounced, the river flows faster.

As the water gains speed, turbulence increases. Increased turbulence and lower temperatures increase the amount of oxygen dissolved in the water.

This suffices to change the species composition of the river and of its banks. Fish that like oxygen-rich water appear, such as the “River-trout”, a voracious carnivore that feeds on insect larvae, molluscs, and crustaceans.

The river speeds up, biodiversity changes.

“(...) small streams, equally agile and happy, that carelessly let themselves slide down the open valleys in the heights and ventured down the montain; it is as if they already knew that downstream they would become portentous river whose flow would thicken until it reached a size that would allow it to make itself the sea.”

André Gago

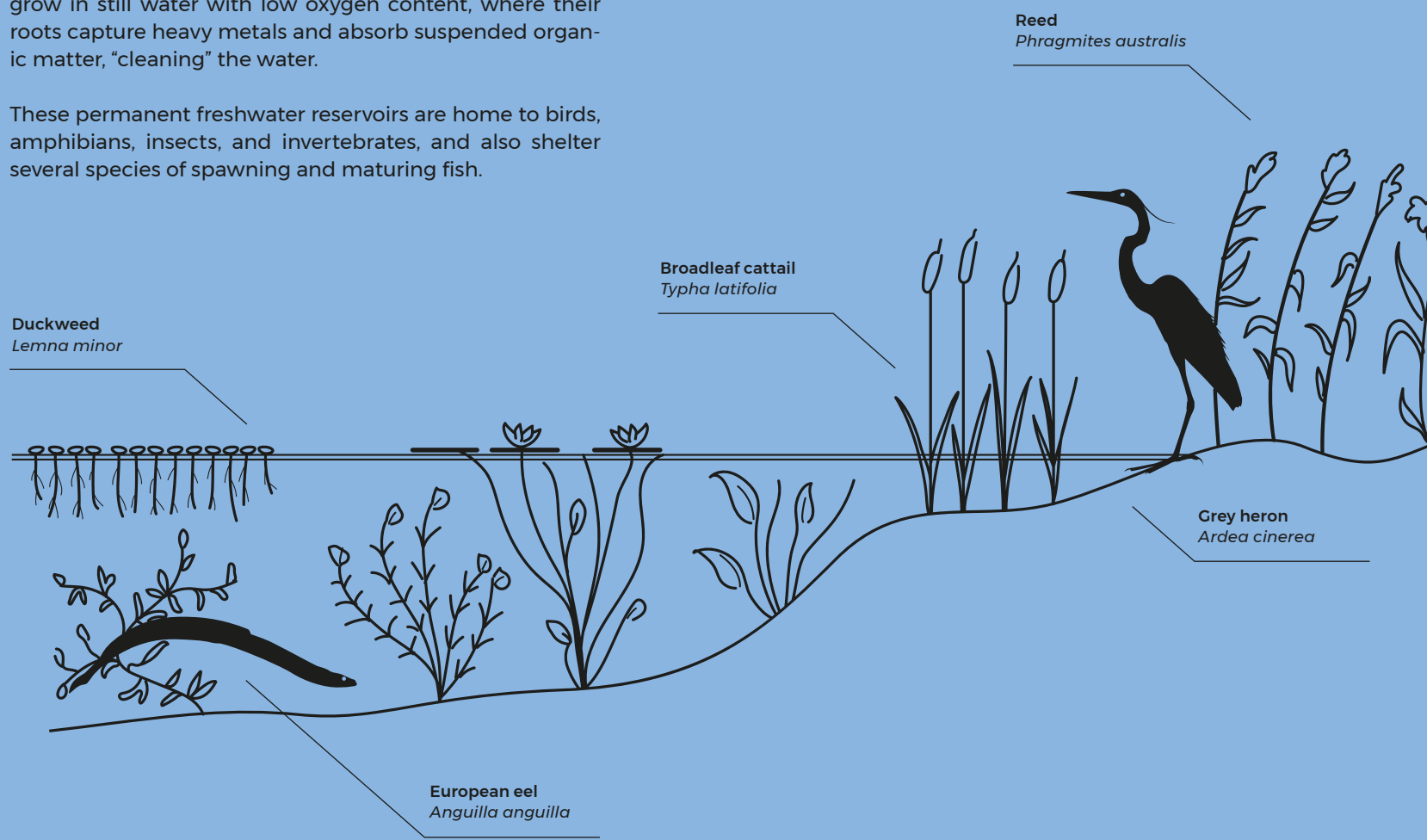
A river seen from below!

Marsh

A marsh is a wetland that the convergence of water streams and rain keep flooded throughout the year.

In a marsh, water is absorbed and retained, serving as reservoir, and as a purification zone. Several plants contribute to this important ecological function, such as common duckweed (*Lemna minor*), broadleaf cattail (*Typha latifolia)* and common reed (*Phragmites australis*). These plants grow in still water with low oxygen content, where their roots capture heavy metals and absorb suspended organic matter, "cleaning" the water.

These permanent freshwater reservoirs are home to birds, amphibians, insects, and invertebrates, and also shelter several species of spawning and maturing fish.



Iberian midwife toad
Alytes cisternasii

Broadleaf cattail
Typha latifolia

The broadleaf cattail occurs on all continents except Antarctica, in soils that are soaked during most of the year, such as riverbeds, streambeds, and beds of ponds and lakes. This species prefers areas with a higher concentration of nutrients. It is used to decontaminate polluted waters because it has a high capacity to absorb pollutants. The broadleaf cattail's ears resemble rockets and are the plant's reproductive structures. Its black-brown lower part is female, and its narrower upper yellow extremity is male.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Where is the male
Iberian emerald lizard
(*Lacerta schreiberi*)?

Slowing the river down

Where a riverbed widens or a slope becomes less pronounced, a river flows slower.

With less turbulence and elevated temperatures, slow flowing sections of a river are less oxygenated than faster flowing sections.

Low turbulence and oxygen are defining characteristics for the species that inhabit these regions, such as the Broadleaf cattail. Amongst the riverbank vegetation we may find the Iberian emerald lizard in its reproductive season.

The river may slow down, but biodiversity does not.

Discovering the margins of wider rivers...

"(...) long whisper of the willows that speak to the running waters and embrace in the air when the wind blows (...)"

J. Simões Dias

Safe haven

An estuary is a safe haven between the river and the sea.

At estuaries fresh and saltwater meet. Muddy and murky waters fluctuate with the tides, and are rich in nutrients, transported in the sediments brought by the river, and in salt, brought by the sea. For this reason, from the Nile to the Sado, civilizations have settled on the shores of estuaries for millennia, using the fertile soils for agriculture and to produce salt.

Richness in salt and nutrients determine the species composition of this ecosystem. Plants like the sea purslane are tolerant to salt and water submersion and contribute to stabilize the estuary's bottom and margins. Root networks trap the mud providing more resilience to tidal movement. Crustaceans, molluscs, insects, and fish benefit from nutrients and take shelter among the roots and leaves of estuarine vegetation. Eels cross the estuary as they migrate to breed at sea.

In pursuit of these animals, come the birds that feed on them, such as the solitary red heron. Portuguese estuaries are along several migratory routes. The Tagus estuary alone receives around 50 thousand wintering birds. The Sado estuary is home to 221 species, including wintering and breeding birds.

As safe havens, estuaries are true sanctuaries of biodiversity.

Estuarine biodiversity.

The river flowed into the estuary,
which we visited walking on a wooden stilt
pier to observe many species of birds.

Black-tailed godwit
Limosa Limosa

This is the national bird of the Netherlands. The species winters but does not reproduce in Portugal, occurring along the coast south of the Ria de Aveiro, predominantly on the Tagus Estuary. It prefers shallow waters — beaches and estuaries, as well as swamps and flooded fields. The black-tailed godwit rests in flocks, and preys on insects and their larvae, worms, molluscs, crustaceans, tadpoles, fish eggs and amphibian eggs.

Conservation:
PT | Least concern

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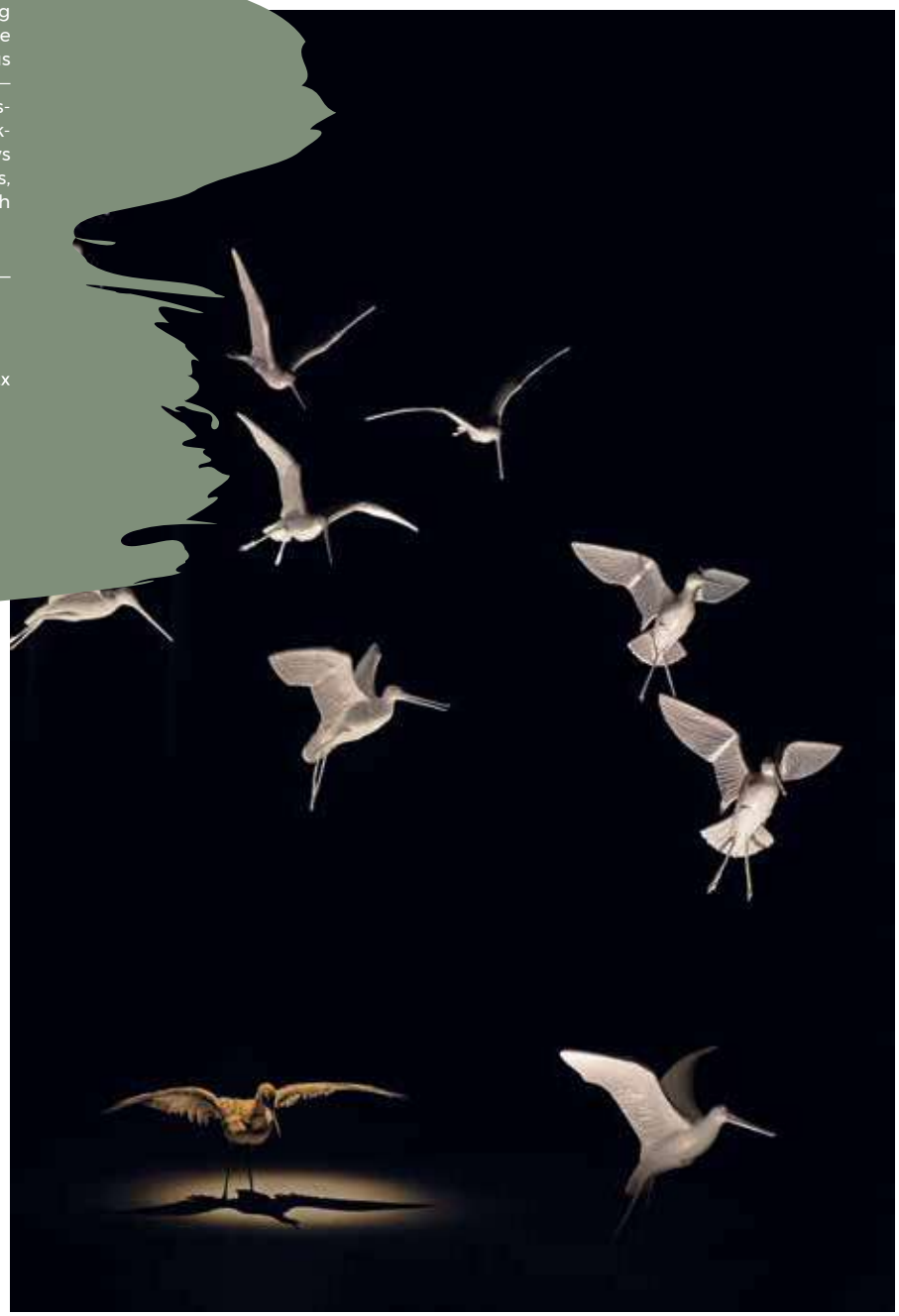
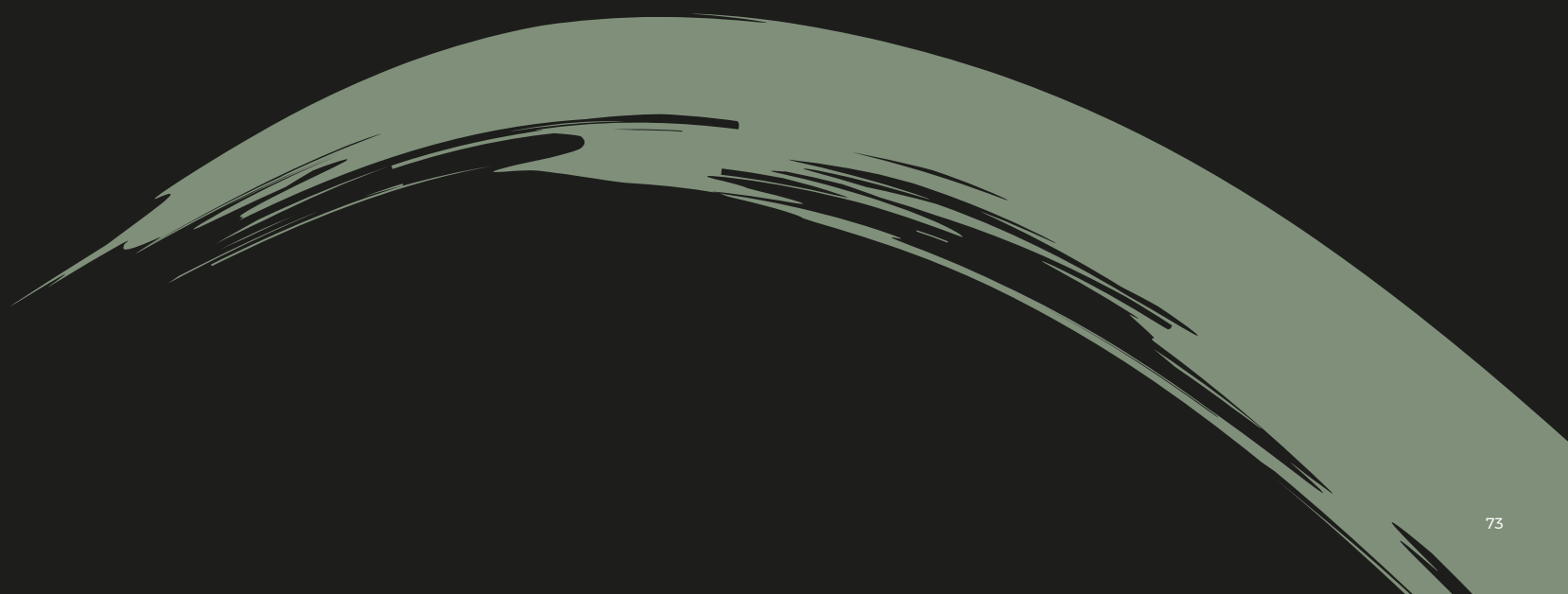


The black-tailed godwit (*Limosa Limosa*) is the national bird of the Netherlands, but winters in Portugal.

“(...) the birds on the reeds of the mud (...) the house deserted by wild turtle doves and terns (...) and flamingos on islands of water daffodils, watermills on grassy pontoons, my mother hanging shirts on the porch that the flood took away (...)”

António Lobo Antunes



“White gold”

Salinas, estuarine saltpans, are areas which humans manage specifically to produce salt. Until the end of the 19th century, salt was the predominant preservation system for meat and fish. Therefore, salt production was one of the most important activities in the country. Nowadays, salt production also produces high quality products, such as salt flower, rich in mineral salts from sea water.

Plants living around estuarine saltpans are highly salt tolerant. These plants shelter birds that feed on estuarine fish and insects.

If a trompet is heard in an estuary, that would be the western swamphen (*Porphyrio porphyrio*).

Western swamphen
Porphyrio porphyrio

The Western Swamphen is distributed throughout Africa, Asia, Oceania and in Europe, in the Iberian Peninsula and Italy. In Portugal, the species appears to be enlarging its distribution. The Western Swamphen inhabits lakeshores, and other wetlands, feeding on vegetation. When hiding in vegetation, it is betrayed by its trumpet-like call.

Conservation:
PT | Vulnerable

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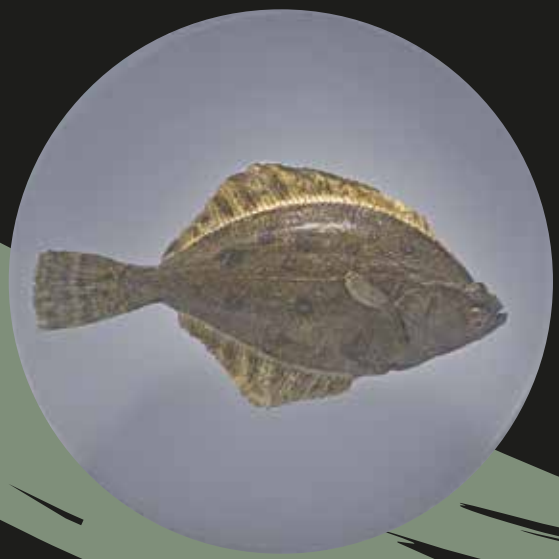
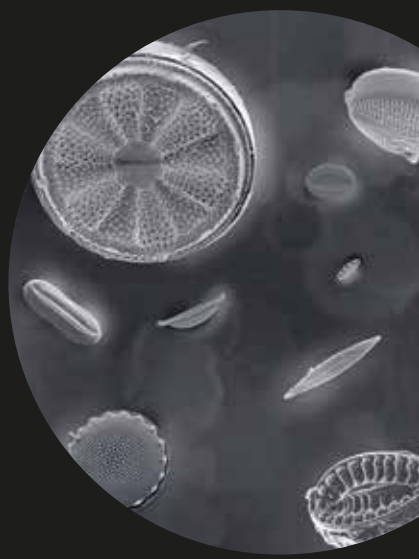


The european flounder (*Platichthys flesus*) is a predatory fish that feeds on herbivores, detritivores, and other carnivores.

If allowed to choose the european green crab (*Carcinus maenas*) will prefer to feed on other animals, but this crustacean is in fact omnivorous.

The snail, *Hydrobia ulvae* is a detritivore gastropod: it feeds on the remains of animals and algae.



Microcrustaceans are microscopic animals that belong to the zooplankton. Shown here are *Evadne spinifera* and the copepods, *Calanus* sp. and *Centropages hamatus*, herbivorous species that feed on microalgae.

Diatoms are microscopic producer organisms and thus belong to the phytoplankton. Several species of diatoms are shown, including, *Cocconeis peltoides, Diploneis dydima, Halamphora* sp., *Navicula spartinetensis, Nitzschia valdestriata, Psammodictyon panduriforme, Surirella fastuosa, Thalassiosira kushirensis*, and *Tryblionella apiculate*.

A estuarine food web

A food web describes who eats whom in an ecosystem. Estuaries have very complex food networks.

Food webs are composed of three types of “pieces”. Producers, like algae, use solar energy to produce their own food. Consumers, like animals, do not have this capacity and feed on producers or on other consumers. Decomposers and detritivores recycle organic matter.

Knowing the structure of a food web is important as it helps us understand how changes, sometimes at the level of a single species, may produce a rippling effect to the whole ecosystem.

Painted goby
Pomatoschistus pictus

The painted goby occurs in the eastern Atlantic, from Norway to the Iberian Peninsula, and the Canary Islands. It has also been reported in the Mediterranean Sea. This fish inhabits gravel and sand bottoms, and feeds on crustaceans. Juveniles may occur in shore pools. Painted goby males produce two distinct sounds, drums, and thumps, to attract females to their nests. Males tend the eggs.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Meagre
Argyrosomus regius

The meagre occurs in the north-eastern Atlantic and in the Mediterranean Sea, predominating along the central and southern Portuguese coast. A migratory fish, meagre feeds on fish and crustaceans, often at night, foraging frequently in shallow waters. Acoustic communication (snoring-like sounds) are produced during reproduction, to attract partners to a spawning spot. Fishermen use these sounds to detect meagre schools.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Lusitanian toadfish
Halobatrachus didactylus

The Lusitanian toadfish occurs in the eastern Atlantic and western Mediterranean, and prefers brackish or marine waters, and soft sand, or muddy bottoms. The Lusitanian toadfish is a sedentary species. It often partly buries or conceals itself in rock crevices in shallow waters. It is generally a solitary fish. The toadfish feeds on crustaceans, molluscs and small fishes. Males use acoustic communication to attract females to the nest, and sounds are also produced for conflict resolution, in a repertoire of rare complexity among fish. Males tend the eggs.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Listening to fish: a choir of meagres, a lusitanian toadfish male calling out for females...

Soup

We are soup experts in Portugal. Fish and seafood soups are first and foremost ways to make the most of all the ingredients. We have eel soup, oyster soup and “Linguerão” (grooved razor shell) soup and we could call them all estuary soups. This highly productive ecosystem is inhabited by polychaetes (worms), molluscs, and crustaceans, and serves as a nursery to various species of fish, including sole and sea bass, and receives migrants such as lamprey and eel.

Eel occurs in all aquatic ecosystems, fresh, brackish, or salt water, from the Minho river to the Guadiana river and also in the coastal waters of the Azores and Madeira. Breeding adults head for the Sargasso Sea and eel larvae migrate in the opposite direction, to grow in continental water bodies. Unfortunately, the last two decades have seen the abundance of adults of this species collapse by 75%.

The grooved razor shell, occurs on sandy bottoms in the northeast Atlantic and the Mediterranean Sea. It is caught at low tide by placing salt at the entrance of its burrow.

In the 1970s, the Tagus and Sado estuaries were the largest natural reserves of the European species of oyster, the Portuguese oyster. In response to the collapse of the species due to overfishing and pollution, the Asian oyster, Crassostrea gigas, was introduced for aquaculture. The latter competes with the Portuguese oyster, threatening to displace it.

Could fish soup be facing extinction?

Three ingredients of “estuary soup”: European eel (*Anguilla anguilla*), an endangered species, Portuguese oyster (*Crassostrea angulata*) and grooved razor shell (*Solen marginatus*), the latter species not evaluated in terms of conservation.

Greater flamingo
Phoenicopterus roseus

In mainland Portugal, flamingos mainly occur on the coastal strip south of the Ria de Aveiro, with the most important populations located in the Tagus and Sado Estuaries, in the Ria Formosa and in Castro Marim. The flamingo visits, but does not nest in Portugal, where it may be found the year round. These birds flock, and feed on insects, crustaceans, worms, algae, seeds, and occasionally small fish.

Conservation:
PT | Vulnerable

NE DD LC NT **VU** EN CE EW EX

Kentish plover
Charadrius alexandrinus

Most populations of this species are fully migratory and have distinct breeding and wintering ranges. Wintering and breeding birds occur in mainland Portugal on beaches, salt pans and sandy islands. Their nests are liable to destruction by humans and dogs on beaches because they are built directly on the sand. The Kentish plover feeds individually or in small flocks, in shallow waters or open terrain, mainly on insects and their larvae, but also on molluscs, crustaceans and spiders.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Back to back: a greater flamingo (*Phoenicopterus roseus*) and a kentish plover (*Charadrius alexandrinus*).

A feeding red heron (*Ardea purpurea*).

Red heron
Ardea purpurea

Distributed throughout Europe and Africa, the Red heron occurs mostly in the Tagus Estuary in Portugal, and less frequently in the Ria de Aveiro. Very discreet and difficult to observe, it preys on fish and insects, with reptiles, small mammals, and spiders as additional snacks. A solitary bird, it can remain immobile for long periods when hunting.

Conservation:
PT | Endangered

NE DD LC NT VU **EN** CE EW EX

A pair of eurasian oystercatchers
(*Haematopus ostralegus*).

A green sandpiper
(*Tringa ochropus*).

A pied avocet
(*Recurvirostra avosetta*)

Eurasian oystercatcher
Haematopus ostralegus

The Eurasian oystercatcher nests in Europe and eastern Asia on coastal saltmarshes, dunes, and inland along the banks of lakes and rivers, or on agricultural fields. The species does not breed in Portugal, where it occurs in coastal wetlands, such as estuaries and salt pans, and in inland wetlands, such as lagoons. Despite its name, the Oystercatcher's preferred bivalve is mussels, also feeding on gastropods, on soft intertidal substrates. It feeds on polychaetes and crustaceans in estuaries, and inland, it preys on earthworms and insect larvae.

Conservation:
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX

Green sandpiper
Tringa ochropus

This migratory species nests in Scandinavia and eastern Europe to Siberia, migrating south to winter in southern Europe, the Indian Subcontinent, Southeast Asia, and tropical Africa. The Green sandpiper winters in Portugal but may be observed in the country all year round. It occurs throughout central and southern mainland Portugal, preferring inland wetlands, such as riverbanks, and the banks of small ponds and channels with vegetation, as well as marshes and abandoned salt pans. Omnivorous, this sandpiper feeds predominantly on aquatic and terrestrial insects.

Conservation:
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX

Pied avocet
Recurvirostra avosetta

This migratory species is distributed throughout Europe. In Portugal, the number of resident birds (those that breed) is scarce and nearly threatened. Migrating, wintering birds are much more abundant. The Pied Avocet is found in estuaries and saltmarshes, and feed on small invertebrates, insects, and small fish by "sweeping" estuarine muds with its beak.

Conservation:
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX

Having crossed the estuary, the sea
and the dunes come into view.

Dunes, between the land and sea

The force of the rain, wind and tide against rock produces sand grains that accumulate on beaches. Near the ocean, sands are very dynamic and have little vegetation. As we move away from the sea, we find more vegetation: larger bushes appear and, finally, trees.

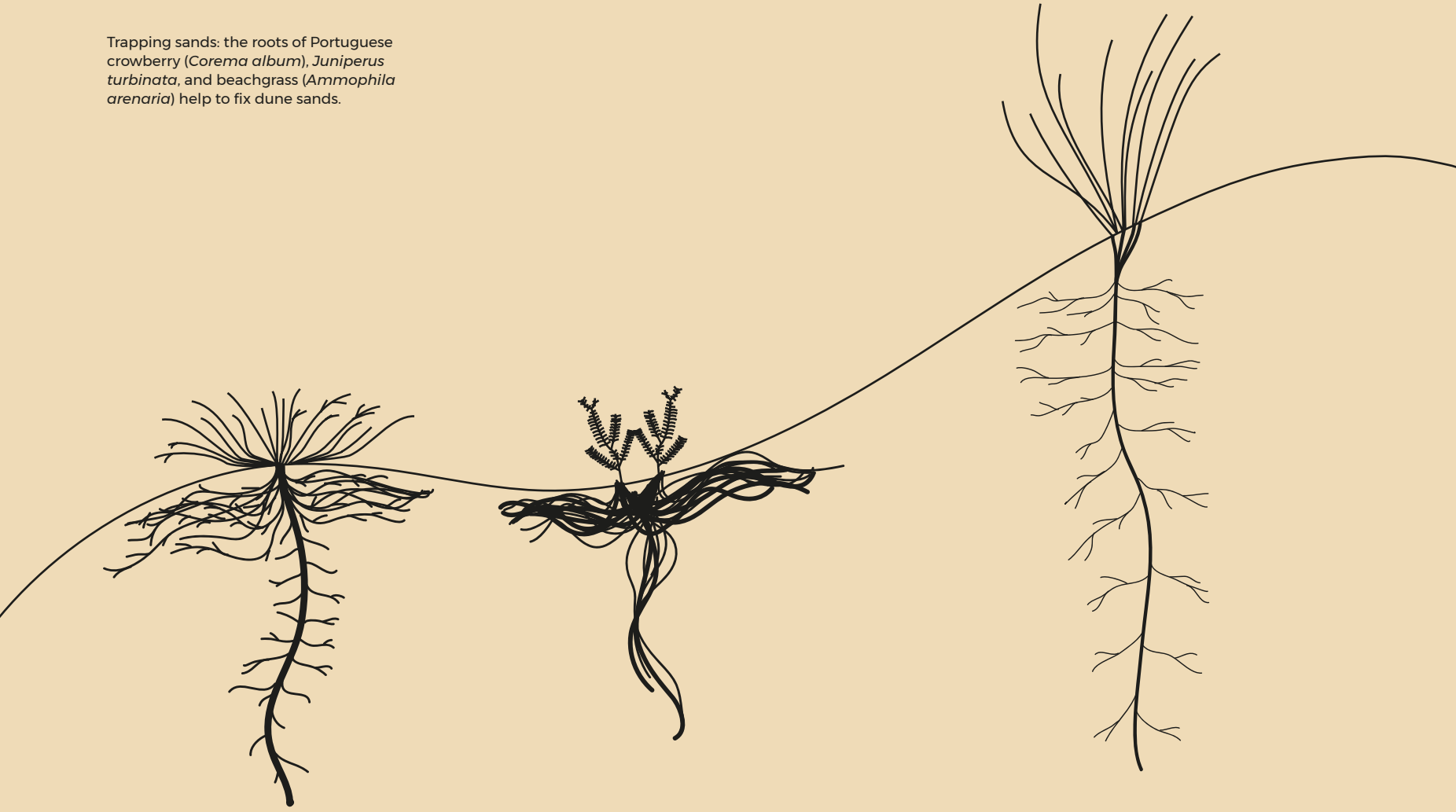
The wind, freshwater scarcity, poor soil and high salinity make this a hostile environment where only a few species thrive. Sand couch-grass tolerates submersion in sea water and may grow elsewhere if carried away by ocean currents. The roots of beachgrass form intricate networks that trap the sand, granting stability to coastal dunes.

Compaction of coastal dunes prevents new vegetation from taking root, and plants are the basic pillars of this ecosystem as they hold the dune together. Hence the elevated walkways, allowing people to walk over the dunes without compacting sand.

"Beyond the dunes the beach stretches along the whole lenght of the coast, its size limited only by the reacho of the eye. And, from north to south, along its sands, run three dark, thick lines of algae, whelks and shells mixed with sea urchins; pieces of cork and pieces of wood which are the remains of buoys and boats. (...)"

Sophia de Mello Breyner Andresen

Trapping sands: the roots of Portuguese crowberry (*Corema album*), *Juniperus turbinata*, and beachgrass (*Ammophila arenaria*) help to fix dune sands.



(Juniperus turbinata)
Juniperus turbinata

Originally from the Mediterranean region, Juniperus turbinata occurs along the southern Portuguese Atlantic coast, in shrublands, dunes, on coastal cliffs, and occasionally, in open pine forests. It tolerates heat and drought but also cold, appearing at higher altitudes. Its seeds are dispersed by animals. A slow grower, it may live up to 500 years.

Conservation:
Global | Near threatened

NE DD LC **NT** VU EN CE EW EX

Portuguese crowberry
Corema album

The Portuguese crowberry occurs in consolidated coastal dunes of the Atlantic coast of the Iberian Peninsula. Some plants are female, and others are male. Particularly common in secondary dunes and dune valleys, this bush grows on mobile sands and sands on rocky cliffs. In Portugal, its white berries are much appreciated due to their high sugar levels. Germination depends on seeds passing through digestive tracts of animals, contributing to their dispersion.

Conservation:
Global | Not evaluated | Endemic to the IP

NE DD LC NT VU EN CE EW EX

Beachgrass
Ammophila arenaria

Beachgrass occurs in dunes and coastal sands, from north to south of mainland Portugal. This plant takes on new roots as it becomes buried, forming a network that traps the sand and thus contributes to sand dune fixation. This plant is extraordinarily tolerant to drought, salinity, wind, and sand mobility.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

The chameleon occurs in the Algarve, in dunes with some vegetation and in coastal pine forests.

Common chameleon
Chamaeleo chamaeleon

This exotic species was introduced into Portugal, occurring on the coast of the Algarve in pine forests, dunes with vegetation and traditional orchards (with carob, fig and almond trees). Diurnal, chameleons live in trees, feeding on flying insects, such as grasshoppers, butterflies, and flies. They brumate (a lethargic state, similar to hibernate) in the winter, burying themselves in the ground, which is also where females lay their eggs.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Many secies take shelter
on rocky cliffs.

High-rise condominiums

Rocky coastal cliffs are highrise condominiums inhabited by several species. Depending on the type of rock, these condos may have varying numbers of stories.

Rocks formed from sediments, such as limestone, are less resistant to erosion. These slopes become less steep with time, forming terraces colonized by vegetation. Plants attract insects — which in turn attract their predators, such as the Jewelled lizard.

Harder rocks, such as granite, resist erosion retaining steeper coastal slopes that are inhospitable for plants, which appear mainly on the top. Such cliffs are difficult to reach by land or sea and shelter sea birds, which often form colonies, such as the Cory's shearwater.

Depending on the type of rock, coastal condos can have varying numbers of stories: this variety attracting different tenants.

Meet the cliff tenants.

"(...) |If| the sprawling curve of the cliffs (...) brought us what was swept away by the sea: shavings of polished granite on the sand and a strong scent of algae and tides (...)"

José Manuel Lopes

Tide pools

As the tide recedes, tide pools fill with seawater and sea life that gets trapped, such as, mussels, urchins, anemones, seaweed, and small fish.

At low tide, these species endure hours exposed to the sun, low oxygen, increasing water temperature, and predators such as wading birds. At high tide, the pool's inhabitants are bathed in fresh seawater, but have to withstand waves and foraging fish.

In southwestern Portugal the white stork (*Ciconia ciconia*) nests on cliffs, which is a unique behavior.

An European shag (*Phalacrocorax aristotelis*) resting on Mediterranean salatwort (*Salsola vermiculata*), a plant that tolerates high levels of organic matter, occurring on guano-rich cliffs.

An apparent tranquillity: tide pools are actually very demanding habitats, requiring specific adaptations from their residents.

White stork
Ciconia ciconia

This long-distance migratory bird, winters in Africa. But in Portugal a growing number of birds have stopped migrating. The white stork occurs throughout mainland Portugal, except in the Serra da Estrela. When breeding, white storks predominate in the Alentejo, where they use tall trees, towers, chimneys, and high-voltage transmission towers to build nests, returning to the same nest the following year. White storks also nest on coastal cliffs and islets on the Portuguese southwestern coast, a unique behaviour. Associated with freshwater habitats, pastures and meadows, this stork feeds mainly on insects and rats in dry years and, in wetter years, on aquatic animals, including amphibians. They also prey on the red crayfish, *Procambarus clarkii*, an invasive exotic species, introduced in the 70's.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Mediterranean salatwort
Salsola vermiculata

This plant is native to arid and semi-arid regions of the Middle East, North Africa, and southern Europe, where it is used as fodder for livestock. It tolerates salt and soils rich in organic matter, occurring on guano-rich cliffs. It is also common in areas subject to human disturbance on the southern coast and central Portugal. In California (USA) this plant is a weed and behaves like an invasive species.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

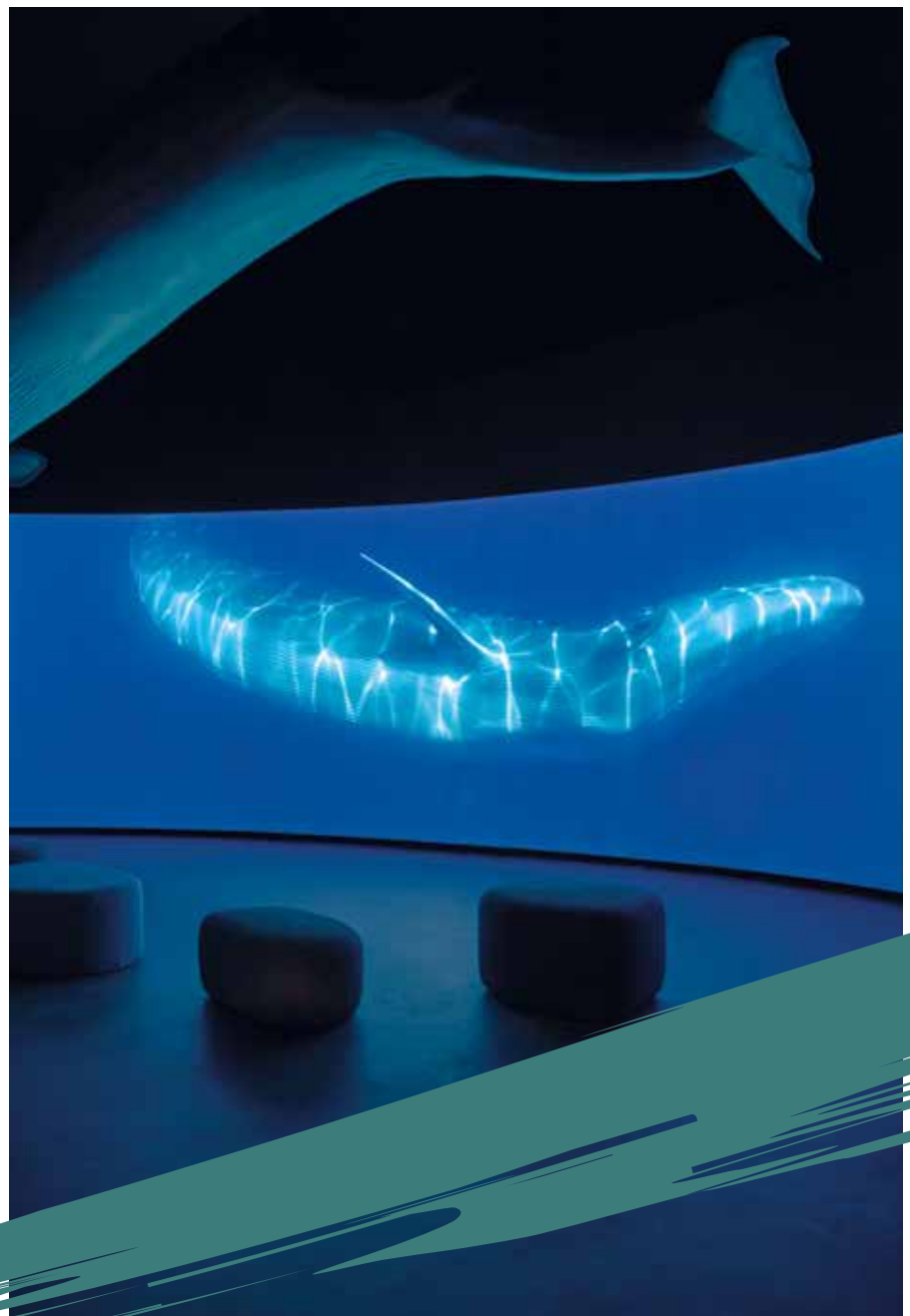
European shag
Phalacrocorax aristotelis

The subspecies *Phalacrocorax aristotelis aristotelis* occurs between Norway and continental Portugal. The species is resident in Portugal, occurring from the Berlengas islands to the south. The Berlengas islands are the most important breeding sites in Portugal. It nests on islands and coastal areas, preferring rugged cliffs. It preys on fish by diving and catching them at or near the sea bottom. The species breeds in colonies and shows high nesting site fidelity.

Conservation:
PT | Vulnerable

NE DD LC NT **VU** EN CE EW EX

The largest animal on Earth.



Dive in!

Viewed from space the Earth is blue.

Oceans cover more than 70 percent of our planet's surface. They form one continuous body of saltwater that helps maintain the Earth's climate. Circulating water around the globe, oceans contribute to the regulation of temperature, keeping coastal areas from getting too hot or too cold.

Coastal habitats represent only 7 percent of the total ocean area, but most ocean life is found there. Most open ocean habitats are found at depth.

Oceans contain the greatest diversity of life on Earth.

Microscopic algae produce about half of the oxygen that humans and other creatures breathe. Larger algae, such as kelp, provide food and shelter for marine animals.

About one million species of animals live in our oceans, including both the largest, and some of the smallest animals on Earth...

More than eighty percent of our oceans remain unmapped and unexplored. To discover a tiny bit of what we do know, dive in!

"And the sea suddenly appeared in his imagination as fantastic and beautiful thing that attracted him irresistibly. Then, a great desire to see the sea sprung up in him (...)"

José Dias Sancho

Long distance call

Whales and dolphins are social animals and acoustic signals play a large role in their social lives. Acoustic signals are important in maintaining group cohesion, coordinating hunting groups, and to select mates, among other functions.

Vision underwater is limited. Sound waves travel through water at a speed of about 1.5 km/sec: 4.5 times faster than through air. Marine mammals use sound adapted to travel different distances, from tens of kilometres to communicate across ocean basins, to tens of meters, to locate prey.

Portuguese researchers use ocean-bottom seismometers (OBS), placed south of Portuguese mainland and in the Azores to hear, record and study whale and dolphin acoustics. Sound frequencies used vary. To make low frequency signals audible to humans, researchers accelerate these recordings.

In the North Atlantic, the two most heard fin whale (*Balaenoptera physalus*) calls are the "20-Hz note", and the "backbeat", a frequency between 18 and 20 Hz. These signals are produced seasonally, its peak coinciding with the breeding season. For this reason these calls are thought to be produced by males to attract females to breeding areas. These calls are produced in sequences that may last for hours. The repeatitiveness, low frequency, and intensity of the 20-Hz note adapt this signal to long-distance communication.

Studies of acoustic signals produced by the Sei whale (*Balaenoptera borealis*) are both scarce and recent. The "downsweep" is a signal of decreasing frequencies between 80 and 30 Hz. It is a very common call, thought to be a contact signal between whales.

The most common blue whale (*Balaenoptera musculus*) calls are composed of two units: a relatively constant frequency between 15 and 18 Hz; and another between 17 and 13 Hz. Usually produced in sequence, these signals are adapted to long-distance communication, and are probably produced by males to attract females.

Killer whales (*Orcinus orca*) produce sounds to communicate and use echolocation to navigate (like bats). In groups of herring-eating killer whales two sounds may usually be distinguished. Echolocation clicks, used to detect the prey, and pulsed calls, which seem to be used in group recognition, and to coordinate hunting behaviour. In Iceland, herring-eating killer whales also produce a unique low frequency sound which is thought to be used to disturb the prey.

Underwater chats.

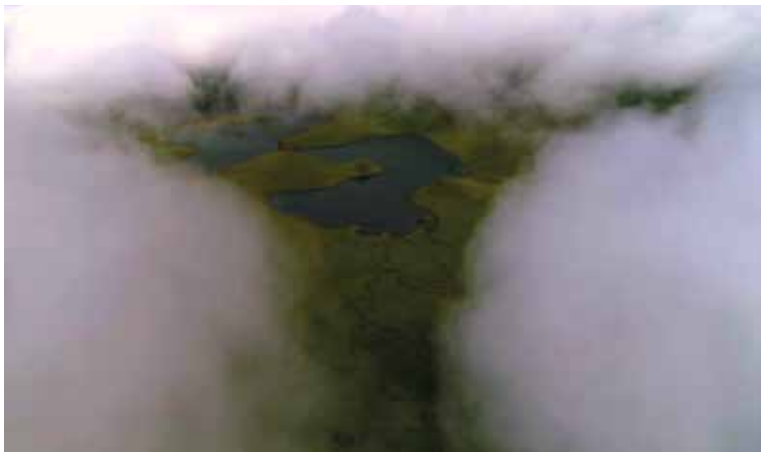
A whale and a microscopic algae.

Fin whale
(*Balaenoptera physalus*)

Sei whale
(*Balaenoptera borealis*)

Blue whale
(*Balaenoptera musculus*)

Killer whale
(*Orcinus orca*)



Corvo Island – Caldeira,
Azores

Desertas Islands – Deserta Grande,
Madeira

Santa Maria Island – São Lourenço,
Azores

Madeira Island – Pico do Areeiro,
Madeira

Flores Island - Lagoa das Patas,
Azores

Porto Santo Island – Porto das Salemas,
Madeira

Islands: species factories

Islands are “species factories” because they are isolated by a powerful barrier: the ocean. This isolation facilitates the origin of new species as it reduces the number of individuals arriving from the nearest landmass.

Individuals of a species are not alike, noted the great English naturalist, Charles Darwin (1809-1882). This variability is important: the characteristics of a living being may be advantageous in a given environment, but not in another. Different properties afford larger or smaller probabilities of survival and reproduction.

Darwin was mainly interested in heritable characteristics, those that are passed from parents to offspring — it is in these characteristics that the key to speciation resides. Over time, the number of individuals adapted to the island environment increases. Differences accumulate in comparison with the ancestral population... Eventually a new species is formed.

The observation of Galapagos biodiversity was essential to Darwin's answer to the question of the origin of species. Although not the Galápagos, the archipelagos of Madeira and the Azores, have “manufactured” many species of their own.

The volcanic green of the Azores.

The lush archipelago of Madeira.

“It was one of the enchanted Islands that rose towards Heaven, like an altar of hills and woods pouring waves of songs, colours and scents over the Sea!”

Jaime Cortesão

Laurisilva forests

Laurisilva (Laurel) forests existed before dinosaurs. Found in humid and temperate regions, these subtropical forests are composed by tree species which have wide, permanent leaves. Depending on where they occur on the planet, these forests have particular characteristics.

Laurisilva forests of the Azores and Madeira are identical to that of the Canary Islands. We find *Persea indica*, *Ocotea foetens*, *Apollonias barbujana* and laurel. But also here speciation has occurred and presently two species of laurel are distinguished: *Laurus novocanariensis*, in the Canaries and Madeira; and *Laurus azorica* in the Azores.

Around 180 million years ago the Earth had only one continent, the Pangea, and Laurisilva forests covered most tropical zones. The isolation afforded by islands promotes speciation but also offered a refuge, allowing variants of these forests to persist until today.

Apollonias barbujana leaf.

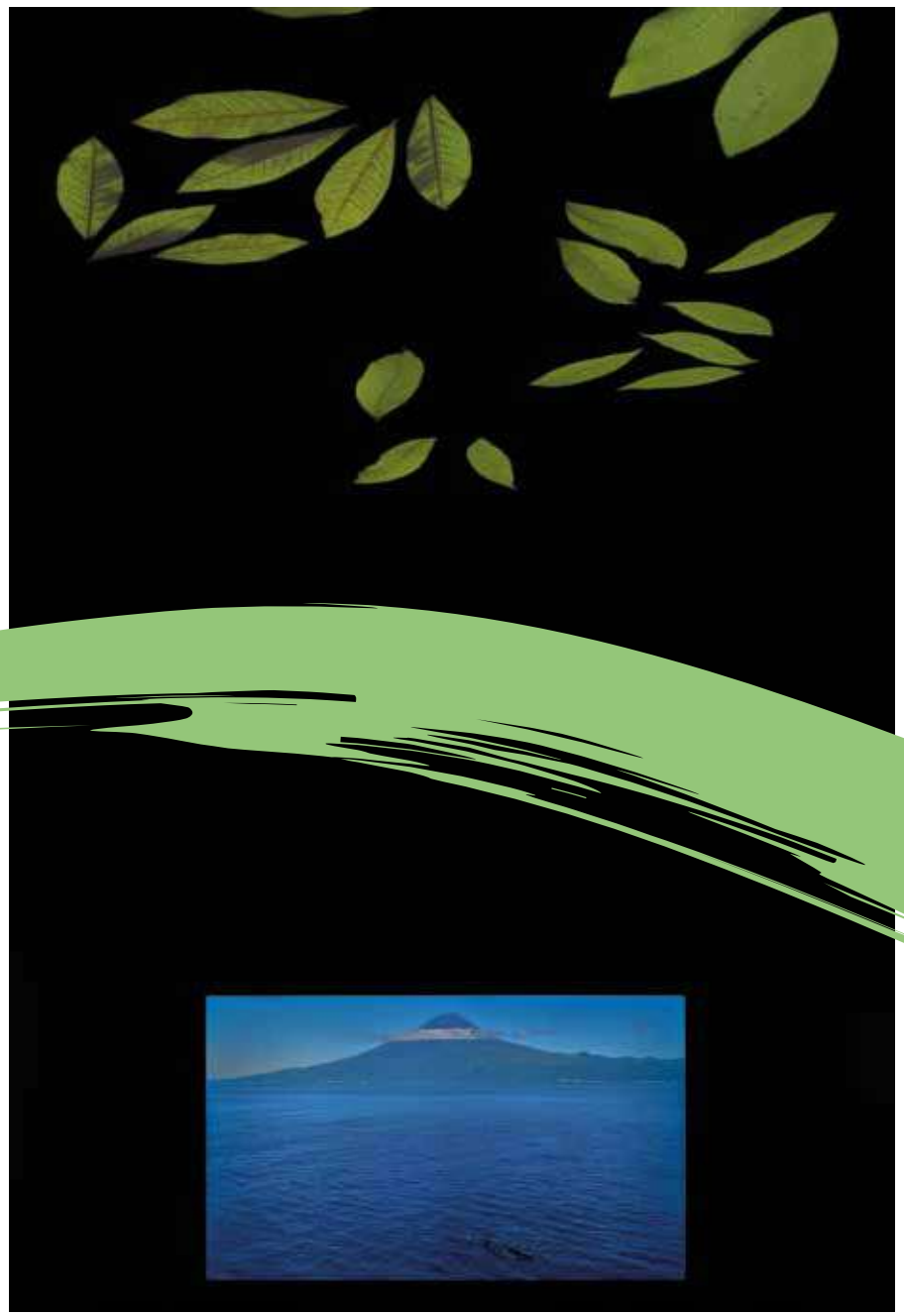
Ocotea foetens leaf.

Persea indica leaf.

Canary laurel leaf,
Laurus novocanariensis.

Azores laurel, *Laurus azorica*,
an endemic species from Azores

Under laurisilva forest foliage
with the Pico Island in the background.



(Azores Drouetius weevil)
Drouetius azoricus

Drouetius azoricus is a small, rare, herbivorous, endemic weevil of the Azores Archipelago of which four subspecies are presently recognized.
The subspecies *Drouetius azoricus azoricus* occurs on the islands of Faial, S. Jorge and Graciosa. The subspecies *Drouetius azoricus nitens* has been described on the islands of Corvo and Flores. The subspecies *Drouetius azoricus parallelirostris* appears to occur only in a small region of the Terceira Nature Park. Finally, *Drouetius azoricus separandus* has been described only in the island of São Miguel. However, this subspecies may be extinct.
The species has never been described for the island of Santa Maria, and it is difficult to establish with certainty why this is so. The species is herbivorous and feeds on different plants, but there's little native vegetation left in Santa Maria. Perhaps this is what explains this weevil's absence from the island.
Likewise, the species has never been described in Pico. Though it is difficult to establish an explanation with certainty, it may be because Pico is the youngest island of this volcanic archipelago.

Conservation:
PT | Endangered | Endemic to Azores

NE DD LC NT VU **EN** CE EW EX

Porto Santo wolf spider
Hogna schmitzi

These spiders are recognized by their orange "socks" and exist exclusively on Porto Santo Island and its islets. Little is known about their ecology. The Porto Santo wolf spider is found in rocky areas, of bushe and meadows, sometimes close to human populated areas. Active predators, this spider hunts on the ground, does not web, and feeds mostly on insects.

Conservation:
PT | Least concern | Endemic to Madeira

NE DD **LC** NT VU EN CE EW EX

Heer wolf spider
Hogna heeri

The Heer wolf spider is found on the islands of Deserta Grande and Madeira in varied habitats, such as laurisilva forest, shrubland, grassland, barren and rocky areas, and also close to human settlements. The Heer Wolf Spider is an active ground hunter feeding mainly on other arthropods.

Conservation:
PT | Least concern | Endemic to Madeira

NE DD **LC** NT VU EN CE EW EX

Desertas wolf spider
Hogna ingens

The Desertas wolf spider is restricted to the Castanheira Valley, on the Deserta Grande Island. One of the largest spiders in its family, this wolf spider may reach up to 12cm. Unlike many of their relatives, they do not use web to hunt: they forage in the soil, preying on insects and even small lizards. The Desertas Wolf spider's main threat is the introduction of an invasive plant that covers the ground, changing its habitat.

Conservation:
PT | Critically endangered | Endemic to Madeira

NE DD LC NT VU EN **CE** EW EX

Speciation processes at different stages: the complex of tarantula species in the Madeira archipelago and the ongoing speciation of *Drouetius azoricus* weevils in the Azores archipelago.

Speciation: all in due course

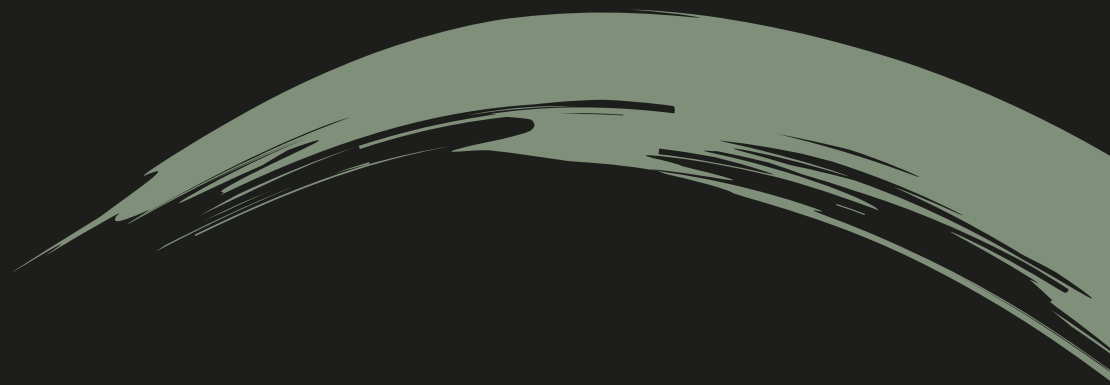
Why are Drouetius azoricus weevils not identical across the islands of Azores? Why do we find different species of wolf spiders on the three islands of Madeira?

When Charles Darwin thought about the origin of species, a crucial element he considered was heritable variability. Over generations, colonization of an island by terrestrial species from the mainland or other islands takes place with little "contribution" from the outside because the ocean is a difficult barrier to overcome.

But the origin of new species takes time: Before recognising new species, we observe distinct populations – such as the populations of the small, herbivorous *Drouetius azoricus* which is endemic to the Azores. Four different subspecies of weevils are already recognized among the islands. Weevils that are sufficiently different to be grouped into distinct populations, but not different enough to be considered different species.

The speciation process of *Drouetius azoricus* is not as advanced as that of the Madeira *Hogna* wolf spiders (nicknamed "tarantulas" for their size). Different species of wolf spiders are already recognized across the islands of the archipelago.

Darwin would have loved it.



“I walk on foot: I think faster”

Maria Gabriela Llansol

THE PROTECTED AREAS

Protected Areas in Continental Portugal

The Peneda-Gerês National Park (Parque Nacional da Peneda-Gerês) was the first Protected Area (Área Protegida) to be designated as such in Portugal, on the 8th of May 1971. Today the National Network of Protected Areas (RNAP) is a collection of natural areas classified by their importance in terms of diversity, rarity, and their scientific, ecological, social, and scenic value.

The classification of a protected area aims to afford that area the legal status of protection appropriate for the maintenance of biodiversity, ecosystem services, and geological heritage, as well as the enhancement of the landscape. Nationally classified protected areas are managed by the Institute for the Conservation of Nature and Forests (ICNF). Regional or local protected areas are managed by municipalities, and private protected areas are managed by private entities.

There are currently 48 Protected Areas in mainland Portugal, including protected maritime zones, covering an area of more than seven hundred and ninety thousand hectares. This is equal to almost 8% of the total territory of mainland Portugal.

The “Natural.PT” brand is associated with the uniqueness and the cultural and environmental value of mainland Portugal’s protected areas. The “Natural.PT” brand is an initiative for the integrated promotion of the territory, products and services existing in protected areas and their surrounds that share the values and principles of sustainability and appreciation of nature and endogenous resources.

1. Parque Nacional da Peneda-Gerês
2. Parque Natural de Montesinho
3. Parque Natural do Litoral Norte
4. Parque Natural do Alvão
5. Parque Natural do Douro Internacional
6. Parque Natural da Serra da Estrela
7. Parque Natural do Tejo Internacional
8. Parque Natural das Serras de Aire e Candeeiros
9. Parque Natural da Serra de São Mamede
10. Parque Natural de Sintra-Cascais
11. Parque Natural da Arrábida
12. Parque Natural do Sudoeste Alentejano e Costa Vicentina
13. Parque Natural do Vale do Guadiana
14. Parque Natural da Ria Formosa
15. Reserva Natural das Dunas de São Jacinto
16. Reserva Natural da Serra da Malcata
17. Reserva Natural do Paul de Arzila
18. Reserva Natural das Berlengas
19. Reserva Natural do Paul do Boquilobo
20. Reserva Natural do Estuário do Tejo
21. Reserva Natural do Estuário do Sado
22. Reserva Natural das Lagoas de Santo André e da Sancha
23. Reserva Natural do Sapal de Castro Marim e Vila Real de Santo António
24. Paisagem Protegida da Serra do Açor
25. Paisagem Protegida da Arriba Fóssil da Costa da Caparica
26. Monumento Natural do Cabo Mondego
27. Monumento Natural das Portas de Ródão
28. Monumento Natural das Pegadas de Dinossáurios de Ourém / Torres Novas
29. Monumento Natural de Carenque
30. Monumento Natural da Pedra da Mua
31. Monumento Natural dos Lagosteiros
32. Monumento Natural da Pedreira do Avelino
33. Parque Natural Regional do Vale do Tua
34. Reserva Natural Local do Estuário do Douro
35. Reserva Natural Local do Paul de Tornada
36. Paisagem Protegida Regional do Litoral de Vila do Conde e Reserva Ornitológica do Mindelo
37. Paisagem Protegida Regional Parque das Serras do Porto
38. Paisagem Protegida Regional da Serra da Gardunha
39. Paisagem Protegida da Serra de Montejunto
40. Paisagem Protegida do Corno do Bico
41. Paisagem Protegida das Lagoas de Bertiandos e São Pedro de Arcos
42. Paisagem Protegida da Albufeira do Azibo
43. Paisagem Protegida Local das Serras do Socorro e Archeira
44. Paisagem Protegida Local do Açude da Agolada
45. Paisagem Protegida Local do Açude do Monte da Barca
46. Paisagem Protegida Local da Rocha da Pena
47. Paisagem Protegida Local da Fonte Benémola
48. Área Protegida Privada Faia Brava

A stone bridge over the Laboreiro river.

Parque Nacional da Peneda-Gerês

The Peneda-Geres National Park is a mountainous region principally formed of granitic rock, where the effects of the last glaciation are visible in the zones of higher altitude. The Park extends over almost seventy thousand hectares, stretching from the Mourala to the Castro Laboreiro highlands, and includes the Peneda, Soajo, Amarela, and Gerês mountain ranges. The park's deep valleys support a dense hydrographic network that enables a wide variety of life forms and habitats.

Several rare and endemic species and some of the most important oak woods in Portugal can be found in the National Park. Also noteworthy are the presence of interesting semi-natural habitats and remarkable botanical diversity. Forests, wood lands, riparian vegetation and peatlands, in addition to moist scrublands. In the agricultural patchwork, the "prados de lima" (semi-natural humid meadows) and natural meadows stand out.

The fauna diversity within the park also includes endemic species, such as the golden-striped salamander (*Chioglossa lusitanica*), endangered species, such as the Iberian wolf (*Canis lupus signatus*) and species of limited distribution, such as the whinchat (*Saxicola rubetra*).

The Peneda-Geres National Park is the only national park in Portugal and has a rich historical and cultural heritage that includes megalithic necropolises, traces of romanization, castles, traditional corn-cob granaries, old ovens, water mills, water channels, terraces, summer residences (where populations spent their summers), winter cabins (where they endured harsh winters), thermal baths, and local traditions. In addition to all this, there are interesting mountain villages and the presence of various well-preserved nuclei of traditional architecture.

Location

Year of birth
1971

Ecosystem
Mountain

Ecosystem
Forest

Ecosystem
Fast water

Parque Natural de Montesinho

In the Terra Fria Transmontana[1], the Montesinho Nature Park (Parque Natural de Montesinho) is dominated by shale, but limestone can be found in plateau areas and granite in the Montesinho mountain range. The sober landscape is marked by smooth reliefs with rounded outcrops separated by deep river valleys.

One of the most important peculiarities of the park is the flora found on the very rare in Portugal, ultrabasic rocks[2], which give rise to very selective and toxic soils for most plants. Noteworthy are the oak and wild chestnuts, clump grasses, peat bogs, extensive covers of brushwood, heather, and rockroses, colouring the landscape, not to mention riverside vegetation, lameiros[3], and fields of rainfed crops.

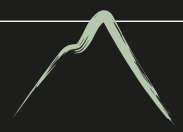
This is also one of the most important mountainous areas for fauna at both national and European levels. About 70% of terrestrial animal species found in Portugal can be found within the Park's more than seventy-four thousand hectares, with one of the most important populations of Iberian wolf and some of the best national centres of the Pyrenean desman (*Galemys pyrenaicus*). The Park has varied birdlife (avifauna), including the golden eagle (*Aquila chrysaetos*) and more than 120 breeding species. The ichthyofauna (fish species) includes the Iberian barbel, the Iberian nase, the Northern Iberian chub, and the brown trout.

The rural atmosphere is well represented by ovens, mills, community grape and olive presses and countless examples of lay architecture in housing and in the equipment associated with daily life (such as dovecotes or community forges), as well as a fountain of old traditions expressed in festive moments.

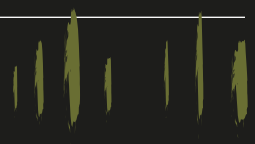
Location

Year of birth
1979

Ecosystem
Mountain



Ecosystem
Forest



Translator's notes:

[1] "Terra Fria Transmontana" means the "Cold Lands of Trás-os-Montes" and is the name given to the northeastern portion of Portugal in the Trás-os-Montes region.

[2] An "ultrabasic" rock is an igneous rock with a very low silica content and rich in minerals.

[3] "Lameiros" are semi-artificial mountain meadows.

Lameiros[3] and oaks along
the Meiral walking trail.

A winter scene of European golden plovers (*Pluvialis apricaria*) and windmills in Apúlia.

Parque Natural do Litoral Norte

The North Coast Nature Park (Parque Natural do Litoral Norte) extends from the river Neiva's estuary south to the area of Apúlia where windmills, one of the defining characteristics of this area, are an obvious visual reference. The Park contains marine habitats, beaches (sea and river), dunes, reefs, and the "horses of Fão" (rocks) off the coast of Ofir beach (associated with the legend of King Solomon). Stretching along 16 km of coastline, with a total of more than eight and a half thousand hectares, comprised of about 15% terrestrial (1,316.47 hectares) and about 85% (7,445.34) hectares of marine and/or estuarine reserves, this is the most extensive and best-preserved dune system in Northern Portugal.

The estuaries of the Cávado and Neiva rivers are home to some of the most significant habitats in the park. In addition to the central body of estuarine waters, they include intertidal areas, comprised of mud, marshes, and sandbanks. Pine woods, agricultural fields, some small hardwood forests, and reed beds also contribute to the diversity of flora and fauna. About 240 species of plants are inventoried and 140 species of birds can be observed in the terrestrial area alone. The estuarine zone is particularly important to migrating birds, for food and rest during winter.

This is an area of intense agricultural activity, namely in troughs, cultivated fields dug into the sand next to dunes, close to the water table and ensuring the availability of water throughout the year. As they are excavated, they also provide protection from the winds. This coast is one of the traditional places for gathering sargaço[1].

Location

Year of birth
2005

Ecosystem
Sandy coast

Ecosystem
Marine

[1] **Translator's note:**
"Sargaço" is seaweed of the genus *Sargassum* harvested collected as fertilizer in agriculture.

Parque Natural do Alvão

The Alvão Nature Park (Parque Natural do Alvão) is predominately a granite zone with some schist, and numerous rocky outcrops. The steep water courses are highlighted by the Olo river which is associated with the famous waterfall of Fisgas do Ermelo.

Rare plants occur here, such as the round-leaved sundew (*Drosera rotundifolia*), a carnivorous species that grows on poor and sodden land and on the banks of watercourses, enriching the local flora. Tree cover in the park, of just over seven thousand hectares, is varied with oak trees in the highest areas, and mixed hardwood forests that alternate with non-native species. It should also be noted that there is a vast area of scrub or shrubland. In the proximity of water courses, the birch stands out. The agricultural areas include fields of rye (high altitude cereal), corn and potato, marshes where maronesa[1] cattle is reared, and commons, where goats are grazed.

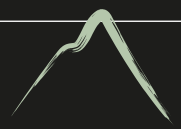
The fauna, typical of the mountain ranges of the northern interior, includes the Iberian wolf and an interesting array of amphibians and reptiles, including the gold-striped salamander (*Chioglossa lusitânica*) and water snakes (*Natrix maura* and *Natrix natrix*). Also, deserving mention is the alcon blue butterfly (*Phengaris alcon*) that inhabits wet peat bogs and wetlands with the marsh gentian (*Gentiana pneumonanthe)* and ants (*Myrmica* spp), depending on both to complete its lifecycle.

The type of settlement and rural architecture, such as can be found in the villages of Lamas de Olo, Ermelo and Barreiro are characteristic of the Trás-os-Montes region.

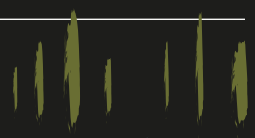
Location

Year of birth
1983

Ecosystem
Mountain



Ecosystem
Forest



Ecosystem
Fast water

[1] **Translator's note:**
Maronesa cattle ("gado maronês") is a breed of cattle from the region of Serra do Marão.

The small village of Arnal
in the Alvão mountain range.

The Douro river canyon
viewed from Miranda do Douro.

Parque Natural do Douro Internacional

The section of the Douro River that forms the border and separates Portugal from Spain has deep valleys and steep banks. The Douro International Nature Park (Parque Natural do Douro Internacional) covers an extensive area adjacent to the river, with vegetation being dominated by the evergreen oak (*Quercus rotundifolia*, colloquially known as "Executioner"[1]), interspersed with woods of cade juniper (*Juniperus oxycedrus*) and cork oak (*Quercus suber*), and patches of Pyrenean oak (*Q. pyrenaica*).

An important habitat for cliff-nesting birds namely, large birds, such as the Egyptian vulture (*Neophron percnopterus*) and the Bonelli's eagle *(Aquila fasciata*), the Douro international region is an essential area for the conservation of avifauna. In fact, birds are the most emblematic part of the fauna, due to their high diversity, and to the occurrence of endangered species, which maintain an important part of their national and Iberian nesting populations here. The Park occupies almost eighty-six thousand hectares and, the nature protection of this border area is complemented with just over one hundred and six thousand hectares of the Arribes del Duero Nature Park on the Spanish bank.

Population density of the region is low, and agriculture and livestock are the main economic activities. Traditional dovecotes, which provided fertilizer and food, accompany a landscape that takes on dramatic expression in the cliffs of the Douro. Mirandese, the second official language of Portugal, is one of the surprises that the far north eastern region has for us.

Location

Year of birth
1998

Ecosystem
Shrubland

Ecosystem
Slow water

[1] **Translator's note:**
"Carrasco" in the original portuguese text.

Parque Natural da Serra da Estrela

Due to its size and altitude, Estrela is the main mountain range in mainland Portugal. It is part of the Cordilheira Central[1]) and includes the Torre[2], which rises to the height of 1.991 metres above sea level. The Serra da Estrela has the status of a geopark attributed by UNESCO (Estrela UNESCO Global Geopark) because it is an important testimony of the last glaciation, which occurred about 30 thousand years ago, has a high geodiversity and rocks with ages up to about 600 million years old. Comprised of granite and shale, and guarding the springs of Mondego, Alva and Zêzere, Estrela is a true water tower dominating the Beiras region.

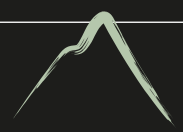
With more than eighty-nine thousand hectares, the Serra da Estrela Nature Park has a varied landscape, including lagoons and high pastures, peat bogs, oak and wild chestnuts, and areas of woodlands and commercial forestry. Vegetation is influenced by three types of climates, Mediterranean, Atlantic, and Continental, spread over three elevational zones: low; intermediate; and high. Due to their importance and diversity, small reptiles, and amphibians, with endemic species such as the Iberian rock lizard (*Iberolacerta monticola*) stand out, but the fauna also includes many mammals and birds.

Settlement is essentially peripheral, with some isolated hamlets and interesting examples of lay architecture. The mountain range gives origin to the "Estrela Mountain Dog ", the "Estrela Sheep", a breed of sheep bred for its production of milk, and the famous " Serra da Estrela cheese ".

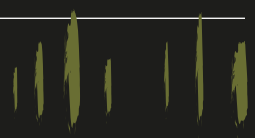
Location

Year of birth
1976

Ecosystem
Mountain



Ecosystem
Forest



Ecosystem
Fast water

Translator's notes:
[1] The "Cordilheira Central", usually translated as Iberian System or Central System, is one of the main mountain ranges of the Iberian Peninsula.
[2] The Torre, which means "Tower", is the highest point of Estrela.

The Zêzere river shaping the landscape.

Red deer thrive along
the Portuguese-Spanish border.

Parque Natural do Tejo Internacional

The International Tagus Nature Park (Parque Natural do Tejo Internacional) is an extremely important area for the conservation of several species of birds that nest on the steep banks of rivers and adjacent areas. The most important are the Iberian imperial eagle (*Aquila adalberti*), the golden eagle (*Aquila chrysaetos*), the Bonelli's eagle (*Aquila fasciata*), the cinereous vulture (*Aegypius monachus*), the Egyptian vulture (*Neophron percnopterus*), the black stork (*Ciconia nigra*) symbol of the park, the black wheatear (*Oenanthe leucura*), and the red kite (*Milvus milvus*). In the watercourses there are populations of several species of threatened and endemic fish in the Iberian Peninsula, such as the Iberian arched-mouth nase (*Iberochondrostoma lemmingii*).

Within the almost twenty-six and a half thousand hectares of the park, the geological substrate is predominantly schist and supports an interesting flora characteristic of Southern landscapes, namely cork oak and holm oak, dense olive groves, sometimes with terraces, and cereal steppes. In less fertile land, the rockrose dominates. From the point of view of vegetation, the park features typical biological communities of Mediterranean environments.

The richness of the Park's biodiversity is related to the fact that the border section of the International Tagus Nature Park, as well as the valleys and adjoining areas, are one of the most unpopulated and least frequented areas in Portugal. The steep valleys of the Tagus and Erges rivers have a wild character that gives them appreciable scenic value and, on certain slopes, outcrops, in the form of escarpments, creating rocky canyons, such as the Segura gorge.

Location

Year of birth
2000

Ecosystem
Shrubland, montado

Ecosystem
Slow water

Parque Natural das Serras de Aire e Candeeiros

The Aire and Candeeiros Mountain Ranges Nature Park (Parque Natural das Serras de Aire e Candeeiros) covers a significant part of the Extremadura Massif. With an area of almost thirty-eight and a half thousand hectares and elevations greater than 200 metres, it stands out with altitudes ranging between 100 and 200 metres in relation to surrounding areas.

The dryness, accentuated by the absence of surface waters, marks a landscape to which faults, escarpments and rocky outcrops give a vigorous and rugged appearance. Water flows through an intricate underground network. Karst erosion, in turn, creates characteristic formations, such as karst fields, limestone pavements, hollows and pit caves, and karst depressions and sink holes, in a rare profusion of forms. Often, caverns are fertile in mineral deposits, forming stalactites, stalagmites, etc.

Several species of birds are important nationally, such as the Eurasian eagle-owl (*Bubo bubo*) and the red-billed chough (*Pyrrhocorax pyrrhocorax*) that nests in cavities. More than 100 species of birds nest here and are the group of vertebrates with the largest number of individuals in the park.

Other aspects that led to the designation as a nature park are the karst morphology and the nature of the local flora, with about 600 species present, including wild orchids and endemic species from Portugal, such as the *Arabis sadina*[1], the *Narcissus calcicole*[2], and the *Silene longicilia*[3]. Additional aspects are its network of underground watercourses and specific fauna, namely, caves with important colonies of bats (honoured in the symbol of the park), including the Schreiber's bent-wing bat (*Miniopterus schreibersii*), the greater mouse-eared bat (*Myotis myotis*), the Mediterranean horseshoe bat (*Rhinolophus euryale*) and the Geoffroy's bat (*Myotis emarginatus*). The status of nature park also serves to protect part of the region from intense activity in the field of stone extraction.

Location

Year of birth
1979

Ecosystem
Limestone

Ecosystem
Shrubland

Translator's notes:
[1] *Arabis sadina* is a flowering plant in the family brassicaceae.
[2] *Narcissus calcicole* is a species of daffodil.
[3] *Silene longicilia* is a plant of the carnation family.

Through a realm of stone
and down the Canada valley.

The Marvão medieval bridge
lays on top of a quartzite ridge.

Parque Natural da Serra de São Mamede

Altitude, distinct climatic conditions, and the differentiated geological substrates of the São Mamede mountain range are akin to that of the Beira region, despite being in the Alentejo. It is a mountain massif, sometimes crowned by strange quartzite ridges that dominate a smooth and undulating landscape.

Encompassing an area of just over fifty-six thousand hectares, the São Mamede Mountains Nature Park (Parque Natural da Serra de São Mamede) contains oak plantations, wild oak forests, cork oaks and evergreen oaks, together with carpets of broom, rockrose, and gorse. This combination indicates a transitional zone between Atlantic and Mediterranean influences. This diversity of habitats corresponds to the presence of several animal species, especially birds of prey, including the Bonelli's eagle, prominent on the logo of the park, and bats. This area of the country also has the largest number of species of amphibians and reptiles in Portugal. In fact, of Portugal's 17 species of amphibians, 14 can be found here.

Numerous testimonies from the past, from the Roman ruins of Ammaia, to the lime kilns of Escusa, along with examples of martial architecture, such as those in Marvão, Castelo de Vide and Alegrete are present here. The population centres are also particularly attractive, with interesting buildings from ancient times, such as at Marvão and Castelo de Vide.

Location

Year of birth
1989

Ecosystem
Mountain

Ecosystem
Forest

Ecosystem
Montado

Ecosystem
Fast water

Parque Natural de Sintra-Cascais

The undeniable scenic value, associated with this protected area, was recognized by UNESCO by listing part of the mountains and the historic centre of Sintra on the World Heritage List with the category of "cultural landscape".

The Sintra mountain range is a small eruptive massif, known by the Romans as “the promontory of the Moon”, is situated on the ocean coast and rises up to an elevation of 528 metres at Cruz Alta. Once dominated by brush, the mountain changed its features after the introduction of diverse forestry. Today, in certain stretches, dense forest scents can be sensed in contrast with those of the vegetation of the coastal strip or the limestone platform of São João das Lampas. Exotic flora reaches greater expression in the parks of Pena and Monserrate, enveloped in the mists that give a certain mysticism to the landscape.

Encompassing almost fourteen and a half thousand hectares, the Sintra-Cascais Nature Park features escarpments, low cliffs, beaches, dunes and the Roca Cape, on an impressive seashore where there are even dinosaur tracks to be found (at Grande do Rodízio beach).

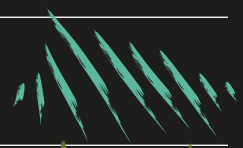
The park has areas of high interest for the conservation of flora, including several endemic species, some even having “Sintra” in its common name, such as the carnation (*Dianthus cintranus ssp. cintranus*).

In addition to numerous examples of erudite construction, such as Sintra’s Palace, with its unique chimneys, the symbol of this protected area, the park also hosts interesting examples of lay architecture in its rural areas.

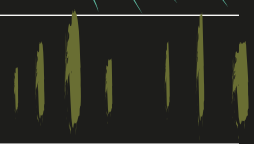
Location

Year of birth
1981

Ecosystem
Costal cliff



Ecosystem
Forest



The exotic landscape
and vegetation of Sintra.

The retrograde shoreline of Portinho
da Arrábida and the Anixa Rock.

Parque Natural da Arrábida

The Arrabida Nature Park (Parque Natural da Arrábida) is located on a small limestone massif that buttresses the sea on large escarpments suggesting a wall facing the Atlantic, etched by small coves, and hiding gaps of tiny sandy beaches. It owes its name to the Arrábida mountain range, which includes the mountains of Risco, São Luís, Gaiteiros, Louro and São Francisco. 180 million years ago, when this mountain range began to form, this area was submerged, and the current morphology evidences the violent tectonic and erosive phenomena.

Of interest among the Mediterranean flora are the dense scrubland remains of old growth forests (called “maquis”) and the less dense shrubland remains (called “garrigue”).

On the sheltered, South facing slopes, the maquis is arboreal forming the forests of Vidal, Solitário and Coberta. This area is totally protected, requiring prior authorization for access, allowed only for certain purposes. The Park covers just over seventeen and a half thousand hectares, including almost five and a half thousand hectares hectares of the Professor Luiz Saldanha Marine Park (Parque Marinho Professor Luiz Saldanha), home to more than 1400 species.

Human occupation is evidenced by prehistoric remnants, the enchanting convent of Arrábida, farmlands and examples of both lay and erudite architecture. Cheese from Azeitão, muscatel from Setúbal and honey from Arrábida are just some of the many flavours that the mountain offers. Superb views of the sea and the small picture-postcard cove of Portinho, complete a picturesque landscape of great importance.

Location

Year of birth
1976

Ecosystem
Marine

Ecosystem
Shrubland

Ecosystem
Limestone

Ecosystem
Costal cliff

Parque Natural do Sudoeste Alentejano e Costa Vicentina

The Nature Park of Southwest Alentejo and Vicentina Coast (Parque Natural do Sudoeste Alentejano e Costa Vicentina) has a great diversity of coastal habitats, including, beaches, cliffs, islets, and isolated rocks. The island of Pessegueiro, a lithified (consolidated) sand dune, is anchored close to the coast. On land, shrubland and heath alternate with irrigated and rainfed crops, and commercial forestry.

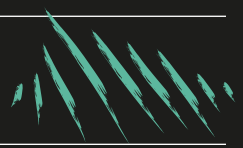
The Park encompasses just over eighty-nine and a half thousand hectares of which almost twenty-nine thousand hectares are in the marine zone. The park's flora has elements of Mediterranean (predominant), Atlantic and North African vegetation, with about 750 species, 100 of which are endemic, rare, or localised, including thyme endemic to the Southwest of Portugal, *Thymus camphoratus*, the Almograve diabelha (*Plantago almogravensis*) and the tojo-de-Sagres (*Ulex erinaceus*). The Park hosts varied nesting birds, with the white stork (*Ciconia ciconia*) building nests on the coastal rocks. The southwest coast is an important migratory corridor for many birds, especially in autumn, including the black stork, the Eurasian griffon and the cinereous vulture. As for mammals, the Eurasian otter (*Lutra lutra*) takes shelter in the nearby cliffs and ravines and, in a rare case in Europe, fishes in the sea. The seabed is diversified: the confluence of different bodies of water and the presence of deep waters contribute to high levels of biodiversity.

The constant presence of the sea and horizons as far as the eye can see, the majesty of the Cape of São Vicente, a setting of the gods, the stories of Sagres and, above all, the huge natural stone battlements facing the ocean, hiding, and revealing small beaches and attractive fishing ports, complete one of the most lonely and beautiful vistas on the Portuguese coast.

Location

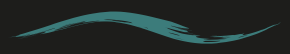
Year of birth
1988

Ecosystem
Costal cliff



Ecosystem
Shrubland

Ecosystem
Marine



The colourful and rocky southwest coast,
and the Telheiro Beach, near Sagres.

The multicultural village of Mértola
overlooking the Guadiana river.

Parque Natural do Vale do Guadiana

The Guadiana Valley Nature Park (Parque Natural do Vale do Guadiana) is located in the middle valley of what is called the "Great River of the South" of Portugal and encompasses a rolling plain where the deep river valleys and its tributaries are hidden and are often reduced to temporary stagnant ponds or dry channels in the summer season. The protected area borders the Guadiana, from the Pulo do Lobo area to the mouth of the Vascão stream. The highest point of the nature park (370 m) is located in the quarzitic elevations of the Alcaria and São Barão mountain ranges.

The Guadiana watershed is the most important in Portugal for the conservation of inland fish. With 16 native and migratory species, 10 of which are endemic to Iberia and of these, in Portugal, four exist only in this basin, such as the Iberian minnowcarp (*Anaecypris hispanica*) and the Guadian nase *(Pseudochondrostoma willkommii*).

The flora in the Park's more than sixty-nine thousand hectares is dominated by evergreen oak montado[1], with a modest presence of cork oak, and extensive areas of rock rose and rainfed crops, indicating that we are in the heart of the Alentejo. Birds of prey and an important array of passerines[2] are a highlight of the park's avifauna. The last urban colony and one of the most important at national level, of the very rare and threatened species, the Lesser kestrel (*Falco naumanni*), can be found in In Mértola.

At the top of a rocky spur, marking the end of navigability on the Guadiana river, Mértola dominates the surroundings and retains innumerable historical testimonies, such as Moorish, Roman, Medieval...

Location

Year of birth
1995

Ecosystem
Shrubland, montado, steppe

Ecosystem
Slow water

Translator's notes:
[1] "Montado" is a human managed savannah-like ecosystem that combines forestry, agriculture and grazing. The ladscapes is a mosaic of scattered cork oaks, holm oaks, or a mix of these, cereal crops, and grazing. This ecosystem was included in **Variações Naturais** and appears on page 43.
[2] "Passerines" are commonly known as perching birds or song birds.

Parque Natural da Ria Formosa

Any telegraphic description of the Ria Formosa Nature Park (Parque Natural da Ria Formosa) would be limited to two peninsulas, five islands, six ocean bars, marshland, and the smell of salty air. On one side, the sea, on the other, before the land, the broad estuarine river mouth. In the eastern Algarve between the sandy peninsulas of Ancão and Manta Rota, Ria Formosa is the most important wetland in southern Portugal. Separated from the sea by a cordon of barrier islands, the estuary is seasonally fed fresh water by small water courses.

Encompassing almost eighteen thousand hectares, the park has several habitats, such as dunes, marshes, mudflats, areas of pine forest, and agricultural areas, is an important area for birdlife, and the lagoon area functioning as a nursery for some marine fauna.

Many species of migratory waterfowl from northern Europe spend the winter here or use the estuary as a stopover on their southern migrations. The Western swamphen or the sultana bird (*Porphyrio porphyrio*), symbol of the park, the colony of little egret (*Egretta garzetta*) and the populations of white stork (*Ciconia ciconia*) are notable. The little tern (*Sternula albifrons*), in decline in Europe, nests in the dunes and salt marshes.

The estuary is the scene of multiple activities, such as bivalve aquaculture, fish farming, sea salt production, among other, and subjected to intense tourism, as it is in the heart of the touristic Algarve. Cacela-a-Velha with its 17th century fort, "Cubist" Olhão or Tavira with its hipped or scissor roofs and crossed by the Gilão river (or Séqua river), live side by side with the tourist bustle characteristic of the far south of mainland Portugal.

Location

Year of birth
1987

Ecosystem
Sandy coast

Ecosystem
Wetland

The Formosa Ria, between land and sea.

An imposing juniper
contributes to fix sands.

Reserva Natural das Dunas de São Jacinto

The Dunes de Saint Jacinto Nature Reserve (Reserva Natural das Dunas de São Jacinto) is located in the Aveiro estuary, on a narrow sandy peninsula that separates the salty waters from the brackish waters to which the Vouga River gives a sweet tone. The well-maintained dune system stretches along the Atlantic, consolidated by spontaneous vegetation, including European beachgrass (*Ammophila arenaria* ssp. *arundinacea*), sea holly (*Eryngium maritimum*) and shore bindweed (*Calystegia soldanella*). From the end of the 19th century, the dune system was confined to a forested area with maritime pine and acacia trees, to fix the sands. The nature reserve includes the National Forest of the Dunes of Saint Jacinto, where forest birds, such as several tit species, commonly occur.

Of the almost one thousand hectares of the park, just over two hundred and fifty hectares are in the maritime zone. On the ocean side, sea birds and waders can be observed during the migration season. The ponds or mudbanks support a variety of aquatic vegetation, including the broadleaf cattail, reeds, and rushes, as well as the creeping willow, having been created in the 1980's, to serve as a refuge for Anatids (aka ducks) in the estuary and as shelter for a colony of herons. Today, this waterfowl reserve is one of the areas in the country with the largest number of wintering Anatids, such as the mallard (*Anas platyrhynchos*), the common teal (*A. crecca*) and the Eurasian wigeon (*Mareca penelope*).

Running between the waters of the estuary and the beach, which faces the diverse moods of the sea, an extensive walkway allows us to discover the attractions of a slip of land that, in the past, was once the ocean.

Location

Year of birth
1979

Ecosystem
Sandy coast

Ecosystem
Marine

Reserva Natural da Serra da Malcata

The Serra Malcata Nature Reserve (Reserva Natural da Serra da Malcata) sits atop a succession of rounded schist like boulders, which stretch off into Spain through the Gata mountains, furrowed by small water ways that are hidden from view.

To the north there are remnants of oak trees and, to the south, a heavily exploited and eroded area, that was once the domain of the cork oak, is the presence of holm oak and a large area of commercial forestry. Along the banks of the rivers Bazágueda, Côa and the Meimoa, riverine forests of appreciable size consist of common alder (*Alnus glutinosa*) and narrow-leafed ash *(Fraxinus angustifolia*), occasionally interspersed with salvia-leaf willow (*Salix salviifolia*) and grey willow (*Salix atrocinerea*). In terms of forestry, the Serra Malcata National Forest, in the parish of Penamacor, stands out, with almost two thousand hectares with its principal objective and use as forestry for conservation and protection. It should also be noted that about 400 of the 657 hectares of the Serra da Nogueira National Forest, are included in the just over sixteen thousand hectares of this nature reserve.

Extensive areas of Mediterranean shrubland are home to varied fauna in which, until recently, the Iberian lynx was present. One of the most endangered mammals in Europe, the Iberian lynx is the subject of a Portuguese-Spanish conservation project aimed at establishing the wild rabbit, its preferred food, and enhancing its habitat. Reptiles such as the ladder snake (*Elaphe scalaris*) and the Montpellier snake (*Malpolon monspessulanus*) are also present. In the water courses, the Iberian emerald lizard (*Lacerta schreiberi*) and the Mediterranean turtle (*Mauremys leprosa*) are relatively frequent. An extensive array of birds, including birds of prey, such as the griffon vulture (*Gyps fulvus*), the cinereous vulture (*Aegypius monachus*), and the black stork (*Ciconia nigra*) are also present in the park.

Settlements are essentially peripheral. In this part of Portugal, the complex trails are an invitation to lose yourself in an environment that recalls the saga of the smugglers of yesteryear.

Location

Year of birth
1981

Ecosystem
Shrubland

The rounded and scrub
covered hilltops of Malcata.

The Arzila marsh, a reserve
on the lower Mondego river.

Reserva Natural do Paul de Arzila

The “Baixo (Lower) Mondego” is situated on the final section of the alluvial plain located between Coimbra and Figueira da Foz. There were times when the Mondego River wandered and the most entangled water courses were located between Pereira and Montemor-o-Velho, constituting what was once called the “wrapping encircling of Montemor-o-Velho”[1]. The Arzila marsh, on the left bank of the river, is the consequence of this situation. It receives waters from small watercourses and from springs that, due to the little slope, result in a sodden area, today partly surrounded by forested areas, and, in the past, partially cultivated.

The Arzila Marsh Nature Reserve (Reserva Natural do Paul de Arzila), encompassing nearly five hundred and eighty--seven hectares, has an interesting ground cover of hygrophilous vegetation (that is, adapted to the abundance of water), with an emphasis on the lakeshore bulrush (*Scirpus lacustris*) and the common reed (*Phragmites australis*). In fact, there are more than 300 plants here, including xerophiles (that is, adapted to dryness) and hygrophilas. In humid and shady places, one finds, somewhat unexpectedly, the common hazel (*Corylus avellana*), the English oak (*Quercus robur*), the royal fern (*Osmunda regalis*) and even the rare angular Solomon's seal (*Polygonatum odoratum*).

Having a large diversity of birdlife, with 126 species including bot resident and migratory birds, the marsh zone is an autumn passage for transarian[2] migration, for feeding and rest for several birds, shelter for nestlings and over wintering for paleartic[3] species. Mammals, such as the otter, and fish, such as the nase, in addition to various amphibians and reptiles are also present.

Location

Year of birth
1988

Ecosystem
Wetland

Translator's notes:
[1] “The “embrulhada volta de Montemor” in the original designated the meanderings of river Mondego.
[2] “Eurasian-African migration.
[3] “Eurasian or Old world species.

Reserva Natural das Berlengas

The Berlengas Nature Reserve is located northwest of Cape Carvoeiro. Three groups of islets, Berlenga Grande, Estelas, and Farilhões or Forcadas, form this archipelago, a granitic mass surrounded by islets and reefs, where only Berlenga is visitable.

Flora includes a hundred herbaceous and shrub species, some of which are endemic, such as *Armeria berlengensis*, *Herniaria berlengiana* or *Pulicaria microcephala*. It has an interesting population of reptiles, including the Berlenga wall lizard (*Podarcis carbonelli berlengensis*), and it is also important for the nesting of seabirds and a stopover point for numerous migratory birds, such as the Northern gannet (*Morus passans*).

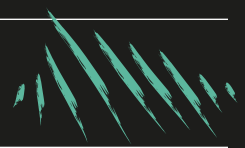
Of the just over nine thousand five hundred and forty hectares of the reserve, more than nine thousand four hundred and sixty-one hectares are marine reserve. This is the area of greatest underwater diversity on the Portuguese coast, with the frequent presence of marine mammals, including the common dolphin (*Delphinus delphis*), the common bottlenose dolphin (*Tursiops truncatus*), the orca (*Orcinus orca*) and the common minke whale (*Balaenoptera acutorostrata*), due to it being an area of confluence of fauna of diverse origins, with species specific to the coastal fringe and others originating from the high seas which, less frequently, reach the continental coast. The upward sea currents, originating in deep waters, contribute to the high productivity of the waters and to the development of aquatic fauna that includes populations with evident commercial interest, such as the conger eel (*Conger conger*), seabreams (*Pagrus* spp.), the common two-banded seabream (*Diplodus vulgaris*) and the gilt-head seabream (*Sparus aurata*). The richness of these waters in marine mammals, fish, marine plants, and other organisms led to its classification as a Marine Reserve.

The fort of São João Baptista reminds us of the historical past, while the Berlenga lighthouse indicates the island's location. The reserve registers an intermittent presence of fishermen throughout the year and a notable upturn in tourism during the summer.

Location

Year of birth
1981

Ecosystem
Costal cliff



Ecosystem
Marine

The rose coloured granite of the Belenga Grande Islet, sculpted by the sea.

Herons and spoonbills form an important colony in the Boquilobo marsh.

Reserva Natural do Paul do Boquilobo

In the humid interior and reliant on the flows of the Tagus and Almonda rivers, the Boquilobo Marsh Nature Reserve, covering just over eight hundred and seventeen hectares, is dominated by plant species associated with humid environments, such as the lakeshore bulrush, reedmaces and rushes. The largest nucleus of the *Narcissus fernandesii*, a threatened and endemic narcissus from the Iberian Peninsula, within a protected area and the second largest in the country is a highlight of the reserve.

Amongst tree strata, in temporarily flooded areas, willow trees dominate, especially the white willow (*Salix alba*), which form small islands of vegetation and even dense forests. Of the fish, the European eel (*Anguilla anguilla*) and the Iberian nase (*Pseudochondrostoma polylepis*) stand out. Amongst the amphibians, four are endemic to Iberia. Also present, are the marbled newt (*Triturus marmoratus),* the Iberian ribbed newt (*Pleurodeles waltl*), and 27 species of mammals. Due to its "endangered" conservation status, the presence of the European pond turtle (*Emys orbicularis*) should also be mentioned.

The high ornithological value of the reserve is confirmed by the presence of about 220 species of birds, having an important colony of Ardeidae including the cattle egret (*Bubulcus ibis*), the little egret (*Egretta garzetta*), the black-crowned night heron (*Nycticorax nycticorax*), the grey heron (*Ardea cinerea*), the purple heron (*Ardea purpurea*), and the squacco heron (*Ardeola ralloides*). Here, the Eurasian spoonbill (*Platalea leucorodia*) has one of its few nesting sites in Portugal. There is also a large winter population of duck species, including the Northern pintail (*Anas acuta*) and the common pochard (*Aythya ferina*).

Location

Year of birth
1981

Ecosystem
Wetland

Reserva Natural do Estuário do Tejo

The Tagus Estuary Nature Reserve (Reserva Natural do Estuário do Tejo), with almost fourteen and a half thousand hectares, is on the largest wetland of the Portuguese territory, the Tagus estuary, including estuarine waters, fluvial islands, salt lakes, agricultural land, mudflats and montado[1].

On the banks of the estuary, as the tide comes in and out, marshlands develop, a habitat characterized by a large amount of organic matter (primary productivity), rich in polychaetes[2], molluscs and crustaceans. The estuary is a nursery for several species of marine fish, such as the Dover sole (*Solea solea*) and the European seabass (*Dicentrarchus labrax*) and is also a transition zone between the marine and fluvial environments for migratory fish, such as the sea lamprey (*Petromyzon marinus*), the European river lamprey (*Lampetra fluviatilis*), the twaite shad (*Alosa fallax*), and the European eel (*Anguilla anguilla*).

However, it is water birds that gives European importance to the Tagus estuary, given that the numbers of individuals of wintering species reach about 120,000. In fact, in this protected area there are more than 10,000 wintering ducks and 50,000 wintering waders, birds that look for food in sediments, with emphasis on the symbol of the reserve, the pied avocet (*Recurvirostra avosetta*), which makes up about 25% of the wintering population. Also noteworthy is the significant presence of many other species, namely, the greater flamingo (*Phoenicopterus roseus*), the greylag goose (*Anser anser*) and the dunlin (*Calidris alpina*).

Location

Year of birth
1976

Ecosystem
Estuary

Translator's notes:
[1] "Montado" is a human managed savannah-like ecosystem that combines forestry, agriculture and grazing. The landscape is a mosaic of scattered cork oaks, holm oaks, or a mix of these, cereal crops, and grazing. This ecosystem was included in **Variações Naturais** and appears on page 43..
[2] Polychaetes are bristle worms.

Kentish plovers and dunlins
murmurate on the estuary.

Flamingo flocks paint the sky pink.

Reserva Natural do Estuário do Sado

The Sado Estuary Nature Reserve (Reserva Natural do Estuário do Sado) presents several points of contact between land and water, making the transition between the last mountains of the Extremadura region, the Arrábida mountains, and the Alentejo plains. Encompassing nearly twenty-four thousand hectares, the reserve includes a stretch of river, marshes, mud and sand banks, salt pans (mostly abandoned), beautiful beaches and coastal dunes, as well as montados[1], pine forests and farmland.

In the Troia Dunes Botanical Reserve (Reserva Botânica das Dunas de Troia), a natural dune ecosystem, endemic species of significant character occur. The only estuary--resident population of dolphins in Portugal lives here, the common bottlenose dolphin[2], the symbol of the reserve, which uses the estuary to feed and reproduce.

The estuarine zone is of undeniable ichthyological importance, as a natural "nursery" for molluscs and countless fish, 100 species having already been identified as having great biological and commercial interest, notably the famous Portuguese oyster. This estuary is still one of the three main Portuguese wetlands of importance for water birds, mainly as a nesting and wintering spot, especially for anatids and waders.

Despite the sparsely populated coast, the nature reserve holds numerous vestiges of human presence in the past, such as Roman ovens located at Herdade do Pinheiro and the Phoenician factory in Abul, to which can be added the Roman fish processing complex in the vicinity of Troia.

Location

Year of birth
1980

Ecosystem
Montado

Ecosystem
Estuary

Translator's notes:
[1] "Montado" is a human managed savannah-like ecosystem that combines forestry, agriculture and grazing. The landscape is a mosaic of scattered cork oaks, holm oaks, or a mix of these, cereal crops, and grazing. This ecosystem was included in **Variações Naturais** and appears on page 43.
[2] *Tursiops truncatus* called "roaz-corvineiro" in Portugal.

Reserva Natural das Lagoas de Santo André e da Sancha

The Lagoons of Santo André and Sancha Nature Reserve (Reserva Natural das Lagoas de Santo André e da Sancha) is located in the southernmost area of concave coastline between the mouth of the Sado and the Cape of Sines (Arco Litoral Troia-Sines). The beach is adjacent to the dune system running semi parallel to the coast, containing several coastal lagoons isolated from the sea, especially those of Santo André and Sancha.

With about 15 km of coastline, the reserve covers a strip of land (3,116.45 ha) from 2 to 3 km in width and a marine zone (2,149.06 ha), of about 1.5 km in width and of sandy substrate, rich in annelids[1] and bivalves, food for several marine fish species. Among the fish in the Santo André lagoon, the European eel (*Anguilla anguilla*) and the *Cobitis paludica*, which are rare in Portugal, are notable.

With more than 270 species, including the Red-crested pochard (*Netta rufina*), the Eurasian coot (*Fulica atra*), the Little tern (*Sternula albifrons*) and the Greater flamingo (*Phoenicopterus roseus*), birds are the most important fauna. The reserve is located along an important migratory corridor, with resting places and abundant food, and it is common to find thousands of water birds.

The flora is rich and diverse, with 510 species of plants. The vegetation includes reeds, rushes, and willows in the lagoon areas, in addition to maritime pine plantations and Atlantic scrub, including some Lusitanian endemics.

The mosaic variety of the vegetation, diverse topography, the presence of bodies of water, the proximity of the sea and even the light provide great scenic interest to the whole.

Location

Year of birth
2000

Ecosystem
Wetland

Ecosystem
Sandy coast

Ecosystem
Marine

Translator's notes:
[1] annelids are segmented worms

The Galiza willow grove species
have adapted to flooding.

Nature and culture: saltpans, birds,
and in the distance, the castle of Castro Marim.

Reserva Natural do Sapal de Castro Marim e Vila Real de Santo António

On the righthand bank of the Guadiana River, a few kilometres from its mouth, the waters spread through an extensive area of marshland, that over the centuries, has supported saltpans and pastures. The Castro Marim and Vila Real de Santo António Marsh Natural Reserve is a wetland consisting of a complex system of marsh lands, canals, bodies of brackish water, saltpans, dry lands for agricultural use, some patches of scrubland and a small area of montado[1] with cork oak. The streams (channels) of Lezíria and Carrasqueira and the salt marsh areas function as breeding habitats for various species of fish, some of which are of high economic value.

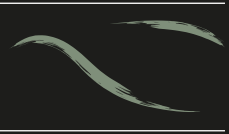
Several endangered or endemic species stand out from among the more than 460 plant species in this protected area of just over two thousand three hundred hectares. The nature reserve is also a nesting area, a migratory stopover, and a wintering place for more than 170 species of birds, predominantly aquatic birds, namely waders, those that feed on the organisms found in mud, especially the elegant and noisy black-winged stilt (*Himantopus himantopus*), chosen to symbolize this protected area.

Castro Marim, located on a fortified hillock, was probably once an island accessed via creeks, and only later became "land" due to progressive silting. Castro Marim has witnessed various historical periods, with vestiges left by the Phoenicians, Greeks, Carthaginians, Romans, and Moors, and provides an excellent scenic lookout over this end of the Algarve.

Location

Year of birth
1975

Ecosystem
Estuary



Translator's notes:
[1] "Montado" is a human managed savannah-like ecosystem that combines forestry, agriculture and grazing. The landscape is a mosaic of scattered cork oaks, holm oaks, or a mix of these, cereal crops, and grazing. This ecosystem was included in **Variações Naturais** and appears on page 43.

Paisagem Protegida da Serra do Açor

Looking to the west, from the southern end of the Estrela Mountain range, one discovers a monotonous succession of rounded hill tops that conceal valleys plunging to lower levels and steep water courses.

At a turn in the path, the Margaraça Forest (Mata da Margaraça) appears unexpectedly, a vestige of the forest that would have covered the schist slopes of the mountainous areas of central Portugal. Due to its small size and unique character, with a mix of Atlantic elements, the European oak (*Quercus robur*) and the sweet chestnut (*Castanea sativa*), and Mediterranean elements, the strawberry tree (*Arbutus unedo*), the Portuguese laurel cherry (*Prunus lusitanica*), and the bay tree (*Laurus nobilis*), sheltering rare flora species such the Veronica micrantha, endemic to Iberia, or the scented Solomon's seal (*Polygonatum odoratum*), this forest is a very vulnerable ecosystem.

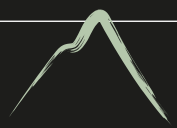
The water richness of the Protected Landscape of Serra do Açor (Paisagem Protegida da Serra do Açor), with just over three hundred and seventy hectares, is associated with numerous reptiles and amphibians, as well as an interesting array of passerines, a dozen micromammals, such as the red squirrel (*Sciurus vulgaris*), the European hedgehog (*European erinaceus*), and the greater white-toothed shrew (*Crocidura russula*), and many bats, including the Bechstein's bat (*Myotis bechsteinii*), considered “Endangered”. The Fraga da Pena, a curious geological accident, hides a waterfall flanked by leafy vegetation, a sight that never fails to amaze in the Serra do Açor.

Pardieiros, the only village within this protected area, keeps the knowledge of the artisanal manufacture of wooden spoons, while the terraces, separated by old schist walls, show the ancient agricultural use of the slopes.

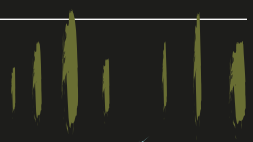
Location

Year of birth
1979

Ecosystem
Mountain



Ecosystem
Forest



Ecosystem
Fast water

The Fraga da Pena waterfall surrounded by vegetation.

From the fossil cliff, the forest, the dunes,
and the sandy beaches can be seen.

Paisagem Protegida da Arriba Fóssil da Costa da Caparica

Rising abruptly and overlooking the so called “Coast Lands”, and coloured yellow-brown or slightly reddish, the fossil cliff1 is a vestige of the previous coastline and the geological element that gives its name to the Caparica Coast Fossil Cliff Protected Landscape (Paisagem Protegida da Arriba Fóssil da Costa da Caparica), which encompasses just over fifteen hundred hectares hectares. This coastal extension of the cliff, which today no longer works as such, and is hence called a fossil, its geological characteristics, and the erosive process, which remodels it over time, give the area an undeniable scenic value. The cliff's paleontological importance is based on its abundant fossil content of fluvio-marine origin, in which bivalves, gastropods (aka snails) and traces of Miocene fish are predominant.

Next to the cliff there is a vast stretch of sand, dunes, and woods, and upon it, the Botanical Reserve of the National Forest of Medos (Reserva Botânica da Mata Nacional dos Medos). Known as “the King’s pine forest” (Pinhal do Rei), the reserve was planted by King João V to trap the sands on the cliff from advancing towards the agricultural fields. Amongst the stone pines twisted by the wind, the *Juniperus turbinata* subsp. *turbinata* draws attention due to its size.

The entire area is subject to immense stress from visitors, due to its proximity to the capital, and especially during the summer season, with its vast stretches of sand filled with bathers.

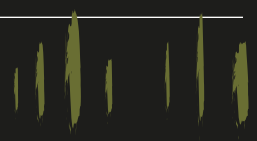
Immediately south of this protected area is the Albufeira lagoon, an important refuge for birds, with brackish water and in the dune system.

Location

Year of birth
1984

Ecosystem
Sandy coast

Ecosystem
Forest



Monumento Natural do Cabo Mondego

At the highest point of the Boa Viagem mountains, between the beaches of Murtinheira and Figueira da Foz, Cape Mondego is the only escarpment on the central Portuguese coast, a portentous crease of limestone rocks descending into the sea. The coal mines of Cape Mondego (the first in the country) operated here, and hydraulic lime was also extracted.

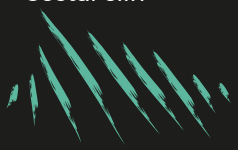
In Jurassic outcrops each layer is a record of the Earth's geological evolution in the period between 185 million years ago and 140 million years ago. In fact, Cape Mondego has highly valued in the domains of palaeontology of ammonites and transitional environments, sedimentology and paleoichnology of dinosaurs, being an international standard of reference, materialization, and representation of a specific geological time limit, recognised by the IUGS (International Union of Geological Sciences). This is still the best place in the world to understand the formation of the Atlantic Ocean.

Covering almost one hundred and eighteen hectares, of which just over sixty-one hectares are marine area, the Cape Mondego Natural Monument (Monumento Natural do Cabo Mondego) is the best and only place in the world, in which, from a stratigraphic point of view, rocks of about 170 million years of age can be observed and studied, belonging to the Middle Bajocian-Jurassic period, therefore, it was recognized as a Global Standard Stratotype Section and Point. The natural monument has a Golden Spike (Golden Nail), marking the lower limit of the geological floor called Bajocian (Epoch - Middle Jurassic, circa 170 MA), designated "Section of Murtinheira", classification attributed by the IUGS.

Location

Year of birth
2007

Ecosystem
Costal cliff



Monumento Natural das Portas de Ródão

The Ródão Gates Natural Monument (Monumento Natural das Portas de Ródão) includes the geological formation resulting from the intersection of the hard quartzite relief of the Talhadas mountains with the course of the Tagus River, located near Vila Velha de Ródão and known as Portas de Ródão (Gates of Rodão). The steep walls (170 m high) are reminiscent of two "Gates", one to the north, in the municipality of Vila Velha de Rodão, and the other in Nisa, causing an impressive narrows in the course of the Tagus River. The beginning of this narrowing of the river, caused by erosion, dates back about 2.5 million years and took place in several stages reflected in the river terraces and embedded platforms caused by erosion, visible on the right bank upstream of this natural monument.

In the area of the Monument, encompassing almost nine hundred and seventy hectares, the presence of the Western prickly juniper (*Juniperus oxycedrus* subsp. *oxycedrus*) stands out, in terms of plants, as relic species that found refuge here from the last glaciations. However, it is the birds that attract more visitors to this protected area, with the largest colony of the Eurasian griffon (*Gyps fulvus*) in the country, not to mention more than a hundred other species, such as the black stork (*Ciconia nigra*), the cinereous vulture (*Aegypius monachus*), the Bonelli's eagle (*Aquila fasciata*), the Eurasian crag martin (*Ptyonoprogne rupestris*) and the blue rock thrush (*Monticola solitarius*).

In Conhal do Arneiro you can climb one of its gigantic piles of pebbles from the great heap that is the "conhal", the result of Roman gold extraction. At the top of the "north gate", from the small castle of King Wamba, you have a vast panoramic view over the Tagus valley.

Location

Ano criação
2009

Ecosystem
Slow water

The world-renowned limestone layers of Cape Mondego.

The Tagus River narrows of the Portas de Rodão.

The footprints of imposing dinosaurs
on a limestone slab (Ourém/Torres Novas).

The tunnels located at the dinosaur
footprints site (Carenque).

Monumento Natural das Pegadas de Dinossáurios de Ourém / Torres Novas

The Ourém/Torres Novas Natural Monument of Dinosaurs Footprints (Monumento Natural das Pegadas de Dinossáurios de Ourém/Torres Novas) is located in the village of Bairro, on the eastern edge of the Aire Mountains, in the Aire and Candeeiros Mountain Ranges Nature Park (Parque Natural das Serras de Aire e Candeeiros). Occupying just over fifty--four hectares, this natural monument protects an important Trace fossil (ichnofossil) record, that is, traces of biological activity that have fossilized, from the Jurassic period. The paleontological deposit of Galinha's Quarry (Pedreira do Galinha), being one of the most important in Portugal.

During the separation of the supercontinent, Pangea, that caused the formation of the current continents, there were shallow marine extensions and a tropical, hot and humid climate prevailed. The vegetation of the time allowed the proliferation of herbivorous dinosaurs, such as the sauropods, which left footprints in the thin layers of limestone mud in shallow marine lagoons. Later, the mud dried, and was buried by limestone sediments that turned into rock. Sauropods were herbivorous dinosaurs with long necks and rounded legs.

In the limestone slab, the dinosaur footprints were preserved over 175 million years ago (in the Middle Jurassic), and 20 tracks can be observed, including one of the longest tracks (147 m long) of sauropod dinosaur footprints known to date.

Location

Year of birth
1996

Ecosystem
Limestone

Monumento Natural de Carenque

In 1986, the Pego Longo - Carenque deposit was discovered by two university students, in a disused quarry at Quinta de Santa Luzia, southwest of Belas, in the municipality of Sintra. It contains dinosaur footprints from the early Late Cretaceous (estimated age of 92 million years) and is the only deposit from this period in Portugal. Currently, the Carenque Natural Monument, of just over six hectares, is not being employed for tourism or education because after latex moulds of all the footprints were taken, the footprints were covered with earth for their protection.

There are about 200 footprints in a thin layer of limestone of 10 to 15 cm thickness, including a 132-metre-long trail, one of the largest in Europe, with subcircular footprints of 50 to 60 cm in diameter, probably from an ornithopod. An ornithopod is a bipedal herbivore, with three toes that, leaves footprints similar to those of birds and hence the name " ornith "(bird) and "pod" (foot). Other footprints are also present, probably from theropods (bipedal carnivorous dinosaurs).

Most of the main trail and the most interesting area of this monument was at risk of being destroyed by the construction of the A9 motorway or Lisbon Regional Outer Circular (CREL) but was protected thanks to the involvement of civil society. The solution found to preserve the traces, was the building of tunnels through which the CREL passes.

Location

Year of birth
1997

Ecosystem
Limestone

Monumento Natural da Pedra da Mua

On the south cliff of Lagosteiros Beach (Praia dos Lagosteiros), below the hermitage of Nossa Senhora da Memória, known as Santa Maria da Pedra da Mua until 1428, and next to the sanctuary of Sra. do Cabo, stands the Natural Monument of Pedra da Mua. Encompassing just over five hectares, this monument is perhaps the most spectacular trace fossil deposit located in the Cape Espichel area, due to its privileged location where it is situated and the excellent conservation of the impressions.

On vast limestone slabs with inclinations of 30 to 40 degrees, dating from the Upper Jurassic, there are footprints of theropods (bipedal carnivorous dinosaurs) and large and small sauropods (herbivores) that passed through the area about 145 million years ago. Parallel tracks reveal that at least 7 small sauropods and 3 large adults travelled together in a herd, an excellent example of the social behaviour of these animals.

Showing how natural and cultural heritage are intertwined, the legend of Our Lady of Pedra da Mua tells how a giant mule transported the Virgin from sea level to the top of Espichel, designating it as a sacred place, from then on. In fact, the footprints recorded in the rock are, not from a mule, but from dinosaurs that lived long before the human species appeared on the planet.

Demonstrating the importance and richness of the trace fossils of Cape Espichel, which is why it is considered a Geosite, Lagosteiros Natural Monument, also with dinosaur footprints, is situated atop of the north cliff of Lagosteiros beach. Both monuments are integrated into the Arrábida Nature Park.

Location

Year of birth
1997

Ecosystem
Limestone

Monumento Natural dos Lagosteiros

About 1.5 km north of Cape Espichel, the Lagosteiros Natural Monument (Monumento Natural dos Lagosteiros), encompassing just over seven hectares, is located atop the cliff that borders the northern side of Lagosteiros beach. In a layer of brownish-yellow limestone from the Lower Cretaceous period, footprints can be seen that attest to the passage of dinosaurs 130 to 133 million years ago.

Indeed, the Trace fossils (ichnofossils) deposit at Lagosteiros constitutes an important paleontological occurrence, exceptional in the domain of paleoichnology of dinosaurs, due to the high quality of the ichnites (fossils of biological activity), from the trails, and for their number, diversity, and distribution over the time.

The longest trail (50 m) is divided into 2 sectors, with 14 and 16 footprints, being attributed to an ornithopod (bipedal herbivorous dinosaur with legs resembling those of birds "ornith" - bird + "pod" - foot), probably an Iguanodontid. There are also footprints that appear to be juveniles, perhaps of the same species. Another trail includes the animal's tail print. The three-toed footprints of theropods (bipedal and carnivorous) should also be highlighted, one of which appears to have moved at around 14 km/h, which is quite fast.

Demonstrating the importance and richness of the trace fossils of Cape Espichel, The Pedra da Mua Natural Monument is situated on the south cliff of Lagosteiros beach. Both monuments are integrated into the Arrábida Nature Park.

Location

Year of birth
1997

Ecosystem
Limestone

Monumento Natural da Pedreira do Avelino

In Zambujal (Sesimbra) and encompassing more than one and a half hectares, the Avelino Quarry Natural Monument (Monumento Natural da Pedreira do Avelino), includes an important set of dinosaur footprints from the Upper Jurassic period around 150 million years ago. Dinosaurs would have been sauropods (quadrupedal herbivores with long tails and long necks) that travelled separately and in different directions, with forepaw prints in the shape of a half-moon and those of hind paws, oval.

Of special interest are the narrow-gauge trackways, which lack space between the inner margins of the footprints, of sauropods of the *Parabrontopodus* type and the different speeds of movement estimated between 2 and 4 km/h. The big differences in the size of the animals should also be highlighted, the largest measuring 4 m from ground to hip, with hind paw prints about 1 m in length (visible with oblique lighting) and forepaws prints of 30 cm in length, and 46 cm in width, and the smallest measuring 1.2 m from ground to hip, with hind paw prints 30 cm long by 25 cm wide, and forepaw prints 18 cm by 13 cm. There is also an incomplete trail predominantly of forepaw prints from Upper Jurassic sauropods, the first of its kind in Portugal.

The footprints were left in muds (horizontal) of a shallow coastal lagoon with calm waters, in a tropical, warm, and humid environment. Later geological processes led to the lifting and tilting of the layers with these footprints. Today, the footprints can be seen on a main slab about 15 m long and 10 m wide, with an inclination of 30 degrees, which facilitates observation and educational use.

Location

Year of birth
1997

Ecosystem
Limestone

At Cape Espichel, dinosaur footprints have given rise to legends.(Pedra da Mua).

There are dinosaur footprints next to Lagosteiros beach.

Dinosaur footprints are the object of study and curiosity (Pedreira do Avelino).

TUA®
Parque Natural Regional
do Vale do Tua

The serenely flowing Tua river.

Parque Natural Regional do Vale do Tua

The Tua Valley Regional Nature Park (Parque Natural Regional do Vale do Tua) is characterized by the presence of mountain ranges and imposing quartzite ridges, plateau areas with little undulation, and valleys with steep slopes, especially along the final stretches of the Tua and Tinhela rivers.

The Tua valley has some of the most interesting plant formations in Hot Lands of Trás-os-Montes (Terra Quente Transmontana) and in the park, which occupies more than twenty-four thousand hectares, you can see boxwood (*Buxus sempervirens*), an endangered species, woods of Montpellier maple (*Acer monspessulanum*) and cork oak woods with Portuguese oak (*Quercus faginea*). The flora is diversified, with emphasis on the endemic *Digitalis purpurea* subsp. *amandian*.

Regarding fauna, 943 species have been identified so far, of which 744 are terrestrial invertebrates, 15 are fish, 12 are amphibians, 20 are reptiles, 123 are birds and 29 are mammals, of which 14 are bats. Due to rarity and/or degree of threat, the presence of the following species are noteworthy: regarding fish, the Brook lamprey (*Lampetra planeri*), and the *Cobitis calderoni*; in the birds, the black wheatear (*Oenanthe leucura*), and the Bonelli's eagle (*Aquila fasciata*); and in mammals, the Mediterranean horseshoe bat (*Rhinolophus euryale*). Other rare or emblematic species of the region are the Pyrenean desman (*Galemys pyrenaicus*), the cabrera's vole (*Microtus cabrera*), the Eurasian otter (*Lutra lutra*), and the Eurasian eagle-owl (*Bubo bubo*).

Location

Year of birth
2013

Ecosystem
Shrubland

Ecosystem
Slow water

Reserva Natural Local do Estuário do Douro

The Douro Estuary Local Nature Reserve (Reserva Natural Local do Estuário do Douro) is located on the south bank at the mouth of this river, near the fishing village of Afurada, encompassing Cabedelo and São Paio Bay, where a marsh located.

The importance of the Reserve, which occupies more than sixty-six hectares, highlights the birds that live or pass through it, as it is a resting, feeding, and sheltering area for thousands of migratory birds connected to the estuary. More than a hundred species have been observed in this area, with the most common being seagulls, such as the Lesser black-backed gull (*Larus fuscus*), the black-headed gull (*Larus ridibundus*), and the yellow-legged gull (*Larus michahellis*), and several waders such as the common sandpiper (*Actitis hypoleucos*), the ruddy turnstone (*Arenaria interpres*), the black-tailed godwit (*Limosa limosa*), the grey plover (*Pluvialis squatarola*) and the sanderling (*Calidris alba*). In the patches of vegetation that surround the sands, diverse passeriformes (perching birds) are also present.

Sand plants include a subspecies of starthistles (*Centaurea sphaerocephala* ssp. *polyacantha*) and the Jasione maritima, endemic to mainland Portugal. As for the salt marsh, plants such as the sea purslane (*Halimione portulacoides*) resist salinity and the ebb and flow of the tides, contributing to the depollution of the estuary and its function as a fish nursery.

Location

Year of birth
2018

Ecosystem
Estuary

A view of Porto and the birds
in the Douro estuary.

A spot to get to know the birds
of the Tornada marsh.

Reserva Natural Local do Paul de Tornada

The Tornada Marsh Local Nature Reserve (Reserva Natural Local do Paul de Tornada) is divided by Vala do Meio and is limited by two drainage ditches, the Guarda-Mato and Palhagueira. The Reserve covers an area of more than fifty--three hectares, of which about 25 hectares are permanently flooded. The surrounding area is flood prone during periods of heavy rainfall.

Known in the times of Queen Leonor by the name of Cornaga or the Boa Vista do Extremo Marsh, the Tornada Marsh is a vestige of a past in which the sea penetrated deeply into the interior, through the valley of Caldas da Rainha, when the Tornada river was still navigable.

The vegetation is typical of wetlands, with yellow iris *(Iris pseudacorus*), bulrushes (*Typha* spp.), lakeshore bulrushes (*Schoenoplectus lacustris*) and white willow (*Salix alba*), making the marsh an important area for the conservation of reedbeds and the birds that inhabit them, such as the Eurasian reed warbler (*Acrocephalus scirpaceus*), the great reed warbler (*Acrocephalus arundinaceus*), and the Savi's warbler (*Locustella luscinioides*).

Here, the spotted crake (*Porzana porzana*) winters and the little bittern (*Ixobrychus minutus*), the purple heron (*Ardea purpurea*), the western swamphen (*Porphyrio porphyrio*) and the Eurasian coot (*Fulica atra*) nest. Fish such as the Achondrostoma oligolepis, mammals such as the Eurasian otter (*Lutra lutra*), symbol of the reserve, and an array of amphibians, dragonflies and damselflies can be seen in this area, a great spot for Environmental Education, especially on the importance of wetlands.

Location

Year of birth
2009

Ecosystem
Wetland

Paisagem Protegida Regional do Litoral de Vila do Conde e Reserva Ornitológica do Mindelo

The Regional Protected Landscape of the Vila do Conde Coast and the Ornithological Reserve of Mindelo (Paisagem Protegida Regional do Litoral de Vila do Conde e Reserva Ornitológica do Mindelo), covers the coastal part of the municipality of Vila do Conde, between the mouth of the Ave River, to the north, and the mouth of the Onda River, to the south. This Protected Landscape, covering almost four hundred hectares, is the only coastal area preserved between Barrinha de Esmoriz and the coast of Esposende Esposende (in the Parque Natural do Litoral Norte).

The mosaic of this habitat includes dune systems, coastal cliffs, wetlands, barren lands, and agricultural areas. There are several plants endemic to Portugal, especially the presence of *Coincya johnstonii*, endemic to the Porto metropolitan area, and the *Jasione maritima*, in the coastal dune system.

In terms of fauna, 81 species of birds have been confirmed, 57 of which have conservation status. The most relevant areas for birds are the Ave estuary and the adjacent beach and areas of salt marsh, the IC1 bridge and the original area of the Mindelo Ornithological Reserve. This protected area is also an important refuge for amphibians, with 14 of the 17 species present in Portugal being present.

Created in 1957, the Mindelo Ornithological Reserve was the first area in Portugal for the protection of birds.

Location

Year of birth
2009

Ecosystem
Sandy coast

Walk slowly and enjoy the scenery.

Nature of the Porto mountains.

Paisagem Protegida Regional Parque das Serras do Porto

The Porto Mountains Regional Protected Landscape Park (Paisagem Protegida Regional Parque das Serras do Porto) hold a strategic position in the Porto Metropolitan Area, as a refuge for biodiversity and a provider of important ecosystem services to the community. It extends over nearly six thousand hectares, in a mixed terrain that is due to the Valongo Anticline and translates into a sequence of six hills, Santa Justa, Pias, Castiçal, Santa Iria, Flores and Banjas, interspersed by the valleys of the Ferreira and Sousa rivers. It is part of the 'Valongo' Special Conservation Zone (Zona Especial de Conservação 'Valongo') of the Natura 2000 Network.

The vast catalogue unquestionably supports its wealthy heritage, highlighting its geological uniqueness, with rocks and fossils from the Palaeozoic Era, archaeological remains, especially on the largest underground gold mining complex of the Roman Empire, rural traditions and habitats and species of flora and fauna with special conservation status.

The only known populations of the Killarney fern (*Vandenboschia speciosa*) and the woolly tree fern (*Culcita macrocarpa*) occur in this territory, as well as the only place in all of Continental Europe where staghorn clubmoss (*Palhinhaea cernua*) has been observed. The species *Dryopteris guanchica*, *Succisa pinnatifida*, *Linkagrostis juressi* and the emblematic cyclamen-flowered daffodil (*Narcissus cyclamineus*) are examples of restricted distribution endemic flora. Insectivorous (carnivorous) plants are also of particular interest, such as the pale butterwort and the Portuguese sundew.

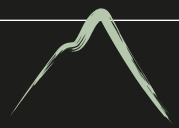
In terms of fauna, there is the gold-striped salamander (*Chioglossa lusitanica*), which finds excellent sites for its reproduction and metamorphosis in ancient Roman mines, but also, for example, the peregrine falcon, the Iberian frog, the Iberian emerald lizard, the Eurasian otter and the Nase, and of the invertebrates the stag beetle and dragonflies named *Gomphus graslinii*, *Macromia splendens* and *Oxygastra curtisii*.

This is a regionally protected landscape of markedly peri-urban nature, which combines conservation with sustainable use, and significant civic involvement.

Location

Year of birth
2017

Ecosystem
Mountain



Paisagem Protegida Regional da Serra da Gardunha

The Regional Protected Landscape of the Gardunha Mountains (Paisagem Protegida Regional da Serra da Gardunha), exhibits a high biological diversity, intricately linked to its geomorphology and lithology, consisting essentially of granites, surrounded by hornfels and metasedimentary units of complex shale-greywacke. These characteristics affect both the use of land by human populations and the occurrence of species, which translates into the existence of various endemic species, including the *Asphodelus bento-rainhae*, a plant endemic to Gardunha.

Near Castelo Velho there are five granitic outcrops of evident geological value, especially the "Polygonal Fracture blocks", the "Fractured blocks", the "Residual Blocks" and some "Tors".

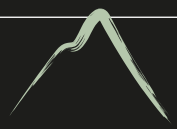
On the north side of this Protected Landscape there are chestnuts and oak groves, while on the south side there is an abundance of heather and rockroses with communities of *Echinospartum ibericum*, endemic to Iberia. Among the natural habitats, alluvial forests stand out. Here the beech marten (*Martes foina*) is popularly known as the "gardunha".

The ancient human occupation of the region is attested to by the presence of 26 archaeological sites and classified properties, within the more than ten thousand hectares of this Protected Landscape.

Location

Year of birth
2014

Ecosystem
Mountain



The Gardunha mountain range:
rocks, terraces, villages.

Near Lisbon, the Montejunto mountains dominate the west coast.

Paisagem Protegida da Serra de Montejunto

The Protected Landscape of the Montejunto Mountains (Paisagem Protegida da Serra de Montejunto) has a predominantly limestone substrate and the vegetation that covers it is, in part, constituted by plants of Mediterranean character. Adapted to the geology, microclimate of the mountains and the resulting ecological conditions, namely the lack of surface water, it is not surprising that the holm oak and the kermes oak are dominant here.

Just 1 hour from Lisbon and encompassing almost five thousand hectares, this Protected Landscape has an evident diversity of flora, especially when compared to the surrounding region. About 400 species of plants have been identified, including some orchids such as the sawfly orchid (*Ophrys tenthredinifera*) and the *Himantoglossum robertianum*. Despite the risk of fire and increasing planting of eucalyptus, there are still small forests of chestnut, pine, exotic cedar and cypress and an extensive blanket of shrubs and aromatic species, which fill the mountains with colours and aromas. Birdlife here includes the presence of 75 species of birds, of which 10 are threatened.

Human occupation here dates to the Neolithic, with many archaeological remains (necropolis caves) and fortified settlements (castros). In the 12th century, the top of the mountain was chosen for the first Dominican convent in Portugal, near the chapels of São João Batista and Senhora das Neves. In the mid-18th century, the Royal Ice Factory (Real Fábrica do Gelo) was built in Quinta da Serra, which supplied "snow" to Lisbon.

Location

Year of birth
1999

Ecosystem
Shrubland

Ecosystem
Limestone

Paisagem Protegida do Corno do Bico

In a mountainous region with soft and rounded forms, the Protected Landscape of Corno do Bico (Paisagem Protegida do Corno do Bico) culminates in Corno do Bico (883 m) at its highest point. This Protected Landscape occupies just over two thousand hectares and is characterized, especially at higher altitudes, by the presence of groups of rounded granite blocks, arranged in isolation or atop each other, which give the landscape a chaotic appearance.

The slopes, broken up by agricultural fields, walls and terraces, are home to an important patch of oak wood, the result of afforestation carried out in the 20th century. In the vegetation, the presence of woods flanking water courses (riparian), dominated by narrow-leaved ash (*Fraxinus angustifolia*) and common alder (*Alnus glutinosa*), patches of pine, and marshes, is also worth noting. There is also a peat bog, an ecosystem where the water level is at the surface, promoting vegetation adapted to flooding (hydrophilic), and the formation of peat, which develops in the absence of oxygen.

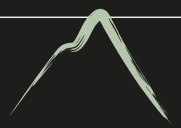
439 species of flora have been catalogued, including some endemic species such as *Bruchia vogesiaca*, a moss, and *Veronica micrantha*, a flowering plant. The fauna is varied, from mammals, such as the Iberian wolf, to numerous arrays of birds, including the European crested tit (*Lophophanes cristatus*) and the common firecrest (*Regulus ignicapillus*).

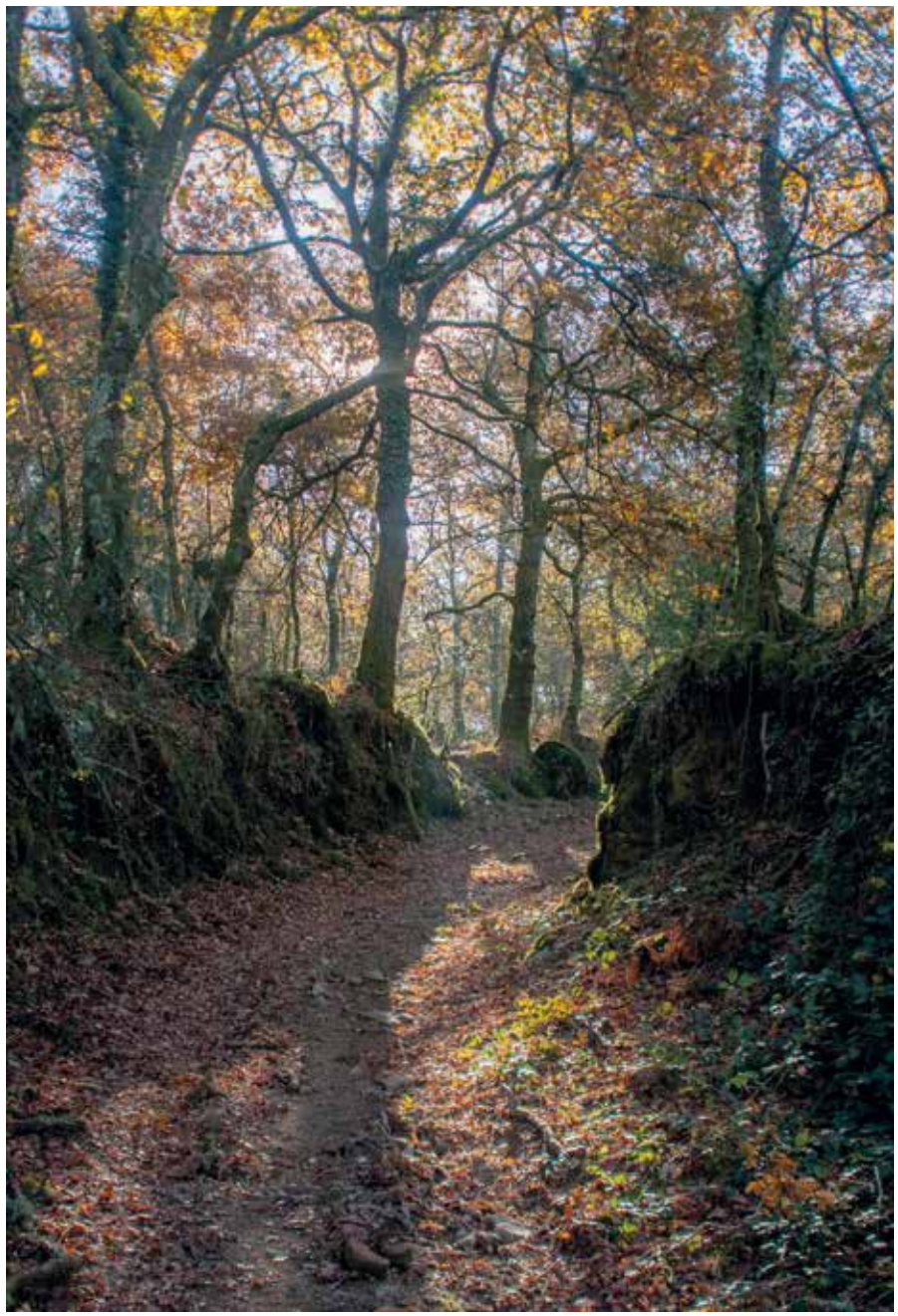
The long history of human occupation is evidenced by the existence of megalithic monuments, in Bico and São Martinho de Vascões, associated with the megalithic nucleus of Chã de Lamas, fortified villages, the castros of Cossourado and Cristelo, and Roman milestones (the markers of the Roman mile).

Location

Year of birth
1999

Ecosystem
Mountain





The freshness of an oak grove.

Natural lakeside pastures.

Paisagem Protegida das Lagoas de Bertiandos e São Pedro de Arcos

The Lakes of Bertiandos and São Pedro de Arcos Protected Landscape (Paisagem Protegida das Lagoas de Bertiandos e São Pedro de Arcos) are home to a complex of lakes (temporary and permanent). In a depression crossed by the Estorãos River (a tributary of the Lima River) and with natural pastures and rice fields in the past, the lakes of São Pedro and Mimoso and the final section of the Estorãos River are bordered by galleries of riparian (waterside) vegetation. Surrounded by natural wet pastures with partition hedges, thickets of hardwoods, and on the hills adjacent to the lakes, by pine forests, agricultural practices persist on the flood plains, and scattered olive groves are found in small areas bordered by grape vines.

The habitat mosaic of the almost three hundred and fifty hectares of this Protected Landscape includes 508 plant species, some of which are rare or threatened. It also allows for the refuge and feeding of fauna, including 9 migratory fish, such as the European eel (*Anguilla anguilla*) and the sea lamprey (*Petromyzon marinus)*, which use the Estorãos River in their larval stage and as an ecological corridor to reach spawning places upstream.

This area is also important for birds (144 species), including the common moorhen (*Gallinula chloropus*), the common kingfisher (*Alcedo athis*), the purple heron (*Ardea purpurea*) and the European nightjar (*Caprimulgus europaeus*). Invertebrates are well represented and include the orange-spotted emerald (*Oxygastra curtisii*), the southern migrant blue-eyed hawker (*Aeshna affinis*), and the southern damselfly (*Coenagrion mercurial*).

Location

Year of birth
2000

Ecosystem
Wetland

Paisagem Protegida da Albufeira do Azibo

The Azibo Reservoir Protected Landscape (Paisagem Protegida da Albufeira do Azibo) is part of the hydrographic basin of the river Sabor and is an agricultural reservoir created in the late 1970s. The vegetation is a mixture of Mediterranean and Atlantic flora, so the Portuguese oak (*Quercus faginea*) and sweet chestnut (*Castanea sativa*) coexist with olive trees, vines, cork oaks, scrub and marshes, in a mosaic enriched by the presence of spontaneous orchids. One of the best-preserved cork oak woods in Trás-os-Montes can be found here.

The large body of water and its surroundings allow the nesting and refuge of wild birds. The great crested grebe (*Podiceps cristatus*), symbol of this protected area, and whose courtship dance, a true aquatic dance, deserves to be appreciated, nests here. Several species of anatids reside here, as well as waders such as the common sandpiper (*Actitis hypoleucos*) and the little grebe (*Tachybaptus ruficollis*). Also worth mentioning, are the little ringed plover (*Charadrius dubius*) and the montagu's harrier (*Circus pygargus*).

Located two kilometres from Macedo de Cavaleiros, this Protected Landscape covers more than three thousand hectares and is partly included in the “Morais” Community Interest Site (Natura 2000). With a notorious winter and summer rigor, this region is tempered by the presence of the water, which, together with the nature and culture, the landscape, its river beaches, and the existing facilities, are obvious attractions for those visiting this zone.

Location

Year of birth
1999

Ecosystem
Slow water

The Azibo Reservoir, a refreshing oasis
and refuge for birds.

The Socorro and Archeira mountains,
the route of the French invasions.

Paisagem Protegida Local das Serras do Socorro e da Archeira

Standing above its surroundings, the Socorro and Archeira Mountains Local Protected Landscape (Paisagem Protegida Local das Serras do Socorro e Archeira) is comprised of the Socorro, Archeira, Galharda and Monte Deixo mountains.

It has fenced areas with Portuguese oak (*Quercus faginea*), and shrubland, agricultural and forest mosaics, and riparian structures in various stages of equilibrium, where orchids often occur. Highlights are the Antirrhinum linkianum, endemic to the Iberian Peninsula, the Kermes oak (*Quercus coccifera* subsp. *rivasmartinezii*) a subspecies endemic to mainland Portugal, and the Silene longicilia, endemic to the western limestone mountains.

In this area it is possible to observe fossils of marine organisms from the Late Cretaceous period and a trunk fossil from the Upper Jurassic period.

This Local Protected Landscape occupies more than one thousand hectares and has natural, historical, and cultural sites, such as mills and forts.

This area includes the Historical Route of the Lines of Torres Vedras, which belonged to the first line of the defensive system against the French invasions, and which consisted of the forts of Catefica, Feiteira and Archeira.

Location

Year of birth
2012

Ecosystem
Shrubland

Paisagem Protegida Local do Açude da Agolada

In the Ribatejo, about 2.5 km from the village of Coruche, the 266.4 hectares Agolada Dam Local Protected Landscape (Paisagem Protegida Local do Açude da Agolada) centres around a privately-owned reservoir about 1 km long.

Initially built for agricultural purposes, in this wetland, the leafy and abundant tree cover is dominated by montados[1] of Cork oak (*Quercus suber*) and Stone pine (*Pinus pinea*).

Catalogued fauna includes fish, especially the carp, *Cyprinus carpio*, reptiles, including the water snake, *Natrix maura*, and mammals such as the common genet (*Genetta genetta*), the Granada hare (*Lepus granatensis*), the serotine bat (*Eptesicus serotinus*) and the European polecat (*Mustela putorius*).

Visits require prior confirmation with the Herdade da Agolada de Baixo.

Location

Year of birth
1980

Ecosystem
Montado

Ecosystem
Wetland

Paisagem Protegida Local do Açude do Monte da Barca

In the Ribatejo region, about 9.5 kilometres from the town of Coruche, The Monte da Barca Dam Local Protected Landscape (Paisagem Protegida Local do Açude do Monte da Barca) occupies an area of almost eight hundred and seventy hectares and includes an earth dam with a reservoir about 2.5 kilometres long.

For some time now, the storage of water for agricultural irrigation has been combined with its use for recreational purposes by the local population. The potential of the reservoir and the surrounding areas contribute to this end.

A sandy soil type, associated with tree cover dominated by montados[1] of cork oak (*Quercus suber*), with patches of stone pine (*Pinus pinea*) and maritime pine (*Pinus pinaster*), give the landscape special characteristics.

Location

Year of birth
1980

Ecosystem
Montado

Ecosystem
Wetland

Translator's notes:
[1] Montado" is a human managed savannah-like ecosystem that combines forestry, agriculture and grazing. The landscape is a mosaic of scattered cork oaks, holm oaks, or a mix of these, cereal crops, and grazing. This ecosystem was included in **Variações Naturais** and appears on page 43.

The Agolada dam between montado[1] and pine.

Mirrored water in the Ribatejo (Monte da Barca).

The rocky outcrop of Rocha da Pena,
between the Barrocal and the mountains.

Paisagem Protegida Local da Rocha da Pena

The Rocha da Pena Local Protected Landscape (Paisagem Protegida Local da Rocha da Pena), encompassing just over six hundred and seventy hectares, is located within the transition zone between the Barrocal and the Algarve mountains. It is a steep mountain range of very hard limestone, about 50 m high, which has suffered slow erosion, creating cracks and caves.

The flora, with more than 500 species of plants, includes a daffodil, *Narcissus calcicola*, endemic to Portugal, and the Mediterranean dwarf palm (*Chamaerops humilis*), the only spontaneous palm in the country. Birdlife includes more than 120 species, such as the Eurasian jay (*Garrulus glandarius*), the common buzzard (*Buteo buteo*), the Bonelli's eagle (*Aquila fasciata*) and the redwing (*Turdus iliacus*). Among the mammals present, the Schreiber's bent-wing bat (*Miniopterus schreibersii*) and the lesser mouse-eared bat (*Myotis blythii*) stand out, both protected.

At the top of Rocha da Pena there are two stone walls, perhaps from the Iron Age, which were used by the Moors who took refuge there during the reconquest of Portugal by Dom Afonso III, when the castle of Salir was taken by Dom Paio Peres Correia. Due to this fact, the cave is known as Algar dos Mouros (Cave of the Moors).

The surrounding villages are also rich in heritage buildings, such as the village of Penina, with an arched portal and a chimney from 1827, some norias[1] in the Álamo valley and, on the eastern slope, two mill ruins, known as "Moinhos da Pena".

Location

Year of birth
2010

Ecosystem
Limestone

Translator's notes:
[1] A "noria" is a water wheel where a chain of buckets attached to the wheel's rim are used to raise water from the stream.

Paisagem Protegida Local da Fonte Benémola

The Fonte Benémola Local Protected Landscape (Paisagem Protegida Local da Fonte Benémola), encompassing more than four hundred hectares, is located on the border of the Algarve Barrocal and is crossed by the Menalva stream, which banks are flanked by a dense riparian gallery, consisting of arboreal species such as the narrow-leafed ash (*Fraxinus angustifolia*), willows, poplars, and the laurestine, *Viburnum tinus*. This is in clear contrast with the valley slopes covered by Mediterranean vegetation, characteristic of the Barrocal, such as rosemary (*Rosmarinus officinalis*), Spanish lavender (*Lavandula stoechas*), strawberry trees (*Arbutus unedo*), and kermes oaks (*Quercus coccifera*), as well as arboreal species such as carob (*Ceratonia siliqua*) and wild olive (*Olea europea* var. *sylvestris*).

The riverine vegetation creates a favourable habitat for several species of birds, especially the grey heron (*Ardea cinerea*), the little egret (*Egretta garzetta*), the common moorhen (*Gallinula chloropus*) and common kingfisher (*Alcedo atthis*). Along the stream, in areas with year-round water, you can see amphibians and reptiles, such as the European pond turtle (*Emys orbicularis*) and the Mediterranean pond turtle (*Mauremys leprosa*).

A water mill, water channels, norias[1] and dams are testament to the ancient and important use of water in local agriculture.

Location

Year of birth
2010

Ecosystem
Fast water

Translator's notes:
[1] A "noria" is a water wheel where a chain of buckets attached to the wheel's rim are used to raise water from the stream.

Water and coolness in the dry Algarve.

RESERVA
FAIA BRAVA

The Faias (escarpments)
and the steep valley of the Coa river,
a refuge for riparian birds.

Área Protegida Privada Faia Brava

Also known as the Faia Brava reserve, the Faia Brava Private Protected Area (Área Protegida Privada Faia Brava) is located between the Marofa mountain range and the mantle of vineyards of the Douro, in the heart of the Côa river canyon.

The deep granitic cliffs, which characterize the territory where they are located, are at the origin of the name of the reserve, "Faia", which means escarpment and are quiet and safe places for the nesting of large cliff-nesting birds. The Eurasian griffon (*Gyps fulvus*), the Egyptian vulture (*Neophron percnopterus*), the Bonelli's eagle (*Aquila fasciata*) and the golden eagle (*Aquila chrysaetos*) are among the nesting birds that make Faia Brava a place of extreme interest for nature conservation.

In 2010, this Protected Area with about two hundred and fifteen hectares, was classified as the first private protected area in Portugal and was a pilot area for European project Rewilding Europe for the creation of wild natural areas and the development of nature tourism in Europe.

Location

Ano criação
2010

Ecosystem
Shrubland

Ecosystem
Slow water

Protected areas of Madeira

The first Reserve to be created in the Autonomous Region of Madeira and at the national level was the Ilhas Selvagens (Savage Islands), in 1971. These islands constitute the southernmost Portuguese territory and are 163 nautical miles from Madeira.

In 1982 the Madeira Nature Park (Parque Natural da Madeira) was created, encompassing two thirds of the island, and covering areas with different protection statuses. Of special interest is the Laurel Forest, which has been a UNESCO designated World Heritage Site since 1999, the only one in Portugal.

The first exclusively marine reserve in Portugal, the Garajau Partial Nature Reserve (Reserva Natural Parcial do Garajau), was created in 1986, and subsequently in 1997, the Sítio da Rocha do Navio Nature Reserve (Reserva Natural do Sítio da Rocha do Navio) was created, on the north coast of Madeira.

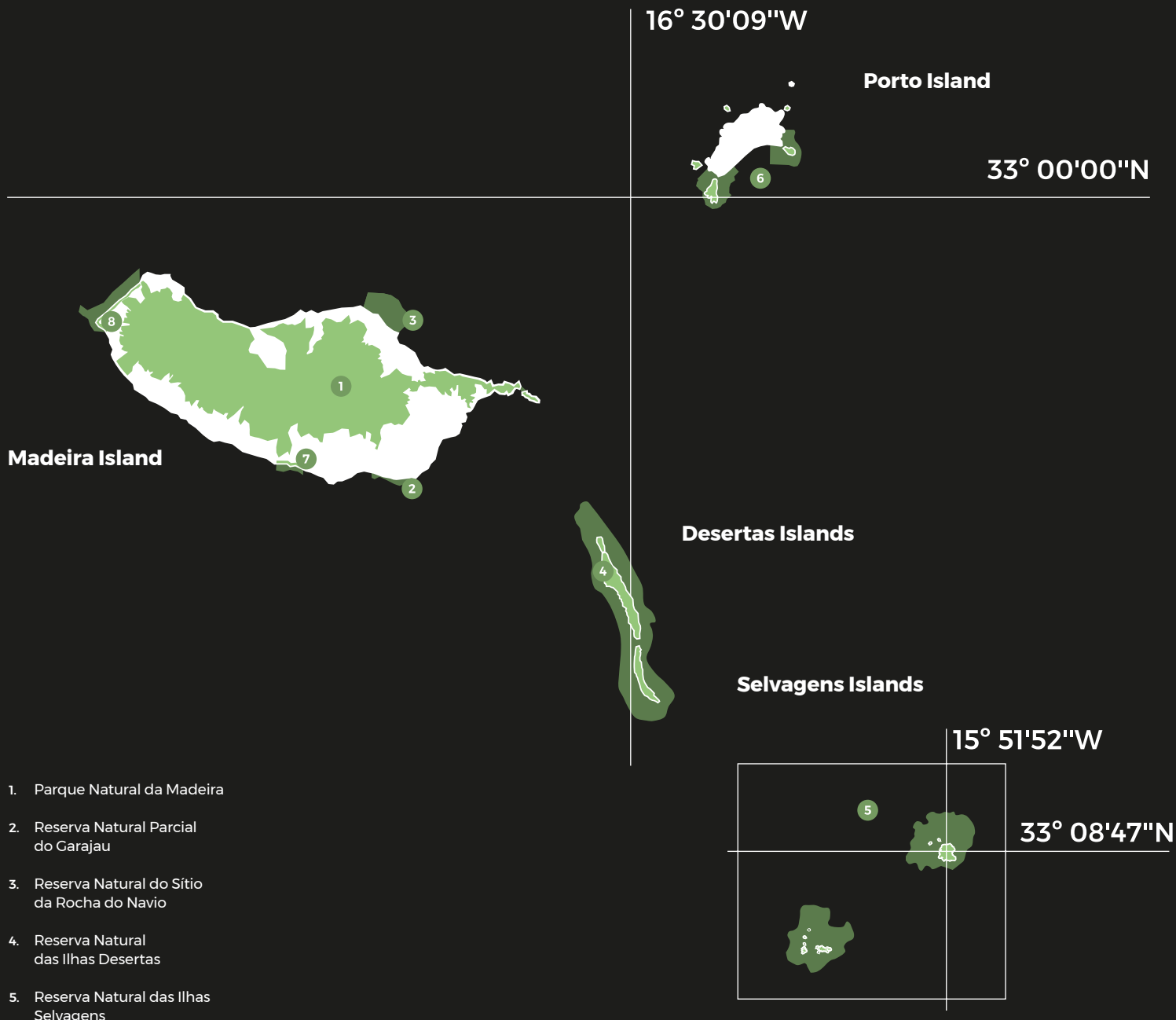
In order to safeguard the fur seal, the rarest seal in the world, the Desertas Islands were legally protected in 1990, and in 1995 became a Nature Reserve. These islands, as well as the Savage Islands, have the European Diploma for Protected Areas, unique in Portugal.

In 2008, the Porto Santo Marine Protected Areas Network (Rede de Áreas Marinhas Protegidas do Porto Santo) was created, which encompasses the six islets of Porto Santo. More recently, the Protected Areas of Cabo Girão, in 2016, and Ponta do Pargo, in 2018, were created, both consisting of Marine Parks, Natural Monuments and Protected Landscapes.

Currently, the Madeira Archipelago has 8 classified areas and 19 areas included in the Natura 2000 Network, spaces of Nature and people, with a huge diversity of habitats and a large number of unique living beings on a planetary scale!

Location

Ecosystem
Islands



1. Parque Natural da Madeira
2. Reserva Natural Parcial do Garajau
3. Reserva Natural do Sítio da Rocha do Navio
4. Reserva Natural das Ilhas Desertas
5. Reserva Natural das Ilhas Selvagens
6. Rede de Áreas Marinhas Protegidas do Porto Santo
7. Área Protegida do Cabo Girão
8. Área Protegida da Ponta do Pargo

Protected areas of Azores

On the 7th and 8th of March 1972, the first protected areas of the Azores archipelago were created, respectively the Caldeira Integral Reserve (Reserva Integral da Caldeira), on the island of Faial, and the Montanha do Pico Integral Reserve (Reserva Integral da Montanha do Pico). Two of the oldest protected areas in Portugal, they are two unique places in the world, where biodiversity and geodiversity live in harmony with human populations, and a source of pride for the Azoreans.

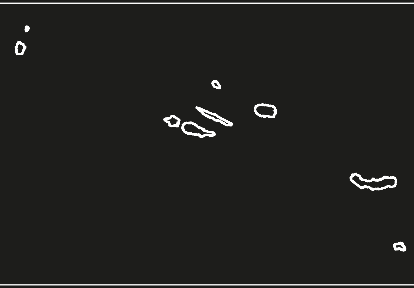
The conservation importance of Caldeira do Faial has several aspects. The Laurel Forest present in the Caldeira is similar to the one that covered the island in the period prior to settlement, and it is still possible to find the majority of the most emblematic native species of the Azores. In addition, the crater is a priority geosite of the Azores Geopark (Geoparque Açores), a UNESCO World Geopark. The recognition of its importance dates to the 1940s, and on June the 5th 1948, at an ordinary meeting of the Municipality of Horta, the Caldeira was declared a "Nature Protection Zone", prohibiting the cutting of firewood in the interior, but retaining the possibility of grazing the sheep.

It currently has several protection statutes, such as its inclusion in the Natura 2000 Network and its classification as a Wetland of International Importance (Ramsar Convention).

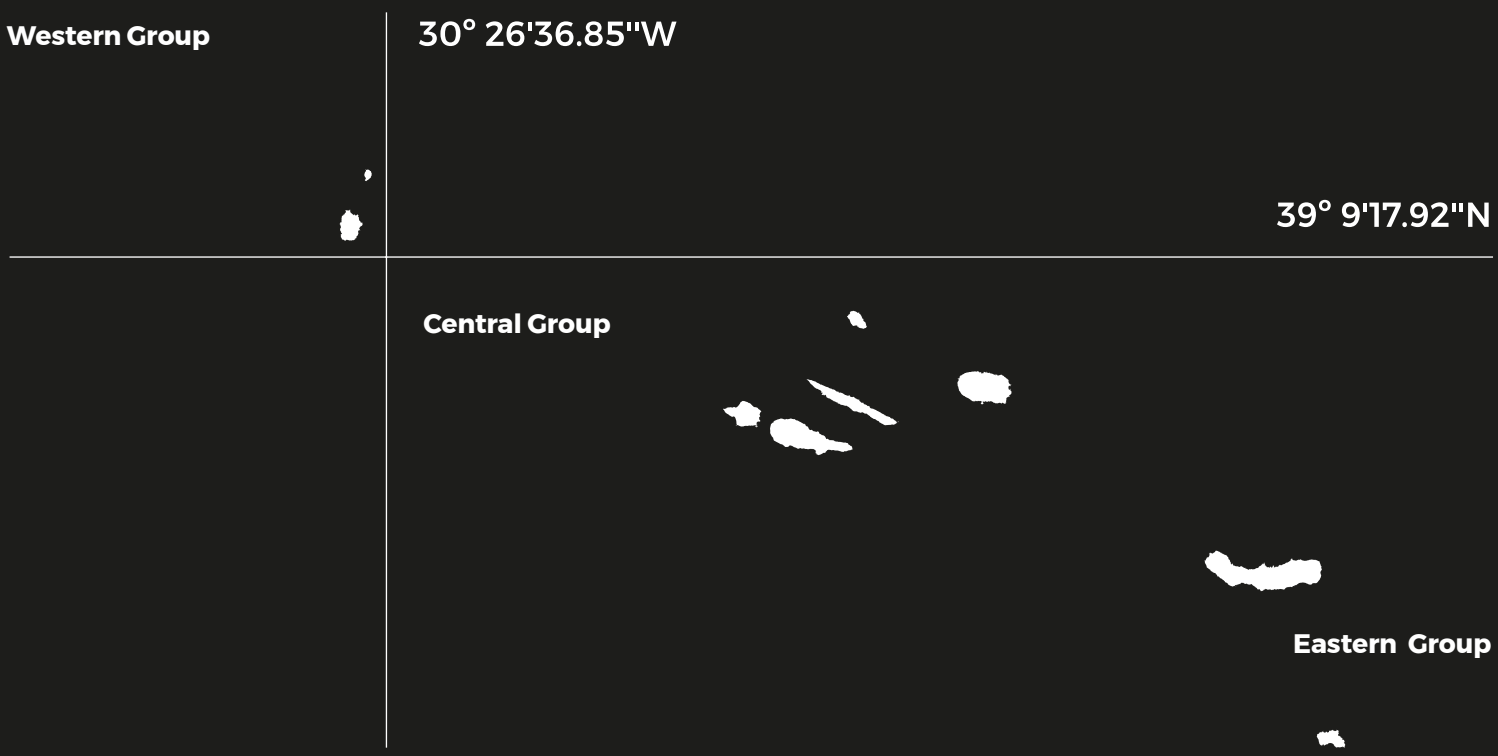
Pico Mountain is a volcanic edifice with a height of 2351 meters above sea level and about 3500 meters above the oceanic platform of the Azores. It is a stratovolcano, similar to the Fogo Volcano in Cape Verde, Mount Teide in the Canary Islands, Mount Fuji in Japan and Mount Mayon in the Philippines. The highest point in Portugal and the third largest active volcano in the Atlantic Ocean, Pico Mountain, like the Caldeira do Faial, is a priority geosite of the Azores Geopark, UNESCO World Geopark.

Currently in the Azores there are 124 protected areas, classified and reclassified according to the IUCN categories: natural reserve (complete and partial), natural monument, protected landscape area, protected area for the management of habitats and species and protected area for the management of resources (excluding the category of national park, which does not exist in the Azores).

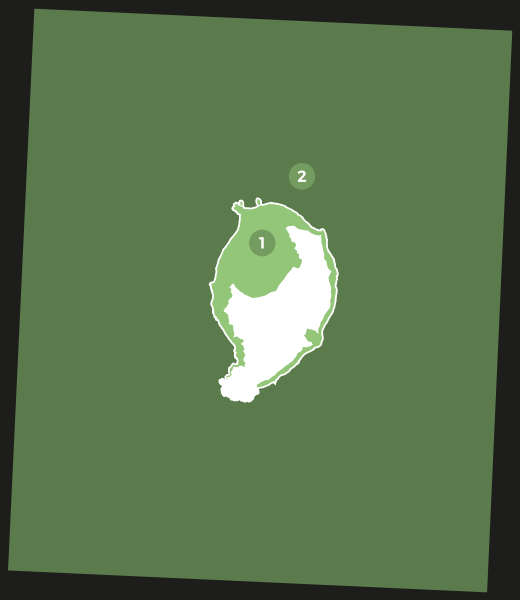
Location



Ecosystem
Islands

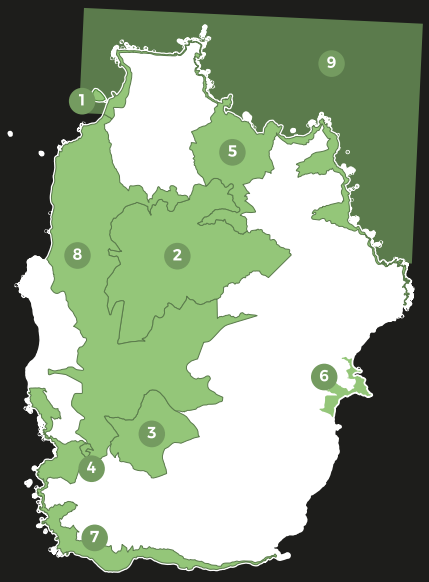

Western Group
30° 26'36.85"W
39° 9'17.92"N
Central Group
Eastern Group

Corvo Island



Western Group

Flores Island



Corvo Island Nature Park

1. Área Protegida para a Gestão de Habitats ou Espécies da Costa e Caldeirão do Corvo
2. Área Protegida de Gestão de Recursos da Costa do Corvo

Flores Island Nature Park

1. Reserva Natural do Ilhéu de Maria Vaz
2. Reserva Natural do Morro Alto e Pico da Sé
3. Reserva Natural das Caldeiras Funda e Rasa
4. Monumento Natural da Rocha dos Bordões
5. Área Protegida para a Gestão de Habitats ou Espécies da Costa Nordeste
6. Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Caveira
7. Área Protegida para a Gestão de Habitats ou Espécies da Costa Sul e Sudeoeste
8. Área de Paisagem Protegida da Zona Central e Falésias da Costa Oeste
9. Área Protegida de Gestão de Recursos da Costa Norte

Faial Nature Park

1. Reserva Natural das Caldeirinhas
2. Reserva Natural da Caldeira do Faial
3. Reserva Natural do Morro de Castelo Branco
4. Monumento Natural do Vulcão dos Capelinhos
5. Área Protegida para a Gestão de Habitats ou Espécies do Cabeço do Fogo
6. Área Protegida para a Gestão de Habitats ou Espécies dos Capelinhos, Costa Noroeste e Varadouro
7. Área Protegida para a Gestão de Habitats ou Espécies do Varadouro - Castelo Branco
8. Área Protegida para a Gestão de Habitats ou Espécies da Lomba Grande
9. Área de Paisagem Protegida do Monte da Guia
10. Área de Paisagem Protegida da Zona Central
11. Área Protegida de Gestão de Recursos do Canal Faial Pico Sector Faial
12. Área Protegida de Gestão de Recursos do Castelo Branco
13. Área Protegida de Gestão de Recursos dos Capelinhos
14. Área Protegida de Gestão de Recursos dos Cedros

Pico Island Nature Park

1. Reserva Natural da Montanha do Pico
2. Reserva Natural do Caveiro
3. Reserva Natural do Mistério da Prainha
4. Reserva Natural das Furnas de Santo António
5. Monumento Natural da Gruta das Torres
6. Área Protegida para a Gestão de Habitats ou Espécies da Lagoa do Caiado
7. Área Protegida para a Gestão de Habitats ou Espécies das Lajes do Pico
8. Área Protegida para a Gestão de Habitats ou Espécies das Furnas de Santo António
9. Área Protegida para a Gestão de Habitats ou Espécies da Silveira
10. Área Protegida para a Gestão de Habitats ou Espécies do Mistério de São João
11. Área Protegida para a Gestão de Habitats ou Espécies da Terra Alta
12. Área Protegida para a Gestão de Habitats ou Espécies das Ribeiras
13. Área Protegida para a Gestão de Habitats ou Espécies da Zona do Morro
14. Área de Paisagem Protegida da Cultura da Vinha - Ponta da Ilha
15. Área de Paisagem Protegida da Cultura da Vinha - Ponta do Mistério
16. Área de Paisagem Protegida da Cultura da Vinha - Zona Norte
17. Área de Paisagem Protegida da Cultura da Vinha - São Mateus - São Caetano
18. Área de Paisagem Protegida da Cultura |da Vinha - Zona Oeste
19. Área de Paisagem Protegida da Zona Central
20. Área Protegida de Gestão de Recursos do Porto das Lajes
21. Área Protegida de Gestão de Recursos da Ponta da Ilha
22. Área Protegida de Gestão de Recursos dos Cedros do Canal Faial - Pico - Sector Pico

Central Group

São Jorge Island Nature Park

1. Monumento Natural da Ponta dos Rosais
2. Área Protegida para a Gestão de Habitats ou Espécies da Costa Noroeste
3. Área Protegida para a Gestão de Habitats ou Espécies da Costa Sudoeste
4. Área Protegida para a Gestão de Habitats ou Espécies da Costa das Velas
5. Área Protegida para a Gestão de Habitats ou Espécies do Pico da Esperança e Planalto Central
6. Área Protegida para a Gestão de Habitats ou Espécies da Fajã das Almas
7. Área Protegida para a Gestão de Habitats ou Espécies da Costa do Topo
8. Área Protegida para a Gestão de Habitats ou Espécies do Ilhéu do Topo
9. Área de Paisagem Protegida das Fajãs do Norte
10. Área Protegida de Gestão de Recursos da Costa Oeste
11. Área Protegida de Gestão de Recursos de Entre Morros
12. Área Protegida de Gestão de Recursos da Costa das Fajãs
13. Área Protegida de Gestão de Recursos do Topo

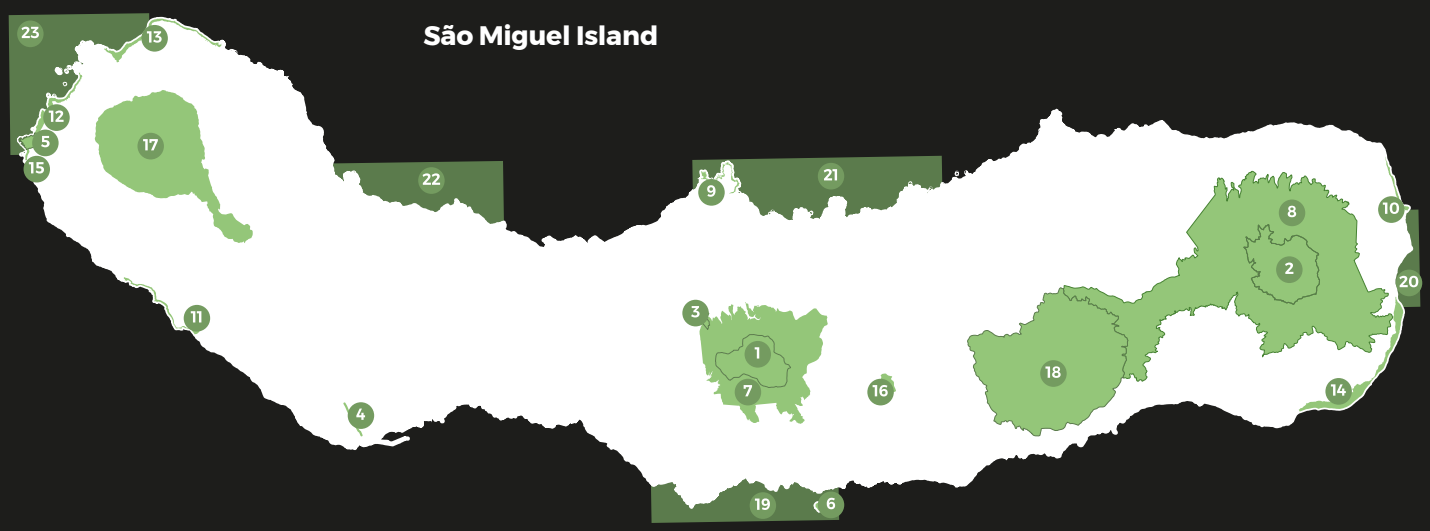
Graciosa Island Nature Park

1. Reserva Natural do Ilhéu de Baixo
2. Reserva Natural do Ilhéu da Praia
3. Monumento Natural da Caldeira da Graciosa
4. Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Restinga
5. Área Protegida para a Gestão de Habitats ou Espécies da Ponta Branca
6. Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Barca
7. Área Protegida de Gestão de Recursos da Costa Sudeste
8. Área Protegida de Gestão de Recursos da Costa Noroeste

Terceira Island Nature Park

1. Reserva Natural da Serra de Santa Barbara e dos Mistérios Negros
2. Reserva Natural do Biscoito da Ferraria e Pico Alto
3. Reserva Natural da Terra Brava e Criação das Lagoas
4. Monumento Natural do Algar do Carvão
5. Monumento Natural das Furnas do Enxofre
6. Área Protegida para a Gestão de Habitats ou Espécies da Ponta das Contendas
7. Área Protegida para a Gestão de Habitats ou Espécies dos Ilhéus das Cabras
8. Área Protegida para a Gestão de Habitats ou Espécies da Matela
9. Área Protegida para a Gestão de Habitats ou Espécies do Biscoito da Fontinha
10. Área Protegida para a Gestão de Habitats ou Espécies da Costa das Quatro Ribeiras
11. Área Protegida para a Gestão de Habitats ou Espécies do Planalto Central e Costa Noroeste

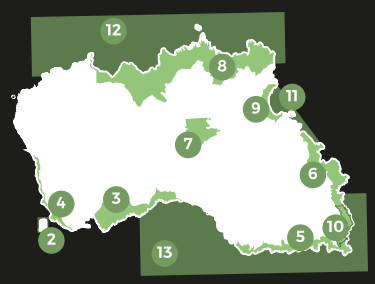
Eastern Group



São Miguel Island Nature Park

1. Reserva Natural da Lagoa do Fogo
2. Reserva Natural do Pico da Vara
3. Monumento Natural da Caldeira Velha
4. Monumento Natural da Gruta do Carvão
5. Monumento Natural do Pico das Camarinhas - Ponta da Ferraria
6. Área Protegida para a Gestão de Habitats ou Espécies do Ilhéu de Vila Franca
7. Área Protegida para a Gestão de Habitats ou Espécies da Serra de Água de Pau
8. Área Protegida para a Gestão de Habitats ou Espécies da Tronqueira e Planalto dos Graminhais
9. Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Cintrão
10. Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Arnel
11. Área Protegida para a Gestão de Habitats ou Espécies das Feteiras
12. Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Escalvado
13. Área Protegida para a Gestão de Habitats ou Espécies da Ponta da Bretanha
14. Área Protegida para a Gestão de Habitats ou Espécies do Faial da Terra
15. Área Protegida para a Gestão de Habitats ou Espécies da Ferraria
16. Área Protegida para a Gestão de Habitats ou Espécies da Lagoa do Congro
17. Área de Paisagem Protegida das Sete Cidades
18. Área de Paisagem Protegida das Furnas
19. Área Protegida de Gestão de Recursos da Caloura - Ilhéu de Vila Franca
20. Área Protegida de Gestão de Recursos da Costa Este
21. Área Protegida de Gestão de Recuros da Ponta do Cintrão - Ponta da Maia
22. Área Protegida de Gestão de Recursos do Porto das Capelas - Ponta das Calhetas
23. Área Protegida de Gestão de Recursos da Ponta da Ferraria - Ponta da Bretanha

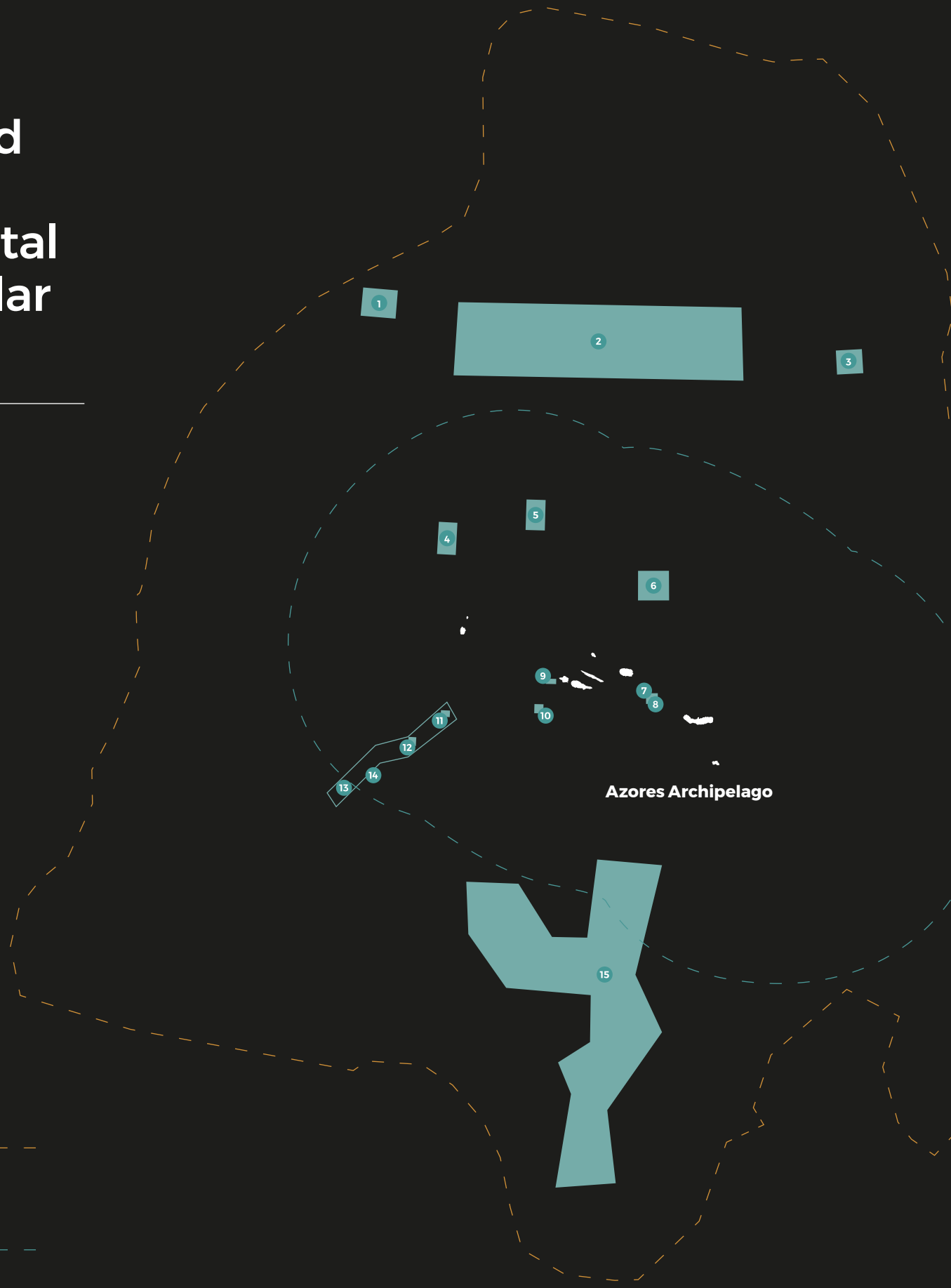
Santa Maria Island



Santa Maria Nature Park

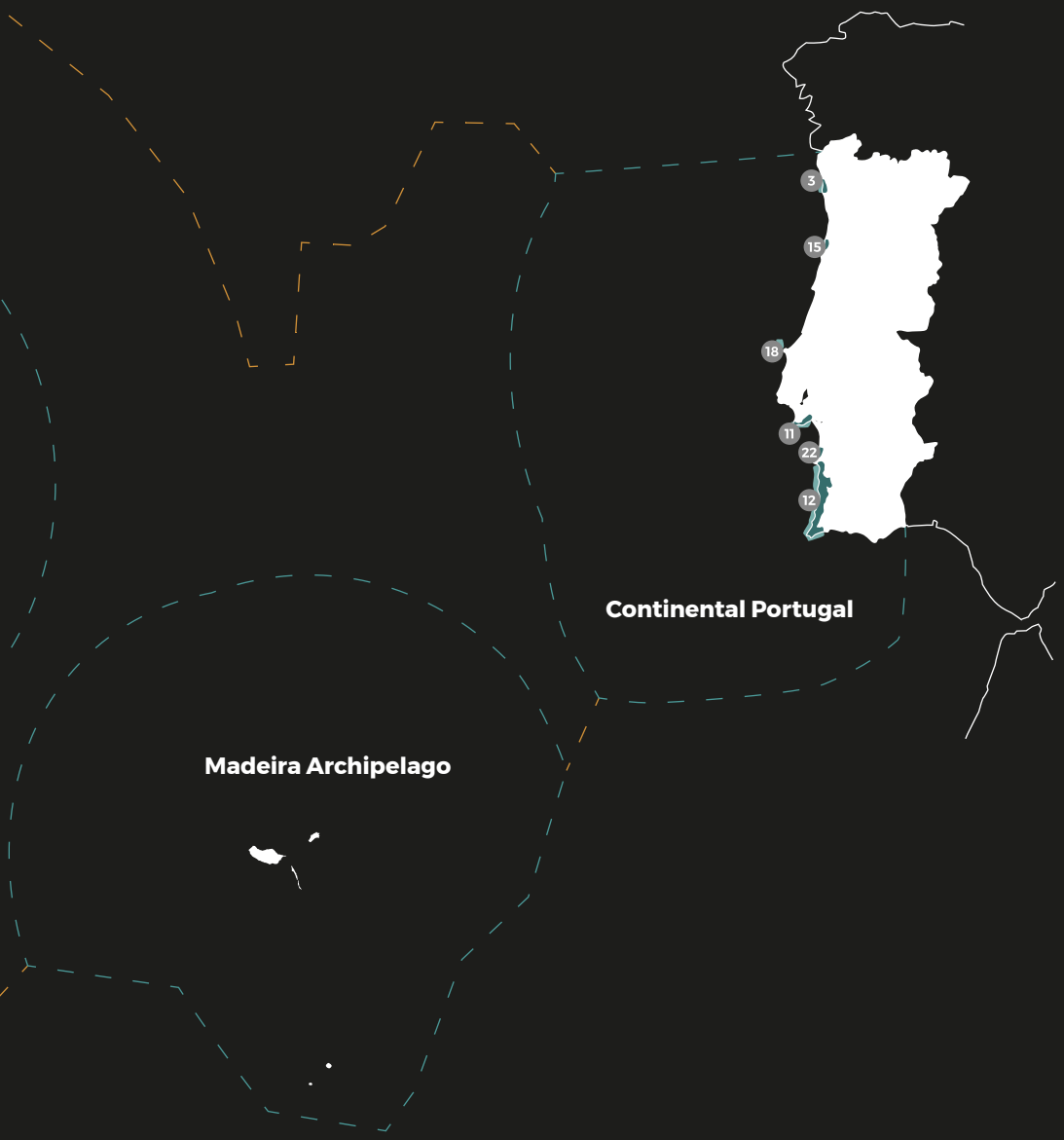
1. Reserva Natural dos Ilhéus das Formigas
2. Reserva Natural do Ilhéu da Vila
3. Monumento Natural da Pedreira do Campo, do Figueiral e Prainha
4. Área Protegida para a Gestão de Habitats ou Espécies da Costa Sudoeste
5. Área Protegida para a Gestão de Habitats ou Espécies da Ponta do Castelo
6. Área Protegida para a Gestão de Habitats ou Espécies da Baia do Cura
7. Área Protegida para a Gestão de Habitats ou Espécies do Pico Alto
8. Área de Paisagem Protegida do Barreiro da Faneca
9. Área de Paisagem Protegida da Baía de São Lourenço
10. Área de Paisagem Protegida da Baía da Maia
11. Área Protegida de Gestão de Recursos da Baía de São Lourenço
12. Área Protegida de Gestão de Recursos da Costa Norte
13. Área Protegida de Gestão de Recursos da Costa Sul

Marine Protected Areas of continental and insular Portugal



Proposed Extension of the Continental Shelf

Exclusive Economic Zone of Portugal



Marine areas of continental Portugal

3 Parque Natural do Litoral Norte (área marinha)

15 Reserva Natural das Dunas de São Jacinto (área marinha)

18 Reserva Marinha das Berlengas

11 Parque Marinho Luiz Saldanha

22 Reserva Natural das Dunas de São Jacinto (área marinha)

12 Parque Natural das Lagoas de Santo André e da Sancha

Azores marine nature park

1 Área Marinha Protegida do Monte Submarino Altair

2 Área Marinha Protegida do MARNA

3 Área Marinha Protegida do Monte Submarino Antialtair

4 Área Marinha Protegida Oceânica do Corvo

5 Área Marinha Protegida Oceânica do Faial

6 Reserva Natural Marinha do Monte Submarino Sedlo

7 Área Marinha Protegida do Banco de D. João de Castro

8 Reserva Natural Marinha do Banco de D. João de Castro

9 Área Marinha Protegida do Banco Condor

10 Área Marinha Protegida do Banco Princesa Alice

11 Reserva Natural Marinha do Campo Hidrotermal Menez Gwen

12 Reserva Natural Marinha do Campo Hidrotermal Lucky Strike

13 Reserva Natural Marinha do Campo Hidrotermal Rainbow

14 Área Marinha Protegida dos Campos Hidrotermais a Sudoeste dos Açores

15 Área Marinha Protegida do Arquipélado Submarino do Meteor

THE SPECIES

Names and species conservation status

Species were identified at the exhibition by their scientific name, the two-name system ("binomial nomenclature") that is unchangeable worldwide. In a scientific name the first word indicates the species genus. The second word in the scientific name is species specific and distinguishes the species within the genus. Scientific names are written in italic: *Sus scrofa* is the scientific name of wild boar.

However, species are usually known by one or several common names. The common name is the name by which the species is known among the general public. These names vary between countries, and sometimes between regions within a country. Here, when multiple English names exist, the British form is usually presented. When no English name exists, we suggest a name between brackets (the Portuguese name, or its translation, when possible). When no Portuguese common name exists we repeat the species scientific name in regular type.

At the exhibition, and here, we also provide each species conservation status attributed by the International Union for Conservation of Nature (IUCN). IUCN created the *Red List of Threatened Species* in 1964, the most comprehensive inventory of the conservation status of biological species. The data used in Red Lists are cooperatively contributed by researchers worldwide, organized by groups of specialists, and using common criteria. Red List assessments may be Global or regional (**Eur**opean, **Med**iterranean) or national (**P**ortugal).

Under IUCN conservation status species are allocated into one of nine possible categories: Not evaluated (NE), Data deficient (DD), Least concern (LC), Near threatened (NT, close to being at risk in near future), Vulnerable (VU, meets one of five at risk of unnatural extinction criteria), Endangered (very likely to become extinct in near future), Critically endangered (faces an extremely high risk of extinction in the wild), Extinct in the wild (survives only in captivity/cultivation), Extinct (beyond reasonable doubt that species no longer extant).

Finally, we draw attention to endemic species, a species that exists only in a given geographic region. We distinguish between species endemic to the Iberian Peninsula ("Endemic to the IP") or Portugal ("Endemic to PT").

Diatoms, fungi, lichens, bryophytes, and ferns

Bog-moss
Sphagnum auriculatum

This moss is common to swampy areas and moist soils near lakes and streams. It occurs mostly in northern and central Portugal but is increasingly found in the south. Medium to large in size, it may be green, yellow--brown or red-brown. It appears in dense groups, with a yellowish central core. It serves as a substrate for several plants, providing support and moisture.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Cypress-leaved plait-moss
Hypnum cupressiforme

Very common in Portugal, especially north of the Tagus river, this moss grows on different types of substrates, such as, soil and rocky slopes, various species of trees and shrubs, and also artificial substrates. It occurs in humid and shady areas, where it forms continuous mats, which can reach up to 10 cm in height, providing physical support and creating the ecological conditions (adequate moisture and nutrients) necessary for the germination of various plant species. Widely used, in Portugal, to decorate Nativity scenes, the cypress-leaved plait-moss may be threatened in some areas due to its uncontrolled harvest and commercialization for this purpose.

Conservation:
PT | Least concern

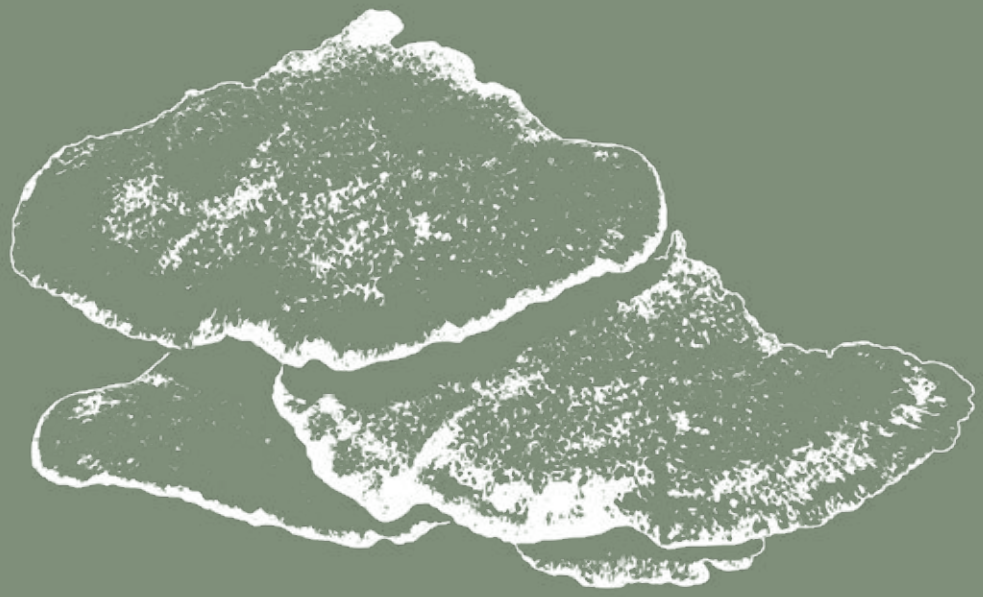
NE DD **LC** NT VU EN CE EW EX

Diatoms
Bacillariophyta

Diatoms are a group of single-celled algae, represented by thousands of species worldwide. Diatoms have silica walls that may assume a multitude of shapes. These algae can be found suspended in water or forming a thin film over the bottom substrate. Diatoms produce more than 20% of the oxygen we breathe, and are one of the most important carbon sinks, sequestering atmospheric carbon dioxide (CO_2). Due to their beauty, diatoms are nicknamed "jewels of the sea".

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX



(Funalia gallica)
Funalia gallica

Funalia is a complex of mushroom species of which Funalia gallica is the form found in Europe. Decomposer species play an essential role in nutrient recycling as they break down dead or decaying organisms. This fungus grows on damp wood, causing it to rot, which allows nutrients to return to the soil and be used by other plants.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Lady fern
Athyrium filix-femina

This fern occurs in the temperate northern hemisphere. Most prevalent in northern Portugal, it occurs in acidic soils in humid and shady forests, frequently close to water streams.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Oak lungwort
Lobaria pulmonaria

Oak lungwort is a lichen: a partnership between fungi, algae, and cyanobacteria. An epiphytic species, that grows on the trunks of other trees. It is distributed over almost the entire planet, preferring sites with high humidity. It is sensitive to atmospheric pollution and habitat destruction. It is used in medicine and in the perfume industry.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Leafy-liverwort
Frullania tamarisci

Frullannia tamarisci is a bryophyte, the group of green plants with no real roots, stems, leaves or vascular system, of the leafy-liverwort group, which are identified by their bilateral symmetry. This epiphytic species commonly grows on Pyrenean oak. It occurs in mainland Portugal and the Azores.

Conservation:
PT | Least concern

NE DD LC NT VU EN CE EW EX

Red beard lichen
Usnea rubicunda

Lichens are symbiosis between fungus and algae. This lichen is epiphytic, growing on tree branches and trunks of Mediterranean woodlands, and requires some solar exposure. Very sensitive to nitrogen pollution, its presence is an indicator of good air quality.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Willow moss
Fontinalis antipyretica

The willow moss occurs in the rivers of Europe, Asia and parts of Africa. It grows in large clusters clinging to submerged rocks in fast-flowing rivers where it offers refuge for numerous invertebrates and fish eggs. It is used in cold water aquariums. It is used to assess water quality in rivers because it accumulates toxic compounds.

Conservation:
PT | Least concern

NE DD LC NT VU EN CE EW EX

Plants

(Caldoneira)
Echinospartum ibericum

This endemic species occurs in granite and quartzite mountainous regions of the central and north eastern Iberian Peninsula, subjected to strong cold winter winds, such as the Serra da Estrela. It is a thorny, dense, cushion--like shrub, whose flowers exude a honey odour.

Conservation:
Global | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Cordgrass
Spartina maritima

Cordgrass grows where few other plants can grow, in the muddy areas of estuaries and coastal shores. Cordgrass has a fundamental ecological role, forming meadows where fish come to spawn, as they offer protection and food to their young. Cordgrass roots help to fix estuary bottom soils and stabilize its banks. Their stems and leaves offer a barrier to swift water, favouring the deposit of particles.

Conservation:
Med | Near threatened

NE DD LC **NT** VU EN CE EW EX

Cork oak
Quercus suber

Cork oak was established as a national tree in 2011. It is an essential species of Mediterranean vegetation communities. Protected by the cork covering its trunk, it easily regenerates after the fires that characterize these ecosystems. On mainland Portugal, the cork oak predominates in the south with coastal influence. Its crowns are green all year round and its fruits feed various animals. It can appear spontaneously forming cork oak forests or by stands, as in a montado.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

English oak
Quercus robur

This is the most abundant oak species in Europe, and is found in coastal northern and central mainland Portugal. It grows deep roots and prefers deep, dry soil regions with moderate climates. It is a large tree and has deciduous foliage—it loses its leaves in winter. It presently occurs in sparse groups and not in the large expanses of oak forest it formed in the past.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

Dwarf eelgrass
Zostera noltii

In Portugal, dwarf eelgrass is distributed from Cabo Espichel to the south, throughout the Algarve coast, in estuaries, and beaches, and coastal lagoons. It prefers muddy substrates, forming meadows that often cover the intertidal zone. Dwarf eelgrass may also occur in sandy areas and tolerates submersion. It has an important role in the oxygenation of water and its roots promote the stabilization of bottom sediments. They function as shelter and breeding habitats for several species, including fish. Ducks feed on its leaves.

Conservation:
PT | Near threatened

NE DD **LC** NT VU EN CE EW EX

Furbellow, Kelp
Saccorhiza polyschides

This species of kelp occurs from Northern Africa to Northern Europe, including the Mediterranean, growing in depths of up to 35 metres. This kelp species grows very fast in late spring and summer, up to two metres per month, covering the available substrate, and then disappear in the winter. Together, these and other kelp species form "kelp forests", one of the most dynamic and productive coastal habitats. They are considered "ecosystem engineers" due to their importance in habitat building.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Gorse australis
Ulex australis

This Portuguese endemic species occurs in the basins of the Tagus and Sado rivers, and along the southern coast of Portugal. It grows with other gorse and bushes, sometimes in pine forests and woodland, as well as in stabilized dunes and other sandy or clay-loam soils.

Conservation:
PT | Least concern | Endemic to PT

NE DD **LC** NT VU EN CE EW EX

Gum rockrose
Cistus ladanifer

The gum rockrose occurs throughout the western Mediterranean and Canary Islands, forming dense shrublands. In Portugal, it predominates in the Alentejo and the Algarve and dominates after disturbances such as fires. Preferring non-calcareous acidic soils: it occurs in granite, quartz, and shale regions. Appreciated by goats and pollinated by insects, it resists drought due to its leaf-covering resin that avoids dehydration. An aromatic shrub, its resin is used in the perfume industry.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Kermes oak
Quercus coccifera

The kermes oak is distributed through the Mediterranean, from Portugal to Morocco and Greece. It predominates in the southern half of mainland Portugal. The species tolerates water scarcity, dominating in dry scrub, and dry and rocky cliffs, and forming particularly dense scrub growing on limestone. The leaves are perennial, persisting for two to three years. This oak's red "berries" are not a fruit at all but are a reaction to an insect sting. The resulting excrescence, in the past, used to be dried and powdered to produce a red dye. The Kermes oak species benefits from recurring fires.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

Heath spotted-orchid
Dactylorhiza maculata

This species is widespread across much of Europe, from Portugal and Iceland to Russia, but is also found in Algeria and Morocco. Heath spotted-orchid grows in grasslands, peat-bogs, and marshes, on acidic and somewhat moisty soils, in full sunlight to shade. In Portugal, it mainly occurs on the continent in the mountainous northern regions., The heath spotted--orchid flowers from May to July, and is pollinated by insects, especially bumblebees, however, it does not provide nectar to its pollinators.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

(Limonium ovalifolium)
Limonium ovalifolium

Salt tolerant, this species occurs in poor soils and prefers bright, humid environments. Along the Atlantic Coast, from France to Gibraltar and Morocco, this *Limonium* lives on the edge of marshes, cliffs, and coastal cliffs. Its scientific name, *ovalifolium*, describes the oval shape of its leaves.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Lusitanian gorse-heath
Ulex densus

This endemic species occurs only in the limestone soils of midwestern Portugal and in the Arrábida Mountains. The Lusitanian gorse forms rounded and almost impenetrable shrubs: hence its scientific designation, *densus* ("dense"). It may be found growing with other gorse in coastal cliff bushland.

Conservation:
PT | Least concern | Endemic to PT

NE DD **LC** NT VU EN CE EW EX

Perennial glassworth
Sarcocornia perennis

It occurs north to south of mainland Portugal in salt marshes, and in the Azores and Madeira. It has a role in the early stages of saltmarsh and estuary succession. In southern Europe, its colonization may be facilitated by Cordgrass (*Spartina maritima*). A primary colonist, it tolerates saline conditions, growing in saline and moist soils that become submerged at high tide.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

(Pioneer genista)
Genista florida

This shrub is distributed over the Iberian Peninsula, southwestern France, and northern Morocco (in the Atlas Mountains). *Genista florida* is found in northern Portugal. It resists the cold winter winds of mountainous regions, occurring in thickets, forest and woodland clearings and edges.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Purple glasswort
Salicornia ramosissima

The purple glasswort occurs north to south of mainland Portugal in marshes, estuaries, and salt marshes, and in the Azores and Madeira. Salinity-tolerant, this Salicornia occurs in saline soils that submerge at high tide. Its scaly leaves become reddish in the Autumn. It is used in food, especially in France, as a substitute for salt.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Rock rose
Cistus albidus

This rock rose occurs in southwestern Europe and Mediterranean north Africa. In Portugal, it is found in the Douro valley, and in the western and interior centre and southern mainland Portugal. This species prefers dry climates, mild winters and warm summers, and limestone rich soils. Flowers are very ephemeral, lasting only one day, but they are very abundant in number between April and June.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Sageleaf rockrose
Cistus salviifolius

This *Cistus* occurs throughout the Mediterranean Region and in the archipelagos of Madeira, the Azores, Cape Verde, and the Canary Islands. It is present in low scrub, meadows, pine forests and abandoned meadows, mainly in acidic soil. It prefers dry and sunny locations. This species seed sprouting is promoted by fire.

Conservation
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Sand couch-grass
Elymus farctus

Sand couch-grass is found in maritime sands throughout Portugal, appearing in embryonic dunes. A pioneer, it has an essential role in the fixation of sand dunes, due to its roots. The species grows rapidly, tolerates salinity, and temporary submersion in sea water.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Sea heath
Frankenia laevis

The sea heath is distributed along the Atlantic European coast, including the coastal areas of mainland Portugal, and the archipelagos of Madeira and the Azores. Salt-tolerant, this plantoccurs in cliffs, marshes,and maritime sands, withstanding salty marine winds. As it excretes excess salt, it forms salt crusts on its leaves and branches.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Sea purslane
Halimione portulacoides

Distributed throughout Europe, Africa and Asia, the sea purslane occurs in mainland Portugal in saltmarshes, frequently colonizing banks of ditches that flood at high tide. This evergreen blossoms from August to November and is pollinated by the wind.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Sea holly
Eryngium maritimum

Sea holly appear in coastal sands and dunes, from the north to the south of Portugal. It has an important role in sand fixation, thus its occurrence in embryonic dunes. It dominates in human disturbed areas, presumably because it stings, avoiding being walked over. The wax covered leaves are protected from dehydration and sand abrasion. Seeds and dead vegetation are blown away by the wind, rolling through the sand, hence its Portuguese name (literally "rolling-cactus").

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Strawberry tree
Arbutus unedo

This bush tolerates drought and is frequently used in post-fire reforestation. It produces a red fruit, the "medronho" (mə'droɲu) that ripens in autumn at the same time that it blooms. In this period, when other foods are scarce, it provides nutrition to birds and mammals, which in turn contribute to seed dispersal. Sugar-rich, medronho is used to produce jams, liquor, and spirits.

Conservation:
Eur | Least concern

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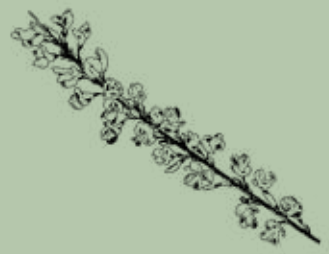

White broom
Cytisus multiflorus

Endemic to the Iberian Peninsula, this species is very frequent in the northern interior and central Portugal. It was introduced to India, Australia, France, Italy, the USA, and Argentina. The white broom occurs in bushland, undergrowth, abandoned lands, embankments, and road edges, growing in poor, sandy, acidic soils. It is used as a medicinal and ornamental plant, for honey production, soil fertilization and agrosilvopastoral (crops, forestry, and pasturage) management.

Conservation:
Eur | Least concern

NE DD **LC** NT VU EN CE EW EX

Insects and other invertebrates

(Algar do Pena millipede)
Cylindroiulus villumi

This millipede derives its name from the cave where it dwells, the Algar do Pena, in Santarém. It is the first known species of its kind adapted to life underground. Adaptations to darkness include blindness, depigmentation, and its smaller size, which distinguishes it from related non-cave-dwelling species.

Conservation:
Global | Not evaluated | Endemic to PT

NE DD LC NT VU EN CE EW EX

American cockroach
Periplaneta americana

Despite its name, this species is native to Africa and spread worldwide, proliferating in cosmopolitan areas. In temperate regions cockroaches live in houses, warehouses, and restaurants, wherever they find their preferred food — animal fat and remains. During the day, cockroaches hide in humid, hot shelters emerging at night to search for food: they may contaminate our food with unpleasant odours and transmit diseases.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Antlion
Macronemurus appendiculatus

Clearly not a lion, but also not an ant. It is a neuropteran, an insect that in adult form sports two pairs of netted wings. Larvae behave ferociously and feed on... ants! Hence its common name: honouring its lion-like predatory behaviour.

Conservation:
PT | Least Concern

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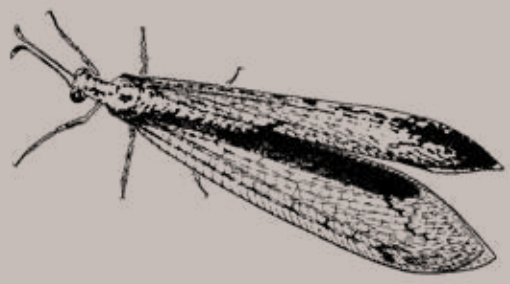

Bearded fireworm
Hermodice carunculata

The bearded fireworm occurs across the central-western Atlantic, the Indo--Pacific and the Mediterranean. The fire in its name comes from the pain caused by a neurotoxin it releases when touched, causing a burnt-like skin irritation. Very common in Madeira and the Azores, the bearded fireworm dwells in rocky bottoms, three to 40 meters deep. This species preys on several animals, including anemones, corals and starfish and may behave as a scavenger, feeding on animal remains.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

(Cave scarab)
Speonemadus algarvensis

This cave-dwelling species has been found in only three caves of the Algarve karst massif. Scarabs are the most diverse group of insects on Earth, contributing significantly to subterranean biodiversity. This species retains the colouring pattern and the eyes of related species, which, unlike *Speonemadus algarvensis*, have been found buried under leaf litter in forests as well as in caves.

Conservation:
Global | Not evaluated | Endemic to PT

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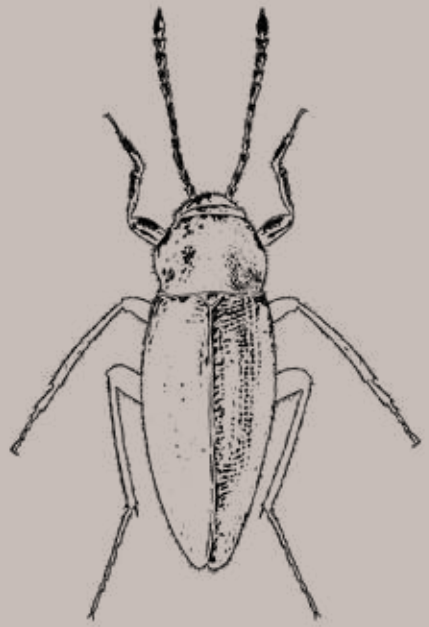

(Cave woodlouse)
Porcellio cavernicolus

This species is found only in caves of central and northern Portugal, especially in the Sicó massif. It is important for the ecosystems where it lives because it feeds on debris from underground and is fed upon by predators, such as spiders and centipedes. Unlike its relatives living outside caves, it has no eyes and is depigmented. It is also larger in size.

Conservation:
Global | Not evaluated | Endemic to PT

NE DD LC NT VU EN CE EW EX

Cicada
Cicada orni

Common in southern and central Europe, the Middle East and North Africa, this cicada occurs mostly in central and southern Portugal. Before reaching adulthood, cicadas live in the soil. Adults occupy forested areas or cultivated land, such as olive groves and orchards. They are easier to hear than to observe, singing in the summer, usually in the hottest hours. Their songs, which are produced only by the males, to attract females, can be heard over long distances.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Earthling stone grasshopper
Euryparyphes terrulentus

As the species common name implies, this grasshopper looks like a stone. It inhabits Mediterranean shrubland, steppes and pastures, at various altitudes. Endemic to the Iberian Peninsula the earthling stone grasshopper was thought to occur only in southern Spain when, in 2017, its presence was noted in the south of Portugal, in a protected area area of Castro Verde, in the Alentejo.

Conservation:
Global | Least Concern | Endemic to the IP

NE DD LC NT VU EN CE EW EX

(Giant pseudo-scorpion)
Titanobochica magna

The giant pseudo-scorpion is a predator that lives in caves of the Algarve, from Portimão to Olhão. It likely preys on the giant silverfish, *Squamatinia algharbica*, as they inhabit the same caves. Currently, no other species of the same genus are known. Other populations of the species are also unknown, although it is thought their distribution may have been much wider in the past.

Conservation:
Global | Not evaluated | Endemic to PT

NE DD LC NT VU EN CE EW EX

(Giant silverfish)
Squamatinia algharbica

The largest terrestrial cave insect in Europe lives in the Algarve. Its three-centimetre length make it special — a giant compared to related species living on the surface. Unable to survive outside, the giant silverfish has no eyes and is depigmented. It apparently has a non-carnivorous diet, coexisting in caves with the giant pseudo-scorpion, *Titanobochica magna*, for which it is likely prey.

Conservation:
Global | Not evaluated | Endemic to PT

NE DD LC NT VU EN CE EW EX

Gorgonian, Sea fan
Leptogorgia sarmentosa

They may not look like it, but gorgonians are animals. These soft corals are composed of polyps, each of which has multiple stinging cells that release toxins to paralyse prey or deter predators. Just like other gorgonians, *Leptogorgia sarmentosa* is a slow-growing species, growing only about one to five centimetres per year. This renders the species vulnerable to the physical impact of certain fishing techniques and from divers.

Conservation:
Med | Least concern

NE DD LC NT VU EN CE EW EX

Iberian tiger beetle
Cicindela lusitanica

Found only on the Portuguese mainland, this endemic species always appears in association with coastal dunes. The tiger beetle is a predator that feeds on smaller insects and other smaller arthropods, such as spiders.

Conservation:
PT | Vulnerable | Endemic to PT

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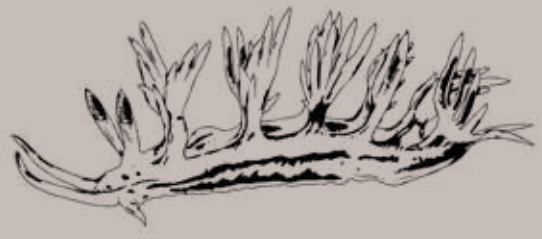

Nudibranch
Luisella babai

This mollusc from the nudibranch group is distributed throughout the Mediterranean and along the Portuguese Atlantic coast. There are many different species of nudibranchs, characterized by their extraordinary and diverse colours. They feed on hydrozoans, such as the Portuguese man o' war, and are able to absorb and use their prey's stinging cells for self-defence. *Luisella babai* occurs in the rocky reefs of the Portuguese coast and is much sought after by underwater photographers.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Sand hopper
Talitrus saltator

Distributed over the sandy beaches of the Atlantic and the Mediterranean, its Portuguese common name ("sea flea") derives from its size, appearance, and locomotion (jumping). The sand hopper feeds on decomposing organic debris, such as algae remains. Crucial to ecosystems, the sand hopper is a food source of birds and fish. The abundance of sand hoppers indicates reduced direct human impact in sandy shores.

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Sand velvet spider
Adonea algarvensis

Endemic to Portugal, this spider occurs only in coastal southern dunes. Ground-dwelling, the sand velvet spider is a sheet-web builder that constructs simple vertical or inclined burrows. It feeds on various small insects and other invertebrates.

Conservation:
Global | Not evaluated | Endemic to PT

NE DD LC NT VU EN CE EW EX

Silver Y
Autographa gamma

The silver Y moth is common throughout Europe, including Portugal, North Africa, and Asia. Active at night, this moth is prey to geckos and bats. Silver Y has characteristic northbound spring and summer migrations, which may involve large swarms — as famously happened during the Euro 2016 final, when a swarm invaded the stadium and the species reached stardom as a moth landed on Cristiano Ronaldo's face.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Spanish dung-beetle
Copris hispanus

There are several species of roller dung beetles, such as the Spanish dung-beetle. They got this name because males roll dung into spheres, which are used as a food source and breeding chamber. These spheres are buried, serving as food for larvae and adults. This particular species is distributed throughout southern Europe (France, Italy, Portugal, and Spain) and in northern Africa (Morocco, Algeria, Tunisia, Libya, and Egypt).

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Spanish heath butterfly
Coenonympha iphioides

Endemic to the Iberian Peninsula, this butterfly occurs in flowering moist meadows in the north of Portugal. The Spanish heath butterfly can be seen from May to August in characteristic slow, low, and intermittent flights. The species is easy to identify due to the presence of large black spots on the underside of its rear wings.

Conservation:
Global | Not evaluated | Endemic to IP

NE DD LC NT VU EN CE EW EX

West African fiddler crab
Afruca tangeri

The hues of its carapace vary throughout life and according to luminosity – hence its Portuguese name, "Rainbow crab". The West African fiddler crab occurs along the eastern shores of Atlantic ocean, in lagoons, estuaries, and coastal areas, digging the tunnels it inhabits in silt and sandy soils. Fiddler crabs use their tunnels to hide from predators, and to shelter at high tide and in the dry season. Feeding mainly on microalgae, but also on plants, fiddler crabs leave the remains of their food in clusters (balls) of sand at the entrance of their tunnels, contributing to sediment mobilization and soil oxygenation. Males have an asymmetrically larger claw (which, unfortunately for them, are a popular snack in the Algarve).

Conservation:
Global | Not evaluated

NE DD LC NT VU EN CE EW EX

Wingless mantis
Apteromantis aptera

Endemic to the Iberian Peninsula, it occurs in central-southern Spain and Portugal, in meadows, but also at the edge of pine forests, and in open patches of montados. This is a peculiar mantis: being wingless and having pointed eyes. Active during the day, it feeds on other insects, and is preyed upon by birds.

Conservation:
PT | Endangered | Endemic to the IP

NE DD LC NT VU **EN** CE EW EX

Fish

Brown trout
Salmo trutta

The non-migratory brown trout, called "River-trout" in Portugal, appears in rivers and lakes. Its migratory counterpart, called "Sea-trout", migrates out to sea about two years after hatching, returning to the river at maturity, to reproduce. Brown trout feeds on invertebrates, and smaller fish, preferring shallow waters, of strong to moderate current, and rocky or gravelled bottoms. In Portugal, the migratory, Sea-trout, is in sharp decline, occurring only in the rivers Lima and Minho.

Conservation:
PT | Critically endangered

NE DD LC NT VU EN **CE** EW EX

Greater pipefish
Syngnathus acus

The greater pipefish occurs in the eastern Atlantic, from the Atlantic coast of Norway to South Africa, in the Azores, the Mediterranean, and the Black Sea. It lives in shallow coastal and estuarine areas, preferring rocky bottoms with algae or areas covered by seagrass. This pipefish feeds on plankton, small crustaceans, larvae, and juvenile fish. Greater pipefish males incubate the eggs in a specific pouch that can hold up to 400 eggs. Juveniles hatch inside this pouch, leaving it once they are able to swim freely.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Iberian barbel
Luciobarbus bocagei

Endemic to the Iberian Peninsula, this fish was named in homage to the zoologist José Vicente Barbosa do Bocage. The Iberian barbel occurs in mainland Portugal, except for the Guadiana and Mira rivers, and smaller streams of the Algarve. This species avoids colder waters and prefers weak to moderate currents, but may also appear in reservoirs. An omnivorous fish, the Iberian barbel takes refuge on waterbanks, feeding on filamentous algae, insects, and crustaceans, but it tolerates mildly polluted water and may feed on organic debris.

Conservation:
PT | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Iberian nase
Pseudochondrostoma polylepis

The Iberian nase is endemic to the Iberian Peninsula. This fish avoids low--oxygen content waters, waters polluted by urban and industrial discharges or contaminated by pesticides and fertilizers. Iberian nase prefer fast waters but sometimes appear in dams. They feed mostly by scraping algae off the river's rocks, but also feed on small invertebrates and organic debris.

Conservation:
PT | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Northern Iberian chub
Squalius carolitertii

Endemic to the Iberian Peninsula, this chub occurs in flowing water in plains and mountains above the Mondego river, tolerating summer waters with low oxygen content. The species feeds on insects, crustaceans, and small fish. A spring breeder, the northern Iberian chub spawns on rocks and vegetation in weak currents.

Conservation:
PT | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Ocean sunfish
Mola mola

The ocean sunfish occurs in the open waters of tropical and temperate oceans around the world. To keep warm and get rid of parasites, the sunfish swims at the surface, allowing other fish and birds to prey on the parasites living on its skin. They also deparasitise by jumping out of the water, as high as three meters, the impact forcing the parasites to fall off. Ocean sunfish females can produce 300 million eggs, awarding them the medal for the most fertile vertebrate in the world!

Conservation:
Global | Vulnerable

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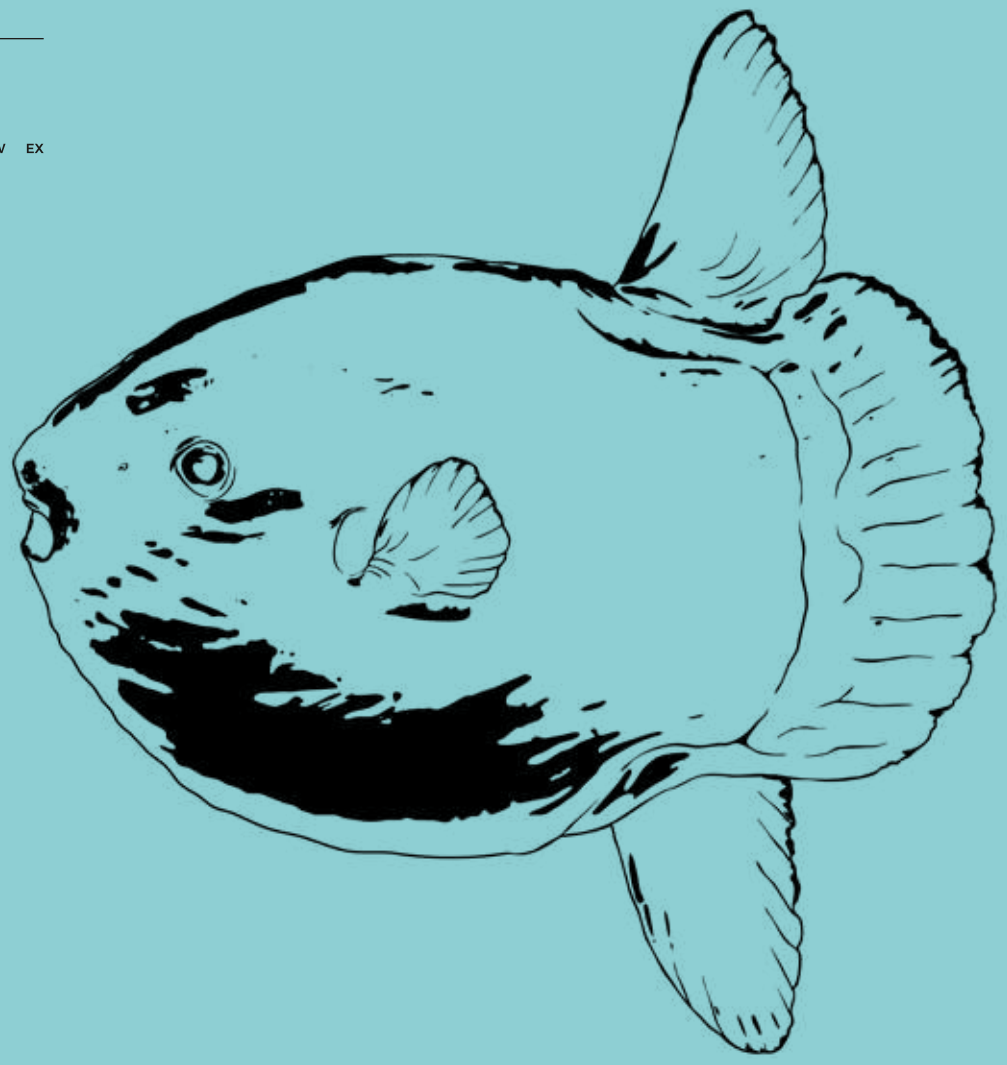

Shortfin mako
Isurus oxyrhinchus

The shortfin mako occurs in tropical and temperate oceans and is the fastest shark in the world. In pursuit of its prey, fish, and squid, it can reach more than 70 kilometres per hour. A long-distance migrator, the shortfin mako may travel 100 km in a day and 4000 km annually . Shortfin mako liver oil is used to produce supplements, but without much evidence of healing properties. Its fins are the main ingredient in shark fin soup, and shark finning is this species' biggest threat.

Conservation:
Med | Endangered

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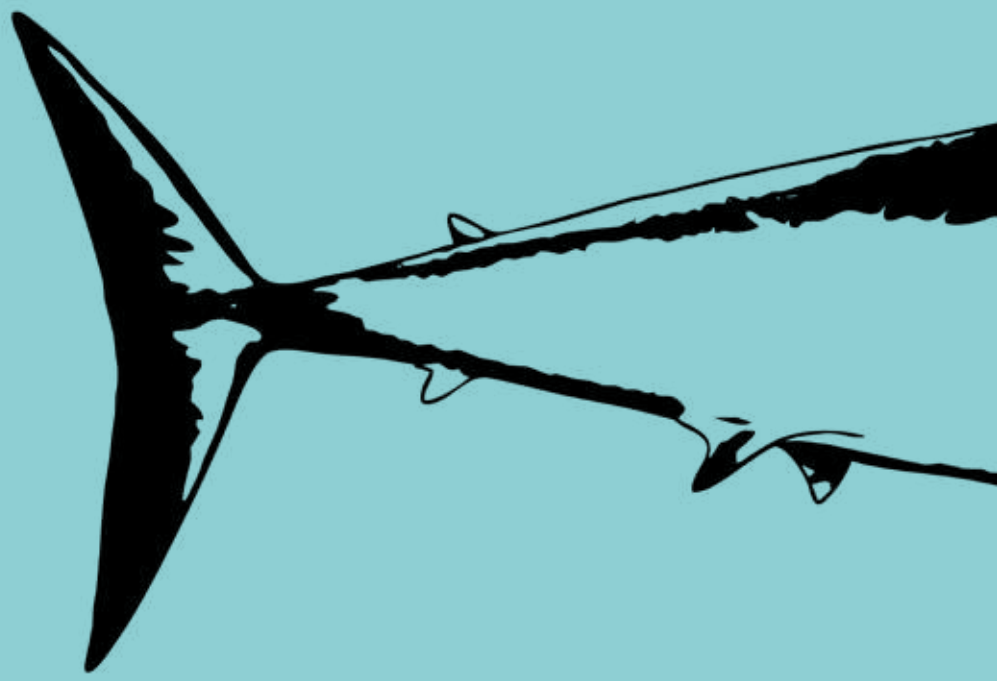


Reptiles and amphibians

Bocage's wall lizard
Podarcis bocagei

Endemic to the Iberian Peninsula, this lizard occurs mainly north of the Douro River, at altitudes ranging from sea level to 1550 meters. In Portugal, it prefers the humid climates of the Minho and coastal Douro. It thrives in dunes, woodlands, scrubland, humid pastures, and urban areas. It preys on small insects, including mosquitoes, and spiders.

Conservation: PT:
PT | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Iberian emerald lizard (male)
Lacerta schreiberi

This endemic lizard requires humid micro-habitats to reproduce, occurring frequently near water streams with vegetation such as alder, silver birch, chestnut, and English oak. In Portugal, the species occurs north of the Tagus river, however to the south of the Tagus, it occurs in only three isolated populations, in the mountain ranges of São Mamede, Cercal and Monchique. The emerald lizard feeds on mosquitoes, flies, grasshoppers, and beetles, and may release its tail if threatened.

Conservation:
PT | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Iberian frog
Rana iberica

Endemic to the northeast of the Iberian Peninsula, the Iberian frog prefers clear, cold, fast waters with abundant vegetation and rocks. Distributed north of the Tagus, except for the Serra de São Mamede, the species occurs in altitudes from sea level to 1900m. Active day and night, Iberian frogs feed on spiders, insect larvae, snails and beetles. Adult frogs are prey to water snakes, trout and small carnivorous mammals and larval stages are prey to aquatic insects, water snake, trout and newt.

Conservation:
PT | Near threatened | Endemic to the IP

NE DD LC **NT** VU EN CE EW EX

Iberian rock lizard
Iberolacerta monticola

This species is endemic to the Iberian Peninsula and is distributed between two main groups: the central plateau of Serra da Estrela mountain in Portugal; and north western Spain. In Portugal, Iberian rock lizards prefer rocky mountain habitats above 1400 meters. Territorial, they hunt small insects and spiders and, in Serra da Estrela, are themselves hunted by birds of prey.

Conservation:
PT | Vulnerable | Endemic to the IP

NE DD LC NT **VU** EN CE EW EX

Jewelled lizard
Lacerta lepida

Jewelled lizard is distributed throughout mainland Portugal. Rarest in dense forests, this lizard prefers sun exposed places that also offer shelters, such as, rocks, stone walls or shrubs. The largest lizard in Portugal, it feeds on insects, but also on snails, slugs, smaller lizards, small mammals and, occasionally, fruits. It is preyed upon by snakes, birds of prey, storks, herons, and mammals such as Egyptian mongooses, weasels and lynxes. Jewelled lizards hibernate and remain inactive in the hottest hours of summer days.

Conservation: :
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX

Montpellier snake
Malpolon monspessulanus

The Montpellier snake is distributed throughout the western Mediterranean. Commonly found in mainland Portugal this species avoids dense forests, otherwise appearing in all Mediterranean habitats, including montados. Adults grow to 2m or longer, and feed on other reptiles, small birds, and small mammals. The rear position of this snake's fangs prevent it from delivering poison when it bites larger mammals (including humans). The species hibernates in winter.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Moorish gecko
Tarentola mauritanica

Native to the Western Mediterranean, this gecko is broadly distributed in Portugal. An agile insect hunter, the gecko's enlarged fingertips are covered with microscopic hairs allowing it to stick to smooth surfaces, climb walls and move upside down. Most active at dusk and at night in the spring and summer, they may display daytime activity, particularly on sunny winter days. Geckos can regrow their tails.

Conservation:
PT | Least concern

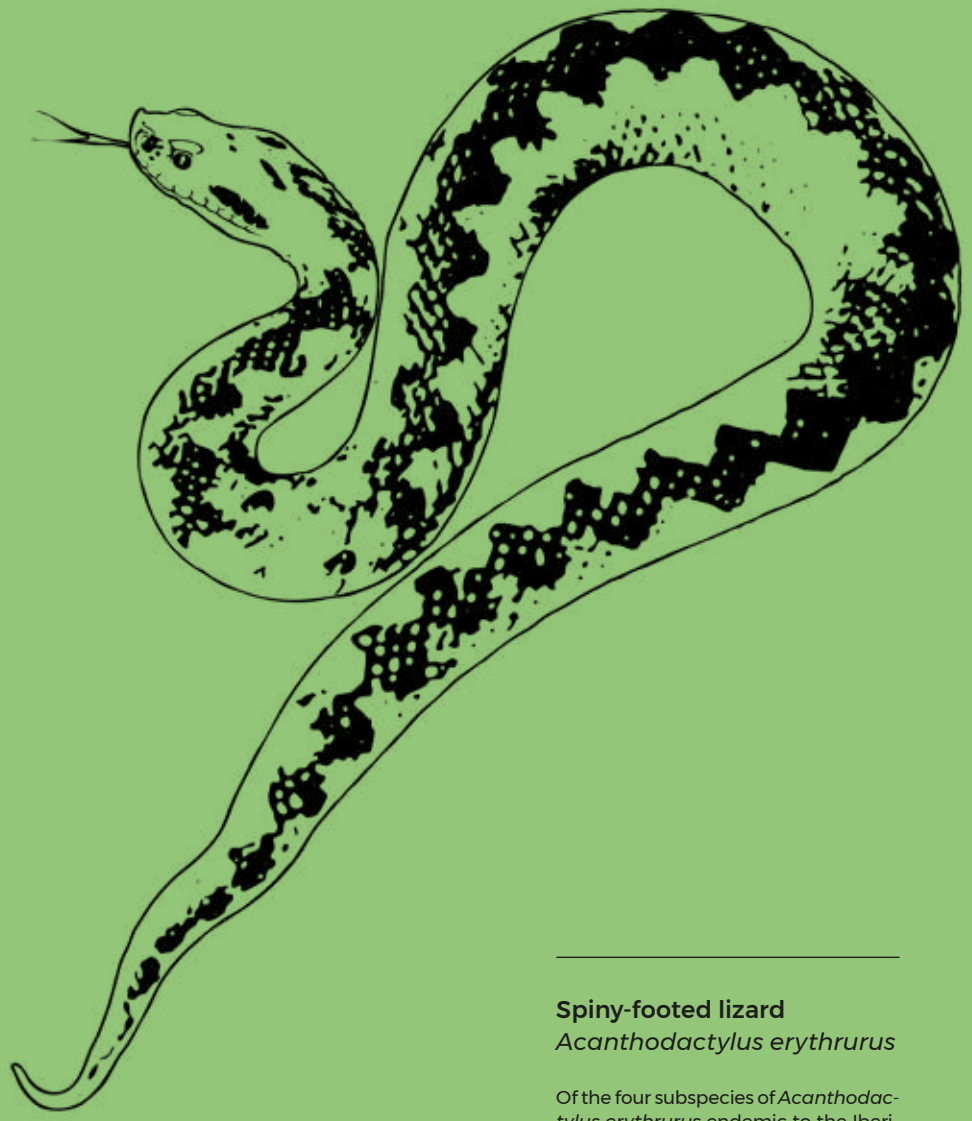
NE DD **LC** NT VU EN CE EW EX

Snub-nosed viper
Vipera latastei

This viper prefers mountainous, rocky shrublands, occurring in altitudes from sea level to 1500 meters in Estrela and Gerês. At lower altitudes, it appears in shrubland, agricultural areas and coastal pine forests, preferring sites with mixtures of sunny and shady spots. Adults feed on small mammals, while juveniles hunt small lizards, and juveniles of Ocellated and Iberian emerald lizards. The snub-nosed viper's poison is dangerous but usually not deadly to healthy humans. It has been hunted since the Middle Ages as an amulet and for presumed medicinal purposes, and this contributes to the species' vulnerability.

Conservation: :
PT | Vulnerable

NE DD LC NT **VU** EN CE EW EX



Spiny-footed lizard
Acanthodactylus erythrurus

Of the four subspecies of *Acanthodactylus erythrurus* endemic to the Iberian Peninsula, *Acanthodactylus erythrurus erythrurus* is the only subspecies occurring in Portugal. Patchily distributed from North to South in isolated populations, this lizard appears at different altitudes. The species prefers flat, open, dry areas of either less compacted soils, as in dunes, or of consolidated granite or schist. Spiny-footed lizards feed mainly on ants and beetles.

Conservation:
PT | Near threatened | Endemic to the IP

NE DD LC **NT** VU EN CE EW EX

Birds

Booted eagle
Aquila pennata

Migratory, the Booted eagle is distributed throughout the Mediterranean, migrating to Africa during the winter. We'll find it in the summer where it nests: in forests, mountains, and montados in southern mainland Portugal. Very territorial, Booted eagles defend their nests aggressively. They hunt in open areas, alone or in pairs, feeding on small and medium-sized birds, small mammals and insects.

Conservation:
PT | Near threatened

NE DD LC **NT** VU EN CE EW EX

Common cuckoo
Cuculus canorus

The Cuckoo is difficult to observe: its presence is revealed by its song. In mainland Portugal it occurs from north to south, being rare in high altitudes and urban environments. The Cuckoo is a brood parasite: it lays its eggs in nests of other birds. The cuckoo young hatch first and expel the other chicks out of the nest as they hatch. Cuckoos feed on insects and caterpillars.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Common kingfisher
Alcedo atthis

The common kingfisher occurs throughout mainland Portugal in two forms. Sedentary birds, that reside here all year round, and migratory birds, wintering birds from other parts of Europe. This species lives on freshwater, brackish water, and saltwater habitats of all kinds – estuaries, rivers and coastal waters. The kingfisher preys on small fish, but also on crustaceans, aquatic and terrestrial insects and, sometimes, on amphibians. This bird nests in tunnels dug into riverbanks.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Cory's shearwater
Calonectris borealis

More than 85% of this species breeds in the Azores and Madeira, with a few pairs breeding on the Berlengas Islands off the Portuguese mainland. The remaining 15% breed on the Canary Islands. The vast majority of the population spends its non-breeding season in the South Atlantic, in the Benguela current. The Cory's shearwater feed mostly on fish, which are obtained generally by surface-seizing. The Cory's shearwater frequently feed simultaneously with tuna and dolphin, taking advantage of the fact that those species pursue their prey, fish, squid, and crustaceans, to the surface to feed.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Crested lark
Galerida cristata

The Crested lark is distributed throughout Europe, Africa and Asia. It is present in Portugal all year round, occurring from north to south, but mostly in the south, both in plowed and uncultivated land, namely in floodplains but also on the edge of wetlands. It feeds on seeds and leaves, and some invertebrates, especially small beetles.

Conservation:
PT | Least Concern

NE DD **LC** NT VU EN CE EW EX

Dunlin
Calidris alpina

The Dunlin nests in arctic and sub-arctic regions and in temperate northern Europe. Birds observed in Portugal are either wintering or in migratory passage. The Dunlin is active at low tide in shallow waters or exposed sands and muds. It takes refuge at high tide in coastal areas without vegetation or with low vegetation. It feeds mainly on small invertebrates, but also on insects, crustaceans, bivalves and, occasionally, small fish.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

European roller
Coracias garrulus

A migratory bird, the European roller nests in Europe, Asia, and north western Africa. It occurs in centre and southern mainland Portugal, predominantly in the interior of the Alentejo. It prefers steppe-like meadows, and agricultural areas with crop rotation and scattered trees (oaks or pines). It nests in trees, and hunts by choosing a perch from which it preys on flying insects, such as beetles and crickets.

Conservation:
PT | Critically endangered

NE DD LC NT VU EN **CE** EW EX

Great spotted woodpecker
Dendrocopus major

This woodpecker occurs in Europe, Asia, and North Africa. In Portugal, it prefers forested areas from north to south, especially oak forests as well as cork oak and holm oak montados. Great spotted woodpeckers nest by pecking holes with their beaks in tree trunks and wooden electricity poles. They feed mainly on insects found on tree trunks, but also on seeds and chicks from other birds.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Grey heron
Ardea cinerea

Four Heron subspecies are recognized, with the Ardea cinerea cinerea occurring in Europe, Africa, and western Asia. The Grey heron nests in the Azores and mainland Portugal. It nests in colonies and feeds on fish, amphibians, small mammals, and insects that it hunts in shallow waters.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Golden eagle
Aquila chrysaetos

The Golden eagle may behave as predator or scavenger: the species hunts medium-sized prey – rabbit, fox, other birds – and feeds on carrion such as sheep and goat carcasses. In Portugal, this eagle occurs in mountainous areas: it nests on cliffs, hunting in open to semi-open areas. Fifty to 60 couples are estimated to live in Portugal.

Conservation:
PT | Endangered

NE DD LC NT VU **EN** CE EW EX

House sparrow
Passer domesticus

The house sparrow originated in the Middle East and spread, with the advent of agriculture, to Europe, Asia and North Africa. It was introduced into America, Australia, New Zealand, and several archipelagos, including the Azores. This species occurs in both rural and urban habitats. While preferring grains (oat and wheat), this opportunistic species will eat what it finds, particularly in urban areas.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Iberian magpie
Cyanopica cooki

The Iberian magpie occurs in the Iberian Peninsula, distributed throughout mainland Portugal, except in the northeast. Adults are omnivorous and chicks feed on insects. Diurnal, noisy Iberian magpie flocks fly in the vicinity of water streams.

Conservation:
PT | Least concern | Endemic to the IP

NE DD **LC** NT VU EN CE EW EX

Pigeon
Columba livia

Pigeons occur on all continents except Antarctica. They are distributed throughout mainland Portugal and the archipelagos of Madeira and Azores. Pigeons feed on seeds, plant shoots and even small insects and spiders, and their natural habitat are rocky cliffs. Nevertheless, they have adapted to urban areas where they have become very abundant.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Red-billed chough
Pyrrhocorax pyrrhocorax

The red-billed chough is rare in mainland Portugal, with an estimated 500 individuals spread over five populations: Gerês, Douro Internacional, the Serra de Aires and Candeeiros, Alvão and the southwestern Algarve. This chough nests in inaccessible coastal cliffs, caves and cliffs, and hunts in agricultural areas and pastures preying on insects, caterpillars, and larvae. This diet is supplemented in the winter with seeds and grains.

Conservation:
PT | Endangered

NE DD LC NT VU **EN** CE EW EX

Tawny owl
Strix aluco

Tawny owls prefer forests, such as oak forests and, in Portugal, they are also common in cork oak and holm oak montados. Like other birds of prey, tawny owls hunt by choosing a perch from which they spot and fly over their prey. Rodents, like wood mice, make up most of their diet which is complemented with insects, reptiles, amphibians, small birds, and juvenile rabbits.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Yellow-legged gull
Larus michahellis

This opportunistic seagull may feed on carrion, crustaceans, other bird's chicks, eggs and insects. The yellow-legged gull is adapted to a large number of habitats, including cities where it nests on roofs, and other structures. Easily observed in mainland Portugal, and in the Azores and Madeira archipelagos, yellow-legged-gulls may display migratory, partially migratory or resident behaviour.

Conservation:
PT | Least concern

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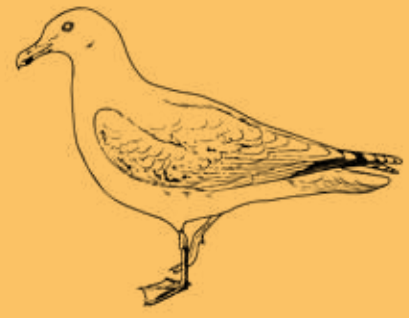
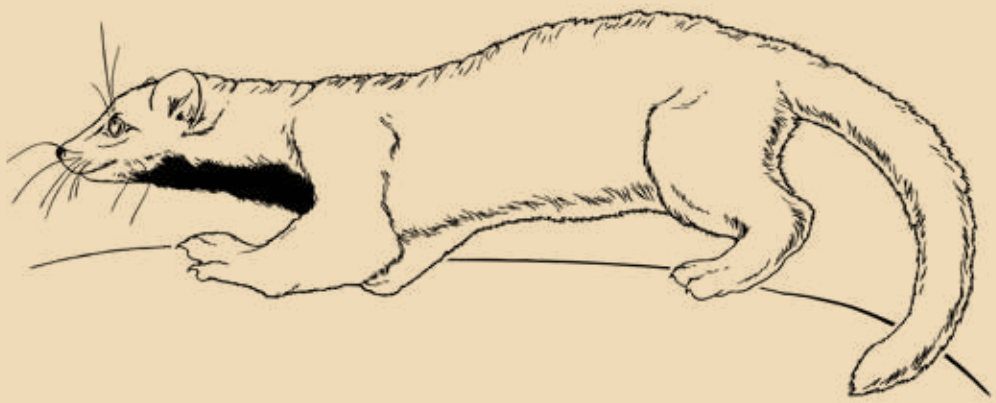


Mammals



Beech marten
Martes foina

This predator occurs throughout Europe and Central Asia. Good climbers, like genets, beech martens prefer wood mice, but will also prey on insects and small birds, and eat eggs and fruits. Pursued because they raid chicken coops and steal eggs, few recognize the martens' merit as an efficient predator clearing barns, stables and attics of mice and other rodents.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Blue whale
Balaenoptera musculus

This is the largest animal in the world! The blue whale may reach up to 30m in length, and has a global distribution, with several subspecies identified. Despite its size, it feeds on small, one-centimetre-long crustaceans called krill. The blue whale can dive up to 500 meters deep and submerge for more than 15 minutes. Hunted almost to extinction, blue whales are now slowly recovering after the 1967 international whaling ban.

Conservation:
Global | Endangered

NE DD LC NT VU **EN** CE EW EX

Brown rat
Rattus norvegicus

Probably one of the most successful mammals on the planet, after our species. The brown rat is thought to have originated in China, but currently inhabits all continents except Antarctica. Social, this rat is nocturnal, and has very developed auditory and olfactory senses. It feeds on cereals but is omnivorous in cities, feeding on almost anything it may find.

Conservation:
Global | Least concern

NE DD **LC** NT VU EN CE EW EX

Common genet
Genetta genetta

Native to Africa, it was introduced in southwest Europe and the Balearic Islands, occurring from north to south in mainland Portugal. Active at night and at twilight, it is a solitary, territorial animal that leaves its faeces in high places, such as trees and roofs, to define territory. Genets prefer forested areas abundant in wood mice (*Apodemus sylvaticus*), though they may also hunt reptiles and insects, and add fruits to their diet.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Eurasian otter
Lutra lutra

Predominantly nocturnal, the Eurasian otter prefers freshwater habitats with banks rich in vegetation, occurring in rivers, streams, lagoons, and reservoirs... But in Portugal otters also appear in estuaries and, in the southwest, they are known to fish at sea, returning to coastal freshwater to wash the salt away from their fur, which is essential to regulate their body temperature. A piscivore, the Eurasian otter will nevertheless prey on amphibians, crustaceans, and insects — and presently this otter feeds also on red crayfish, *Procambarus clarkii*, an exotic species that was introduced in Portugal in the 1970s.

Conservation:
PT | Least concern

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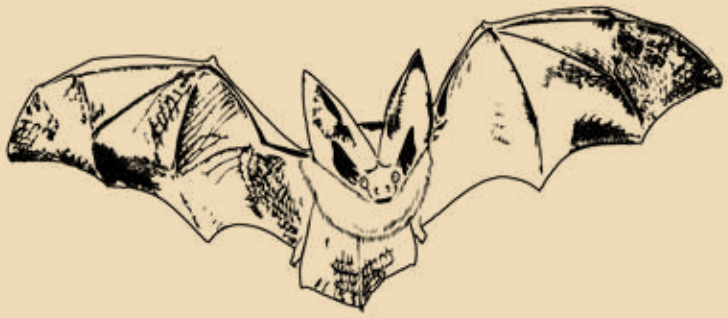

Grey long-eared bat
Plecotus austriacus

The Grey long-eared bat occurs in Central and Southern Europe, and in fragmented populations throughout mainland Portugal. In the Madeira Archipelago, the species is critically endangered. This bat takes shelter in abandoned buildings, bridges, and rock crevices. An insectivore, grey long-eared bats prey on moths.

Conservation:
PT | Least Concern

NE DD **LC** NT VU EN CE EW EX

Iberian lynx
Lynx pardinus

Endemic to the Iberian Peninsula, the Iberian lynx was distributed throughout the peninsula but is currently restricted to the south, mainly shrubland and montados. Cork oaks may provide dens to females. Carnivorous, the Lynx is a "super-specialist": it feeds on rabbits. It may prey on other species to survive, but it requires rabbit to reproduce, and so its decline has accompanied that of its prey. Ongoing successful conservation strategies include Lynx breeding programs in captivity for release in the wild, as well as rabbit repopulation efforts.

Conservation:
PT | Critically endangered | Endemic to the IP

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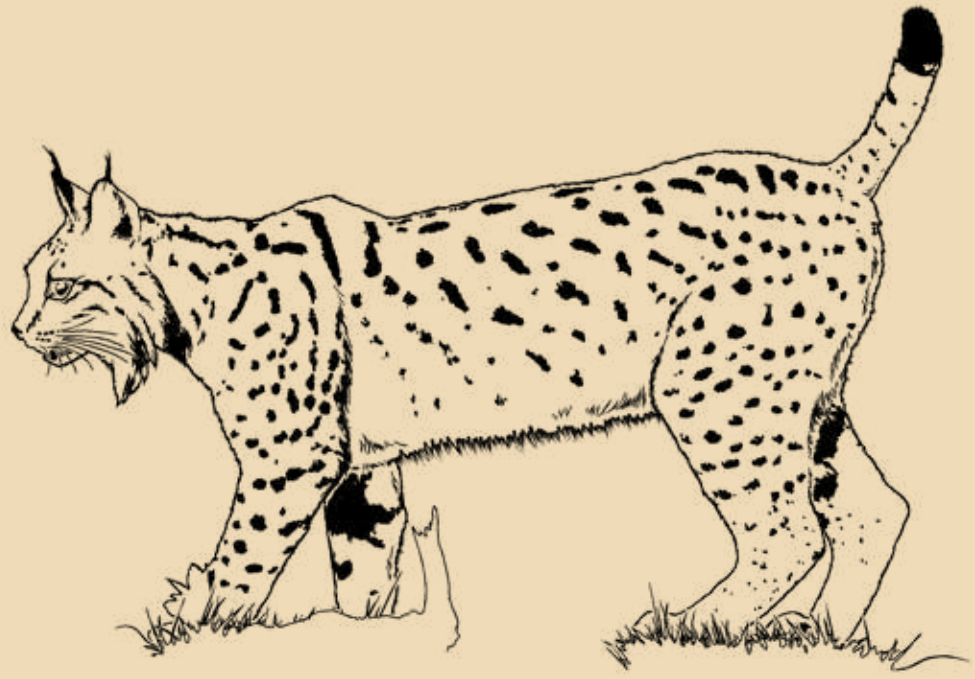

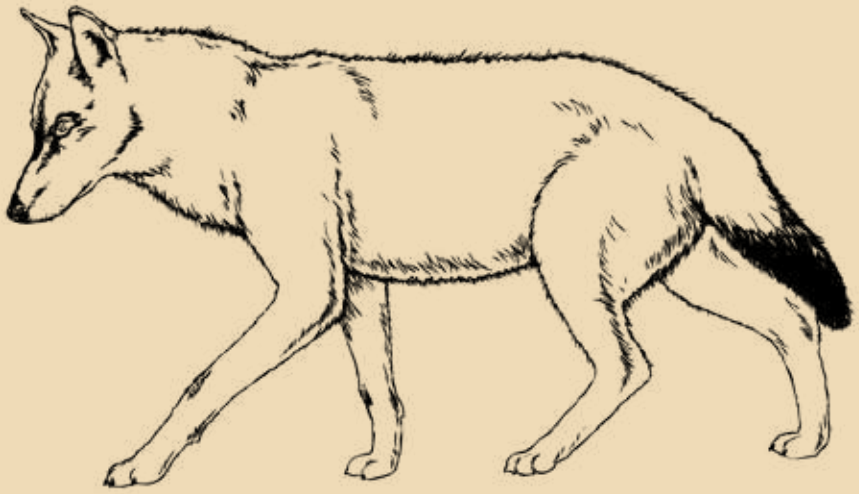

Iberian wolf
Canis lupus signatus

Like dogs and foxes, wolves are canids: they are the largest living wild canids. The Iberian wolf is the subspecies found on the Iberian Peninsula and may be distinguished from European wolves by their darker fur. Wolves live and hunt in packs. They prefer roe deer, red deer and wild boar, attack herds of domestic animals, and may display scavenger behaviour in periods of food scarcity. In Portugal, there are, on average, five wolves per pack, and about 60 packs in total, distributed throughout northern and central mountain ranges.

Conservation:
PT | Endangered | Endemic to the IP

NE DD LC NT VU **EN** CE EW EX

Mediterranean monk seal
Monachus monachus

This rare species occurs mainly in the Mediterranean, in vulnerable and fragmented populations. One of the two remaining resident populations of the North Atlantic is found in the Desertas Islands of the Madeira archipelago. Mediterranean monk seals can submerge for more than 10 minutes, using their eyes and long whiskers to forage for fish. Reaching up to 400 kg and 4 metres long, this seal is very curious and bold, approaching humans frequently.

Conservation:
Global | Endangered

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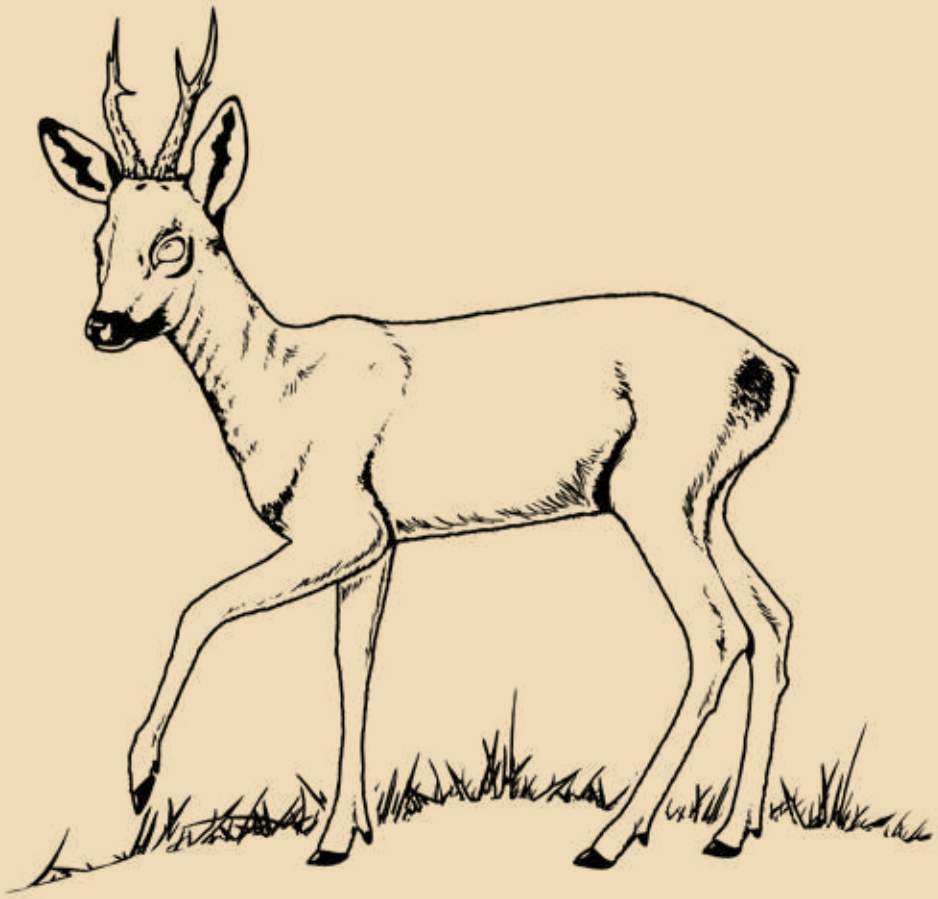


Roe deer

Capreolus capreolus

Roe deer prefer forests and woodland. In mainland Portugal, Roe deer are more commonly found in northern mountains and natural parks. A ruminant herbivore, this deer is a generalist, feeding on a wide variety of plants. Roe deer are preyed upon by Iberian wolves. Only males develop antlers.

Conservation:
PT | Least concern

NE DD **LC** NT VU EN CE EW EX

Red fox
Vulpes vulpes

The red fox occurs virtually across the entire northern hemisphere, in a multitude of habitats, including urban areas. Foxes are found from the north to the south of mainland Portugal. Parents care for their young. Families occupy burrows abandoned by other species, living there until their young become independent. A solitary predator of smaller rodents, the red fox also preys on birds, rabbits and even insects. Omnivorous, foxes often eat fruit, and are sometimes scavengers, feeding on carrion.

Conservation:
PT | Least concern

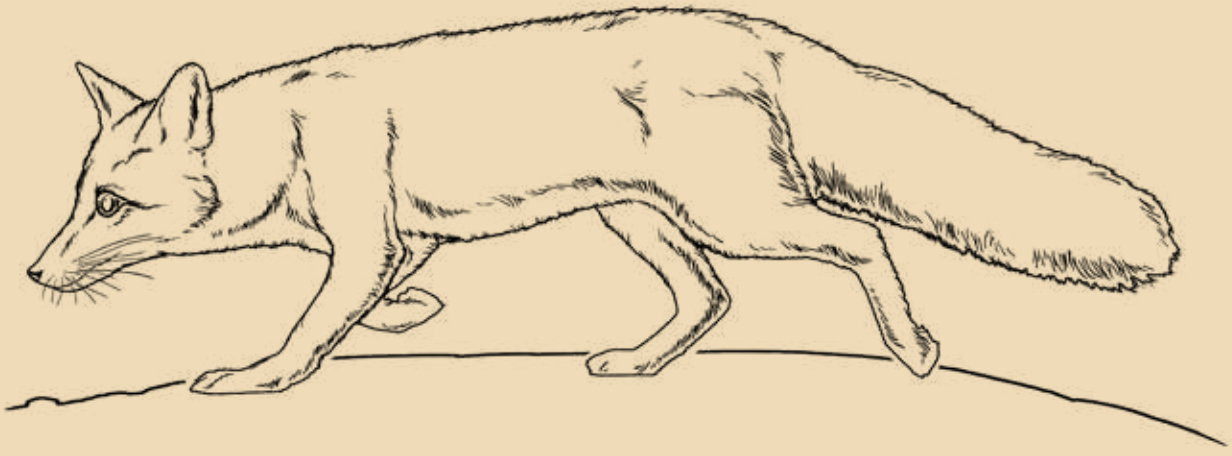
NE DD **LC** NT VU EN CE EW EX

Schreiber's bent-wing bat
Miniopterus schreibersii

Schreiber's bent-wing bat is distributed worldwide throughout tropical and subtropical regions with the exception of the Americas. This bat is found throughout continental Portugal, nevertheless forming only a few dozen colonies. Exclusively cave-dwelling, the bent-wing bat hunts in open areas, often over freshwater habitats, and hibernates in winter.

Conservation:
PT | Vulnerable

NE DD LC NT **VU** EN CE EW EX



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by Isselee)
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Image, exhibition and catalog credits
Exhibition credits

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Câmara Municipal de Lisboa | Lisboa Capital Verde Europeia 2020
Instituto de Conservation da Natureza e das Forests, I.P.
Universidade de Lisboa:
Museu Nacional de História Natural e da Ciência
Faculdade de Ciências

Curator
Cristina Branquinho: FCUL-cE3c

Steering committee
Coordenator: José Sá Fernandes: CML-LCV2020
Anabela Trindade: ICNF, I.P. | Cristina Branquinho: FCUL-cE3c | João Carlos Farinha: ICNF, I.P. | José Manuel Pinto Paixão – Ulisboa |Judite Alves: MUHNAC-ULISBOA | Margarida Santos-Reis: FCUL-cE3c | Marise Francisco: CML-LCVE2020

Executive coordinator
Marise Francisco: CML-LCVE2020

Museographic and graphic projects, and executive production
Toyno

Scenography and Graphic Material
Sala Bocage: Unveil
Sala da Baleia: Ypunto Ending, S.L.

Multimedia and Lighting
Ypunto Ending, S.L.

Assistant producers
Jorge Prudêncio e Rogério Abreu: MUHNAC-ULisboa

Accessibility
Acesso Cultura
Diana Carvalho: MUHNAC-ULISBOA

Cultural Program
Marise Francisco: CML-LCVE2020
Raquel Barata e Fernando Serralheiro: MUHNAC-ULISBOA

Communication
Filomena Costa, Paulo Vilhana: CML/DMC/LCVE2020
Filipa Vala: FCUL-cE3c
Mafalda Madureira, Tânia Ferreira e Tiago Ribeiro: MUHNAC-ULISBOA

Scientific committee
Anabela Trindade: ICNF, I.P. | Filipa Vala: FCUL-cE3c | João Carlos Farinha: ICNF, I.P. | Judite Alves: MUHNAC-ULISBOA | Margarida Santos Reis: FCUL-cE3c

Texts
Filipa Vala: FCUL-cE3c

Scientific reviewers
Algae, bryophytes, lichens, and fungi
Cecília Sérgio: MUHNAC-cE3c, César Garcia: MUHNAC-cE3c, Lourenço Ribeiro: FCUL-MARE, Ricardo Melo: FCUL-MARE, Vanda Brotas: FCUL-MARE
Arthropods
Ana Sofia Reboleira: FCUL-cE3c, Carla Rego: FCUL-cE3c, Eva Monteiro: TAGIS, Filipe Lopes: MUHNAC-cE3c, Frederico Almada: ISPA-MARE, José Paula: FCUL-MARE, Mário Boieiro: UA-cE3c, Patricia Garcia Pereira: FCUL-cE3c, Paulo Borges: UA-cE3c, Pedro Cardoso: UH-LUOMUS
Birds
João Carlos Farinha: ICNF, I.P., José Pedro Granadeiro: FCUL-CESAM, Martim Pinheiro de Melo: UP-CIBIO, Teresa Catry: FCUL-CESAM, Vítor Encarnação: ICNF, I.P.
Mammals
Anabela Trindade: ICNF, I.P., Andreia Pereira: ISCTE-UL, Filipa Samarra: UI, Jorge Palmeirim: FCUL-cE3c, Margarida Santos Reis: FCUL-cE3c
Oceans
Miguel Pais: FCUL-MARE, Sofia Henriques: FCUL-MARE
Paleobiology
Carlos Carvalho: UNESCO-IDL, Vanda Santos: FCUL-IDL
Fish
Clara Amorim: FCUL-MARE, Judite Alves: MUHNAC-cE3c, Paulo Fonseca: FCUL-cE3c,
Vascular plants
Ana Cristina Figueiredo: FCUL-CESAM, Isabel Caçador: FCUL-MARE, Manuel João Pinto: FCUL, Otília Correia: FCUL-cE3c, Sérgio Chozas: FCUL-cE3c
Reptiles and amphibians
Rui Rebelo: FCUL- cE3c
Protected areas
Anabela Trindade: ICNF, I.P., João Carlos Farinha: ICNF, I.P.

Proofreading
Portuguese: João Vilhena
English: Paul van Breemen

Literary excerpts
Coordinator: Margarida Fernandes: ICNF, I.P. CRIA LITESCAPE.PT
Translation: Ana Rita Martins: FLUL
Proofreading: Luka Alexander Clarke

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Specimen naturalization and modeling
Conservation: Catarina Teixeira e Laura Moura:
MUHNAC-ULISBOA
Naturalization and scientific modeling:
Pedro Andrade: MUHNAC-ULISBOA, Ana Campos
Models: Limosa limosa: COOL SET – Fábrica dos Cenários, Lda

Ilustration
Species: Nuno Farinha
Maps: João Carlos Farinha: ICNF, I.P.
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Daniel Pinheiro</td></tr>
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<tr><td>Islands</td><td>Nuno Sá</td><td></td></tr>
<tr><td>Where will we go next?</td><td>Ypunto Ending, S.L.</td><td>Natural.PT</td><td></td><td>Natural.PT</td></tr>
</table>

*Microscopic images provided by the FCUL Microscopy Facility - Luís Marques: FCUL-BIOISI.

Documentary about the wolf
Coordination, research, script, interviews and support to editing:
Margarida Fernandes: ICNF, I.P. - CRIA
Artistic Direction: Toyno
Video Production: Wildstep Productions
Photography and Audio: Afonso Abreu, Daniel Pinheiro, Luís Pinheiro
Video Editing: Daniel Pinheiro
Interviewees: António Rebelo, Francisco Fonseca, Gilberto Tomás, Humberto Figueiredo, José Rodrigues, José Dimas
Translation: Ana Rita Martins (FLUL)

Legal Advice
CML/DMAEVCE
Maria José Marreiros: CML-LCVE2020

Technical Support
Filipe Paiva, José Sousa, Manuela Carvalho (coord.)
e Paulo Gabriel: MUHNAC-ULISBOA

Security Plan
Márcia Valério: ULISBOA

Finantial Support
Fundo Ambiental

Acknowledgments
Ana Amorim, António Machado, Andreia Pereira, César Garcia, Clara Amorim, CML-DMHU, Câmara Municipal de Viana do Alentejo, Direção Regional do Ambiente dos Açores, Ester Serrão, Filipa Grilo, Filipa Samarra, Finish Museum of Natural History, Instituto de Forests e Conservation da Natureza, IP-RAM, João Belo, João Cunha Ferreira, José Paula, Lourenço Ribeiro, Luís Filipe Catarino, Manuel João Pinto, Maria da Luz Mathias, Maria Amélia Martins Loução, Museu de História Natural do Funchal, Otília Correia, Paula Simões, Paulo Foseca, Pedro Cardoso, Sofia Reboleira, TAGIS, Telmo Afonso, Tiago Marques, Universidade dos Açores, Vanda Santos.

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Anabela Trindade: ICNF, I.P.
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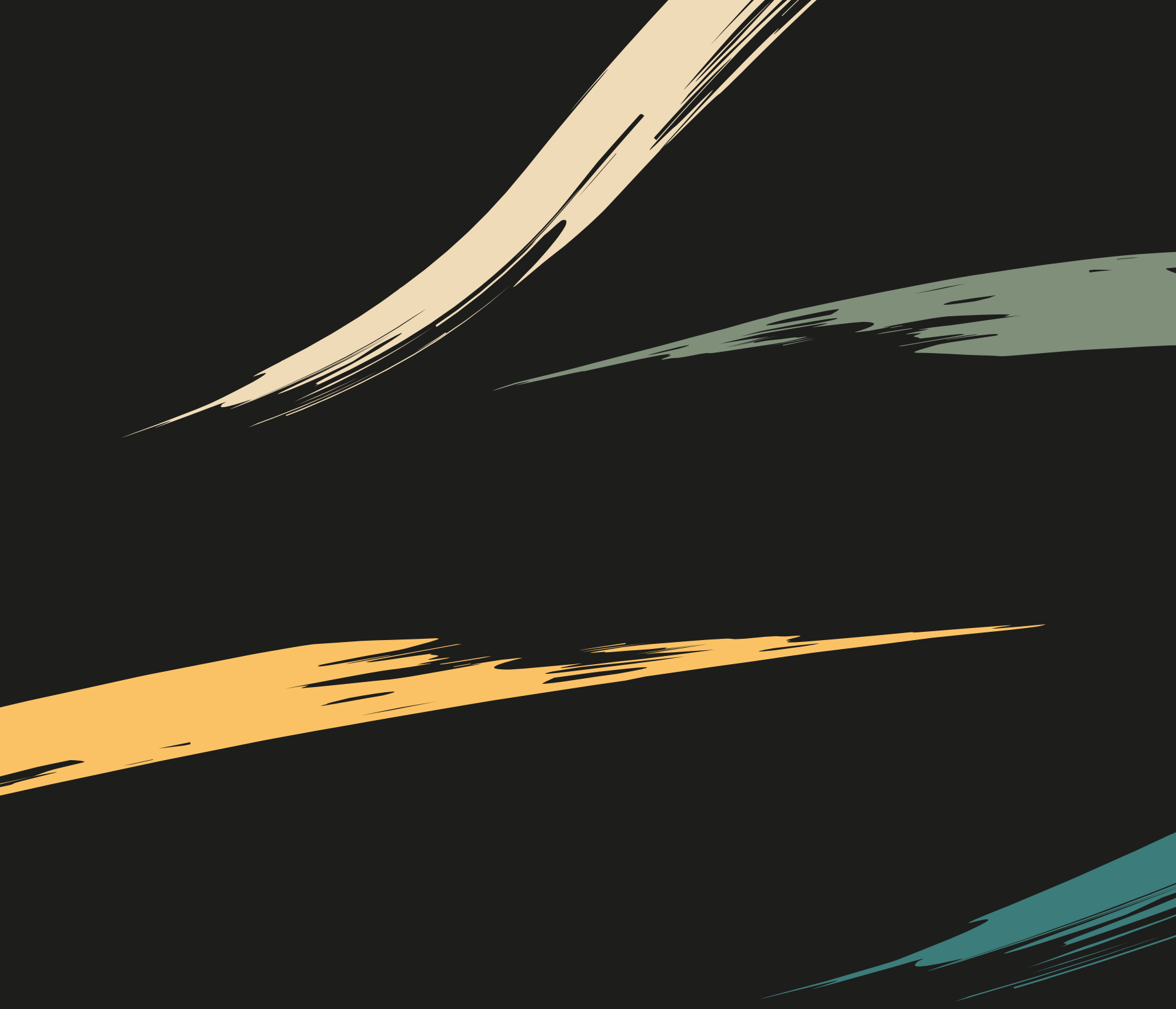
Filipa Vala: FCUL-cE3c
João Carlos Farinha: ICNF, I.P.
Judite Alves: MUHNAC-ULISBOA
Marise Francisco: CML-LCVE2020

Editorial-coordination
Cristina Branquinho: FCUL-cE3c
Filipa Vala: FCUL-cE3c
Marise Francisco: CML-LCVE2020

Project and graphic design
Toyno

Texts
The exhibition; The species – PT, ENG: Filipa Vala
The protected areas – Mainland – PT: Cristina Girão Vieira; ENG: Paul van Breemen
The protected areas – Azores: Carla Silva
The protected areas – Madeira: Paulo Oliveira

Acknowledgements
Adolfo Franco, Alexandra Baptista, Alexandra Cartaxana, Alexandra Gomes Oliveira, Alice Nunes, Alunos do Curso Avançado PSCA (Production of Science Communication Activities) 2019-20, Ana Campos, Ana Isabel Correia, Ana Lavrador, Ana Leal, Ana Luz, Ana Salvado, Ana Sofia Reboleira, André Gago, Andreia Sousa, António Brum da Silveira, António Lobo Antunes, Aquilino Machado, Artur Serrano, Carlos Coelho, Cecília Sérgio, César Garcia, Clara Amorim, Clara Crabbé Rocha, Conceição Freitas, Cristiane Bastos-Silveira, Filipa Grilo, Filomena Magalhães, Francisco Andrade, Francisco Petrucci-Fonseca, Gui Martins, Helena Serrano, Henrique Pereira dos Santos, Inês Barroso, Inês Matias, Inês Navalhas, Inês do Rosário, Isabel Correia, João Alves, João Pinho, João Pinto, Jorge Prudêncio, Jorge Bochechas, Jorge Palmeirim, José Barbosa, José Pedro Granadeiro, Helena Ceia, Leonor Vaz de Carvalho, Luísa Rodrigues, Manuel João Pinto, Manuela Sim-Sim, Margarida Fernandes, Maria Amélia Martins-Loução, Maria da Luz Mathias, Mariana Marques, Marina Sequeira, Mário Boeiro, Mário Cachão, Miguel Pais, Miguel Rosalino, Olímpio Martins, Otília Correia, Pedro Andrade, Paula Shrubland, Paulo Fonseca, Pedro Pinho, Pedro Prata, Pilar Del Rio, Raquel Viterbo, Ricardo Melo, Rui Rebelo, Sara Aliacar, Sara Dias, Sara Magalhães, Sérgio Chozas, Tiago Marques, Vanda Brotas e Virgínia Pimenta.



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