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EUROPEAN COMMITTEE FOR THE CONSERVATION
OF NATURE AND NATURAL RESOURCES

Committee of experts on protected areas

DONANA NATIONAL PARK
(Spain)

APPLICATION FOR THE EUROPEAN DIPLOMA

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Name : Donana National Park

Name and address of body responsible for its management : National Institute for Nature Conservation
Gran via de San Francisco 35
Madrid

Country : Spain

1. Type of natural area, site or feature

Wetland, mobile dunes and sand stabilised by matorral.
Appendix 1 : General description of the national park

2. Characteristics and scientific, aesthetic, cultural or recreative value justifying conservation

a. Scientific interest :

Extremely high : the park contains a series of primitive ecosystems whose fauna, flora and geomorphological formations are of great ecological value.
Appendix 2 : Ecosystems in the national park.
Appendix 3 : List of species of fauna in the national park.

b. Aesthetic interest :

Extremely high, because of the survival of three very diverse ecosystems and the quality of the landscape (dunes, marsh and matorral).

c. Cultural interest :

Extremely high, with abundant archaeological remains and the preservation of traditions and customs which have survived nowhere else. The region was the gateway to America for more than two hundred years. The park is also of the utmost importance for matters related to the biological sciences and their interpretation.

d. Recreative interest :

Extremely high : at peak periods (summer, Romeria del Rocio) more than a million people visit the park and its surroundings and for the rest of the year there is a constant stream of visitors.

3. European interest justifying the application

a. Area of concentration and passage of African species migrating to Europe and vice versa

b. Very important wintering area for numerous European species

c. Survival of species found nowhere else, such as the Spanish Imperial Eagle (Aquila heliaca adalberti) and of other species which are severel-endangered in Europe, such as the Pardel lynx (Lynx pardina), the Mongoose (Herpestes ichneumon), the Purple galinule (Porphyrio porphyrio) etc, as well as unique plant species such as the toadflax (Linaria thursica)

d. Very large populations of various species. ./.

4. Description of geographical position and 1 : 100 000 sketch

See Appendix 4

5. Photographs illustrating typical aspects of the area

Available in the Secretariat

6. Protective measures already taken or under review : Donana National Act

See Appendix 5

A P P E N D I X 1

GENERAL DESCRIPTION OF THE NATIONAL PARK

Doñana National Park, which covers 50 000 hectares of land surrounded by a further protected buffer zone of almost 25 000 hectares, is the largest and most important national park in Spain.

It is also the best known, both in Spain and abroad, not only because of its natural habitats but also because of the traditions and legends with which the region has always been associated. Its historical links with noble families, its use as a royal hunting ground, the visits by famous people of all descriptions and lastly its "discovery" by early twentieth century English naturalists have combined to turn it into a mythical paradise, a lost country where nature has remained virtually intact.

But the National Park's true importance lies in the extraordinary wealth of animal species which it contains ; it is on the one hand a refuge for endemic species which have either greatly declined or become completely extinct over the rest of their former range and at the same time an essential stage along the migration routes between Eurasia and Africa and an important breeding area for numerous species which winter in Doñana.

Species which breed in the region include 8 fish species, 9 amphibians, 17 reptiles, 125 bird species and 28 mammals ; a further 125 bird species pass through or winter in the region.

This exceptional wealth is the result of a combination of circumstances. The first is the geographical position, which exposes the area to both Atlantic and Mediterranean influences, and the proximity to the African continent. Generally speaking the Atlantic coast forms a long corridor down through which a number of plant and animal species have moved southwards protected by the maritime influences, species which in these latitudes could not survive in the more continental inland areas. Mediterranean species also extend as far as Doñana, where they occupy the driest and highest sites. The nearness of the African coast further enhances species diversity by encouraging the movement of flying and coastal species.

These varied influences have resulted in a considerable diversity of biotopes covering very wide areas, greater than the critical area required for the preservation of almost all the species originally present. The exceptionally good state of preservation of the park's ecosystems is due in places to the poorness of the soil, in others to soil instability, and to the swamps which have hindered human attempts to transform the area.

The diversity of biotopes is due to the existence of three major environmental systems : shoreline/dunes, stabilised or reserve areas, and the swamps in which several sub-systems and their intermediate transitional zones can be distinguished.

Doñana retains one of the few mobile dune systems in the Iberian peninsual. The active dune area covers a strip parallel to the coast, some 20 km long and up to 5 or 6 km wide. The mobile dunes consist of four great

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active fronts rising progressively in height inland, which as they advance leave behind them three series of depressions covered with sand stabilised by semi-shrub vegetation of cistus and heath with some umbrella pine.

Vegetation on the mobile dunes is much sparser, being limited to a few highly specialised species such as "barron" and "camarina". Animal life too is sparse, though we may note the presence of the sand lizard and a species of viper.

The reserve zone is currently occupied by a thick maquis of heterogenous composition, including a few scattered tree species : cork oak, strawberry trees, junipers, wild olives, umbrella pines and eucalyptus plantations. The variety of characteristics and needs evinced by these species is proof of the wide range of environmental conditions present.

The matorral consists of some thirty species whose distribution, clearly delimited, corresponds to two main vegetation types : a Mediterranean matorral with cistus, thyme, rosemary and lavender on the driest and highest sites, and an Atlantic matorral dominate by heaths whose darker tones inspired the local name of "black hills", in contrast with the "white hills' of the earlier mentioned group. It is even possible to distinguish a third sort, the "grey hills" which are to some extent a transitional area covered with shrubs, furze and some cistus.

This area houses some 80 species of vertebrates, of which just over half are birds. The resident species, include the imperial eagle, the buzzard, kite, kestrel, wood pigeon, partridge, screech owl, green woodpecker, long-tailed warbler, rook, jay and magpie. Migratory species include the white-tailed eagle and booted eagle, black kite, bittern, the "crialo", tawny owl, etc.

The most important mammals are the lynx, mongoose, fox, badger, field mouse, weasel, civet, wild boar, red deer and dormouse. Amphibians include the spade-foot toad, and reptiles the grass snake, horned viper, water snake, tortoise and a number of lizards.

Marismas (marshes) make up the largest and also the most important ecosystem in the national park. In their present form, which is filled in and away from tidal influences, they constitute a badly-drained plain in which the surface water of a vast basin converges along a series of river branches and furrows. Since it is now cut off from the Guadalquivir, whose influence is only apparent on the occasion of major floods, the most important sources of supply are the Travieso, Guadiamar and Madre de las Marismas.

The plant cover of the marismas depends on the marshy conditions imposed by the micro-relief and the salt content of the soil. The duration of the floods is the restrictive factor for their fauna and flora.

In the highest places the marismas have a halophyte vegetation consisting of chenopodiaceae such as the salty and sweet saltwort. The lower areas with seasonal flooding are covered by marshy plants, "bayuncos", corncockle and camomile. In the lagoon areas where water is always present and less salty, reeds, sedge and gladioli are to be found.

The marismas are essential as a wintering place for a number of water birds such as the Greylag goose, of which more than 40 000 arrive in a normal year, and other anatidae which account for between 2500 and 200 000 individuals. The common teal and the wigeon are the most numerous.

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In spring, a number of species of ducks, coots and other birds nest there as do the purple heron, stork, "fumareles" and "canasteras". Flamingos have also nested there on several occasions and their colonies have been extending progressively in recent years.

The Doñana wetland is the largest in Spain and has also been classified in the MAR project as exceptionally large among all those to be found in Western Europe and North Africa.

A P P E N D I X 2

ECOSYSTEMS OF THE NATIONAL PARK

ECOSYSTEMS OF DOÑANA

Cotos (game reserves)

Of the three major landscapes or environmental complexes in Doñana : reserves, shoreline/dunes and marismas, the reserves represent the terminal and mature type of Mediterranean forest ecosystem whilst the dunes and the marismas can be regarded as a pioneer and transitory ecosystem with considerable environmental control and very marked fluctuations.

The cotos are indeed the stable sector in which living beings have a more decisive part to play and constitute the most detached elements of landscape whilst being quantitatively important because of their biomass and the accumulation of matter or substances that they give rise to.

From the landscape point of view, the cotos change little during the year ; apart from their colour, and that is because of the predominance of one of the component parts : the white or pink flowers of the heather, the yellow of the small shrubs, the broom and the snapdragon. The animals are difficult to see and are not as spectacular as the swamp birds, but they do offer extremely interesting features such as the large mammals (red deer, wild boar) and the beasts of prey (lynx, imperial eagle).

A description should first mention the general characteristics of the vegetation and its relations with the environment, outstanding animal species and local variations or important subsystems.

The cotos are covered by dense matorral of varied composition with isolated specimens of cork oak , juniper, strawberry tree, wild olive, buckthorn, ash, umbrella pine and plantations of umbrella pine and eucalyptus. Apart from the plantations, the tree population is restricted and the ecosystems dominated by the matorral.

The matorral consists of some 30 ligneous species with a well-defined distribution corresponding to two major types of vegetation : a Mediterranean matorral with thyme, rosemary and lavender, Cistus libanotis, Helychrysum italicum, Halimium commutatum and an Atlantic matorral dominated by heather species, Calluna vulgaris, Erica scoparia, E. umbellata, E. australis, E. ciliaris, which give it a dark "black hills" colour, accompanied by large graminaedae : Erianthus ravennae, Imperata cilindrica, with myrtle and buckthorn.

The Mediterranean matorral is to be found on the windy crests, the higher parts and, in general, in the dry and exposed places ; the Atlantic matorral is located in depressions or wetlands close to the groundwater. Between the two extremes there is a third type of matorral with a rather pioneering or opportunistic character, dominated by one species which is characteristic of it : Halimium halimifolium, whose greyish colour has given rise to the name "white hills" for that type of matorral. It is accompanied by Staurancanthus genistoides, Genista anglica and sometimes by a cistus : Cistus salvefolius.

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Physiologically the species of the Mediterranean matorral stand up to the summer drought very well. Those of the black hills are incapable of surviving without a continuous supply of water in the summer but stand up very well to wintry, marshy conditions. Those of the white hills colonise the exposed areas and would only disappear at more mature stages because of competition, since they are fostered by fires or upheavals.

The Mediterranean matorral is between 0.3 and 0.8 m in height, the soil covers less than 30% and the biomass is exceedingly low, from 100 to 250 m/m2/per annum.

The white hills variety is from 0.7 to 1.5 m in height, the cover is between 70 and 90 % and the biomass between 500 and 1,000 g/m2 of dry matter, with a productivity of approximately 200 g/m2/per annum.

The black hills variety is 2 - 3.5 m in height and on occasion as much as 5 m ; the cover is 100% with stratification ; the biomass is high, ranging from 2 to 4.5 kg/m2, and the productivity is approximately 500 g/m2/per annum.

There are some 80 vertebrate species, half of them birds. The resident population includes : the imperial eagle, the buzzard, kite, kestrel, wood pigeon, tawny owl, green woodpecker, lark, long-tailed and black-headed warbler, "tarabilla", common falcon, blackbird, crow, jay, roller, magpie and tit. The migratory species include several varieties of eagle, the black kite, bittern, "crialo", screech owl, nightjar, bluetit, nightingale, royal falcon and the robin.

Apart from the lynx and the mongoose, the most important mammals are the fox, badger, dormouse, Andalousian weasel, civet, wild boar, red deer, rabbit, hare, common rat, field mouse, common mouse. To these should be added the Chiroptera and a few rare species. The spade-food toad is important among the amphibians and the reptiles include the grass snake, the horned viper, the water snake, the red-tailed lizard, the scaly lizard, the common lizard, and the tortoise.

The requirements of some of these species are so varied that the ecosystem of the reserves should be broken down into a number of important subsystems.

The destruction of the plant covering by fire or tree-felling creates open spaces whose colonisation by ligenous vegetation is slow, since transitory pasturage establishes itself for from two to five years followed by a low maquis which closes over slowly. Shrubs or trees then appear and there are no mature stages for forests in Donana. The open clearings are important for pioneer herbaceous species and fauna such as the bittern, the lark or the red-tailed lizard. Other species are encouraged indirectly since they use the open spaces for grazing (deer, rabbit) or hunting (lynx, predatory species, falcon).

At the other extreme, the mature stages, including the development of tree cover, are very important because of the fact that trees organise space and are themselves important component parts (greater productivity, source of food - seeds and leaves).

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The dry savin forest holds little attraction for animals although it is very thick. On the other hand, the mixed forest including the cork oak, strawberry tree, kermes oak, wild olive, together with buckthorn, myrtle and heather as underwood is of outstanding importance. The cork oak with its extensive crown (sometimes as much as 12 m in diameter) is occupied by nests ranging from the most complex and the largest, such as that of the imperial eagle, to the simplest such as those of the wood pigeon, the magpie, the "crialo", and the kestrel, the falcon, the kite and the "calzada".

The jays, green woodpeckers, tits, screech owls, tawny owls, civets, dormice, "caretos" and bats take advantage of the cavities or cracks.

In view of repeated fires, many of these trees have remained isolated on the edge of humid depressions, where a temporary or permanent lagoon forms and is surrounded by dense pasturage ending abruptly in a band of heather with Ulex minor. The pasturage consists mainly of Agrostis stolonifera with Mentha pulegium, Anagallis arvensis, Illecebrum verticillatum, Hypericum tomentosum, Eleocharis palustris, with Echinodorus ranunculoides, Hydrocotyme vulgaris, Anagallis tenella, Lotus subbiflorus in the more widely flooded areas and isolated specimens of Senecio jacobea. Small expanses of Pteridium aquilinum are frequently found at that level and rushes (Scirpus holoschoenus, J. effusus, J. congolmeratus) appear near the springs or little lagoons only if the water is permanent and deeper and are accompanied by Typa latifolia and more rarely by phreatophytic species such as the white poplar and the tamarisk.

The little lagoons between the dunes supplied by the discharge from aquifers at the edges of the mobile dunes or the stablished sand banks are small stretches of shallow water (depth from 0.5 to 1 m) which usually last for varying periods (six to eight months) but may be permanent (Santa Olalla - Dulce) or may even disappear for a number of dry years followed by years in which the water levels may be as much as two metres (Heath lagoon). The waters are atrophic and neutral and a considerable amount of organic matter may be suspended in them.

The vertebrates found in them include the newt, the San Antonio frog, spade-foot toad, natterjack, amphibians and water snakes. Eels, mud turtles and "icoteas" are also to be found in the deeper lagoons (Santa Olalla, Zahillo, Taraje). Carps are plentiful in Santa Olalla.

The main predatory species living off these colonies of fish in the lagoons was the otter, which has almost disappeared from the Guadalquivir. They are sometimes fished by the fish eagle, the heron, the purple heron and perhaps the stork and black kite. The mud tortoise, the water snake and water birds must have a slight influence.

La vera

The matorral of the reserves is linked to the marismas by a 200 to 1,500 m wide strip known as "La Vera" and corresponding to a major ecological gap which obviously coincides with an important break between the two areas, marked by repeated tectonic activity.

In this strip, the topographical level descends slowly from 3-5 m in the matorral to 1 - 2 m in the marismas and there are equivalent changes in the depth of the groundwater, soil and vegetation. The latter changes from maquis to white hills and then to impoverished black hills

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with isolated strips in the form of major heath areas and large areas of ferns which constitute continuous bands up to a breadth of dozens of metres.

Grazing areas appear at the lower level : if they result from a sandy and dry sub-stratum, the grass is poor and dominated by by Rumex bucephalophorus, which gives it a distinctly reddish colour, together with Plantago coronopus, Erodium cicutarium, Vulpia membranacea and a geophite species of greater importance ; Urginea maritima or a species of onion. These areas of poor and dry pasturage are frequented by rabbits, deer, "canasteras", the common lark, waterfowl.

Curiously enough, the tit nests here, on the surface of the soil, taking advantage of the odd rabbit burrow.

At the lower level, nearer to the swamp, we find a richer pasturage whose species are dominated by Asphodelus cerasifer together with Trifolium subterraneum, Ornithopus pinnatus, O. roseus, Agostis stolonifera, Tolpis barbata, Briza minor and others. At an even lower level, with a winter marsh, the asphodelus disappears and the vegetation is dominated by Senecio jacobea, Trifolium resupinatum, Ranunculus bulbosus, Cynodon dactylon, Juncus buffonius, Mentha pulegium, Juncus capitatus.

The gap between the swamp consists of a thick band of rushes in which J. acutus and J. maritimus, close to J. effusus, J. conglomeratus and Scirpus holoschoenus.

The wettest grazing area is used by the moorhen, the "buscarla", the quail, the water rat, the little mole, the spade-foot toad. Many "predators" capture them here : snakes, kites, buzzards, imperial eagle and other species of eagle, etc.

The more intense "majadeo" of the pasturage is due, however, to rabbits, fallow-deer, red deer and wild boar

The wild boar is continually in search of rhizomes, bulbs and animal prey, thereby constantly rejuvenating the pastures.

The presence of cork oaks in the marismas near the fringe gives exceptional characteristics, because the rich fauna of the cork oak includes colonies of gregarious birds (mainly herons). Since they tend to nest in bushes or shrubs, they correspond to reserve species which exploit the lagoons or water courses with a vegetation (reeds) which was originally frequent in the area. There are or have been colonies of these species in the streams (eg the Mazette) or the lagoons (eg the tamarisk). The existence of colonies in the fringe areas is a specific feature in view of their enormous size and their striking nature, accentuated by the enormous cork oaks in which they live and which constitute one of the characteristic features of Doñana.

Although the stork, heron and spoonbill, which occupy the upper nests, predominate, there is also a large number of pairs of little egrets, "picabueyes" and night heron.

During the nesting season they are habitually joined by almost as many black kites, which feed on the carrion (small chicks which fall out of the nest, waste matter) and also snatch young birds out of the nests. A particular type of colony is formed by a dense cluster of storks' nests on the eucalyptus trees at the edge of the marismas, near the palace in the Royal Reserve.

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The chain of cork oaks occupied by the colonies is the remains of the old cluster of cork oaks which extended from close to the fringe and also contained a large number of ash trees, wild pears and poplars, of which isolated specimens and larger groups can be found in the north of the park (Mazette, Royal Reserve). This northern region is more frequented than the fringe area by the civet, field mouse, hedgehog, nightingale, owl, screech owl, "crialo" and tawny owl.

Pine Woods

There can be no doubt that the pinewoods which exist in the park are traces of the original vegetation, except perhaps the Lighthouse Pinewoods. Although the umbrella pine has regenerated, and it is known that it existed earlier in the region, pinewoods have often been planted. The pine is well adapted to the sandy subsoil and the climate and it grows well, although slowly and with generally twisted branches.

The reforestation operations in the 40s and 50s which were abandoned immediately after planting are in a poor state ; the trees are too close together, between three and four metres high and thirty years old. Other areas which were reforested earlier and properly looked after are in better shape and the trunks are as much as 10 to 15 metres high.

Although the bird population is smaller than in the areas planted with cork oaks it remains large and the following species nest there : imperial eagle, short-toed eagle, buzzard, kite and black kite, kestrel, wood pigeon, crow, magpie, "rollier", royal and common falcon, goldfinch, green woodpecker, etc, in addition to the fauna referred to in the marismas.

Although the pinewood is open, the maquis is similar to that in the treeless areas, but the humidity is greater.

The beaches and dunes

The intense natural movement along the coast is constantly changing the profile of the beaches. Only in the higher and more stable areas do we find the characteristic vegetation with Agropyrum junceum, Cakile maritima, Euphorbia paralias, Lotus creticus, Eryngium maritimum, Crucianella maritima, Diotis candisima and Carex arenaria.

This fleeting vegetation is daily destroyed by the accumulation of sand or upheavals during storms.

Higher up begin the small dunes with an abundance of graminaceae (Anmophila arenaria) which stretch inwards throughout the whole dune system accompanied by Artemisia chritmifolia, Pancratium maritimum, Scrofularia canina and Armeria gaditana.

The seabed near the beach is covered with areas of Cymodocea nodosa and of course, Zostera marina, together with abundant quantities of lamellibranchia and gasteropodes such as : Panopea glycimeris, Pecten maximum, Anonia ephippnne, Solen marginatus, Donax anatinum, Lutraria lutraria, L. oblonga, Mactra canaleas, Murex brandarius, Apprihanspes pelicani, Turritella connus, and seaweed of the Fucus genus.

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On the rocky bed we also find Crassostrea angulata, Mytilus edulis, acorn shells (Chthamalus stellatus) and a large number of seaweeds particularly Gelidium species (G. pusillum, G. spathulatum), Laurencia, Gigartona acicularis, Canlocanthus, Cymnogongrus griffithsiae and others.

The beaches are covered with animal remains swept up by the waves and include large numbers of local species such as lamellibranchia, gastropods, crustaceans, coastal fish ; seaweed, turtle grass and sometimes organisms of more distant origins such as Spirula or Velella and, more rarely, selachians and cetaceans. Turtles and seals have been washed up, sometimes alive.

Sea birds also frequent the coast. Their remains can be seen on the beach after violent storms and include the "alca", plover, "sea ducks", cormorant, albatross.

More specifically coastal birds are also found : herring gull, lesser black-headed gull, Mediterranean gull, "vauriens", "fumarel", oyster fishers, and other limocolae, "correlimos", button quail.

Among these, only the Charadrius alexandrius lives more permanently on the beach and nests on it. Strays from the marismas are also very frequent, such as kites and crows which take advantage of the remains left behind by the tide. More rarely other vertebrates such as the lynx, fox or wild boar rove on the beach in search of remains. A pair of falcons and another of owls are usually to be found at Torre Carboneros.

The dunes system

The contrast between stable and depressed areas (slacks) and unstable and elevated ones (dunes) is very marked and has a considerable influence on the ecosystems. The slacks are occupied by maquis which alternates with pasturage frequently associated with umbrella pines. The maquis differs according to the depth of the groundwater and the age of the slack. In the most recent ones we find shrubs : Corema albun, Scrofularia sufruticosa, Helychrisum italicum, Festuca rubra, Corynephorus fasciculatus, Armeria pungens, Artemisia chritmifolia, Silene psamiti, Linaria pedunculata.

As it becomes more stable, the umbrella pine coverage is in principle important and the slack is invaded by types of bushes similar to those on the white hills and the black hills of the reserves. The lowest areas have a large amount of Scirpus holoschoenus and vast patches of Agrostis stolonifera together with Mentha pulegium, Anagallys tenella, Hydrocotile vulgaris, Carex spp and other species already mentioned in places where there is much damp grass between the lagoons. It is interesting to mention in this context Lobelia urens and a small species of toadflax endemic to the area which constitutes one of the biological jewels of Doñana. It is the thursic toadflax, found and described in 1977 by research workers from the Department of Botany at Seville University.

The stable forest stages are absent in the dunes and the species found there, savin (J. phonicea var. lycia) and the juniper (J. oxycedrus ssp macrocarpa), are reduced to isolated specimens or small residual patches, the last trace of the woods which covered the dune system in an earlier stable phase.

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The Marismas (swamps)

This is an extremely interesting system because of its high productivity and the way in which it is slanted towards animals (particularly birds) for many of which it is an essential migration spot. The extent of the mark's marismas (approximately 27 000 hectares) and their excellent conservation makes them even more valuable.

Mention has already been made of the senescent character of the marismas, which are already out of touch with the sea and the river which brought them into being and have become converted largely into an endorheic badly-drained plain criss-crossed by elevated furrow drains. The predominant change of environment which conditions the topology of ecosystems is the duration/depth of the marsh which determines the pools, reeds and crevices, the flooded swamp, the dry swamp, veins and "paciles" and the fringe.

The pools of the swamp (Los Ansares, Membrillo, Mari-Lopez and other smaller ones) still have a concentric structure of ecosystems with a deeper central depression without vegetation and a "verge" varying from 10 to 300 metres wide dominated by "bayunco" (Schoenoplectus lacustris) with a marshy plant (Scirpus maritimus) as a subsidiary feature.

These very shallow expanses of water (the maximum depth does not as a rule exceed 1.20 metres) have a peculiar annual cycle : during the summer drought they are very small or even completely dry with a cracked bottom of grey clayey alluvium, sometimes covered (Membrillo) with salty crusts. When the autumn arrives the water accumulates from rainfall (and frequently as a result of artificial communication with the river). After the heavy rainfall in December and January it normally reaches the maximum level which may be considerably higher than that of the Lucio. It has been estimated that during the rainy season some 30 000 hectares of swamp are flooded on the right bank of the Guadalquivir, although the water does not form a continuous sheet. After this maximum has been reached a decline sets in which speeds up considerably from the month of May.

Because of the strong winds and the shallowness of the water, permanent stratification does not develop. The water temperature, which is low in winter, reaches 32 degrees in the central part and 36 degrees at the edges in summer under the marshy vegetation. The water is alkaline.

The northern part of the marismas is not flooded for any length of time, but only for a short while (1 - 3 months) after the winter rains because of its impermeability and slow drainage.

The low salt content of the soil has resulted in the vegetation being dominated by Artrocnemum perenne, A. glaucum, Salicornia ramosisima with an occasional lagoon of herbaceous plants among which Plantago coronopus and Hordeum maritimum are noticeable, sometimes growing in association with the species mentioned previously.

The animal population in the marismas is low and confined to species related to a certain extent to the steppes, such as the marsh lark. As the humidity increases other species arrive, ie the common lark, bittern, sandgrouse, hazel hen, calandra, Montagu's harrier, hare, mouse, common rat. The following species concentrate near a depression, drainage canal or reed bed where water accumulates : spade-foot toad, amphibians, water snake and duck, teal, moorhen , coot, "limicolos", little grebes, heron, little egret, stork.

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Animals which died near these reed beds or water-filled depressions when they came to drink, by sinking in the mud or being drowned during floods, attract a spectacular range of carrion-eating species distinguished by their rarity, such as the black vulture, followed by the "leonado" which can be seen flying over the park in large numbers. Magpies are particularly active and are accompanied by waterfowl, black kite and kite.

The wild boar also intervenes on occasion as a carrion eater as does probably the common rat.

The deepest part of the marismas (from 15 to 50 cm of water in winter) has numerous aquatic plants such as Ranunculus peltatus, R. tripartitus, R. trilobus, R. baudoti, Eleocharis palustris, E. multicaulis, Juncus heterophyllus, Potamogeton trichoides, Zannichellia pallustris, Chara, Myriophyllum alterniflorius, Elatine alsinastrum, Damasonium.

The high primary productivity of the vegetation above water is matched by that of the submerged vegetation (Chara, Zannichellia, Damasonium, Cladophora) and plankton, which maintains zooplankton and a large amount of benthos which provide a large amount of exploitable resources, although these are entirely seasonal.

Migratory birds are the vertebrates which lend themselves most to exploitation, and indeed the wealth of water birds in the swamp is unbelievable. In the winter during the flood season, the population may be as high 40 specimens for each hectare under water.

The enormous bird population, nearly 250,000 specimens, can be broken down into 20 species which are frequently present and just over 30 which appear more rarely. The most numerous are the mallard, the teal, the shoveller, whose population exceeds 25,000 specimens, whilst the coot, pintail, pochard, red-crested pochard, gadwall and shelduck have smaller populations.

Two other species are to be found in large numbers : the greylag goose, which exceeds 50,000 specimens, and the flamingo of which there are approximately 10,000.

Other species represented in smaller numbers are : ruddy shelduck, garganey, marbled duck, tufted duck, crested coot, white-headed duck, moorhen, etc.

The larolimicolae include lapwing, blackfooted curlew, avocet, stork, slender-billed gull, "charrancito", "fumarel", "cariblanco", "pagazapiconegra", "canastera".

Reference has already been made to the presence of herons and other bird species from forests and copses as well as from steppe areas which occupy the dry marismas in the summer (larks) as well as to that of mammals, reptiles and amphibians.

From an ecological point of view it is interesting to note how such a varied community of water birds develops in a biotope with such striking annual changes as the marismas.

The dry period prevents the existence of plankton, benthos and water vegetation and makes the bank of seeds, fruit and rhizomes inaccessible and useless to water birds. With the autumn rains the swamp is flooded and

and the water and bulbs from the swamp plants are available for greylag geese (and wild boar) as are the seeds in the soil for most of the water species, particularly the mallard which returns very early to the marismas.

Owing to the advanced state of the marismas' development, the flooded areas are shallow, thus favouring surface species rather than divers, ducks and seabirds. The co-existence of species requiring similar ecological conditions is possible thanks to a series of supplementary strategies including, as far as ducks are concerned, the choice of slightly differing biotopes, lagoons, reed beds, pools) which are frequented because of their different types of food by species of different sizes (the largest going to the depper parts). As the increasing summer drought gradually prevents that separation by bringing all the species together around the few remaining areas of water, competition increases and the number of species in the marismas diminishes. Those which remain are birds which are more flexible where food resources are concerned and whose nests cover smaller areas.

The other species disperse to other areas in the province or even further afield (the Peninsula, North Africa), where competition is less keen because of the smaller bird population or because the biotope is structurally more complex.

The remains of the rushes on the sand and in the dunes in the marismas leads to the formation of a very dense area of vegetation with an abundance of sedge, gladioli, marshy plants and "bayunco" which contribute to split up and progressively fill the bed. The "Brazo de la Torre" is a very striking example of that process. Its role is important for species which frequent dense cane plantations or deep waters, such as the purple gallinule, purple heron, red-crested pochard, pochard and rare white-headed duck, as well as other ducks and teal.

Furthermore, the common "carricero" and the thrush are exclusive to these formations together with water animals and reptiles such as the pond tortoise, "icotea", common frog, San Antonio frog, newt, water snake, and fish like the carp or "panarra", eel, "pejerrey', mullet, etc.

The La Rocina rush deserves special mention because it retains a sort of dense wood which must have been a characteristic of other rushes before intense human interference. In La Rocina the damp cork oaks have been replaced by maquis near the river bed, where there are many ash trees and willows and the maquis corresponds to black hills or hygrophitic maquis with liana : R. ulmifolius, Silax aspera, Lonicera periclimenum.

The maquis on the shore gives way to an area of deeper water dominated by a belt of rushes followed by marshy plants and "bayunco", with open water in the centre. This structure is particularly favourable for the development of an ecosystem rich in animal species combining those of the marismas and the fringe wood and those found where there are abundant rushes as well as swamp as such : the colony of heron at La Rocina became one of the largest in Doñana a few years ago.

The narrow strips of swamp which remain above water correspond to the stretches where grasses of a different type thrive according to whether the sub-stratum is sandy of clayey. These exposed areas, known as "vetas" or "paciles", provide refuge during the floods for land species such as the deer, hare, mouse, and rat and are frequented by other water species such as coots or greylag geese.

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The vegetation is dominated by Limonium ferulaceum, Sphenopus divaricatus, Medicago disciformis, Trifolium tomentosum, Pholiurus incurvus.

After the water has dried up, these arid areas are occupied by the buzzard, sandgrouse, grouse and various species of lark.

The transitional area between the banks of the flooded swamp and the wooded fringe takes the form of a series of very flourishing clayey pastures whose composition depends to a considerable extent on the degree of the annual floods and whose phenology is very marked in a single cycle. The flooded areas carry S. maritimus, Aleuropus littoralis and Polypogon maritimus. In a drier area where the soil is more sandy we find Anthemis cotula, Melitolus sulcata, Hordeum maritimum, Spergularia tangerina, Trifolium ornithopodioides, Frankenia hirsuta, Plantago coronopus. Lastly there are the dense rushes of the Juncus maritimus and J. acutus, which have a different type of foliage on their stalks a little above the ground, together with Trifolium maritimum, Vicia lutea, Geranium disiectum, Cerastium glomeratum, Galium palustre and also Carex chaetophylla, Juncus articulatus, J. heterophyllus, J. enmanuelis, Lithrum hysopifolia, Scorzonera fistulosa.

These intermediate areas are regularly grazed by fallow-deer (which find refuge in the rush beds), wild boar and horned cattle ; red deer and rabbits are less common. The pools and lagoons of the matorral are invaded by an enormous number of spade-foot toads which are eagerly pursued by their "predators" in these grassy areas of the wooded fringe.

Relations between ecosystems

Reference has already been made to the existence of three major environmental complexes in Doñana : reserves, beach/dunes, marismas. But other peripheral major systems have also been referred to : pastures, reforested areas, crops, ricefields, the Guadalquivir and the Gulf of Cadiz, with which the Doñana ecosystems establish relations.

I should now like to refer to a number of groups of relationships, first of the three complexes of the park among themselves and then between these and the peripheral areas.

The environmental complex of the reserves is on the whole that which is most isolated from the others. Its water supply comes from rainfall which it loses by evaporation and, to a lesser extent, from infiltration and shallow layers of groundwater, but rarely from surface sources.

The soil is extremely poor and most of the food content is stocked in the biomass. The latter's photosynthetic content is low (approximately 0.2). The biomass of herbivorous animals and upper layers is very low. As an ecosystem it has considerable stability throughout the year. The vegetation biomass influences the area to a marked degree, considerably affects the micro-climate, stores most of the ecosystem's food matter and has a low gross productivity. It represents a degree of maturity which is much greater than that of the other ecosystems. In spite of its Mediterranean character it constitutes the main stable ecosystem in Donâna.

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That characteristic makes it a base or refuge for the major grazing species which exploit other less mature, organised or more productive ecosystems in the reserves : these are the birds of prey and the large mammals which exploit the marismas and the dunes thereby leading to a flow of food and matter towards the reserves. This ecosystem is not easily affected by outside phenomena, apart from fire which causes large-scale destruction by preventing structuration and the accumulation of food matter in the biomass and thus makes development processes very slow and difficult.

Of the four major sub-systems referred to in the reserves that of the savins is the most stable and poor in respect of biomass and productivity.

Mixed forests consisting of cork oak and wild olive, with a much greater biomass and productivity, structure the space on a larger scale, create a more uniform micro-climate and retain a considerable variety of elements. Most of the major vertebrates are associated with them, although at present they have degenerated towards secondary maquis.

The existence of small enclaves where the marismas maintain a grazing area free of ligneous species constitutes points of high productivity and are taken advantage of by herbivores and their predators ; the largest structures with permanent water supplies (lagoons) considerably enrich the aquatic ecosystem (much more productive per surface unit) by exploiting it.

A particular case is constituted by the gallery of trees to be found in the fringe area and in contact with the marshy complex. This gallery, which forms vast areas of pasture in the north of the park and must originally have been the point of contact with the marismas, is the centre of the most important bird colonies. These colonies, consisting mainly of herons, exploit the ecosystems from the most stable and organised to the least stable (marimas) and result in a new flow of elements and matter similar to that of the vertebrates, but restricted in time (only when they are nesting) and very local : the colonies are densely populated but scattered.

Another important species as a source of food supplies is the spade-foot toad : it exploits the transitory sub-systems of the little lagoons and pools in the reserves, reaches maturity there and then invades the edge of the swamp in the form of massive migrations. In this case it behaves as a swamp organism exploiting the less stable facies of the ecosystems of the reserves (enclosures).

The beaches and dunes are considerably influenced by the geomorphological processes which have an extremely active biotope.

The three sub-systems consisting of beach, dunes and enclosures differ considerably from one another. The beach has the characteristics of a frontier or ecotonia between the Gulf of Cadiz and the mainland which extends beyond the limits of the actual dunes system ; the lynx, foxes, wild boars and kites which reach the beach normally come from the "reserves".

In its turn, the beach as such contains organisms of its own, plants in the higher part which are eaten by "nutrientes", land invertebrates, mainly insects, etc which eat up organic remains or hunt species which do so. All these biocenoses are supported by organic matter brought in by the sea

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in the form of debris left behind by the waves. The birds use the beach during their full cycle ("correlimos patinegro") as a food reserve or simply as a more stable refuge (many seabirds). In view of their greater stability and structuration in relation to the sea, the beach organisms exploit this ecosystem to a certain degree.

The net flow from the beach towards the dunes and enclosures is basically sand although it is possible that other elements (Ca, M, P, Na, K) are involved.

The biomass and productivity of the sands is very low, 3 or 4 orders of magnitude less than the enclosures.

The functioning of the enclosures is comparable to that of the reserves' ecosystems but their extension is very limited (eg islands of shrubs in the sands) and their stability less : more violent fluctuations of the piezometric surface, progression of the dunal fronts. In view of their more effective organisation, greater biomass and higher productivity, the enclosures tend to exploit the contour of the dunes : the vertebrates in the enclosures graze and hunt on the dunes (outside the enclosure). The interplay between the enclosure and the dunes in the environment comes into being through two frontiers or through dysymetrical interphases parallel to the beach : the dunal front advances and destroys (exploits) the ecosystem from the outside. Only when the latter is very highly structured (considerable accumulation of biomass in the form of large trees, thick maquis) may the advance of the dune be checked or slowed down. Through the other frontier, also dysymetrical, the enclosure exports organic matter which initiates a process of succession finally leading to the existence of an enclosure in that direction.

The enclosure and the dune are thus unaffected by fire and experience intense climatic changes because of variations in the depth of the piezometric surface.

The relations with the complex of "reserves" are established by a chain of lagoons between the dunes which are supplied by aquifers in the dune system itself. The development of these areas takes the form of a humid depression in "reserves" with all its wealth of biotopes and organisms although the lagoons are not very stable as far as their water level is concerned (and consequently in respect of the aquatic ecosystems which generally retain a distinctly pioneer character) and also because of the periodical invasions of sand which destroy them.

Contact with the marismas is in principle rather abrupt : discharge from aquifers continues and may lead to trickles of water and other types of "springs" near the lagoons. The invasion of sand into the marismas is very marked although the amounts vary considerably. The large vertebrates which require extensive pastures pass from one formation to another.

An interesting case is the use made by the geese of the sand from the dunes to help masticate their food.

The marismas are the park's most productive ecosystem and that explains its considerable capacity for conserving the animal biomass and the use made of the latter by species from other complexes. It is interesting to note that the primary productivity is highly seasonal (end of winter, spring) and not made use of in the stable structures (the vegetation

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is almost completely herbaceous) ; only small quantities of bulbs and fruits accumulate (mainly rhizomes from marshy plants). As a result food is not accumulated in the biomass since its circulation is greatly accelerated.

This primary production can be exploited effectively only by migratory species or those with a very high reproduction rate. The quantity of energy available for suspensors, detritriverous and decomposing agents is very stable.

With such a concentration of nourishment in the soil and a favourable climate, the limiting factor is water.

The impermeability of the soil means that the decomposition of organic matter becomes anaerobic a few millimetres below the surface thus favouring the existence of organisms such as Chlostridium botulinicum which causes extensive destruction in the area.

The presence of numerous migratory waterbirds requiring different food sources permits the exploitation of an important proporition of the primary and secondary production, although amphibians and fish and a number of groups of water insects or larvae (coleoptera, diptera, dragonflies, erypthroma, etc) are very abundant.

During the dry season the fauna of the swamp in the dried up areas is composed of species which flourish in arid places or indeed in the steppes.

As a fluctuating, very productive and slightly structured ecosystem the marismas retain a constant sparse population of vertebrates restricted to permanently damp enclaves : pools.

The others act as occasional exploiters of the remainders of the production on the basis of other more stable ecosystems. Reference has been made to the large mammals from the reserves, the birds from the colonies and the migratory species of very different origins. In that connection, the major migrations of fish which take place as the water descends towards the Guadalquivir would amount to an equivalent process of temporary exploitation, as would the summer species (amphibians, spade-foot toads) or as a form of resistance (eggs, spores).

Furthermore, the annual cycle of the marismas is determined by the volume of water supplied by surface sources and groundwater as well as that resulting from rainfall. The importance of water depends not only on its quantity but also its composition. Thus the park's environmental complex is more open and more sensitive to numerous interventions, to its components (because they come from other sometimes very remote ecosystems) to the volume and duration of its water supplies (particularly ground and surface waters) and to the composition of the surface water.

A P P E N D I X 3

LIST OF FAUNA SPECIES IN THE NATIONAL PARK

FISH

Representative nature, characteristics and numbers

SPECIES	very common	common	fairly common	very numerous	numerous	small numbers	rare	Introduced
1. Anguille anguille	X			X			X	X
2. Micropterus salmoides			X			X		
3. Aphanius iberus		X				X		
4. Cobitis paludicole				X			X	s.XIV (?)
5. Cyprinus carpio	X							
6. Gasterosteus aculeatus				X				X
7. Gambusia affinis	X							

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AMPHIBIENS AND REPTILES

Representative nature, characteristics and numbers

SPECIES	very common	common	fairly common	very numerous	numerous	small numbers	rare
1. Pleurodeles waltl		X			X		
2. Salamandre salamandre							(X)
3. Triturus boscai			X			X	
4. Triturus marmoratus		X			X		
5. Alytes cisternasii			X			X	
6. Discoglosus pictus		X				X	
7. Pelobates cultripes	X			X			
8. Pelodytes punctatus			X			X	
9. Bufo bufo			X				
10. Bufo calamita		X			X		
11. Hyla meridionalis		X			X		
12. Rana ridibunda	X			X			
13. Mauremys caspica	X			X			
14. Emys orbicularis		X			X		
15. Testudo graeca	X					X	
16. Triturus		X			X		
17. Blanus cinereus	X				X		
18. Acanthodactylus erythrurus	X			X			
19. Lacerta hispanicus			X			X	
20. Lacerta lepida		X			X		
21. Psamodromus algirus	X			X			

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AMPHIBIENS AND REPTILES

Representative nature, characteristics and numbers

SPECIES	very common	common	fairly common	very numerous	numerous	small numbers	rare
22. Chalcides bedriagai							X
23. Chalcides chalcides	X				X		
24. Coluber hippocrepis							X
25. Coronella girondica			X			X	
26. Elaphe scalaris		X			X		
27. Macroprotodon cucullatus							X
28. Malpolon monspessulanus	X			X			
29. Natrix maura	X			X			
30. Natrix natrix							X
31. Vipera latasti		X			X		

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BIRDS

Representative nature, characteristics and numbers

SPECIES	Sedentary	Summer visitor	Winter visitor	Bird of passage	Very common	Common	Fairly common	Numerous	Fairly numerous	Rare
1. Podiceps ruficollis	X				X			X		
2. Podiceps nigricollis	X						X		X	
3. Podiceps cirstatus	X				X			X		
4. Botaurus stellaris	X	X	X						X	
5. Ixobrychus minutus		X				X		X		
6. Nycticorax		X				X		X		
7. Ardeola ralloides		X				X		X		
8. Ardeola ibis	X	X			X			X		
9. Egretta garzetta	X	X			X			X		
10. Ardea cinerea	X	X			X			X		
11. Ardea purpurea	X				X			X		
12. Ciconia ciconia		X		X	X			X		
13. Platalea leucorodia		X			X			X		
14. Plegadis falcinellus										X
15. Phoenicopterus ruber	X	X	X			X		X		
16. Anser anser			X		X			X		
17. Tadorna ferruginea										X
18. Tadorna tadorna			X						X	
19. Anas platyrhynchos	X		X		X			X		
20. Anas strepera	X		X			X		X		
21. Anas penelope			X		X			X		
22. Anas acuta		(X)	X			X		X		

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BIRDS

Representative nature, characteristics and numbers

SPECIES	Sedentary	Summer visitor	Winter visitor	Bird of passage	Very common	Common	Fairly common	Numerous	Fairly numerous	Rare
23. Anas clypeata		(X)	X			X		X		
24. Anas crecca		(X)	X		X			X		
25. Anas querquedula				X			X		X	
26. Anas angustirostris	X						X		X	X
27. Netta rufina	X		X			X		X		
28. Aythya ferina	X		X		X			X		
29. Aythya nyroca	X								X	X
30. Aythya fuligula			X			X		X		
31. Melanitta nigra			X			X		X		
32. Oxyura leucocephala	(X)									(X)
33. Milvus milvus	X		X			X			X	
34. Milvus migrans		X			X			X		
35. Buteo buteo	X				X				X	
36. Hieraetus pennatus		X					X		X	
37. Aguila heliaca	X					X			X	
38. Circaetus gallicus		X				X			X	
39. Circus pygargus		X					X		X	
40. Circus aeruginosus	X		X			X		X	X	

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MAMMALS

Representative nature, characteristics and numbers

SPECIES	very common	common	fairly common	uncommon	very numerous	numerous	fairly numerous	rare	introduced
1. Erinaceus europaeus		X					X		
2. Suncus etruscus		X				X			
3. Crocidura russula	X				X				
4. Myotis oxygnathus		X					X		
5. Miniopterus schreibersii			X				X		
6. Pipistrellus pipistrellus		X				X			
7. Eptesicus serotinus			X				X		
8. Oryctolagus cuniculus	X				X				
9. Lepus granatensis		X				X			
10. Eliomys quercinus	X				X				
11. Arvicola sapidus			X				X		
12. Pitymys duodecimcostatus		X				X			
13. Apodemus sylvaticus	X					X			
14. Ratus ratus			X				X		
15. Ratus norvegious		X				X			X
16. Mus musculus	X				X				
17. Mus spretus			X				X		
18. Vulpes vulpes				X			X	X	
19. Meles meles			X				X		
20. Mustela nivalis			X				X		
21. Putorius putorius				X			X	X	
22. Lutra lutra				X				X	

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MAMMALS

Representative nature, characteristics and numbers

SPECIES	very common	common	fairly common	uncommon	very numerous	numerous	fairly numerous	rare	introduced
23. Herpestes ichneumon		X	X			X	X		
24. Genetta tenetta				X				X	
25. Felis catus				X				X	
26. Lynx pardellus		X				X			
27. Sus scrofa	X				X				
28. Cervus elaphus	X				X				
29. Dama dama	X					X			

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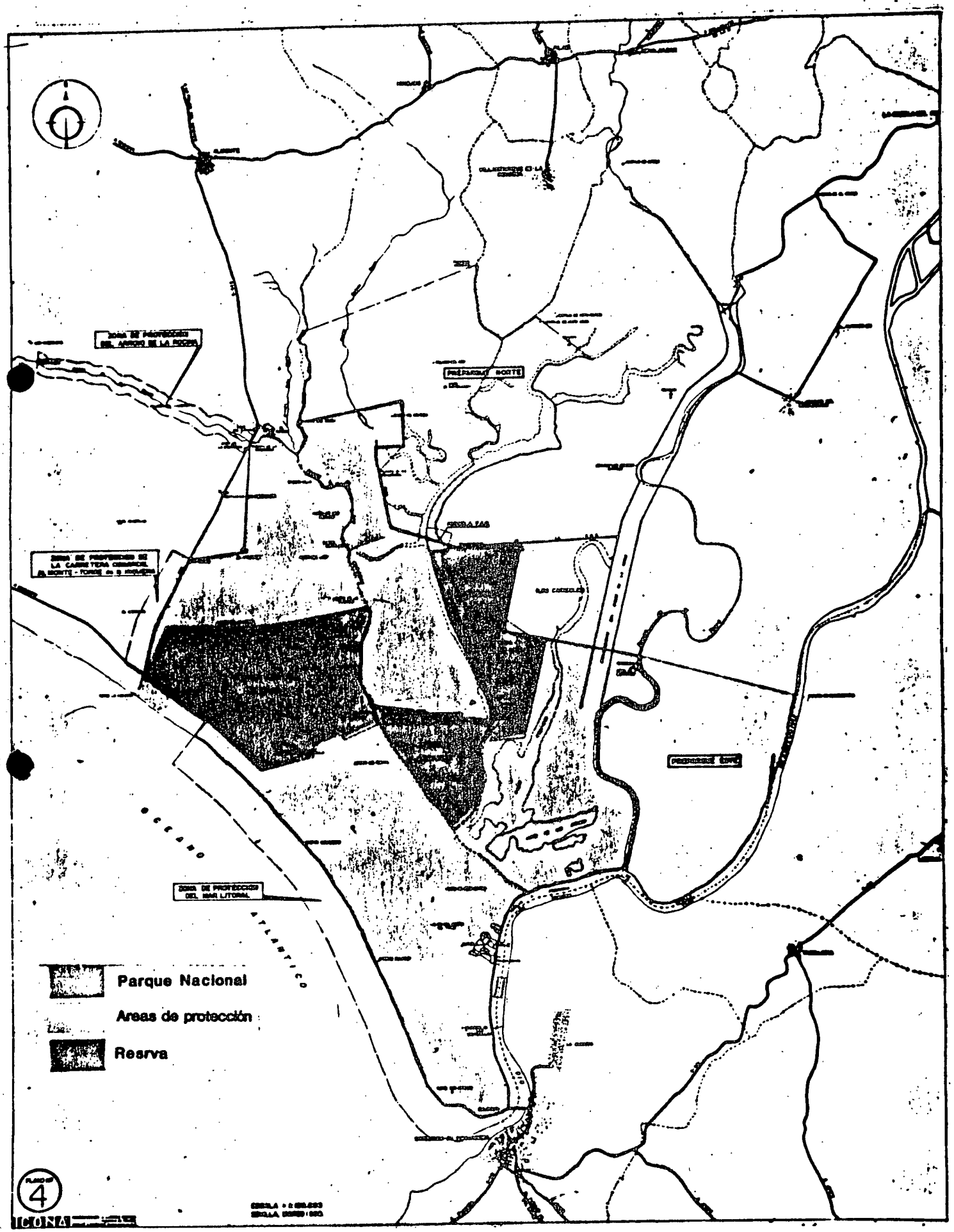
APPENDIX 4

MAP OF DONANA NATIONAL PARK



A P P E N D I X 5

PROTECTIVE MEASURES ALREADY TAKEN OR UNDER REVIEW : DONANA NATIONAL PARK ACT

Official Gazette n° 11 12 January 1979

III Other provisions

Government instructions

931 - Act 90/78 .....

932 - Act 91/1978 of 28 December relating to the Doñana National Park

In accordance with the Act approved by Parliament, I hereby sanction :

Article 1 - Object

1. The object of this Act is to establish a special legal system for the Doñana National Park and its reclassification as such, by implementing the provisions of the Act on natural protected areas of 2 May 1975.

2. This special legal system is designed to protect the integrity of the area's inorganic system, its fauna, flora, water and air and, in short, all the ecosystems of the Doñana National Park as well as its historical and artistic values and to promote research and the use of the national park for education and recreation because of its educational, scientific, cultural, recreational, tourist and socio-economic interest. The conservation measures shall also cover groundwater and the adjoining sea, whilst respecting the powers of the Ministry of Defence and more particularly those covered by the Coastal Act of 26 April 1969.

Article 2 - geographical framework

1. The limits of the Doñana National Park and those of the outside areas set up which are subject to special protection shall be those specified in the appendix to this act.

2. Nonetheless, the Government, in agreement with the Council of Ministers, may attach to the Doñana National Park other lands bordering on it which have the appropriate characteristics, in any one of the following hypotheses :

a. that such lands be the property of the State or one of its bodies ;
b. that they be expropriated to that end ;
c. that they be assigned by their owners to that end.

3. The Government shall adopt the measures and provide the resources necessary to ensure that lands included in the Doñana National Park whose owners failed to sign corresponding agreements concerning limitations subject to compensation become the property of the State. Similarly and without prejudice to the implementation of expropriation whenever necessary,

authorisation may be given for the exchange of lands which are the property of the State or other public bodies for others within the park or within its periphery, after a report by the Board of Management.

4. Lands included in the National Park shall remain classified for all purposes as areas which may not be developed and are subject to special protection.

Article 3 - protection areas around the Park

This Park's natural environment shall be subject to the precise limitations necessary for its conservation, in a manner and for the purposes provided for in the corresponding legislation, relating to the planning of communications, farming, town planning and any other activities.

1. As to the specially protected areas of land provided for in Article 2 of this Act, they shall be used solely for agrarian purposes and activities compatible with the aims of the National Park. To that end, the Ministry of Agriculture, following a report by the Board of Management, shall draw up regulations covering the use in such areas of pesticides, fertilisers, and in general, all products which might be harmful to the National Park.

2. As to the effects of surface waters, the following shall be regarded as areas of influence : the basins of the Guadiamar river and of those rivers situated on the right bank of the Guadalquivir and, in the latter's hydrographical basin, between the Guadiamar and the Atlantic Ocean.

In respect of groundwater, the following shall be regarded as protection areas : area n° 1, defined in decree 735 of 3 April 1971 (all the municipal lands of Almonte, Rociano, Hinojos, Villamanrique de la Condesa, Pilas and Aznalcazar) and the municipalities of Lucena del Puerto, Moguer and Palos de la Frontera.

In these areas and catchment basins and in the case of all interventions which might affect the quantity or quality of ground or surface water flowing into the National Park a report by the park's Board of Management, referred to in Article 5 of this Act, shall be required without prejudice to the duties assigned to the administration by the aforesaid decree n° 735 (1971) and by the Water Act in force.

On a proposal from the Ministry responsible for the Prime Minister's Office of the Government and following an initiative by the Board of Management, the Government may restrict or suspend any activity which might affect the quantity or quality of the National Park's waters. Such restriction or suspension shall be provisional and remain in force until the appropriate remedial measures have been adopted.

3. In any case, the protective measures contained in the preceding two paragraphs shall be offset by a policy for the maintenance and promotion of employment in the area.

Article 4 - Master plan for use and management

1. Within a maximum period of one year as from the promulgation of this Act, the Ministry of Agriculture, through the National Institute for Nature Conservation, shall establish a master plan for the use and, management of the Doñana National Park which shall be made public and after provisional approval by the Board of Management, submitted to the Government for final approval.

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This master plan which shall remain in force for a minimum period of four years, shall include general guidelines for the development and use of the National Park as well as standards for management and the necessary procedures for the conservation and protection of its natural assets and in order to guarantee the implementation of the aims of research, interpretation of natural phenomena, environmental education and use by visitors for recreation and other purposes. It shall also contain :

a. provisions for the zoning of the National Park, defining areas for different types of use which shall include the scientific reserves whether they be strict or directed. To that end scientific reserves shall mean natural spaces which because of their special scientific value are worthy of protection, conservation or improvement whilst avoiding any action which might result in the destruction, deterioration, transformation, disturbance or disfigurement of places or biological communities. The use of these reserves shall be subject to the need to conserve them and to the scientific and research purposes for which they were defined.

The areas expressly defined as such in the appendix shall be set aside to that end.

On a proposal from the director of the biological station, scientific reserves may be established for a specific period.

Scientific reserves intended for scientific research shall come under the Higher Council for Scientific Research through the director of the Doñana Biological Station who shall coordinate all research programmes to be implemented in the National Park. Any action within the scientific reserves shall be carried out with the agreement of the director of the biological station.

b. Measures designed to prevent the exploitation of the National Park's natural resources, apart from such measures as are considered necessary to keep it in its present state.

c. Management activities necessary for the maintenance of existing biological balances.

2. ICONA shall supervise the cooperation of other national public bodies and, optionally and as far as possible, that of national and international private bodies whether they be governmental or not in order to secure the more effective implementation of the aims of Doñana National Park.

Public bodies shall provide the technical cooperation asked of them in accordance with the provisions contained in this article.

3. Any building scheme, work or project which does not appear in the master plan for use and management or in its revised versions and which is regarded necessary, shall be fully justified having regard to the guidelines in the plan and authorised by the National Institute for Nature Conservation following a report from the Board of Management of the National Park.

4. The special legal system set up under this act for the Doñana National Park shall have attached to it the qualification of public utility for all lands making up the Park for the purposes of expropriating property and the rights affected.

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5. Restrictions on property with regard to the authorised uses of land which may not be developed shall be subject to compensation.

Article 5 - Board of Management

1. The Board of Management of Doñana National Park to which the Act on natural protected spaces refers shall be attached for administrative purposes to the Ministry of Agriculture and composed of the following members :

- a representative from each of the departments of the Prime Minister's Office of the Government, finance, education and science, agriculture, public works and town planning, trade and tourism, industry and energy, culture and transport and communications.
- a representative of the Committee of Andalusia
- the Director-Commissioner of the National Park
- a representative of each of the provincial authorities of Seville and Huelva
- a representative appointed by the municipal councils of Hinojos, Almonte, Aznalcazar, Puebla del Rio and Sanlucar de Barrameda
- a representative of each of the provincial agricultural chambers of Seville and Huelva
- a representative of the owners of lands in the National Park, appointed from their midst
- a representative of the Geological and Mining Institute of Spain
- a representative of the Guadalquivir River Conservancy Board
- a representative of the universities of Andalusia appointed jointly by their rectors
- the former commissioners of the National Park and directors of the biological reserve
- the director of the Doñana Biological Station
- a representative of the conservation associations owning land in the Park
- two representatives of associations - one of them from Andalusia - chosen from among those which by their statutes are concerned with nature conservation
- a representative of the wardens of the Park
- a representative freely appointed by the Minister of Agriculture.

The Board of Management shall have its headquarters in the province of Huelva.

The Chairman shall be appointed by the Government from among the members of the Board of Management.

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There shall be a Standing Committee, coming under the Board of Management, whose chairman shall be the Board's chairman and which shall comprise the following members : the representatives of the Ministries of public works and town planning, agriculture and education and science, the representative of the Committee of Andalusia, a representative of the town councils of the Province of Seville, a representative of the town councils of Huelva, a representative of the conservation societies, the Park Commissioner and the Director of the Biological Station.

2. In the event of administrative changes or alterations to the names of the societies' represented, the Government, following an agreement in the Council of Ministers, shall adjust the membership of the Board of Management to the aforesaid changes or alterations.

3. The terms of office and functions of the Board of Management shall be as follows :

a. to watch over the implementation of the standards established in the protection areas, promote any enlargements of the National Park, foster the construction and conditioning of the appropriate access routes, administer funds derived from the use of the Park's services or subsidies granted to the Board of Management by any type of society or by private citizens, propose standards for the more effective defence of values and specific features of the National Park and take all steps deemed advantageous for the latter.

b. to approve provisionally the master plan for use and management and its revised versions whilst watching over its implementation, and the annual report on activities and results which the Park Commissioner shall submit to ICONA.

c. to furnish information on any type of work or research project planned, whether it be included or not in the master plan for use and management.

If, when the Board of Management is considering the reports referred to in paragraph c. above, two-thirds of its members disagree with one of the proposals, the Chairman shall refer the aforesaid proposal back for reconsideration by its authors.

d. to delegate to the Standing Committee all functions it deems appropriate following a decision taken by an absolute majority of the members.

e. to approve and amend its own rules of procedure which shall determine the operational structure of the Park's administration.

Article 6 - Director-Commissioner

1. A director-commissioner appointed by the Director of ICONA, with the prior agreement of the Board of Management, shall be responsible for administrating and coordinating the activities of the National Park. The official appointed shall have academic qualifications.

2. The Director-Commissioner shall be a member of the Board of Management and the Standing Committee and be entitled to vote at the meetings.

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Article 7 - Preemption and withdrawal

The state administration acting through ICONA shall be entitled to exercise rights of preemption and withdrawal in all transactions concerning assets and rights to land situated within the National Park in a manner to be determined by statutory regulations. The right of withdrawal may be exercised only during the six months as from the date of notification of the transmission to ICONA and the Board of Management of the National Park.

Article 8 - Resources

The budgets of the National Institute for Nature Conservation, the Higher Council for Scientific Research and other bodies concerned with the Park shall contain appropriations to cover activities and the work of conservation, improvement and research as well as the general expenses of the Doñana National Park.

To that same end the following shall also be made available :

a. sums earmarked for the same purposes would be included in the general State budgets.

b. Taxes which would be established in the form of access dues to the Park and for the use of services whose form and amount would be decided case by case by agreement between the Council of Ministers on a proposal from the Ministry of Agriculture after consultation with the Board of Management to which this Act refers.

c. Contributions and subsidies from public and private bodies as well as from private citizens.

d. All receipts which might be obtained as a result of concessions and the granting of authorisation for the use of the National Park's services in a manner to be decided upon in the master plan for use and management.

Article 9 - ... of local corporations

1. The town councils of the municipalities included in the territory of the Park and its protection area shall have first right to seek concessions and authorisations from the establishments and the provision of services by the public utility services provided for in the master plan for use and management.

2. Standards for the implementation of this Act shall establish the participation of the said town councils and the taxes which would be established for public access to the Park's installations or for other purposes.

Article 10 - System of sanctions

Any failure to comply with or any violation of the standards applicable to this National Park shall be punished in accordance with the provisions of the Act on natural protected areas and in the Royal Decree n° 2676 of 4 March 1977 approving the regulations for its implementation in accordance with specific legislation which would be applicable in the light of the nature of the offence.

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Article 11 - Public proceedings

Proceedings before the administrative bodies and courts to secure the strict observance of the standards of protection for the Doñana National Park shall be public.

SUPPLEMENTARY PROVISION

Within the maximum period of four months as from the approval of this Act, the Government shall propose or adopt measures designed to promote the socio-economic development of the area and, in particular, an appropriate network of communications, tourist development and the encouragement of farming and stock breeding.

Such measures shall be regarded as prior procedures and be supplemented by a territorial master plan for the coordination of the area which shall be drawn up within a maximum period of eighteen months as from the adoption of this Act.

TRANSITIONAL PROVISION

Projects which affect the quantity and quality of the inflow of surface and groundwater shall be the subject of a compulsory report by the Board of Management within six months as from the promulgation of this Act.

FINAL PROVISIONS

1. Within a maximum period of one year, the Government, after considering a report by the Board of Management, shall set out the standards necessary for the development and enforcement of this Act.

2. The Board of Management of Doñana National Park shall be set up within two months of the entry into force of this Act.

3. An exception shall be made for Act 67 of 22 July 1967 on the confiscation of land in the mountains of Huelva and all provisions which conflict with this Act.

4. As from the entry into force of this Act, the Act of 24 June 1918 on the drainage of lagoons, marshes and marshy lands shall not be applicable to the lands included in the territory of the Doñana National Park and its protection area.

APPENDIX

Boundaries of the Park

A straight line from kilometre 22.9 of the departmental road from Almonte to Torre de la Higuera as far as the Reef Lagoon and continuing from there in a straight line from south to north until it reaches the Canariega bridge on the right bank of the Rocina river, crosses the river, continuing from west to east along the left bank until the confluence with the Garzos canal and the river Partido, continuing along the right bank of the river Partido from south to north until the Ajonjoli bridge.

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As from that bridge the Park's boundary shall be the straight line towards the house of the Galvija from west to east, up to five hundred metres from the Fox farm located south of that line. It shall continue from north to south for two thousand four hundred metres and as from that point in an east-west direction until it meets the wall of the Confederation in the hamlet of Cancela de las Escupideras, continuing further along the wall of the onfederation in a southerly direction and finally turning east until it reaches the ADENA estate before continuing along the boundaries of that estate until the meeting place between the ADENA, Los Caracoles and Matochal estates, and continuing further along the limits separating these two last mentioned estates from west to east as far as the intersection with the Brazo de la Torre.

As from that point the line shall continue from north to south along the left bank of the Brazo until that river joins the Guadalquivir. It shall then follow the right bank of that river as far as the Punto de Maiandar, at the site of the barracks of the Guardia Civil.

From there the line shall continue from north to west and separate the marine area from the land until it reaches a point situated 4,100 metres from the ruined watchtower known as the Torre de la Higuera. From that point and perpendicular to the coast for a distance of 1,000 metres it shall continue as far as the enclosure of the Doñana Biological Station and then run through this in a north-westerly direction until it meets the regional road from Almonte to Torre de la Higuera, opposite the kilometre post marked 29.500 kms

The perimeter of the new Doñana Park shall be rounded-off by a line commencing at the preceding point, continuing along the left side of the regional road until it reaches the km post marked 22.900 kms corresponding to the starting point of the National Park.

Boundaries of the protection areas :

The following protection areas shall be set up for the Doñana Park :

1. Northern protection area
2. Eastern protection area
3. Rocina River protection area
4. Protection area of the regional road from Almonte to Torre de la Higuera
5. Protection area for the coastal sea

Northern protection area

The perimeter shall begin from the Ajonjoli bridge and proceed from south to north along the right bank of the Grazos Canal/Partido River, in a straight line for 5,000 metres. It shall then continue in a straight line from north to east until it joins the boundary line of the municipality of Villamanrique de la Condesa, near the Juncosilla Well, before continuing southwards through the aforesaid municipality until a point situated opposite the "Hato Daza" smallholding and another called the Regatero until it reaches the Guadiamar Canal. It shall then continue along the left bank of the canal until the boundary of the National Park. It shall follow that boundary from north to south and west until it completes the perimeter at the Ajonjoli bridge.

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Eastern protection area :

This shall correspond to the southern section of Mayor island and begin at the meeting-place between the perimeter of the national park to the south of the Caracoles estate and the Brazo de la Torre, and then continue in a straight line eastwards until it meets the right bank of the Guadalquivir opposite the "Los Albardoneros" smallholding. It shall then follow that bank southwards until it meets the National Park before continuing from north to south along the left bank of the Brazo de la Torre until it completes the perimeter of the protection area.

Rocina river protection area

This shall correspond to a protective line going from the Canariega bridge to the Rincon de la Ortigas. It shall be composed of a strip 500 metres wide to the south of that river and another 500 metres wide protection strip on the left bank until it reaches the Casa del Rincon in the contact area with the urban area of El Rocio.

Boundaries of the protection area of the regional road from Almonte to Torre de la Higuera

The perimeter shall begin at the kilometre post marked 29 500 km and take in a strip 1,000 metres wide parallel to the road referred to until it reaches kilometre post 22.900.

Boundaries of the coastal sea protection area

A protection area for the Park covering a strip of one nautical mile from the coastline shall be established commencing in the centre of the mouth of the Guadalquivir in the Atlantic Ocean and stretching along the coast north-eastwards to a point situated 4,100 metres from Torre de la Higuera.

Boundaries of the Scientific Reserves

1. The present biological reserves at Doñana and Guadiamar with their present boundaries

2. The section of the Hinojos Marsh situated to the south of a line connecting the points situated 1 km to the south of the southern extremities of the biological reserves of Doñana and Guadiamar

Done in Madrid the 28 December 1978.

President of Parliament
Antonio Hernandez Gil

Juan Carlos