S'Albufera Natural Park, Mallorca

Guidebook

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Foreword

A unique natural area, heritage for all

The importance of s'Albufera as a natural area symbolic of Mallorca stems from times past and, in fact, there are numerous historical accounts which support the predominant role of the wetland in the north of the island throughout the centuries. Whether ecological, human, economic or cultural, s’Albufera – which means “small sea” in Arabic – has enjoyed a notable standing in the northern part of Mallorca and Roman, Arab and Christian chronicles about her have created an almost mystical aura which the passage of time has failed to destroy.

Owned by the Balearic Government since 1988, s’Albufera is today a protected natural area of enormous ecological and landscape value, which in addition represents a major symbol of the determination of modern Balearic society to preserve its natural heritage. Despite this, s’Albufera continues to be, for the most part, a stranger to the citizens of this land, who perhaps have not yet fully appreciated the importance of possessing a properly preserved natural area encompassing so many natural and environmental values within reach of all.

The object of this publication is precisely to contribute towards the dissemination of these values, by introducing the incredible variety of fauna and flora species which make up an abundant and colourful biodiversity and, in this way, drawing the island population closer to a veritable green paradise, which we need to know if we are to conserve it in all its sensuous vitality.

The Conselleria de Medi Ambient hopes that with the present GUIDE, S’Albufera de Mallorca will disclose little by little some of its secrets to the citizens of our community. And thus, the younger generations may have regular access to a place which has by its presence conditioned the natural, agricultural, economic and even the industrial evolution of the northern part of the island, a region which, when the time for writing its history comes, must strongly search for its lost roots among the deep waters of the “small sea”.

Jaume Font
Conseller de Medi Ambient

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WELCOME

INTRODUCTION: WELCOME TO THE PARK

Few people from our islands have not heard of S’Albufera (‘sa bufera’ as it is always pronounced here).

S’Albufera, with its birds, eels, water and canals, is a natural, almost mythical place. It is also spoken of for its mosquitos, strong and bitter odours and the occasional violent flood. S’Albufera has been used for many purposes: as a hunting-ground by a privileged minority – as well as by poachers -, the source for delicious eels and last but not least the ruin of ambitious agricultural enterprises. On an island as dry as Mallorca the contrast of a landscape of canals and lagoons is especially attractive. S’Albufera offers all this and more: a diverse and plentiful fauna, a distinct flora and culture of its own. S’Albufera is unique in the island context and its natural values have been recognised and appreciated as such.

This recognition was formalised with the declaration of the area as a Natural Park by the Balearic Government on 28th January 1988: a Park embracing our heritage, natural values, indigenous species and some of the most valuable ecosystems in the Balearic Islands.

S’Albufera’s best known value is its birds. Over 25 years ago ornithologists were already proposing protection of the wetland for its ornithological value. At the same time, the flora and the rest of the fauna are also important, and the combination of flora, fauna and the general environment function together as a unit. Of equal merit are the various human factors, the history, traditions and culture; to which we may add one further value - tranquility. S’Albufera beats to a different rhythm: the rhythm of the natural world. Once past the gates to the Park, the visitor enters a world of calm, where sense of urgency is left behind. A half-hour visit, a short stay, is pointless. S’Albufera is beautiful, but to reveal her beauty she needs time, and this alone is part of her charm. The visitor who fails to adapt to this atmosphere of peace will easily leave disappointed. Here, you will not meet the spectacular landscapes of the mountain nor the large animals of the zoo. The strange beauty of the orchid, the to-and-fro of the harrier or heron, the song of the wind in the reeds, or the timid gaze of the terrapin all conspire to entrance you with their charm.

This is the Albufera which welcomes those who wish to appreciate it. We hope this guide will be useful for everyone who wants to enjoy the Park and who recognizes in its beauty the best motive for respecting it to the full.

http://www.mallorcaweb.net/salbufera/
A. THE NATURAL ENVIRONMENT
GEOLOGY: PRE-HISTORY

S’Albufera is one of the most striking geomorphological landscapes of Mallorca, its formation being a consequence of the geological processes which created the island.

The emergence of Mallorca as an island is relatively recent in geological terms, dating from the Upper Tertiary Era about 18 million years ago. Since then the coastline has changed repeatedly, with the lowest-lying areas being inundated on a number of occasions. S’Albufera is one of these areas inundated.

In the Miocene, one of the periods in the Tertiary Era, sea levels rose flooding the entire Sa Pobla plain. Coral reefs, similar to those in the Indian and Pacific Ocean, developed in these shallow marine waters. A few million years later the Straits of Gibraltar closed and the Mediterranean sea level fell markedly as a result of evaporation. The area was then part of the mainland at some distance from a Mediterranean reduced to a series of salt lakes. At the end of the Tertiary Era, in the Pliocene, Gibraltar opened once again, allowing the waters of the Atlantic Ocean to flood the low-lying Mediterranean region. A series of brackish lagoons occupied the Sa Pobla-Inca plain and sedimentation took place. This geological process, sedimentary deposits of clay and gravel from mountain streams, assured that the life of the wetland was limited (in geological, though not in human terms) and dried out naturally. S’Albufera would have disappeared if it had not been for the steady subsidence in this area during the Miocene and Pleistocene, in part due to the weight of the deposited sediments.

The last million years, the Quaternary Era produced glaciations, provoking large fluctuations in sea level, alternately flooding and drying both S’Albufera and other low-lying parts of Mallorca. Some 100,000 years ago (in the Riss Glacial Period) a sandy littoral bar formed, the first step in the emergence of the current S’Albufera.

A study of the sedimentation of S’Albufera has allowed geologists to reveal periods of high salt water domination due to penetration by the sea; while in other periods – perhaps for centuries – the water was relatively or even completely fresh. During these fresh water periods, layers of peat were deposited. These variations were a consequence of slight changes in sea level and increased inflow of fresh water derived from streams flowing into S’Albufera and springs from the Sa Pobla plain water table.

The boundaries of S’Albufera have fluctuated considerably during historical times. During periods of highest inundations in the last 10,000 years, they reached the Roman Amphitheatre at Alcudia, the entire Es Murterar sector and, beyond Son Fe, as far as the current Alcudia to Palma road; to the south it extended to the Pont Gros and the Punta de S’Amarador; and to the south-east as far as Ca N’Eixut and Son Bosc.

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CLIMATE

The climate of Mallorca is Mediterranean: this is characterised by dry summers of moderate to high temperatures and low rainfall, and a rainy autumn and winter of moderately low temperatures and relatively high rainfall. The climate is pleasant and temperate.

The climatic variations as they apply to the island are governed by specific geographical features and topographical effects. The most marked example is the Tramuntana mountains where the climate is notably colder and wetter than the rest of the island.

S’Albufera falls in a zone which experiences a moderate average temperature of 17° with rainfall mainly concentrated in autumn and ranging from 600 to 700 mm per annum. In comparison with the rest of the Island, the climate is a little wetter and more temperate. As for winds, S’Albufera’s location within the large Alcudia bay and open to the sea leaves it strongly affected by winds from the north and north-east.

The following table compares climatic data for S’Albufera with other sites in Mallorca.

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<th>Pollença</th>
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<td>1.342</td>
<td>661</td>
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WATER

For a landscape and ecosystem such as S’Albufera, water is the key factor and merits specific examination for its undisputed role in conditioning everything else.

S’Albufera water derives from three different sources: surface run-off (i.e. carried by streams from outside the wetland), underground springs (known locally as “ullals” meaning eyes or springs) and sea water.

S’Albufera occupies the final coastal plain of an extensive water catchment area. The rain falling within the catchment in part infiltrates the aquifer, in part evaporates or is absorbed by vegetation and in part feeds the streams of Muro and Sant Miguel which empty into S’Albufera. These two streams contribute 20-24 hm³ per year (16 from the Sant Miguel and 4-8 from the Muro “torrent”). The bigger stream, the Sant Miguel, experiences highly increased flows when Ses Ufanes de Gabelli erupt; these are major Vaclusian springs which flow periodically from a point about 10 km north-west of S’Albufera.
In fact, only a limited amount of water from the two streams enters into S’Albufera. During the 19th century the two streams were canalised, embankments raised on either side and the flow steered directly to the sea without flooding the wetland. You can see the form of the canalisation, the embankments and bordering tracks on the map of S’Albufera. Water during increased flows only inundates one area, called Es Forcadet – a triangular area between the two streams before they merge in the Gran Canal. If heavy flow from the streams coincides with high sea levels, two lateral canals at the mouth of the Gran Canal (Es Sol and Sa Siurana) cope with the overflow, channelling it into S’Albufera. Another conduit exists at Punta des Vent in the form of a connection underneath the Enmig track and a sluice near the Canal Loco, within Es Colombar. There are other sluices and conduits at various points along the streams. In some places the embankments are in a bad condition leading to water spilling on to traditional arable land (marjals), causing damage and annoyance to the farmers.

Some fresh (or slightly brackish) water comes from the water table. An unknown number of underground springs flow into the farmland, mainly in the south. It is estimated that water from this source totals between 25 and 30 hm³ per annum. It is mainly this water which circulates via the canals and exits at two outlets: the Englishmen’s Bridge (Pont dels Anglesos), where the Canal del Sol and Siurana flow into the Gran Canal, and L’Estany dels Ponts, receiving flows mainly from the Canal Ferragut. To allow the water from the south-west to cross the Gran Canal there is a series of conduits or siphons from the Canal del Sol to the Canal Siurana, passing beneath the two tracks and the Gran Canal. These siphons have been in operation for more than a century. One of these siphons can often be seen issuing with some power into the Suriana alongside Sa Roca bridge.

When water levels are high in the sea and L’Estany dels Ponts, seawater penetrates via S’Oberta. The balance between salt and fresh water is critically important for vegetation and influences the ecosystem of the entire area.

Unfortunately there are some pollution problems. The Sant Miquel stream receives waste water from Sa Pobla (treated beforehand at the sewage works) and there are also some problems derived from agriculture (nitrates). Fortunately the waters from nearby built-up areas that were a source of pollution are now almost fully treated.

SCENTS AND COLOURS: THE FLORA

The flora of S’Albufera is determined by two decisive elements: water and salt, ecological factors whose impact on the life of plants is well known to all. Human influence has also had a discernible effect on the composition and development of the flora at S’Albufera.

Environmental factors (climate, soil, etc.) act together and, in the case of S’Albufera, reinforce each other: the winter and spring rains coincide with increased flows from subterranean sources and from springs around

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S’Albufera. In summer, lack of rainfall and the high temperatures coincide with very strong evaporation and increased salt concentrations in many places.

The human influence is important: drainage, construction of canals, embankments, re-stocking, agricultural cultivation and its subsequent abandonment are all factors with direct repercussions on the plant-life. On top of that, another, not overtly obvious, factor related to man has influenced the ecosystem immensely: fire. Until recently, this was the usual means of managing the reeds, burning the vegetation of S’Albufera from end to end. Although an effective short-term measure for controlling the reeds and saw-sedge, it had serious negative impacts, for example in the death of many trees (tamarisks, elms, etc.). Fire used in the right way can be a useful tool, but historically it was abused.

Our presentation of the flora of S’Albufera is achieved by grouping together plants according to their ecological requirements: i.e. by community. We make an imaginary journey from the shore to the interior and describe the different plant communities as they conform to variations in the environmental factors.

THE BEACH AND THE DUNES

The coastal strip at S’Albufera is sandy, comprising a relatively narrow beach and a series of dunes. At the beach, the sand is loose, mobile, dry (because of rapid percolation by water), generally poor in nutrients for the plants and rather salty because of proximity to the sea.

The first plant we meet on the beach is the erroneously-named “alga”; it is actually a flowering plant, Neptune-grass *Posidonia*. It is a species which forms seabed “prairies” and its leaves accumulate on the beach once they die. The dead material is fibrous and is rolled by the sea into pale brown balls, intriguing and entertaining for the children.

Nothing much grows on the beach proper, as waves make it impossible for plants to grow. A few metres back from the shore we find the tall, yellow leaves of the marram and other grass species, such as sand couch *Agropyrum junceum* and *Sporobolus arenarius*. Growing among them and forming a tight turf is the Birdsfoot Trefoil *Lotus cytisoides*, with creeping stems and composite leaves, which in early spring blooms in a spectacular yellow carpet. The most beautiful denizen of the beach flowers in summer: the spectacular, large, white, scented Sea Daffodil…although the best known, if not the best loved plant, for bare-foot sunbathers is the Sea Holly, a not particularly large but fiercely prickly umbellifer. Also at home in this zone are the Sea Rocket and the Greater Sea Stock, with its large purple flowers.

These are the sea-resistant plants which inhabit the first crest of the dunes. Further inland we start to find woody plants which bind the sand with their extensive roots, spreading long and wide to gather the water they need. These underground networks are clearly visible where the dunes have been altered by erosion or the hands of man. These plants play an important role in binding the sand into more permanent dunes. The most important of these plants is the Prickly Juniper, here in its only site in Mallorca. Behind this first

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band of junipers is pine woodland, a diverse vegetation of Aleppo pines along with Mastic trees, Rosemary (the scent *par excellence* of the Mediterranean), the heather *Erica multiflora* (with its spectacular sprays of pink flowers in autumn), *Phillyrea angustifolia*, *Daphne gnidium*, Wild Asparagus and *Halimium halimifolium* (bearing attractive yellow flowers). There is no shortage of creepers amongst the bushes, including masses of Wild Sarsparilla providing a spectacular and impenetrable tangle unknown elsewhere on the island. Other climbers here are the Honeysuckle and the unobtrusive Wild Madder with its rough-edged leaves. These dunes are also notable for an endemism exclusive to Mallorca and Menorca: *Thymelea velutina*. This bush of densely hairy, overlapping leaves grows in very few places. In spring, a range of orchids, beautiful and diminutive, bloom amongst the pines.

**THE MARSHLAND FLORA**

Behind the dunes, on a permanently or seasonally flooded substrate of clay and mud, we find the plants of the wetland.

The zones nearest to the sea are generally the most salty and the plants growing here are known as halophytes, which means salt-loving. Dominant in this habitat is the Salicornia, with jointed fleshy leaves which at certain times of year are a striking reddish colour. This is accompanied by Sea Purslane *Obione portulacoides* with its oblong silvery leaves.

In areas flooded for longer periods and where the salinity is not too high, we find rushes, of various species, all thin stemmed with pointed tips. Their leaves are scarcely visible, being small basal scales, but they perform a fascinating and vital function: they accummulate the salt absorbed in the plant, eventually dropping off and ridding the plant of excess sodium chloride. This is generally a densely vegetated habitat, formed by a mosaic of the various species and communities. This patchiness is due to slight topographical variations, which cause changes in humidity, evaporation, salt accumulation, etc.

We next encounter the fossil dunes - ancient dunes, the remains of an ancient sand bar, and supporting a distinctive vegetation structure: successive strips of *Scirpus holoschoenus*, Greater Plantain and pine groves, developed to a greater or lesser degree. Here, too, we find spectacular blooms of orchids, including the Mirror Orchid and others of its type. For a few weeks, the dunes are covered by a carpet of these tiny flowers in their hundreds and hundreds. Nearby, we find the tallest and most striking orchid, the extremely rare Robust Orchid *Orchis robusta*. Orchids and other rare plants are protected and to pick or uproot them is illegal – as well as morally unacceptable.

Areas permanently flooded with fresh water are covered by a dense mass of reeds and Saw-sedge (a sedge with cutting, ribbon-like leaves). Covering hundreds of hectares, these two plants totally dominate the landscape of S’Albufera. They form the basis of the wetland’s most widespread ecosystem and indeed, because their dominance limits animal diversity and abundance management is required to control them. A frequent sight entwined around

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these plants, especially alongside the tracks, is the Great Bindweed *Calystegia sepium* with its arrow-like leaves and conspicuous white flowers.

There are aquatic plants too. Perhaps the most abundant of these is the Fennel Pondweed *Potamogeton pectinus*, with its long, narrow leaves, waving like a hairpiece in the current. The Spiked Water-milfoil is a very attractive plant with whorled leaves and small bright red stems. Bedstraw, Water-cress and Horned Pondweed *Zanichellia palustris* with its very narrow stems are abundant. In the freshest, calmer waters the surface is often covered by a thick soup of Duckweed. Reedmace (still gathered to use in handicrafts), and the Branched Bur-reed line the canals. Elms and White Poplars have been planted along the embankments and edges of the tracks, creating a distinctive, narrow, gallery-type deciduous woodland. They share their space with Hawthorn and Bramble - which bears the delicious fruit so loved by walkers and birds alike - the Periwinkle, with its lilac windmill-shaped flowers, and the Creeping Cinquefoil with its yellow flowers and palmate leaves.

Here and there, where not destroyed by fires, the Tamarisk grows.

**FAUNA**

**THE INVERTEBRATES**

*S'Albufera's* invertebrates are of great diversity and importance. The most notable groups are dragonflies, flies (including species unique to the site), spiders, beetles, other groups of aquatic invertebrates (crustaceans, molluscs, etc.) and, above all, moths, of which more than three hundred species are known. In spite of this, there is still much to discover in this faunistic group, as is demonstrated by the fact that every year new species are identified, including some new for science.

Following the in-depth study of some invertebrate groups we can consider that *S'Albufera* is home to at least 1,500 different species of invertebrate. A few of these 1,500 species are endemic to the Balearics, that is to say, species found nowhere else but these islands. Some of them have been described from *S'Albufera* and *S'Albufera* remains, currently, the only place where they are known to occur.

Because of the endemisms, and their fundamental importance in conservation biology, a special effort was needed as only an approximate idea of their number was known. In *S'Albufera de Mallorca* it is possible to find, in terms of species and subspecies, a minimum of twenty-seven taxa endemic to the Balearics, which is the expected order of magnitude in relation to area. Nevertheless, it would not be entirely unexpected for further small gains to be reported following new studies in this outstanding part of Mallorca.

[http://www.mallorcoweb.net/salbufera/](http://www.mallorcoweb.net/salbufera/)
THE BIRDS, WINGED JEWELS

S'Albufera’s most prestigious and conspicuous group of vertebrates is its birds - diverse, abundant, visible and audible. Many visitors to the area are ornithologists and photographers who come in search of these shy creatures, of which more than two hundred and fifty species have been recorded.

A walk along the canal banks and trails of S'Albufera provide opportunities for interesting sightings or, at the very least to enjoy birds which are hard to see in other parts of Mallorca. A pair of binoculars or, even better a small telescope and tripod, will aid you in your bird-watching.

How may we describe this richness? Words are inadequate to describe the powerful flight of the ducks, the anxious call of the Black-winged Stilt or the piratical glide of the Marsh Harrier, the blue flash of the Kingfisher, or the explosion of colours in the Bee-eater. These little miracles cannot be written: they must be seen. Thus we limit ourselves to a description of the most typical birds at each season, whether in the marshes, the salt pans, the dunes or the cultivations which border the Park.

RESIDENT BIRDS

About thirty species are present all year and, generally, nest at S’Albufera.

The best known is surely the Mallard, which is usually the most abundant of the wild duck throughout the area. Coots - black plumage and white beak - and Moorhens - white feathers on their sides and tail - can invariably be seen on the canals and small lakes. These are the three most likely species to be seen on all visits. The Little Grebe can also be spotted while an outrageous scream, likened to a pig being killed, belongs to the Water Rail.

The most emblematic bird of prey for S’Albufera is the Marsh Harrier. It is very rarely seen away from the marshlands. It flies over the reeds with its wings partially lifted to form a characteristic ‘V’.

From the larger to those of reduced size. The smaller residents include the Hoopoe, Blackbird, Stonechat, Cetti’s Warbler - with its loud, unmistakable song, Moustached Warbler - here one of the largest known European populations, Fan-tailed Warbler - with monotonous repetitive call and jerky flight, and the Reed Bunting – which is most abundant in the winter. This is not all: we must not forget the shy warblers, the tiny Firecrests, the restless Great Tits, nor the portly Corn Bunting, the much loved Greenfinch, Goldfinch, Serin and Linnet.

Another group of birds can be seen all year round in S’Albufera but do not nest here. They come to feed, even if their nest is some distance away. Amongst their number are falcons and gulls, but also one bird that everyone wants to see: the Osprey. This extremely rare species, the rarest bird of prey in Spain and in the Mediterranean, visits S’Albufera every day to fish and rest. There are several species which do not nest in the Balearic Islands but can be

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seen for much of the year. These include the Spotted Redshank, the Black-headed Gull and the Little Egret.

SUMMER VISITORS

These are birds which arrive in our latitudes in spring in order to breed but return to African winter quarters, which for many is south of the Sahara.

The Purple Heron is in this category. It is one of the largest birds to be found at S’Albufera and its flight, with curved neck and long legs, is both majestic and a typical sight of the summer in S’Albufera. Another typical wading bird is the Black-winged Stilt, black and white with long red legs. The Little Ringed Plover is also very common in Es Cibollar, Es Ras and Es Colombar. Notable summer passerines (i.e. perching birds or songbirds), are the Yellow Wagtail, which nests in the saltmarshes, Great Reed Warbler and Reed Warbler, common amongst the rushes and reeds.

The abundance of insects throughout the summer attracts Swifts, Swallows and House Martins. Like giant swifts, sickle-winged and agile of flight, the Eleonora's Falcon – one of the great attractions for birdwatchers visiting S’Albufera - is a very frequent visitor.

WINTER VISITORS

By the end of autumn, a legion of north European and Asiatic birds see their natal area covered in snow and their lakes frozen over. So they descend to the Mediterranean in search of a less harsh climate and more hospitable habitats. S’Albufera meets these requirements and becomes an essential refuge for many thousands of birds. This is the time to see the large black Cormorant, the elegant Grey Heron and flocks of ducks: Wigeon, Teal, Shoveler, Pochard, Tufted Ducks, etc. An annual feature, too, is the arrival of a small but spectacular band of Greylag Geese.

Amongst the waders, the most numerous and well-known is the Lapwing, gathering in large flocks and sometimes accompanied by Golden Plovers. Snipe are also abundant.

A mass of birds find food and refuge in the Canals and vegetation of S’Albufera: Chiffchaffs, Robins, thrushes, pipits and wagtails. The Starlings going to roost is a spectacle which has to be seen. A huge cloud of birds (on occasions in their hundreds of thousands!) twist back and forth in the sky, harassed by and at times harassing harriers and falcons, until they fall like rain into dense and distant reeds.

MIGRANT BIRDS

Birds adhere strictly to their timetables, their cycles. The spring, from March to the end of May, is characterized by an urgent migration north to breeding grounds offering long days and plentiful food. August signals the return which is heavy because those heading north in spring are now joined by their young. Those we have nominated as winter or summer visitors are only a small part

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of the endless cycle of winged travellers passing through the skies of S’Albufera and stopping off for food and rest.

Two examples of this passage are the Squacco Heron, although a small breeding population has also become established in recent years, and the Garganey, a duck typically occurring in spring. An outstanding list of migratory raptors include Honey Buzzard, Black Kite, Montagu’s Harrier and a bird of eastern origin, all dark in the male, the Red-footed Falcon. S’Albufera is virtually the only place in Spain where it can be considered regular.

Of all the migrants, waders are probably the most astonishing. Many, such as members of the sandpiper family (e.g. Dunlin, Little and Temminck’s Stints), migrate all the way from the Arctic tundra to tropical Africa. The Curlew Sandpiper occurs mainly in autumn when it is joined by Ringed Plover, Ruff, Whimbrel, Black-tailed Godwit, Common and Green sandpipers. Another feature is the many different tern species passing through.

RARITIES AND VAGRANTS

Some species are difficult to allocate to the categories already described as they appear only irregularly or unexpectedly. They include a number of very striking birds, highly appreciated by birdwatchers, such as the Great White Egret, Spoonbill, Black and White Storks, which appear irregularly on migration. Groups of Flamingos occur sporadically, normally in the saline lagoons of Es Cibollar.

As was intended from the start, the effective protection of S’Albufera and targeted management of its habitats has enhanced the richness and diversity of bird-life in this privileged corner of Mallorca, to the delight of all bird and nature lovers.

THE MAMMALS

It is not easy to observe mammals at S’Albufera. At dawn or in the evening, it is possible to surprise abundant rabbits on tracks and embankments. A number of rat and mouse species are also abundant: it is thought that there are very high population densities in some of the S’Albufera habitats. This explains the common presence of Weasels, which can be seen running along quiet embankments or paths even in broad daylight. Sightings of the Pine Marten are very rare, and occur above all in autumn. There is a diverse and plentiful population of bats, although their specific identification poses a big challenge to the observer.

Unfortunately domestic cats gone feral are very common in S’Albufera. They cause considerable harm to the wild fauna so their population is controlled by the wardens, as are stray dogs which occasionally appear in the area.

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AMPHIBIANS AND REPTILES

Although only a limited number of species occur, this vertebrate group merits attention from the visitor. The Marsh Frog creates a sonorous background in springtime all over the area, except in the most saline parts; the Green Toad is more erratic, although in some years swarms mass in the coastal strip. This is an eastern species which does not occur in Spain outside the Balearic Islands.

S’Albufera’s most notable reptile is the European Pond Terrapin. A few individuals can usually been found sun-bathing on canal edges or grassy embankments except during the coldest months of the year, when it enters a state of winter lethargy. The Viperine Snake is abundant and frequently encountered crossing the tracks; like all the snakes of the Balearic Islands, it is harmless. The Moorish Gecko is very abundant on walls, ruins and buildings, where the Turkish Gecko may also live. In addition, a small population of Hermann’s Tortoise is known to occur in the dunes and pinewoods of Es Comu. Finally, and regrettably, a further species of this group, the Florida Terrapin also occurs, in some numbers, as a result of unwanted pets released illegally into the Park.

FISH

About twenty fish species are known from S’Albufera waters, three of which – the Mosquito-fish, the Stickleback and the Goby – complete their biological cycle here. The Mosquito-fish is a small fish of American origin, introduced into waters all over the world because of its enormous appetite for mosquito larvae and eggs. It was introduced into S’Albufera during the 1930s. The Stickleback is a recent discovery and was also probably introduced by man. The third species is marine.

The other species known to occur, such as the mullets, Sea-bass and Gilthead Sea-bream are at least in part marine. Historically, these fish were fished commercially, but now pollution in the Estany dels Ponts, the closure of links to the sea and overfishing in the Bay of Alcudia make commercial fishing an impossible proposition.

S’Albufera’s most celebrated fish is the Eel. This distinctive species, which enters the marsh as an elver (one step on from the larval form), undergoes some dramatic changes during its long life-cycle. In its eighth to tenth winter (when it is known locally as correguda, meaning “runner”) it returns to the sea to head for its breeding grounds in the middle of the Atlantic! Eel-fishing is a traditional sport termed de cucada (using worms as a bait) encouraged by the fish’s popularity as a local gastronomic delicacy.

Unfortunately, another species has become a plague in the Park: the Carp. This species has been artificially introduced and is causing serious modification to the communities living in the canals and lagoons. Consequently, control of its population has become another requisite of park management.
HISTORY AND TRADITIONAL USES
HISTORY

From PREHISTORY TO ROMAN S'ALBUFERA

The landscape of S'Albufera — in common with all wetlands — has changed enormously during the course of history, as the initial huge lagoon (or “small sea”) with good communication to the open sea slowly filled up with sediments brought by seasonal streams.

We know that the Talyotic settlers used the resources of this original marine lagoon. For example, in the area around Son Real remains have been discovered of seafood and duck bones, which had served as food for those living there. In other settlements, bones of numerous wetland species such as herons, storks, cranes, water rails and coots have been found.

As early as the first century Pliny the Elder had indicated the existence in the Balearics of species like the Crane, Cormorants and Purple Gallinule. This last species (*Porphyrio porphyrio*), which was recently reintroduced in S'Albufera after going extinct, prompted some fascinating comments: “it is the one which soaks numerous times within the water everything it eats and takes it with his foot as if it was a hand”. Much later, in the chapter entitled “New and fabulous birds”, he states that “the Porphirion comes to us from the islands of Mallorca and Menorca [...]”. He explains that the species is a much appreciated for eating and that in the islands some birds of prey are also consumed, along with cranes.

From Roman archaeological findings, we know that Pollentia was a harbour town, probably with a port situated at its edge. Back then, the S'Albufera lagoons nearest to Alcúdia (the subsequently land-filled Maristany, which during the 19th century was called the Santa Ana lagoon and before that, the Santa Maria lagoon) must have constituted a navigable port.

ARAB S'ALBUFERA AND THE CATALAN CONQUEST

The Arabs successfully developed and implemented a number of irrigation systems. It is worth remembering that both the term “albufera” (meaning little sea) and “marjal” (meaning marsh or marshy land) are derived from arabic. Al-Idrisi, commenting briefly about Mallorca prior to the Catalan conquest made reference to S’Albufera as one of the elements that provided wealth to the island.

S'Albufera and surroundings constituted the source for a wide range of products. On the one hand the marsh was exploited agriculturally by means of a system of terraces (called *veles* on the island) and paddyfields. Although we do not have direct evidence, it is known that rice was one of the products exported by the Mallorcan Arabs to the markets of Flanders and, logically, it is reasonable to assume that some of this rice had indeed been cultivated in fields at Al-Buhayra, meaning “the Lagoon”. Rice cultivation disappeared from S'Albufera in the 8th century and was not reintroduced until the 19th century.
Another notable usage of S'Albufera was for its fish. In this respect, there is an Arab farmhouse called Almadraba, in the Andalusian district of Bullansa. This use was maintained after the Catalan conquest. The Remenbrança Nunyo Sanç (13th century) makes reference to this area as “S'Albufera of fish or fishing”.

Finally, S'Albufera was clearly an important pasture. We find no first direct evidence of this until after 1229, but one of the most complete descriptions of Arab Mallorca, by Al-Zuhri (12th century), emphasises the grazing stock of the island, particularly sheep but also bulls, cows, horses and mules.

This interest in S'Albufera continues to be clear as the Catalan conquest took over, since this region is one of the most sought after by the king and the money magnates, as is demonstrated in the Llibre del Repartimient (Book of Division). It has also been shown that the rents obtained by the royal purse from S'Albufera de Mallorca were one of the largest contributions to the king’s income.

FROM THE 16th TO 18th CENTURY: DESCRIPTION BY JOAN BINIMELIS

It is appropriate to make reference to S'Albufera at this period, since the 1595 description by the historian Joan Binimelis is the oldest we know and, in addition, contains considerable information of natural history interest. At the beginning it offers a less negative vision than the perception which became more topical later on: the Albufera of old was surely not such an unhealthy place because of its communication with the sea. Another interesting point is the species composition he cites, notably the Flamingo (predictably, because it prefers more saline habitats), the Purple Gallinule (mentioned already by Pliny), ganteres (la ganta is the Stork), piules (Wigeon), the capblanc (surely the White-headed Duck Oxyura leucocephala), bregats (possibly Ruffs or maybe Black-winged Stilts) and, especially, sisnes (Swans), very abundant and their feathers subject to commercial exploitation. Despuig (1784) and Vargas Ponce (1787) also mention this species (Francesc Tallades, 1815, mentions it for the Campos saltpans).

Recent studies of the rent documents relating to S'Albufera property during the 17th and 18th Centuries (G. Ordines, 1998) confirm the abundance of swans at S'Albufera. Numerous notices exist prohibiting their hunting, removal of eggs, taking young from their nests or the gathering of swans' tails. The rights to exploit the swans were reserved to those authorised by the proprietor. The feathers were probably collected after the moult and sold for various purposes (writing pens, fans, adornments or perhaps feather pillows).
Document about earnings from agricultural activities began to proliferate from the 17th century. The reclaimed *marjal* became strong: farmers dug large irrigation ditches and with the mud and organic material thus obtained, cleaned of grass and roots, they filled large, central rectangular areas which are still cultivated today.

In the 18th century these areas, which until then were privately owned, passed into the hands of the Royal estate, although previous owners already established there retained the right to use it.

At that time the heart of S’Albufera was a network of large pools linked by canals, already somewhat modified by man (bridges, sluices, channels, etc...). A complex and very productive fishing industry supplied fresh and salt fish to the capital.

A century later, the 19th, ambitious drainage projects began at S’Albufera for reasons of health (fevers were frequent in the region). A Royal Edict in 1851 ordered the above work and established its conditions. The first project, only partially completed, was conducted by engineer Antonio Lopez in 1853 and comprised the excavation of the canals of En Ferragut, S’Ullastrar, En Molines and En Conrado. Ten years later the Gran Canal was opened up, leading the large flood waters of the streams Muri and Sant Miguel straight to the sea without entering the marsh.

Towards the end of 1863, subsequent to a number of initiatives, enterprises and projects, a new concession was made to an English company, the New Mallorca Land Co, founded by J.F. Bateman and W. Hope. The English project involved extension of the Gran Canal embankments into the sea to avoid blockages, the construction of two important lateral channels (Es Sol and Sa Siurana) and total drainage of the flooded area using steam-powered hydraulic pumps. An authentic army of 1,500 men came from all over Mallorca.
and abroad to work under the orders of the English engineers, bringing about a radical transformation to the wetland. As a result of this work, by 1871, 2,146 hectares had been reclaimed, although only 400 of these were suitable for cultivation due to salinization in parts and renewed flooding in others. Most were eventually abandoned to revert to their natural state.

Towards the end of the century the English company, ruined, sold the property to Joaquim Gual de Torrella, who began a rice growing rice enterprise with the company Agrícola-Industrial Balear, with the support of experts from Valencia. A fall in the price of rice and the catastrophic flood in 1906, which destroyed the harvest, caused the abandonment of this industry. The cultivation of rice was then rented out to small, share-cropping farmers, who carried on in a traditional manner up until the 1960s. Today just a few places on the edge of the wetland carry on, using old-fashioned methods, the activity compensated by higher prices due to the scarcity of supply.

The former hydraulic pump facilities were extended and turned into a paper factory which used recycled materials as well as reed and saw-sedge cut under contract and transported in small boats, dragged across the embankments to Sa Roca. This new industry was due to the enterprise of a new society, Celulosa Hispánica, SA, with Mallorcan and Italian capital. The manufacture of paper required a substantial use of chemicals, which sometimes leached into the canals, causing sizeable mortalities of eels and, as a result, protests from the fishermen.

The most radical changes to S’Albufera took place during the second half of the 20th century, due to the process of property segregation and land speculation for urban development reasons. This provoked a serious ecological degradation for a major part of this wetland. The construction of Es Murterar power station meant cooling pipes were laid across Es Cibollar and part of Es Colombars, power-lines, a constant hazard to birds, and other regrettable environmental problems. In the 1970s, a conservation movement started up in favour of what remained of S’Albufera, still of high importance, in the form of insistent calls from local, Spanish and European voices for the declaration of the site as a protected natural area. The first important step towards the effective conservation of S’Albufera took place in 1985, with the acquisition on the part of the regional Government of 830 hectares. The purpose was to make this the nucleus of S’Albufera Natural Park, complemented by acquisitions on the part of the ICONA (Ministry of Agriculture) and the legal conservation of other immediately adjacent areas, such as Es Comú de Muro, for example, one of the last remaining dune ecosystems in Alcudia bay, and of enormous ecological importance.

TRADITIONAL AND CULTURAL USES

FISHING

Studies of rental agreements for the Gran Albufera estate in the 17th to 19th centuries (Ordines Marcé, 1998) have shown, as if it was not already obvious, the historical importance of fishing in this wetland. Thus the main tools of the

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property were nets and boats, along with ditching sickles and hoes – essential utensils for cleaning the irrigation ditches, which was the main maintenance task at S'Albufera. The most fished species were the mullet and the eel, and the fishing methods varied according to the species, season and places where the congregated. Rod fishing was mentioned; as were several types of net, such as the trammel net and the caluper net (the calup was a small mullet), and a variety of gear to be found in the rice irrigation ditches, such as butxells, which were probably a type of tunny net. Other traditional systems of fishing — gathered by Francesc Lillo (1995) — were the following:

- fishing using an oil lamp, known as pesca encesa. This was carried out at night, spearing the fish from a small boat. The boat had a fester or tedero on its prow, a piece of iron on which rested a lighted oil lamp or torch to attract the fish and permit the fisherman to see them.

- La parança. A trap used to fish the correguda eel, i.e., the stage at which the eel returns to the sea. It was installed in such a way that it blocked the canal. It comprised an iron cage with a lipped entrance and various compartments that made it difficult for the fish to escape.

- The artet. A narrow net stretched from both banks of the channels by means of ropes.

- The carriegos or morenells. A type of creel. It was of various sizes and materials. In general, it was a large, almost cylindrical cage, with a funnel entrance that made it difficult for the fish to get out again.

- eel fishing with cucada (worm bait). A system of rod fishing where the bait of worms hangs simply from a hook-less fishing line. The voraciousness of the eel makes it possible to haul it up and remove it from the water with ease and place it inside a keep net located in the ditch, which holds the live eels.

Oral accounts testify to the quantity and variety of fish in S'Albufera. Distinction was made between eel fishing and the fishing of scaly fish, such as mullet, sea-bass and sea-bream. There are stories of catching 400 to 500 kilos of Gilthead Sea-bream in Es Ponts lagoon or at S'Oberta, as well as 17 tons of eels in just 5 or 6 nights during the 1940s.

Nowadays, the catching of eels using traps is not allowed in the Park as a recovery measure for the species. The objective is to promote sustainable use of the resource. The commercial exploitation of the eel has disappeared, but the traditional activity of worm-baiting with rod and line still continues, with preference given to retired people from the local area (Sa Pobla and Muro). Rod-fishing for eels is authorised in certain parts of the Park (Es Sol canal, Gran Canal, Es Polls canal, Sa Siurana, etc.) between the months of July and February. This is by prior application for a free permit from the Park’s Reception Centre and the presentation of a river fishing licence (which is also free for pensioners).
The eel is destined for those delicious classic dishes of the region: *espinagadas*, (fried eels), rehogadas (stir-fried with less oil), eel vermicelli or casserole… never in short supply and always present at the feast of San Antonio in Sa Pobla and Muro. You have to try them!

But the eels are not exempt from problems: climate change, the steady disappearance of wetlands through drainage, water pollution — basically by agricultural chemicals — and overfishing in some of the eels’ nursery areas, all reduce the number of adults reaching breeding age.

**LIVESTOCK GRAZING**

Herds of cattle and horses have only recently been reintroduced for management purposes. However, grazing is one of the most ancient of S'Albufera uses. Records of this activity are numerous from the 12th century onwards. The cattle grazed the wetland and marsh, in a communal zone extending from the cultivated land to the open lagoons.

Most of the old references speak of red cattle and mares, the so-called large stock, but there are occasional mentions of small stock (sheep, goats or pigs). A distinction was also made between domestic and wild stock, based on whether they were confined or free roaming.

The animals grazed unrestricted, often without shepherding, night and day in all months that water levels and green forage allowed. When winter flooding inundated the marsh and the amount of green vegetation declined, the stock was transferred by horse to the nearby mountains or were corralled.

The use of S'Albufera as a pastoral zone has endured through the centuries. From 1987, in collaboration with the Patronage of Native Races of Mallorca (PRAM), a recovery programme has been established for the island races of cattle and horses, which also helps to diversify the vegetation and the fauna of S'Albufera. The stock mainly feeds on reed and softer rushes. This creates the open spaces and free water bodies required by birds.

**CULTIVATING THE MARSH**

An almost identical form of *marjales* can be found in any Mediterranean wetland. It is a landscape of small-holdings claimed from previously inundated land by excavating drains and laying the earth thus obtained in long narrow strips. The result is a landscape of strips surrounded by channels whose purpose is both drainage and irrigation, either through percolation, flooding or water transfer, although in general percolation is sufficient for most types of cultivation. These strips of land or *bancales* are known by various names: veles in Mallorca, feixes in Eivissa, peces in the Empordà (a region in north Catalunya where Dalí lived and died). In general, they are called *HORTS DRENATS* (“drained small-holdings”), since they result from drainage of the wetland and comprise a system of irrigation which is markedly different from conventional surface irrigation systems.

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This type of holding was developed most markedly during the Arab period, as has been demonstrated recently for Ses Feixes de Eivissa. They comprise parcels of land between grazed pastures and an outer band of conventionally irrigated land (using water extracted with the aid of water wheels). In such wetlands there is a tendency in both space and time for the lakes to be followed by saltmarshes, reclaimed land and eventually cultivations: throughout the centuries open lagoons have been gradually transformed into agriculture.

The plants cultivated in the small-holdings at S'Albufera have changed during the course of time. In addition to the traditional mixed holding, we find references to single crop cultivations such as cotton or rice in the Arab period or poplar plantations, which appear to have been a particular feature of the 16th century. In that century almost each holding in this marjal had a number of poplar plantations, (up to 10 in the one estate or possessió). There were groves of one hundred white poplars and others with a thousand sturdy trees. Many were fenced against livestock. There were also grey sallow, crack willow, and mulberries. Above all there were a lot of cane plantations. These plantations would have been linked to small industries of carpentry, basketmaking, wickerworking and silk-loom weavers that enriched the region.

Other important crops up to the 20th century were flax and hemp, particularly the latter. In the 19th century Sa Pobla alone produced 300 tons of hemp, more than three-quarters of the entire Mallorcan production. The process of extracting the fibre from the hemp and linen plants was very similar. Once harvested, they were grouped in bundles, initially dried, then left to soak in S'Albufera before being dried once more. It was then ready for the next process, which consisted of a number of steps: cutting vertically into strips, combing, spinning and blanching: a long process just to prepare it for weaving. From the hemp were produced muleteer shirts for men, towels, skirts, aprons and above all sheets.

RICE GROWING

During first half of the 20th century, rice became one of S'Albufera's biggest crops. According to the study made by Damià Duran, two periods can be identified: the large estates (1901-1908) and the small-holder (1909-1973). During the first period 1,800 quartons were cultivated (in the islands, a quartó or quarter is equivalent to the fourth part of a cuarterada (=7,103.11 m²), by a workforce of some 500 people hired by the company Agrícola Industrial Balear, SA. This system failed, mainly because it was not commercially viable but also because of the floods of 1906, which weakened the investment potential of the company.

Following this failure, the plots were rented to individuals and cultivation remained relatively stable during the Thirties and Forties at about 1,000 quartons of rice. From then it began to decline to virtual extinction.

Rice was grown practically throughout S'Albufera where the water salinity did not prevent it, but especially in the zones known as Es Ras, Ses Puntes, Es

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Forcadet, Son Carbonell, Son Serra, Son Sant Joan and Son Claret. The odd quartó remains today as a testimonial, along the Fornari road.

The cultivated strips or veles are separated by embankments and irrigated by means of drains with gates or entry and exit sluices. These plots remain inundated during the entire growing period apart from when the soil is drained for sowing or to renew the water and treat against pests.

The crop cycle for rice lasts from March to September. The seedling is grown first, then transplanted once it is of sufficient size at the beginning of June. It is harvested by sickle at the end of September. Threshing, drying in the sun and removal of the husks with a machine made for that purpose follows. The varieties used include bomba rice, bombita, panxa blanca, bell-lloc, solana and balilla.

TRADITIONAL USE OF THE NATURAL VEGETATION

The cane and the reed

The cane Arundo donax is a woody grass of Eastern origin. The reed Phragmites communis is native and more abundant, but thinner and less versatile. Every part of both plants was used: the leaves, the roots and especially the stems, tall, tough, smooth and hollow, used extensively for being light and sturdy.

The young leaves were suitable for forage or to line baskets to avoid damage to fruit. The rootstock of the cane, because of its twisted form, was able to serve as a hook for shaking down olives or carob beans or to lower strings of tomatoes, to remove pans from the oven, etc.

The stem is cut immediately prior to new moon once the leaves have dried, during the winter. It was used in thin strips to make baskets, creels or carriegos (a specific type of basket), and in its entirety for a multitude of domestic, agricultural and building uses: broom handles, beating canes (for wool, almonds, in the saltpans, etc.), strong wicker fences, screens, cabins, porches, roofing and matting or trellising for the support of beans, tomatoes and other cultivated climbers. Instruments such as the flute or toys like miniature windmills or gliders were also constructed from cane. An infinity of small objects, from a staff to a spool for winding thread, a bellows for rekindling the fire or a knitting needle case… Little resists the versatility of the cane, its only limitation, it seems, being the extent of human ingenuity. In East and West alike, the cane remains a metaphor for the elemental, simple but effective. “And we are human canes/… Fragile canes, /but full of music”, in the words of Blai Bonet.

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Reedmace

Reedmace is harvested to this day and dedicated people still bind it into chairs. The reedmace has long strap-like leaves and lines the edges of freshwater bodies at S’Albufera. It is harvested during the summer months just as it is about to set seed, then laid out in the sun for fifteen days until it yellows. Bundles thus prepared will keep some time. In order to use it, it needs to be soaked for a quarter of an hour, so that it regains its former flexibility. For making the chairs, the leaves need to be twisted, plaited, spliced and interlaced with the wooden frame to form a compact weft.

Rushes

Several species of rushes are to be found. The most useful are the longest and strongest ones: the sea rush and the sharp rush (Juncus maritimus and Juncus acutus), along with the black bog-rush (Schoenus nigricans). They are collected in June and July, dried in the sun and then used to make fish-traps, carriegos, carpets or baskets. The gear destined for fishing was made by the fishermen themselves during the winter.

Saw-sedge

This is one of the most abundant plants of S’Albufera. Mixed in with the reed or completely dominant, it forms a dense, tall, continuous, almost impenetrable stand, full of sharp, saw-edged leaves. It is related to the papyrus, which — in the words of Pliny the Elder — “safeguards the facts and events of men and the memories of life”. In common with papyrus, saw-sedge has been used to make paper, including at S’Albufera. The company Celulosa Hispánica, SA, built a factory in Sa Roca to produce low quality paper, mainly used for packing. This factory functioned from 1938 to 1966. Some 50 tons of reed and saw-sedge was collected every day, amounting to 50% of the raw material required. Harvesting of the plants was manual, and done by contract workers; the material was carried in small boats punted by wooden pole (or pulled along from the banks) along the canals to the factory, where it was processed and mixed with other materials to form the paste which made up the paper.

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THE SALTPANS OF S’ILLOT

Following the conquest of Mallorca, one part of S’Albufera belonged to the king and the other to the count of Ampurias. In 1272 the count of Ampurias established the woodland, ponds and saltplans situated north of what would become the property or possessió of Son Sant Martí and ceded wood usage rights (but not the grazing or ponds) to all the inhabitants of the Muro and Santa Margalida parishes. This area, with variations in periphery, became known as the common of Es Braç de Son Sant Martí and, later, simply Muro Common (Comú de Muro). Moreover, according to the founding document, this ancient common included some salt-producing pools.

The saltpans of S’Illot as we know them now are a modern construction, which operated for just a few years, from 1950 to 1979. They occupied some 14 hectares, only a tiny fraction of S’Albufera. Despite its small size, it has an interesting value from the viewpoint of heritage conservation. At one level it bears witness to a brief period of expansion for the salt industry, and at another it is testimony to an activity respectful of S’Albufera’s natural environment.

The process to set up these saltpans began just after the end of the Civil War. A first approach, in 1940-41, was unsuccessful but a second, in 1945, received authorisation from the Ministry of Industry on 27th February 1946. The definitive construction plans for the saltpans were presented three months later and approved in February 1947. Work lasted until 1949 and was declared complete by the Ministry of Industry in August of the same year.

A new company, Salinera Mallorquina, SA, was formed to work the saltpans on 23rd December 1949. The first salt was extracted, in all probability, in 1950 but the first record of production, published in the Boletín de la Cámara de Comercio, dates from 1951. Three hundred tons of salt were extracted by a workforce of 11. The saltpans, as they were in 1949, comprised the following: one pre-concentration lagoon of 96,000 m², two concentration lagoons of 9,500 m² and eight crystallisation lagoons of 2,800 m².

In 1955 a depository was approved which included a salt-drying oven and two motor-driven mills: a flat one-metre diameter millstone and a steel cylinder, intended as a reserve. The last year for which data are available was 1975, when 400 tons were produced.

On 12th March 1976, Salinera Mallorquina sought permission for a temporary suspension of work on the grounds that it intended to reorganize the distribution of the lagoons in order to improve production. But this goal was never achieved because of plans put forward to urbanise the land. In the summer of 1979 the Ministry of Industry declared the enterprise as “fallen”, after undertaking an inspection which confirmed total inactivity and abandonment of the saltpans. The company Salinera Mallorquina, SA was dissolved on 28th September 1979.
LITERATURE AND THE SONG BOOK

S'Albufera is an auspicious place for myths. The isolation, the solitude, the tough environment, the richness of the hunting and fishing, the coexistence with others, the pioneering spirit. Herculean efforts to drain the marsh and the fight to conserve its nature, are just some of the themes which have inspired a literature celebrating its life and landscapes.

There are the descriptions of the travellers and scholars from the 18th and 19th centuries XVIII and XIX, in particular the relevant pages of Jeroni de Berard’s book of 1789: Viaje a las villas de Mallorca (Trip to the townships of Mallorca). Joan Rosselló de Son Forteza (1854-1935) dedicated a literary description to S'Albufera under the title La badia llevantina and in a remarkable story, Lluita de braus, perhaps one of the best he wrote. It is a recreation of the myth, the beauty and the beast. The man-beast lived in an even more inhospitable environment than could be imagined at the time, “in the heart of the deserted and unhealthy plain” shepherding bulls in the depths of S’Albufera, whilst the beautiful Llissa, a fisherman’s daughter, lives a happy existence next to the sea. The lives of these two persons become intertwined in a climate of increasing tension, until tragedy is unchained.

As for popular tales, the Archduke had already gathered the legend of the “Por de s’Albufera” (terror of S'Albufera) attributed to the booming calls of a bird that the Natural Park has permitted to return: the Bittern (Botarus stellaris). This myth was also published in the historical journal launched by Joan Parera i Sansó, Sa Marjal (1909-1928), the first rural peridiocal for Mallorca and constituting “an indestructible monument of nineteen years in the life of Sa Pobla”, in the words of Antoni M. Alcover.

S’Albufera and its products feature strongly in the region’s song archive. Park staff have gathered together a substantiation portion of these songs, with the help of Madò Antònia Buades and Alexandre Ballester, among others. Most of the songs directly relate to agricultural activities. Repeated reference to hemp is interesting and underlines its former importance as a crop. The frequency of the theme was reinforced because many agricultural activities were undertaken whilst singing. References to the fishing are relatively strong, however very few exist dedicated to hunting. Here are some examples, in their original:

1

Terres grosses de marjal,
un temps hi cantaven grins
i ara amb sinis i molins
treuen un gran capital.
Patates com un poal,
mongetes com a poncins,
i es diumenges es fadrins
enc que no sien molt fins
corbates i corbatins
pareixen de can Verdal.

(by Ginard, 1966/75)
Un temps tenia criada
per dur ets infants en es llit;
ara per un pa florit
rentaria una bugada.

(by Madò Buades)

Ses juergues s’han acabades
a devers Es Colombar:
ara no podem pescar
aquelles anguiles gruixades
ni pegar aquelles panxades
que no mos podíem 'cabar.

PLACE NAMES

S'Albufera place names have been gathered by Miquel Àngel March and Francesc Lillo. We draw from the notes of the latter to explain some of the more notable names.

S'Amarador. The name relates to the long-established and still current lagoon of that place, in which all the hemp produced at S'Albufera and its neighbourhood was steeped. A substantial part of this abandoned locality was dredged in 1991 to return it to open water.

Es Colombars. Nowadays, this name is allocated to one of the largest portions of S'Albufera. It comprises Es Colombar Petit, located between the Ferragut canal and Es Murterar and, on the other side of the canal, the much larger expanse of Es Gran Colombar. The highest number of small lakes (llissers) are here, formed within a grid of perpendicular canals which cross them from side to side. These make it one of the most inaccessible zones of S'Albufera and this, along with the larger llissers, makes it the principal refuge for wintering waterbirds.

Es Patrimoni. An extensive portion situated in the extreme west of S'Albufera, next to Can Blau, and delimited by the Siurana embankment, canal Loco and Ses Mosqueres. Its name is the only remaining testimony to a time when the royal estate embraced a major part of S'Albufera. This part of the wetland was undoubtedly expropriated automatically during the drainage works, passing into the hands of Bateman. That part of the royal estate not affected by dessication followed a very different route, becoming the property of small-holders (marjalers) who, from time immemorial, had converted former ponds nearest to Muro and Sa Pobla into agricultural plots. Plenty of literature

http://www.mallorcaweb.net/salbufera/
and documentation exists of litigation by plaintives from these two towns wishing to recover land usurped by the Crown.

**Ses Puntes.** Another extensive section of S'Albufera which once extended as pine woodland unbroken from Son Sant Martí to the sea. It is now delimited in the east by the Alcúdia-Artà main road, S'Ullastrar canal in the north, Es Ras in the west and S'Illot in the south. All the old documents mention the pine woods of Ses Puntes, which appear enormous in the engineer Lopez map: it seems, therefore, that they must have included what is now S'Illot and Son Bosc, right up to current day Son Sant Martí. Nowadays, despite the dominance of wetland vegetation and marsh, plenty of pines have survived on the fossil dunes where they form small islands of great landscape beauty and ecological quality.

**Sa Roca.** Nerve centre of S'Albufera, from the moment the English installed the powerful steam engine there in order to drain S'Albufera. As a dry outcrop in the middle of the marsh it formed a “fort” from which the drainage company was able to operate. Indeed, the Gran Canal and the canal d’Es Sol were cut to pass close to Sa Roca to bring them in close proximity to the pump designed to drain the site. On the occasion of its purchase by the Balearic Government and the declaration of the Natural Park the buildings became the administrative block, Park visitor centre staff quarters.

THE ARCHITECTURE

The majority of the most notable architecture dates from the end of the 19th century and relates to the canals, the bridges and the buildings constructed with the purpose of draining S'Albufera.

**The Gran Canal.** The waterbournes of Muro and Sant Miquel join at a point known as Sa Punta des Vent. The watercourse continues by way of the Gran Canal, 50 metres wide and 2,700 metres long to its mouth at S'Oberta. The work was finished in 1871. Before that, the waters of S'Albufera entered the sea through Es Ponts lagoon except on rare occasions, such as the floods of 1852 when En Gelat swelled to overflowing and the waters broke through at that point.

The final section is lined with sandstone blocks to enable periodic cleaning and is crossed by conduits transporting fresh water from the canal de Rec. The embankments either side carry the main S'Albufera tracks. These have been strengthened by the planting of elms and poplars, whose roots bind the soil. The Gran Canal needs to be cleaned out regularly, otherwise it gets filled up with the sediments brought by the seasonal streams. When the Park was declared, the Gran Canal had been neglected for decades so it was necessary to dredge the entire canal.

**The canal Riego.** This canal was used to carry freshwater from the spring at Son Sant Joan for distribution to the rice and hemp crops throughout

http://www.mallorcaweb.net/salbufera/
S'Albufera. It was 72 kilometers long, but currently the only sections in reasonable condition are those running parallel to Ses Puntes and Es Senyals tracks. The water was pumped from the spring by a large hydraulic wheel driven by a steam motor.

The bridges of Sa Roca and Els Anglesos. The latter is also known as S'Oberta bridge, The Englishmen's bridge and, in older times, Ses Comportes bridge. Both bridges have five arcs and cross the Gran Canal at the localities known as Sa Roca and S'Oberta. They are constructed with sandstone blocks on a pine pile foundation. They are 110 m long and originally 5 m wide, but The Englishmen's bridge was extended in 1947 to 7.5 m and in 1982 to 11 m. The five arcs reduce slightly from the middle: the central arc measures 9.30 m, both intermediate ones 8 m and both lateral ones 7.10 m.

The iron bridges. Can Blau and Son Carbonell bridges cross the waterbournes of Sant Miquel and Muro respectively, and are located in the western part of S'Albufera. They were the first iron bridges in the history of Mallorca. They were made in England as part of the 1866 drainage project. Each rests on a foundation comprising two hundred pine piles.

Can Bateman. This, the present interpretation centre of the Park, was originally the house of the English engineer John Frederic Latrobe Bateman. It was constructed in the late 19th century during the drainage works at S'Albufera. Recent restoration work has preserved the building's original architecture. Some new access points have been made and a botanic garden created around it.

In addition to these major artefacts, S'Albufera has a rich heritage of smaller features: ditches, bridges and tracks for the circulation of water and passage of people and livestock within the wetland. Notable amongst these are the little bridge at Son Carbonell, situated alongside the iron bridge, and the houses at Ses Puntes. There are also some wells, buildings for equipment and the constructions associated with the saltpans at S'Illot, including a small store now in ruins.
GASTRONOMY: S’ALBUFERA IN THE KITCHEN

The adaptation to their environment which is a constant for biological species, also applies for human cultures. One of the most telling expressions of popular culture is the larder and kitchen: inevitably, an environment as special as S’Albufera’s must have gastronomical consequences, as much for the raw materials it provides as for the calorific needs such a hostile site signifies for its workers.

Rice and fish — especially the eel — are essential ingredients of the local diet. A good arrós brut combines the typical meats and vegetables of the area, particularly if it uses the variety of rice called bomba, which is still grown in Sa Pobla and Muro. This rice has a particularly rich flavour. The eels are usually prepared with noodles or fideos in a thick soup, or can be enjoyed as an eel casserole or greixonera with the vegetables in season. This fish is also very tasty simply fried with olive oil... and hot pepper. Hot, spicy dishes are a consistent feature of the local gastronomy.

Probably the most famous eel dish is the espinagada, a square shaped pie with vegetables and always very spicy, which is made for the festival of San Antonio, Sa Pobla’s big fiesta, which coincides with the height of the corregudes eel catching season.

RECIPE FOR THE ESPINAGADA

Take a kilo of flour and place in a basin, then make a well in the centre, put 100 g of fat, a cup of oil, 2.5 cups of water and knead into a firm dough. Then finely chop chards, parsley and garlic and flavour with salt, pepper, paprika and oil. Clean the eels, unskinned, and cut into chunks half the size of the palm. Steep in oil marinated with pepper, chopped garlic and parsley for 2 to 3 hours. Do not salt until they go into the pie. In another bowl, season a handful of peas with the same flavourings as above. Roll out the dough thinly and place a layer of vegetables, then the eels and finally the peas. Then cover completely with the rest of the dough to make the pie. It should be rectangular and about 9 x 12 inches (one palm and half by one palm) or more, if required. Then smear hands with olive oil and apply to outside of pie so that oil soaks in. Finally, bake the pie in the oven until well done.

(Recipe of Madò Antònia from Ca Na Lloreta, Sa Pobla)

RECIPE FOR FIDEUS AMB ANGUILES (NOODLES WITH EELS)

Chop leeks, tomatoes, parsley and garlic. Clean eels and chop into four finger-length pieces. Season with oil, salt and pepper. Heat in a small pan with cold water. When the eels are done place in a casserole pan. Then boil the noodles in the remaining juice. The eels are seasoned with oil, salt, pepper, chopped garlic and parsley. The noodles are eaten first, followed by the eel-stew.

(Home recipe, En Joan Curt, Sa Pobla)
CURRENT MANAGEMENT: MANAGEMENT FOR CONSERVATION

Until a few years ago, S'Albufera was for man merely a source of useful products: fishing, hunting, reed and reedmace… or the land itself, converted to agricultural or urban use.

However, 1988 saw the culmination of a conservation process initiated years before, first by scientists and later by individuals and groups of people interested in the conservation of this natural space. Already, in 1962, an international scientific convention (the MAR conference) had highlighted the value of S'Albufera and drew attention to the priority need for its conservation. The protests and pressures for the protection of a wetland progressively eroded by a series of urban developments grew and the force of public opinion in Mallorca — thanks a great extent to the efforts of the GOB — Spain and Europe lay the foundations for the political steps which ensured that S'Albufera was preserved.

In 1985 the Balearic Government acquired a substantial part of the area (830 hectares) and this was added to later with the acquisition of 390 hectares by ICONA and 100 hectares by the Balearic Islands Foundation. This led to the declaration of the Park in 1988, with the remit to protect of the land against urban development, to conserve and restore its natural values and, at the same time, to promote public use compatible with conservation of the site.

Responsibility for the Park passed into the hands of the Balearic Government’s Ministry of Agriculture and Fishing (and now the Environment Ministry), with the decision-making process guided by a management committee comprising representatives from administrations implicated in the site, scientists, conservationists and other interested parties.

A multi-disciplinary team, provided by the Conselleria de Medi Ambient (Environment Ministry) and Espais de Natura Balear, undertakes day-to-day tasks as diverse as management, environmental education, providing information to visitors, administration, environmental monitoring, maintenance, and agricultural and pastoral activities.

In S'Albufera the human and economic resources are governed by a high-priority objective: the conservation and restoration of the natural and cultural heritage in a manner compatible with public, educational and scientific use, whilst integrating with the socio-economic needs of the immediate catchment.

These are the major themes in the management of S'Albufera, guided by a long-term management plan and supported by annual assessment plans.

The water

A key priority in wetland management is the control and monitoring of the quality and volume of water. The declaration of the Park implied an improvement in the quality of the water. Waste water that previously emptied into the wetland untreated now passes through the water purification plants of Sa Pobla, Muro and Can Picafort.

http://www.mallorcaweb.net/salbufera/
Every month Park staff collect water samples to measure a series of physical and chemical factors as an indicator of water quality.

The other objective of the hydrological management is the control of water volume and flow. The canals constructed in the 19th century for the drainage of S'Albufera were designed to allow water to flow directly to the sea. Nowadays the purpose is to maintain the main canal network in good condition for its habitat qualities, its ecological capacity and to ensure that floods do not inundate the bordering agriculture of the marjals.

In addition, actions are being taken to improve retention of the fresh water in order to maintain flooded zones and reinstate old lagoons - all without losing contact with the sea, essential for fish populations such as the eel whose importance to the fishermen of the region has already been emphasised.

These objectives are fulfilled by means of a system of sluices, dredging and clearing the canals, ditches and lagoons, and cutting the reed which would otherwise impede the flow of water in the canals. This is done during the winter to avoid disturbance to nesting birds.

Cleaning activities take on a particular importance at times of torrential flows when water entering the Park brings with it all amount of materials and waste picked up outside.

**Livestock grazing**

In times past, S'Albufera had been grazing pasture, but when this practice was abandoned there was a large increase in area and density of reed beds. This event, coupled with gradual sedimentation of the zone, meant that the shallow open waters, an essential feeding habitat for many birds, virtually disappeared.

In order to recover this habitat the decision was taken to act. Discarding the use of machinery and fire, it was decided on extensive pasturing by cattle. The animals adapted for this task are the Mallorcan race of cattle. In some specific areas, Camargue horses and buffalos are also used. They are all animals capable of foraging effectively in wetlands.

In this way, the Natural Park has also contributed to the restoration of a native race. More than a hundred Mallorcan cattle graze the marshes in spring and summer. Then, in autumn they are transferred to the neighbouring mountain of Biniatria where they spend the winter. Monitoring their health, moving them from pasture to pasture, the construction of enclosures etc., are all part of their management and care.

The pasture acts as an excellent fire-break to the extent that reed-bed fires, which until recently affected much of S'Albufera, have now almost disappeared.
Control of the vegetation by grazing has produced spectacular results for the biodiversity of the Park. A large amount of open water has been restored and this has increased the abundance and diversity of birds present in the Park. The number of birds wintering at S'Albufera has increased by more than 400%. Species which were previously great rarities, such as the Bittern, Cattle Egret and Squacco Heron, now breed; herons are much more abundant. It has also promoted population increases for fish, amphibians, Pond Terrapins and wetland orchids.

The biodiversity

Another step towards restoring the biodiversity has been the reintroduction of species that had disappeared, such as the Purple Gallinule and Red-crested Pochard, both of which are now well established and breeding in S'Albufera.

In addition, the presence of invasive species, detrimental to the native flora and fauna, including Florida terrapins, feral cats, carp and a range of exotic plants, has required measures for control.

Because of their danger to birds some overhead wires have been taken down and power lines buried.

Restoration of the riparian woodland and orchid conservation are other high priorities.

At the same time, there is an on-going programme of vigilance throughout the Park to eliminate poaching and illegal fishing, to reduce the incidence of fires and to ensure that Park regulations are met.

Traditions

Management at S'Albufera is not just directed at the biodiversity: one of the objectives is also to maintain and re-establish traditional uses, such as the eel-fishing, rice growing in the bordering marjals, cane and reedmace craftwork. These activities are part of the district’s cultural heritage and merit protecting. Equally, the restoration of specific features has benefited the valuable architectural heritage.

Science

A fundamental element in the management of S'Albufera is the Programme of monitoring and research.

A range of monitoring activities is conducted from the Park. A weather station collects daily information which is sent to the National Institute of Meteorology and incorporated into the Park database.

http://www.mallorcaweb.net/salbufera/
Monitoring of the water quality is carried out in conjunction with the Directorate-General of Water Resources. Particular attention is given to the levels of nitrates, phosphates and other pollutants present in the Park water.

From 1988 information has been collected systematically on the birds: their populations, migratory movements, breeding, the progress of the reintroduced species... This ornithological monitoring is conducted by means of counts, scientific ringing and an observations log. The contributions made by the visitors are entered here and into the database.

Other monitoring activities include the effects of grazing on the vegetation and trends in public use: the number, origin and the type of visitors are recorded. The Dennis Bishop laboratory is well equipped with scientific instruments at the service of the Park and to other entities undertaken research here. More than twenty research groups and numerous scientists from universities and institutes, both national and foreign, have carried out studies on botany, zoology, geology, ecology, etc., in collaboration with the Park.

Most of the investigation activities are made within the framework of TAiB, The Albufera International Biodiversity group, a multi-disciplinary team of scientists drawn from several European countries. From 1989 they have undertaken continuous monitoring of the biodiversity, ecology, environmental change and effects of management at the Park. The results are to be found in diverse publications and on the "web". A key synthesis of their findings has been published in the inventory of biodiversity at S'Albufera, which gathers into one list the nearly 3,000 species of animals, plants and fungi known to be present in the Park.

The Natural Park’s contribution to science is an essential part of its role, but its most important contribution remains the conservation of the species and the ecosystems.

**The visitors**

S'Albufera de Mallorca Natural Park is as much a place for people as it is for science: tourists, families, naturalists, photographers, schoolchildren, indeed anyone who enjoys nature.

Some 120,000 people visit the Park every year. The number visiting grew spectacularly during the early years of the Park but has now stabilised. About 80% come from abroad, particularly Germany and the United Kingdom.

Facilities designed to enhance the visit include a new reception centre, a permanent exhibition, a number of trails, bird hides, observation platforms and towers, education and information staff, and publications in several languages.

One specially targeted group is the schoolchildren. Within the framework of the Park's education programme, guided walks are provided by the education team for about 4,000 students every year.

http://www.mallorcaweb.net/salbufera/
Activities are also organized for the public generally in the form of guided walks, open days, bird-watching, audio-visual presentations, workshops demonstrating traditional skills, etc.

The intention of all these activities is to enhance people’s understanding of S’Albufera’s flora, fauna, history and traditions etc., to help them appreciate the requirements of management and to improve their respect for the environment. Visitors are required to follow some minimum rules of conduct in order to avoid disturbance to the wildlife and inconvenience to other visitors, including respecting the opening hours, circulating only on foot or by bicycle, following the waymarked routes quietly, and not collecting any plants or animals.

Those who wish can get involved in the conservation work by participating in voluntary workcamps and other activities. The Park gives training and support to the various groups undertaking tasks which meet the needs of management.

The local neighbourhood

S'Albufera is not an island disconnected from the region in which it lies: this is an agrarian, rural and tourism region in which the Park must play an energizing and relevant part.

The attraction of S'Albufera for tourists has had one of the most significant socio-economic repercussions, because it has added value to the zone and this has resulted in tourism of a higher quality. The volume of visitors to the Park peaks in spring and autumn, contributing to an extension of the tourism season beyond just summer.

The integration of neighbouring communities in the conservation process at S'Albufera is a priority objective. Continuous contact is maintained with the district councils of Muro and Sa Pobla, as well as leisure organisations, hunting groups, firms and other local associations to avoid impacts, to find common ground and even to organise joint activities.

The Park regularly organizes a diary of events designed to inform and involve, which is especially directed at local communities. In addition the education programme specifically targets education outlets in the immediate districts in order to enhance perception and pride towards S'Albufera for those living nearby.

S'Albufera de Mallorca Natural Park is water, life and culture, a set of values which has to be preserved. But it is also much more than that. Wetlands are fundamental to the conservation of the biodiversity of the entire planet. And in our islands the Natural Park has a key role in our advance towards sustainability.
C. PRACTICAL GUIDE
HABITATS AND PLACES OF INTEREST

In this section we present a selection of the points of interest which can be found at S'Albufera and which are indicated on the map. Each represents one or more themes, such as ornithology, botany, human activities, etc.

By providing specific information we allow visitors to devise an itinerary which suits their interests, whether this be mono-thematic or enjoying any number of the various values that the site embraces.

We finish by suggesting, in turn, four designated walks taking in points of interest which cover all the possibilities.

In order to get the most out of the visit, we recommend binoculars, a magnifying glass and, to take away a memory of the visit, a notebook and pencil or camera. But there is only one essential: the mind-set to enjoy the beauty - sometimes discreet, sometimes subtle - of S'Albufera.

COASTAL DUNES

The dunes comprise the strip of sand that separates the wetland from the sea. It is known technically as a “sandbar”.

In certain conditions, sea currents deposit accumulations of sand on the shore. The wind moves the sand around, and deposits some of it to form dunes. These grow aided by further displacement of sand landwards by the wind. The sand is “fixed” by the growth of vegetation. The various stages of dune are called “a dune cordon” and lie perpendicular to the prevailing winds.

The dune vegetation is described in the corresponding section. Note how the scrub vegetation adapts to the conditions of summer drought, much more marked here than within the wetland: adaptations include reductions in leaf size, a thickening of the epidermis and in some cases thorns instead of leaves, a dense covering of hairs, etc.

The bird community here is typical of pine woodland and scrub.

Ornithological calendar

<table>
<thead>
<tr>
<th>Resident</th>
<th>Summer</th>
<th>Winter</th>
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</thead>
<tbody>
<tr>
<td>Crossbill</td>
<td>Spotted flycatcher</td>
<td>Robin</td>
</tr>
<tr>
<td>Chaffinch</td>
<td>Nightingale</td>
<td>Chiffchaff</td>
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<tr>
<td>Balearic Warbler</td>
<td>Turtle dove</td>
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http://www.mallorcaweb.net/salbufera/
FOSSIL DUNES

Behind the dune cordon are remnants of a much older dune system formed some thousands of years ago when sea levels were 6 to 8 metres higher than they are now and thus “fossilised in time”, hence the name Fossil Dunes. They are formed by sand. The best examples within the Park are at Ses Puntes and the raised mound of Ses Eres.

Almost all the dunes are covered by Aleppo pine. Other plants include Wild Asparagus, Dune Germander and Maiden's Bower. The ground supports a low herbaceous community of plantain and various rushes interspersed with numerous orchids.

The mounds provide refuge for numerous rabbits, as the abundance of burrows testify.

Lying on the mound of Ses Eres is a large paved platform, which gives it its Mallorcan name: it was here that the rice cultivated in S'Albufera was beaten. The paved area was large enough for four people to work at the same time. The platforms (eres) were traditionally constructed in exposed sites, to assist the separation of the grain from the straw, and the ground beneath was of strongly compacted clay, to avoid the grain getting buried. Ses Eres mound met the exposure requirement but, because of the sandy soil, had to be paved to achieve its task. The paving was done with ceramics, specially designed with grooves which held the grain to prevent it being flattened at the next pass of the beating wheel. The site is not accessible at the present time.

SON BOSC

At the end of Ses Puntes track, past the houses and next to the water treatment plant, is a track which crosses a former sand quarry on its way to Ses Salinetes. This is the holding of Son Bosc.

The arable zone, abandoned and in places removed of its woodland cover, is dominated by grassland interspersed with small aromatic plants such as the Dune Germander and Curry-plant.

In this area bees and wasps are abundant, including a number which breed there. Their abundance is due to the soft sand, suitable for breeding, and the wealth of aromatic plants on which to feed. Bee-eaters also breed here, in burrows made in consolidated sand, and feed on the wasps and bees. This feeding succession of plants, bees and wasps, and bee-eaters is a classic example of a trophic chain.

The old quarries, both this one at Son Bosc and a neighbouring one at Can Nadal, provided material for construction. Once their reserves were exhausted, the ground was used for cultivation.

http://www.mallorcaweb.net/salbufera/
THE SALTPANS

Behind the coastal bar, in the south of S'Albufera, are some abandoned saltpans, partially invaded by saltwort and reed.

Seawater carries a considerable amount of salt in solution, which can be obtained by evaporation. The company Salinera Mallorquina, SA did just that in S'Albufera from 1946, maintaining the saltpans until 1979.

Water was drawn from the sea in underground channels and emptied into shallow but extensive pans, where it was allowed to evaporate. As the salt content increased the water was transferred into another pool. This was so that the different components were precipitated out separately and to concentrate the production, which was some 300 tons each summer.

The open pools contain water during the winter and spring, and are very rich in life. They teem with invertebrates and these serve as food to numerous birds. It is particularly good for waders, especially during periods of passage.

<table>
<thead>
<tr>
<th>Ornithological calendar</th>
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<tbody>
<tr>
<td>Resident</td>
</tr>
<tr>
<td>Yellow-legged Gull</td>
</tr>
<tr>
<td>Coot</td>
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<tr>
<td>Kentish Plover</td>
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<td>Redshank</td>
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BRACKISH POOLS

In Es Cibollar, between blocks of reed and saltwort, there are extensive areas of open water. This landscape diversity is particularly attractive to birds.

This zone supports a large range of vegetation in the form of a complex mosaic created by subtle variations in relief and soil type. There are abundant rushes and reed and good stands of the sea club-rush Scirpus maritimus. The club-rush fruits in summer and its seeds, which fall to the ground, are an important food source for wintering ducks.

A wealth of invertebrates in the brackish pools also serve as a food source for a range of birds.

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<th>Ornithological calendar</th>
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<tr>
<td>Resident</td>
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<tr>
<td>Water Rail</td>
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<tr>
<td>Mallard</td>
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<tr>
<td>Kentish Plover</td>
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</table>
Pipes were installed in 1979 to take cooling water to Es Murterar. These run under the tracks and embankments which cross Es Cibollar and Es Colombar.

SALTMARSH

This community, which forms in places of elevated salinity, is always found adjacent to the coastal bar and is particularly well developed in Es Cibollar (north-east S’Albufera).

Here one can see clearly the link between S’Albufera and the sea, since seawater forms part of the water table and determines the salt content of a soil rich in mud and clays. In winter, the rainwater forms pools and the soils remain flooded or saturated. In summer evaporation is very high and the salt rises to the surface where it is often visible in the form of white powder.

This annual cycle determines the adaptations of the plants. The annuals have a very quick cycle, having to germinate, bloom and fruit after the floods of winter and before the salinity of summer. The perennials have swollen leaves and stems and possess powerful osmotic mechanisms for obtaining water: they included three species of saltwort and some rushes.

An abundance of herbivores, mice and rabbits, attracts raptors - Kestrels and harriers. Many waders gather on the spring and autumn pools, where the plovers and stilts raise their young. Here and there in the saltmarsh stand groups of herons. The outrageous screams of the Water Rail often ring out.

CANALS

A glance at a map of S’Albufera immediately reveals a criss-cross network of canals constructed by man.

The volume of water (depth) and the salinity determine which plants dominate in each channel. The following box outlines how they are distributed:

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<thead>
<tr>
<th></th>
<th>Fresh water</th>
<th>Brackish water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submerged plants</td>
<td>Fennel Pondweed</td>
<td>Tasselweed</td>
</tr>
<tr>
<td></td>
<td>Rigid Hornwort</td>
<td></td>
</tr>
<tr>
<td>Emergent plants</td>
<td>Reedmace</td>
<td>Black Rush</td>
</tr>
<tr>
<td></td>
<td>Brooklime</td>
<td>Sea Rush</td>
</tr>
</tbody>
</table>

The canals support a wealth of fauna. Many animals take advantage of the water or vegetation for food and refuge. Sun-bathing Pond Terrapins are easy to see - indeed they can be seen consistently in the Canal d’es Sol on any day of fine weather. From the bridges, mullet and mosquito-fish can be seen. The frogs tend to haul out at the edges or on floating vegetation. The bird diversity is also high.

http://www.mallorcaweb.net/salbufera/
The canals, along with the tracks, bridges and underground siphons, are products of the various drainage projects carried out at S'Albufera from the beginning of the 19th century. Excavation of the canals led to the formation of embankments alongside, and these were used as tracks.

**RIPARIAN WOODLAND**

The embankments of the main canals became cloaked in a dense gallery forest type of vegetation, as described already in the vegetation chapter. Previously, this community must have been natural denizens of the wetland margins, but the only evidence we have now is this artificial remnant, further reduced by fire, logging and elm tree dieback from the fungus, Dutch elm disease.

We recall that the arboreal layer of this forest is formed by poplar, elm and hawthorn, the shrub layer by brambles and, in places, Osyris alba, and the herbaceous layer, a community including Periwinkle and Creeping Cinquefoil.

The riparian woodland is home to numerous animals. Rabbits are seen with ease and it is not unusual to see a Weasel scurrying by. As elsewhere birds are plentiful, finding fruits and insects in abundance.

**REEDBED**

The reed is a very tall grass which is rather similar to the cane but less robust and with a shorter broader inflorescence. It is the commonest plant of S'Albufera and, standing dense and upright, dominates much of the landscape. It occupies all the land where water lies throughout or for a large part of the year. It grows very quickly, as fast as a millimeter or more an hour in summer! It is invasive and now covers the old abandoned rice fields and many of the canals. It shares much of its space with Saw-sedge and Hedge Bindweed. (see Chapter 3)
The thick beds of reed constitute optimum cover for many birds, which breed here. They also provide important food resources, such as seeds (the reed being a grass produces grain and many small birds are granivorous) and the insects that live in the reed bed and which are devoured by the insectivorous birds.

The reed of S'Albufera has had many different uses. Between 1870 and 1890 bales of pressed reed were sent to England to make paper, taking advantage of boats which were going to bring back coal. Years later, the paper factory used the same resource. Another use, combining reed and rushes, was the one of manufacture of espuertas, a kind of basket container for the transport of early potatoes to England. In 1932, for example, 200,000 espuertas were made. Finally, it can be used as an organic fertiliser for crops.

Currently it tends to proliferate aggressively, to the detriment of other types of habitat, so it needs to be controlled through management, by mechanical means (cutting) or animals (grazing).

### Ornithological calendar

<table>
<thead>
<tr>
<th>Resident</th>
<th>Breeding</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cetti’s Warbler</td>
<td>Marsh Harrier</td>
<td>Snipe</td>
</tr>
<tr>
<td>Fan-tailed Warbler</td>
<td>Purple Heron</td>
<td>Starling</td>
</tr>
<tr>
<td>Reed Bunting</td>
<td>Little Bittern</td>
<td>Chiffchaff</td>
</tr>
<tr>
<td>Moustached Warbler</td>
<td>Reed Warbler</td>
<td>Grey Heron</td>
</tr>
</tbody>
</table>

### BIRD HIDES AND OTHER POINTS OF OBSERVATION

There are five wooden hides, a tower and three observation platforms in the Park. (see the fold-out map)

The bird hides (called aguait here) are the ideal place to observe the birds without disturbing them and causing them to flee. For those with a telephoto lens they are useful for obtaining photographs of the fauna of S'Albufera. The observer will see fauna typical of the canals and reed bed, of salt- and freshwater marshes. In spring time they look out over Black-winged Stilts building their nest or feeding their young, the territorial activity of a range of species, the stealthy fishing of the herons, etc. On some days the observer may be lucky enough to enjoy the spectacle of an Osprey in action over Es Cibollar.

The Watkinson hide (overlooking the Grand Canal), is in memory of Edward Watkinson, a man who loved S'Albufera, and was gifted by his widow, Pat. The Bishop I and Bishop II hides (overlooking Es Cibollar) were erected in memory of Dennis Bishop and gifted by his family. The CIM hide (overlooking Es Ras) was made possible jointly by the Mallorca Island Council and the Balearic Association of Friends of the Parks.

http://www.mallorcaweb.net/salbufera/
THE MARJAL ZONE

The marjal occupies the innermost strip of land on the western edge of the S'Albufera.

It comprises very distinctive fields of cultivation, won from the outer margins of S'Albufera. Their origins are explained in the chapter dedicated to human activities. The famous bomba rice of S'Albufera is still cultivated in traditional manner in the channels between some of the marjal fields.

The channels and ditches between marjals without rice, are home to many plants typical of flooded areas, such as Duckweed and Fennel Pondweed. Great Willowherb and Water-plantain grow at the margins.

Invertebrates abound: aquatic snails, dragonflies, the recently introduced Lousiana Crayfish, etc. The waters also teem with frogs and Mosquito-fish. Some birds, such as the Moorhen, are drawn from the reed beds to feed here and it is not an unexpected occurrence to see the elegant Little Egret hunting along the drains.

http://www.mallorcaweb.net/salbufera/
THE PARK ROUTES AND DISTANCES

Route 1: Sa Roca (Can Bateman) - CIM hide – Watkinson hide
TOTAL DISTANCE: 760 m

Can Bateman to CIM hide: 150 m
CIM hide to Sa Roca mound: 280 m
Mound to Sa Roca bridge (over Canal Es Sol): 180 m
Sa Roca bridge to Watkinson hide: 150 m

Route 2: Sa Roca (Can Bateman) - Es Colombars hide
TOTAL DISTANCE: 1,325 m

Can Bateman to Sa Roca bridge: 225 m
Sa Roca bridge to Es Cibollar platform: 100 m
Es Cibollar platform to Es Colombars hide: 1,000 m

Route 3: Sa Roca (Can Bateman) - Enmig track - Punta des Vent - Can Blau - Es Polls track - S’Amarador - Ses Puntes – Sa Roca
TOTAL DISTANCE: 11,685 m

Can Bateman to Punta des Vent tower: 1,325 m
Punta des Vent tower to Can Blau: 1,650 m
Can Blau to Son Carbonell bridge: 925 m
Son Carbonell to Sa Font bridge: 2,360 m
Sa Font bridge to S’Amarador (Gate): 1,630 m
S’Amarador to Ses Puntes: 1,590 m
Ses Puntes to Es Ras platform: 1,135 m
Es Ras platform to Santa Margalida bridge: 600 m
Sta. Margalida bridge to Can Bateman: 470 m

Route 4: Sa Roca (Can Bateman) - Bishop hides I and II
TOTAL DISTANCE: 725 m

Can Bateman to Sa Roca bridge: 225 m
Sa Roca bridge to Bishop I hide: 370 m
Bishop I hide to Bishop II hide: 130 m

http://www.mallorcaweb.net/salbufera/
S’Albufera Natural Park holds three conservation designations of major international importance.

In September 1987, it was declared a **Special Protection Area for birds (SPA)** by the European Commission under the Directive 74/409, category A. This designation conveys legal protection to the Park from the EEC.

Shortly after, on 28th July 1989, the Council of Ministers designated S’Albufera a **wetland of international importance under the RAMSAR convention**, which establishes the basis for international cooperation for the conservation of wetlands.

In the year 2000, the Government of the Balearic Islands proposed S’Albufera as a site of community importance (SAC) under the EC Directive 92/43 and this was accepted in 2003.

These declarations fulfill one of the objectives of the Park, that S’Albufera should represent a Balearic contribution to nature conservation on a European and world-wide scale.

**POINTS OF INTEREST IN THE DISTRICT**

In the towns around S’Albufera (Alcudia, Muro, Sa Pobla and Santa Margalida) are a whole series of sites of great historical and cultural interest. We point out the most important.

**Alcudia**

City ruins and the Roman theatre of Pollentia (123 B.C.)
Paleochristian cave of Son Sant Martí
Santa Aina Church (13th century)
Victoria Hermitage (15th century)
Stately homes (*cases senyoriales*) fron 14th-17th centuries, in town

**MUSEO ARCHAEOLOGIC (ARCHAEOLOGICAL MUSEUM) D’ALCUDIA** (1986). Sant Jaume, 32. Tel. 971 54 64 13

**Muro**

**MUSEO ETOLOGIC (ETHNOLOGICAL MUSEUM) DE MURO** (MUSEUM OF MALLORCA). Calle Major, 15.

In this Museum, one can see old tools and equipment used by the *marjalers* in S’Albufera.
From 09 h to 13 h and 16 h to 19 h. Closed Mondays.

**Sa Pobla**

**MUSEO DE SA POBLA (SA POBLA MUSEUM)**. Calle de Antoni Maura, 1-2.

[http://www.mallorcaweb.net/salbufera/](http://www.mallorcaweb.net/salbufera/)
An interesting collection of tools used in agriculture and traditional fishing.
Open Monday evenings and Sundays.

Santa Margalida

Talaiotic remains of Son Baulo
Talaiotic necropolis of Son Real and Illot des Porros (Can Picafort)

PRACTICAL ADVICE, AND RULES AND REGULATIONS FOR THE VISIT

PRACTICAL ADVICE

Several references have been made to S'Albufera’s unique environment. The ecology of the zone does have repercussions for the visitor who, therefore, is well advised to come prepared.

FOOTWEAR: In winter, rubber boots are essential and are worthwhile also in spring and autumn after recent rain. If you keep to the recommended routes walking boots are generally sufficient; and in summer any kind of sport shoes are normally adequate.

CLOTHING: Try to dress in neutral tones. One of the most attractive elements of s'Albufera is its birds so it is better not to wear strident colours, which would drive them further away. In summer it is advisable to wear a hat.

MOSQUITOES: At certain seasons, and particularly at nightfall on calm days, mosquitoes can be a bother. It is a question of taking prior precautions: in addition to suitable clothing, a cream or insect repellent is very useful.

OPTICS: To get maximum enjoyment from the visit, do not forget your binoculars. Ones with 8 to 10 magnifications are best. A magnifying glass may enhance your enjoyment of the insects or certain flowers.

REMEMBER YOUR COUNTRYSIDE CODE: Essential! You are enjoying a fragile environment which is a natural heritage to us all. The enjoyment of others will depend on how you behave. Do not shout or be noisy, do not drop litter, do not vandalise or break anything, do not light a fire.

OPENING HOURS

The Park is open to visitors from 09 h to 18 h from 1st April to 30th September, and 09 h to 17 h from 1st October to 31st March. A visitor's permit is required, obtained free of charge at the Reception centre.

Group visits of more than 15 people require special permission which must be obtained in advance. Inquire at the Reception centre or by telephoning the

http://www.mallorcaweb.net/salbufera/
Park. Groups of more than 30 people are not allowed to enter the Park on any account.

ACCESS

Access to the Park must be on foot or by bicycle at the Englishmen´s bridge. Vehicles can be parked along the side roads of the built up area outside the Park or in the purpose-built parking facing the Hotel Parc Natural. People with mobility problems can seek special dispensation for their visit by telephoning the Park.

RULES AND REGULATIONS

— Respect nature and the values which have made this protected area possible. The gathering of flowers, plants, animals or their remains is strictly forbidden.

— Always circulate using the paths indicated, at low speeds if on a bicycle, and respect the signposting in place.

— Bicycles with more than two wheels and motorised vehicles are not allowed.

— Keep to the Park opening hours for your visit.

— Noise disturbs both the animals and the visitors. Circulate in silence.

— Eating in the hides is not permitted and pícnics are forbidden anywhere in the Park. At all times, please occupy the tables at Sa Roca for only short periods.

— Sporting activities (including jogging, horse riding, mountain biking, etc.) are not permitted within the Park.

— Domestic animals (particularly dogs) frighten the fauna. Do not bring them into the Park.

— In the case of a breach of regulations, Park personnel may revoke the visitor permit.

— Share in the conservation of the Park by making known any suggestions you have for the improvement of this protected natural area.
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Status</th>
<th>Seen</th>
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<tbody>
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<td>Acrocephalus arundinaceus</td>
<td>Great Reed Warbler</td>
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<tr>
<td>Acrocephalus melanopogon</td>
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<td>S 3</td>
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<td>Anas platyrhynchos</td>
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<td>Long-eared Owl</td>
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<td>Aythya ferina</td>
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<td>Aythya fuligula</td>
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<td>Calidris alpina</td>
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<td>Calidris minuta</td>
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<td>Carduelis cannabina</td>
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<td>Common Name</td>
<td>Abundance</td>
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<td>Swallow</td>
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<td><em>Pandion haliaetus</em></td>
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<td><em>Parus major</em></td>
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<td><em>Phylloscopus trochilus</em></td>
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<tr>
<td><em>Turdus philomelus</em></td>
<td>Song Thrush</td>
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<td><em>Upupa epops</em></td>
<td>Hoopoe</td>
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<tr>
<td><em>Vanellus vanellus</em></td>
<td>Lapwing</td>
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</table>

**Notes:**
- **W:** Winter
- **R:** Resident
- **S:** Summer
- **M:** Migrant
- **1:** Rare
- **2:** Scarce
- **3:** Abundant

*http://www.mallorcaweb.net/salbufera/*
BIBLIOGRAPHY


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DESPUIG I DAMETO, Antoni. *Mapa de la isla de Mallorca.* Mallorca: 1789. (Escala aproximada 1:70.000.)


[http://www.mallorcaweb.net/salbufera/](http://www.mallorcaweb.net/salbufera/)
CARTOGRAPHY

1. ANTONIO LÓPEZ MAP OF 1856
2. GENERAL MAP OF ROUTES AND PLACE-NAMES

Enmig track-Ses Puntes
Es Cibollar
Es Colombars
Sa Roca

Término municipal de Alcúdia
Término municipal de Santa Margalida
Término municipal de Sa Pobla

Alcudia Bay
Torrente de Muro
En Mama lagoon
Ses Fotges
Las Gaviotas
Grand Canal
Es Cibollar
Sa Roca
Sa Siurana
Es Colombars
Alcudia II power station
Es Murterar
Es Sol canal
Es Patrimoni
Es Forcadet
Sa Pobla Marjal
Es Polls track
En Moix canal
En Moix irrigation channel
En Pujol canal
En Pep track
Son Serra marsh
Es Ras
Ses Puntes
Es Braç
Alcudia Pins
Arta-Alcudia Port
Es Comú
Ses Salinetes
Es Pouetó
Son Bosc
Amarador
Water treatment plant
Es Rotios
Sa Font

http://www.mallorcaweb.net/salbufera/
3. VEGETATION MAP

Cartography: Direcció General de Biodiversitat

Legend
Boundaries of S’Albufera Natural Park
Vegetation
Riparian woodland
Tamarisk copse
Saw-sedge and Reed beds
Lagoons
Rush beds
Matorral, bushes, woodland and scrub
Salicornia saltmarsh
Dune vegetation
Ruderal vegetation and cultivations

http://www.mallorcanet/salbufera/