

SENEGAL

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Senegal Parrot *Poicephalus senegalus*. (ILLUSTRATION: NIK BORROW)

GENERAL INTRODUCTION

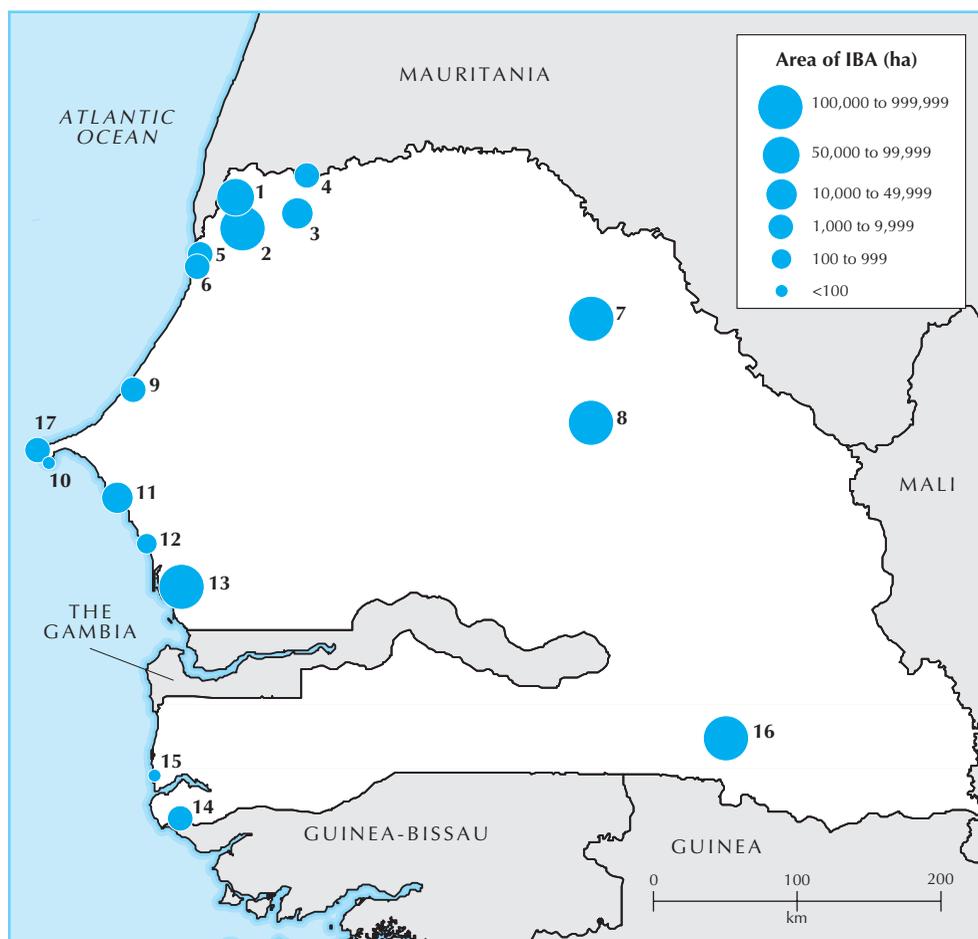
The Republic of Senegal lies on the north-western coast of Africa, bordered by the Atlantic Ocean to the west, Mauritania to the north, Mali to the east, and Guinea-Bissau and Guinea to the south. It covers an area of 196,720 km² from 12°20'N to 16°30'N and from 11°20'W to 17°30'W. The independent state of The Gambia, formed by the banks of the Gambia river, lies in the southern half of Senegal and is entirely enclosed by it, apart from the coastline. The population of Senegal was 7.4 million in 1990, with a growth-rate of 2.7% per annum. Senegal gained independence from France in 1960 and, in political terms, has been largely very stable since then. The southern Casamance region shelters a strong separatist movement, calling for an independent state of Casamance, which has led to civil unrest and some violence. A move to establish a 'Senegambian' State has never come to fruition. The official language of Senegal is French, but the predominant ethnic group and language is Wolof. There are some 20 ethnic groups in total. Wolofs represent around 40% of the population and are mainly Muslims. The country as a whole is predominantly Muslim, but there are significant numbers of Catholics (e.g. the Serere around Thiès and Sine-Saloum) and smaller groups of animists.

The Senegal river flows north out of the Fouta Djallon massif in Guinea to form the whole of the northern and eastern border of Senegal (a length of more than 1,350 km), eventually flowing into the Atlantic at St Louis. The Senegal river is the second-largest river in West Africa, draining a watershed of 290,000 km². Its flood-plain lies within a massive sedimentary basin which runs north into Mauritania and south as far as Bissau in Guinea-Bissau, covering a total area of c.340,000 km². This basin was periodically inundated by the sea: around 6,000 years ago, seawater may have extended up the Senegal river as far as 600 km inland, and mangroves grew on the current site of Lac de Guiers. Although the hills in the south-east of the country are foothills of the Fouta Djallon, Senegal is predominantly low-lying. Around 90% of the country is below 100 m above sea-level and the maximum altitude along the border with Guinea barely reaches 500 m, with a few hills in this region (the

Bassari hills) attaining 400 m. The coastline is mainly sandy, with four significant estuaries of (from north to south) the rivers Senegal, Sine-Saloum, Gambia and Casamance. There are a few rocky outcrops along the coast; the highest, at Cap de Naze, on the 'Petite Côte', south of Dakar, reaching a maximum height of 74 m.

The country has a wide range of climate and habitats. There is a distinct increase in mean annual rainfall from north to south, in a series of parallel bands across the country. Broadly speaking, the distribution of biomes across the country also follows this pattern, with additional influences of the Atlantic Ocean along the west coast and the Bassari hills in the south-east. The main rain-bearing winds are the south-westerly trade winds which prevail over Senegal when the Inter-Tropical Convergence moves north during June to October. Thus, the rainy season is longest at the coast in the south-west and shortest in the north and north-east. At Ziguinchor (12°35'N 16°20'W) the rainy season lasts five months (May to September), in Dakar (14°38'N 17°27'W) it lasts three months (with a peak in August) and at Saint Louis (16°01'N 16°30'W) only two (August and September, occasionally persisting at low levels into November). Rainfall-levels vary from an annual mean of 1,547 mm over c.90 days at Ziguinchor, to an annual mean of 330 mm and fewer than 30 rainy days at Podor on the Senegal river in the north (16°35'N 15°02'W). In the dry season, the Harmattan wind blows from the east and north-east off the Sahara and meets the cooler coastal Alizé from the north-west. The Harmattan is hot and dry and can bring storms of Saharan sand and dust. Where it meets the Alizé, it rises above it and can cause coastal clouds, but rarely rainfall. Coastal temperatures show less extreme variation than inland: at Dakar, on the coast, mean monthly maxima and minima vary throughout the year from 24–29°C and 16–23°C respectively. At Matam, over 400 km inland up the Senegal river (15°40'N 13°18'W), the corresponding figures are: 30–41.5°C and 12–25°C.

The country can be divided into five distinct areas according to soils and vegetation (the approximate coincidence of each of these geographic zones with the main administrative regions is shown in brackets):



Map 1. Location and size of Important Bird Areas in Senegal.

Table 1. Summary of Important Bird Areas in Senegal.

IBA code		Site name	Administrative region	Criteria (see p. 11; for A3 codes, see Table 2)						
				A1	A03	A3 A04	A05	A4i	A4ii	A4iii
SN001		Djoudj wetlands	St Louis	✓				✓	✓	✓
SN002		Ndiaël basin (including the 'Trois Marigots')	St Louis					✓		✓
SN003		Lac de Guiers	St Louis, Louga	✓				✓		
SN004		River Senegal (Ntiagar to Richard-Toll)	St Louis		✓			✓		✓
SN005		Guembeul Avifaunal Reserve and St Louis lagoons	St Louis					✓		
SN006		Parc National de la Langue de Barbarie	St Louis					✓		
SN007		Ferlo North	St Louis		✓	✓				
SN008		Ferlo South	St Louis		✓					
SN009		Niayes (from Dakar to St Louis)	Cap Vert, Thiès					✓		
SN010		Parc National des Iles de la Madeleine	Cap Vert						✓	
SN011		La Petite Côte	Thiès	✓				✓		
SN012		Joal-Fadiouth	Thiès	✓				✓		
SN013		Delta du Saloum	Fatick, Kaolack	✓		✓		✓		✓
SN014		Parc National de Basse Casamance	Ziguinchor	✓		✓	✓			
SN015		Kalissaye Avifaunal Reserve	Ziguinchor					✓		
SN016		Parc National du Niokolo-Koba	Tambacounda			✓	✓			
SN017		Cap Vert	Cap Vert	✓				✓	✓	
Total number of IBAs qualifying:				7	3	4	2	12	3	4

- the region of the Senegal river valley, including the northern part of the Senegal river flood-plain to cover much of the northern interior of the country (Région de St Louis, Région de Louga);
- the coastal zone, from south of the Senegal river down to the Gambia river, including the 'Petite Côte' south of Dakar and the delta and islands of the Saloum river (Région de Louga, Région de Thiès, Région du Cap Vert, Région de Fatick);
- the 'ground-nut zone'—the vast Sahel and Sudan savannas of the interior, including the southern Ferlo (Région de Diourbel, Région de Kaolack, Région de Tambacounda);

- the south-east, including the Bassari hills and the Parc National du Niokola Koba (Région de Tambacounda);
- the Casamance (Région de Ziguinchor, Région de Kolda).

The Senegal river and its valley, from around Bakel downstream to St Louis on the coast, lies in the Sahel biome. The habitat is dry Sahel thorn-bush savanna, dominated by *Balanites aegyptiaca* and *Acacia* spp., with occasional Sudan Savanna species such as baobab *Adansonia digitata* and fruiting shrubs including *Salvadora persica*. Along the riverbanks, there were once important forests of *Acacia nilotica* ('gonakiers'), but these have largely disappeared due to a

combination of drought and human destruction for fuelwood and charcoal. This region grades into Sudan grassland and woodland in the south. In the dry, northern interior, the ‘Ferlo’, there are nomadic herdsman and shifting pastoralists (mainly Peuls), with cattle, sheep and goats. In the flood-plain of the river, traditional ‘walo’ (flood-recession) cultivation was practised previously, but the area has been greatly modified for irrigated agriculture since the 1960s (see below). Many of the people who previously migrated into the flood-plain to cultivate and graze livestock following natural river flooding (and then back again to the Ferlo in the dry season) are increasingly becoming sedentary. This has been made possible by the construction of boreholes providing year-round water from deep aquifers. Some scientists believe that the resulting overgrazing and trampling around areas of permanent habitation with boreholes is contributing to desertification in the Ferlo.

The coastal zone is largely sandy and dominated by dunes, in many places ‘mobile’ and unstable. Behind the dunes between Dakar and Saint Louis, along a strip 150 km long and 5 km wide, lies a series of relict marshy depressions and permanent freshwater lakes, known as ‘niayes’. These depressions are characterized by the oil-palm *Elaeis guineensis* and are formed as a result of the water-table lying close to the surface in this region, coupled with the influence of the moist, coastal Alizé winds. As a consequence, the vegetation in the niayes includes species typical of much higher rainfall areas, including species more usually associated with Sudan–Guinea Savanna zones. Mangroves occur on all the major estuaries, from the Senegal river in the north, to the rivers Sine-Saloum, Gambia and Casamance in the south. There are rocky areas and small cliffs around the Cap Vert peninsula, on which Dakar lies, and south towards the Petite Côte. Offshore there are rocky, volcanic islands including the Ile de Gorée (famous as a former slave-trading post) and the Parc National des Isles de la Madeleine.

The ‘ground-nut zone’ coincides with the area of the country naturally covered in Sudan Savanna zone vegetation (including both grassland and wooded savanna). This grades into the Sahel zone in the north and Sudan–Guinea Savanna vegetation in the south. The zone covers two-thirds of the country, from south of the Senegal river delta down to The Gambia and the border with Guinea-Bissau (excluding the very south-west of the country, i.e. the Middle and Lower Casamance), and as far as 14°E. The natural vegetation has been hugely modified by human cultivation. In some areas, large trees remain (e.g. *Parkia biglobosa*, *Terminalia macroptera*, *Borassus aethiopicum*, *Acacia* spp.), forming a kind of cultivated parkland; in other areas, all large trees have been removed to make way for ground-nuts and food crops.

In the south-east (including the area around the Bassari hills and the Parc National du Niokolo-Koba), larger trees and gallery forest are found, particularly along watercourses, e.g. *Khaya senegalensis*, *Combretum glutinosum* and oil-palm *Elaeis guineensis*, together with bamboo *Oxytenanthera abyssinica*. Interspersed with gallery forest are areas of open grassland and small wetlands, drier forest on the lateritic red soils and rocky outcrops in the Bassari hills.

The Casamance includes the only area of Guinea forest vegetation in Senegal and also the most important areas of mangrove (an estimated 250,000 ha), on the northern bank of the Casamance river delta. The principal species of mangrove in this area, *Rhizophora racemosa*, is declining rapidly as a result of drought and human clearance. The small patches of rainforest include species typical of the Fouta Djallon massif, such as *Parinari excelsa*. Oil-palms *Elaeis guineensis* are widespread in wetter areas.

Human populations are concentrated in the ground-nut area and along the river valleys. Along the Senegal river valley, traditional flood-recession agriculture and artisanal fisheries have declined as a result of damming of the river and attempts to increase the area of irrigated agriculture (especially rice) in the flood-plain. Barrages on the main river, sluices between water-bodies like the Lac de Guiers and the main river, and miles of irrigation canals and embankments have altered the hydrological regime considerably. The natural cycle of an annual flood followed by falling water-levels and the intrusion upriver of salt water from the estuary no longer occurs on the Senegal river and there are plans for barrages on the rivers Casamance and Gambia too. In the Senegal river valley, the development schemes are far from reaching their predicted potential in terms of area of irrigated agriculture.

These changes, compounded by what appears to be persistent drought, especially in the northern Sahelian region, have led to considerable loss of valuable wildlife habitat. For example, the *Acacia nilotica* forests, once widespread along the Senegal river and important habitat for Palearctic migrants, have all but disappeared. The Ndiaël depression, north-east of St Louis, dried up in the 1960s and has remained dry ever since, until recent (partially successful) attempts to recreate a wetland on this site in the early 1990s. There appears to be a general drying out of climate and habitats throughout the country. This is evidenced by dying trees and the gradual disappearance of the oil-palm (even as far south as the Parc National du Basse Casamance), and the increasing occurrence of typical desert bird species (e.g. *Alaemon alaudipes*) in the north.

In addition to habitat loss, other threats to birds in Senegal include pesticides, hunting and the wild-bird trade. The use of insecticides is increasing alongside attempts to increase areas of irrigated agriculture. Pesticides including dieldrin and parathion are used against grasshoppers and locusts and directly to control bird pests such as *Quelea quelea* by aerial spraying of roosts. Both these uses can have indirect effects on raptors and other non-target bird species (the decline of *Ciconia ciconia* in Senegal may be due to loss of insect prey and/or direct poisoning). Levels and effects of hunting are difficult to quantify, but they include organized tourist hunting of ducks and gamebirds and ‘traditional’ hunting of a wide range of species (adults, chicks and eggs) including potentially vulnerable colonial waterbirds, gulls and terns. Some species such as *Philomachus pugnax* are hunted as pests of rice. There is a significant level of export of wild birds, some of it illegal and involving species captured in neighbouring countries and then exported through Senegal.

ORNITHOLOGICAL IMPORTANCE

The avifauna of Senegal is remarkable especially for its variety and for very large congregations of certain (particularly wetland and marine) birds, including many Palearctic migrants. There are also large numbers of raptors and Palearctic migrant passerines and, despite the lack of overall geographical relief, a few montane species occur (residents and Palearctic migrants, e.g. *Monticola saxatilis*).

The total species list for Senegal is 612 (610 listed by Dowsett and Dowsett-Lemaire 1993, with the subsequent additions of *Streptopelia hypopyrrha* and *Lagonosticta virata*). The list includes 357 resident species (of which 210, or 59%, have definite proof of breeding in the country), and 207 regular seasonal migrants (of which 144 are Palearctic).

Ten species of global conservation concern occur in the country. Of these, *Phoenicopterus minor* (NT) is an intra-African migrant (the only known breeding records for the species in West Africa are from Mauritania); *Marmaronetta angustirostris* (VU) is recorded both breeding and as an overwintering migrant; *Aythya nyroca* (VU), *Circus macrourus* (NT), *Falco naumanni* (VU), *Larus audouinii* (CD) and *Acrocephalus paludicola* (VU) are all migrants from Europe. The other threatened species—*Ceratogymna elata* (NT), *Prinia fluviatilis* (DD) and *Illadopsis rufescens* (NT)—are all resident, although definite breeding records have yet to be established for each of these three species. A previously cited record of *Criniger olivaceus* (VU) for Senegal is no longer accepted (Morel and Morel 1990).

There are no bird species endemic to the country and no Endemic Bird Areas. A specimen collected in the south-east of the country in 1966 has recently been re-identified as *Lagonosticta virata* (Payne 1997): the only record of a restricted-range species in the country and hitherto only known from the Upper Niger valley Secondary Area (s040), in Mali. This raises the possibility of designating an IBA (probably an extension northwards of the Niokola-Koba National Park, site SN016) to include the area in which the bird was collected (see ‘Overview of the inventory’).

Species representative of three biomes occur in the country; these are the Sahel (A03), the Sudan–Guinea Savanna (A04) and the Guinea–Congo Forests (A05) biomes, with 12, 33 and 37 species respectively, reflecting the different geographical and habitat conditions found from north to south of the country.

Of particular note are the huge congregations of migrant and resident waterbirds for which the wetlands in the Senegal flood-

Table 2. The occurrence of biome-restricted species at Important Bird Areas in Senegal. Sites that meet the A3 criterion are highlighted in **bold**. Species of global conservation concern are highlighted in **bold blue**. Any other species with a restricted range are highlighted in blue.

A03 – Sahel biome (12 species in Senegal; three sites meet the A3 criterion)									
IBA code:	001	002	003	004	005	007	008		
<i>Ardeotis arabs</i>		✓		✓		✓	✓		
<i>Eupodotis savilei</i>			✓	✓		✓	✓		
<i>Streptopelia roseogrisea</i>		✓		✓	✓	✓	✓		
<i>Caprimulgus eximius</i>		✓		✓		✓	✓*		
<i>Dendropicos elachus</i>				✓	✓	✓	✓		
<i>Mirafra cordofanica</i>				✓					
<i>Cercotrichas podobe</i>		✓	✓	✓	✓	✓	✓		
<i>Prinia fluvialilis</i>		✓		✓					
<i>Spiloptila clamans</i>		✓		✓		✓	✓		
<i>Anthoscopus punctifrons</i>				✓		✓	✓*		
<i>Passer luteus</i>		✓	✓	✓	✓	✓	✓		
<i>Lamprotornis pulcher</i>		✓	✓	✓	✓	✓	✓		
Number of species recorded:	8	4	5	12	5	10	10		
* Records listed for 'the Ferlo' (Ornis Consult 1997) without specifically mentioning occurrence in Ferlo South (site SN008), although these species are expected to occur at the site.									
A04 – Sudan–Guinea Savanna biome (33 species in Senegal; four sites meet the A3 criterion)									
IBA code:	004	007	008	009	011	013	014	016	
<i>Falco alopex</i>						✓		✓	
<i>Streptopelia hypopyrrha</i>								✓	
<i>Poicephalus senegalus</i>	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Musophaga violacea</i>						✓	✓	✓	
<i>Merops bulocki</i>	✓	✓	✓					✓	
<i>Coracias cyanogaster</i>			✓	✓		✓	✓	✓	
<i>Lybius dubius</i>			✓	✓	✓	✓	✓	✓	
<i>Galerida modesta</i>					✓			✓	
<i>Hirundo leucosoma</i>					✓	✓	✓	✓	
<i>Corvinella corvina</i>			✓	✓	✓	✓	✓	✓	
<i>Cossypha albicapilla</i>		✓				✓	✓	✓	
<i>Mymecocichla albifrons</i>				✓	✓	✓	✓	✓	
<i>Turdoides reinwardtii</i>	✓					✓	✓	✓	
<i>Cisticola ruficeps</i>									
<i>Cisticola rufus</i>									
<i>Hypergerus atriceps</i>							✓	✓	
<i>Eremomela pusilla</i>	✓	✓				✓	✓	✓	
<i>Anthoscopus parvulus</i>				✓	✓			✓	
<i>Nectarinia coccinigaster</i>							✓		
<i>Emberiza affinis</i>									
<i>Pytilia phoenicoptera</i>						✓		✓	
<i>Euschistospiza dybowskii</i>									
<i>Lagonosticta rara</i>									
<i>Lagonosticta virata</i>									
<i>Lagonosticta larvata</i>								✓	
<i>Estrilda caerulescens</i>				✓	✓			✓	
<i>Estrilda troglodytes</i>	✓					✓			
<i>Petronia dentata</i>	✓	✓				✓			
<i>Plocepasser superciliosus</i>			✓	✓	✓			✓	
A04 – Sudan–Guinea Savanna biome ... continued (33 species in Senegal; four sites meet the A3 criterion)									
IBA code:	004	007	008	009	011	013	014	016	
<i>Ploceus heuglini</i>		✓							
<i>Lamprotornis purpureus</i>		✓	✓		✓	✓		✓	
<i>Lamprotornis chalcurus</i>		✓						✓	
<i>Ptilostomus afer</i>	✓	✓	✓		✓	✓		✓	
Number of species recorded:	7	9	7	6	11	18	9	23	
A05 – Guinea–Congo Forests biome (37 species in Senegal; two sites meet the A3 criterion)									
IBA code:							013	014	016
<i>Tigriornis leucolophus</i>								✓	
<i>Accipiter erythropus</i>							✓	✓	✓
<i>Sarothrura pulchra</i>								✓	
<i>Tauraco persa</i>								✓	✓
<i>Centropus leucogaster</i>								✓	
<i>Tockus fasciatus</i>							✓	✓	
<i>Ceratogymna fistulata</i>							✓	✓	
<i>Ceratogymna elata</i>								✓	
<i>Pogoniulus atroflavus</i>								✓	
<i>Tricholaema hirsuta</i>								✓	
<i>Indicator maculatus</i>								✓	✓
<i>Campethera maculosa</i>								✓	✓
<i>Campethera nivosa</i>								✓	
<i>Psalidoprocne obscura</i>								✓	✓
<i>Thescelocichla leucopleura</i>								✓	
<i>Phyllastrephus scandens</i>								✓	
<i>Phyllastrephus albigularis</i>								✓	
<i>Bleda canicapilla</i>							✓	✓	
<i>Nicator chloris</i>								✓	
<i>Criniger barbatus</i>									
<i>Criniger calurus</i>									
<i>Alethe diademata</i>								✓	
<i>Illadopsis rufescens</i>								✓	
<i>Illadopsis puveli</i>								✓	
<i>Illadopsis fulvescens</i>								✓	
<i>Phyllanthus atripennis</i>								✓	
<i>Camaroptera chloronota</i>									✓
<i>Sylvietta virens</i>									
<i>Hylia prasina</i>								✓	
<i>Fraseria cinerascens</i>								✓	
<i>Terpsiphone rufiventris</i>								✓	✓
<i>Anthreptes gabonicus</i>							✓		
<i>Nigrita bicolor</i>								✓	
<i>Pyrenestes sanguineus</i>								✓	✓
<i>Spermophaga haematina</i>								✓	
<i>Ploceus nigerrimus</i>									
<i>Malimbus nitens</i>								✓	
Number of species recorded:							5	31	8

plain are of vital importance. These sites, together with wetlands in neighbouring Mauritania and those in the inland delta of the river Niger in Mali and Lake Chad, are the first available stop-over places for migratory waterbirds after a 2,000 km crossing of the Sahara desert. It is estimated that 3 million migrant birds pass through the protected areas in the Senegal river delta each year (Hughes and Hughes 1992). Senegal contains the largest known breeding colony of *Sterna maxima* in the world: an estimated 40,000 nests on the Ile aux Oiseaux within the Parc National du Delta du Saloum in 1999 (Jacques Peeters pers. comm.). The importance of the coastline for resident and passage seabirds has become apparent in recent years, with observations of tens of thousands of migrant terns, gulls and shearwaters moving along the coast, especially around the Cap Vert peninsula on which Dakar lies.

CONSERVATION INFRASTRUCTURE AND PROTECTED-AREA SYSTEM

The principal pieces of conservation legislation relating to protected areas in Senegal are the Forest Code (regulations, 1965; legislation, 1974) and the Hunting and Wildlife Protection Code (regulations and legislation, 1986). The Forest Code defines Classified Forests (Forêts classées) and Reforestation or Restoration Areas, allows for their declassification and for the classification of new areas, and restricts the activities allowed in them. In addition, it covers the establishment and administration of National Parks and other protected areas. The Hunting and Wildlife Protection Code makes further provision for protected areas and also specifies the responsibilities of the Directorate of Water, Forests, Fishing and Soils (Direction des Eaux et Forêts, Chasse, Pêche et Conservation

des Sols, DEFPCPS) and the National Parks Directorate (Direction des Parcs Nationaux, DPN) in regulating hunting and protecting wildlife within and outside protected areas throughout the country.

The Senegalese Monograph on National Biodiversity lists four categories of protected areas: National Parks, Avifaunal Reserves, Biosphere Reserves and Classified Forests—with World Heritage Sites as an additional classification. Biosphere Reserves can be subdivided into Faunal Reserves, Special Faunal Reserves, Special Reserves and Hunting Reserves (or Zones). This leads to some confusion as certain sites with a bird interest are referred to sometimes as ‘Avifaunal Reserve’ and sometimes as ‘Faunal Reserve’ or ‘Special Reserve’ (or another title such as ‘Sanctuaire Ornithologique de la Pointe de Kalissaye’, site SN015). The official protected status given for each site in the site accounts is taken from the Monograph on National Biodiversity.

The DPN has existed since 1973 and now (together with the DEFPCPS) forms part of the Ministry for the Environment and Nature Protection. The DPN has responsibility for management of most of the parks and reserves (apart from Ndiaël basin which is managed by the DEFPCPS). Each National Park is established by Presidential decree, which specifies its own set of regulations for protection and management. The National Parks Service, incorporated as part of the Directorate (DPN), is primarily responsible for the protection of wildlife within the parks. It functions much like a paramilitary service, with highly trained and armed personnel. However, the Service also works with local communities in attempts to combat poaching and fire hazards. Tourism is regarded as invaluable in supporting efforts to safeguard wildlife and aid economic development; many of the parks and reserves have well-developed facilities for overnight visitors. A conservation education unit has existed within the Directorate since 1977 and has launched both adult and children’s nature clubs.

A national conservation strategy was produced with support from IUCN (Journault and Burdock 1983) and more recent strategies and plans of action have been produced according to the reporting requirements of the Biodiversity Convention. The current documents espouse the principles of the Biodiversity Convention (such as the involvement of local communities, national and local NGOs in the management of protected areas). A National Environmental Action Plan (NEAP) was produced in 1995, and each of the 10 regions of the country has a Regional Environmental Action Plan. The ‘Réseau Zones Humides du Sénégal’ (RZHS), established in 1995, has the task of creating a national wetlands conservation strategy for both protected and unprotected areas, which will form part of the NEAP. These strategic and action-planning processes are further described in: ‘Saving Senegal’s biodiversity: a strategy for protected areas and their buffer zones’ (title translated from French) (DPN 1998).

Senegal has one of the most comprehensive protected-area systems in Africa, including six National Parks and six Avifaunal Reserves. Excluding Forest Reserves, it covers around 8% of the country (1,613,790 ha) and includes representative samples of most of the principal ecosystems: wetlands (including coastal), forests, savanna and Sahel. The first protected area (Niokolo-Koba National Park) was created in 1954. In general, the protected-areas network is considered adequate and the management of the parks and reserves within it is good (except in the Sahel region where, until very recently, there was virtually no active management of the two ‘Ferlo’ reserves). Large areas of relatively unmodified habitats, of considerable conservation value, also exist outside the protected-area network, especially in the east of the country and in the Casamance region. The major threats to protected areas are persistent drought, especially in northern areas, mining exploration (especially for iron in the north), and irrigation and agricultural intensification projects. There is an urgent need for a coordinated and integrated approach to the management of wetlands (both protected and unprotected) in the Senegal river delta (DPN 1998). Mangroves in the Saloum delta are threatened by extension of rice cultivation and those in the Casamance delta by soil salinization (IUCN 1991b). Poaching (especially of larger mammals) continues to be a serious problem, despite major government efforts to counter this threat. Lack of resources, recruitment problems and insufficient training for staff (particularly in areas such as participatory resource management) hinders the efficient operation of the National Parks Service (DPN 1996, 1998).

INTERNATIONAL MEASURES RELEVANT TO THE CONSERVATION OF SITES

Senegal became a party to the World Heritage Convention (the Convention Concerning the Protection of the World Cultural and Natural Heritage) in 1976. Four sites have been inscribed as World Heritage Sites (Djoudj National Park, Niokolo-Koba National Park, Island of Saint-Louis and Ile de Gorée, the latter two as cultural sites). Senegal has been a Contracting Party to the Convention on Wetlands (Ramsar, Iran, 1971) since 1977 and four Wetlands of International Importance (Ramsar Sites) have been designated (Djoudj National Park and Bassin du Ndiaël in 1977; Delta du Saloum National Park in 1984; Guembeul Avifaunal Reserve in 1986). Three sites have been designated as Biosphere Reserves under the UNESCO Man and the Biosphere (MAB) programme (Samba Dia Classified Forest in 1979; Delta du Saloum in 1980; Niokolo-Koba National Park in 1981). In 1987, Senegal was the first non-European country to accede to the Berne Convention (the Convention on the Conservation of European Wildlife and Natural Habitats), in recognition of the importance of many of the country’s habitats for migrants (especially birds) between Europe and Africa. The country is also a party to CITES (the Convention on International Trade in Endangered Species), the Bonn Convention (on the Conservation of Migratory Species of Wild Animals), ratified in 1983, and the Convention on Biological Diversity (ratified in 1994). Senegal signed and ratified the African-Eurasian Migratory Waterbird Agreement during 1999 and also chaired the first Meeting of the Parties. Senegal is a party to the Convention to Combat Desertification and the Convention on Climate Change.

Regionally, the country has ratified the 1968 African Convention on the Conservation of Nature and Natural Resources (under the Organization of African Unity). There are well-developed plans for the establishment of cross-border international parks and collaborative management with The Gambia (in the Saloum delta) and with Guinea (Niokolo-Koba/Badiar). The DPN (and particularly staff of the Parc National des Oiseaux du Djoudj) are assisting with the establishment of a ‘partner’ park on the opposite side of the Senegal river in Mauritania (the Diawling National Park). This includes joint training courses and seminars on the problems and techniques of wetland management. The DPN is an active participant and contributor to the annual African Waterbird Census of Wetlands International, supported by the French ONC (Office National de la Chasse), IUCN and Wetlands International, among others. This process is part of a regional sub-Saharan programme to monitor populations of waterbirds, train personnel and establish national databases.

OVERVIEW OF THE INVENTORY

The inventory consists of 17 Important Bird Areas (IBAs), covering approximately 25,800 km², equivalent to just over 13% of the total land area of the country (Map 1, Table 1). Of these sites, 10 are wetlands (four with a coastal and marine element) and a further three are entirely coastal and marine. This reflects the great importance of the Senegal coast and major river estuaries and deltas for both Afrotropical and migrant Palearctic species of waterbirds and seabirds. It also reflects the past observer effort to quite a large extent; the greatest emphasis has been placed on regular survey work in the major wetlands (particularly as part of the African Waterbird Census in which Senegal has participated since the Census began in 1991). There has also been increasing interest, in recent years, in the significance of the coast and immediate offshore marine areas for migrant seabirds. Of the 17 sites, eight are officially fully protected, four are partly protected and five have no recognized protected-area status. The site that is under the most immediate threat is site SN009, the ‘niayes’ wetlands between Dakar and St Louis. Several of these lakes and depressions are being drained, polluted and claimed for building or other development at the time of writing.

Three sites qualify under the A3 criterion for the Sahel biome, between them holding all 12 species in the country that are restricted to this biome (Table 2). Similarly, four sites qualify for the Sudan–Guinea Savanna biome, holding 27 of the 33 species that occur nationally, and two sites qualify for the Guinea–Congo Forests

biome, holding 32 of the 37 species restricted to this biome in Senegal (Table 2).

Although the data for the wetland sites are good, it is quite hard to delimit many of the IBAs, partly because counts take place in slightly different places in different years (often depending on water-levels—many areas are wet in one year, but dry in another). It is likely that future work will lead to an increase in the number of wetland IBAs as specific sites of importance are narrowed down and defined. The approach taken here has been to group together areas of importance into rather large single IBAs (e.g. within the Senegal river delta and along the coast south of Dakar) because the information is not adequate to split them down further. In some cases this means that areas of rather poor habitat (or even human habitation) are included, but the linkages between the different wet areas, both within and between the IBAs as defined here, are so important that this is considered to be a valid approach. Further survey and ecological assessment will be required to determine which areas of land really constitute parts of ecological ‘units’ as used by birds (e.g. flight paths between roosting and feeding sites) and hence merit inclusion within better-defined IBAs.

The one restricted-range species recorded from Senegal (*Lagonosticta virata*) could be incorporated within Parc National du Niokolo-Koba (site SN016) by extending the boundary of this site northwards to cover the location where the bird was found, i.e. c.13°48′N 12°40′W (Payne 1997). It was not considered valid to do this here, in the absence of any data on habitats or population size of the species in the area where the single specimen was collected. However, the area certainly merits further investigation, with a view to extending site SN016 or identifying a new IBA (under the A2 criterion) if a significant population of the species is found to occur.

The importance of observer effort is demonstrated by the River Senegal (site SN004), which qualifies as an IBA on the grounds of congregatory waterbird numbers and species restricted to the Sahel biome, despite the fact that it consists of fairly degraded, unprotected habitat and includes quite dense areas of human population. The principal reason for the very comprehensive species lists for this site is the fact that Gérard and Marie-Yvonne Morel were resident ornithologists in Richard-Toll for more than 35 years. This suggests that more detailed investigation of other inland areas will yield more IBA sites in Senegal. This is reinforced by recent work in the Ferlo area in the north of the country that is beginning to reveal the importance of these semi-arid Sahelian regions for both Afrotropical and Palearctic species (especially passerines and raptors).

Another region of the country which has been relatively little-studied and which might well yield future IBA sites is the south-eastern corner around Kédougou, which contains one of the few areas of relief in Senegal—hills, ravines and some dense forest, on the very edge of the Fouta Djallon plateau. The southern Casamance region has also been relatively little-surveyed in recent years (although there are some very good records from earlier decades) because of civil unrest in the region. More survey work here would again help to define better IBA boundaries and is quite likely to reveal new sites both in the forested areas of the Guinea–Congo Forests biome in the very south and along the coast south of The Gambia towards Guinea-Bissau.

COMMENTS ON THE INVENTORY

- Site names are in French where they are names of recognized protected areas (e.g. National Parks and Ramsar Sites). Local or French names are used for unprotected sites which are not recognized except as IBAs—several of these are named according to local towns or other accepted local area names, e.g. La Petite Côte (site SN011) and Niayes (site SN009). English names are used in some instances, e.g. Djoudj wetlands (SN001), to make the distinction between the IBA and the smaller protected area within it (in this case a National Park—Parc National des Oiseaux du Djoudj).
- Geographical coordinates are taken from Ramsar and Wetlands International records, from published site accounts (Hughes and Hughes 1992, IUCN 1991a, Schepers *et al.* 1998), checked and modified (where IBA boundaries differ from those of designated protected areas) using *Encarta World Atlas 99* (Microsoft

Encarta 1999). Estimates of areas for sites which do not correspond to designated protected areas are very approximate (e.g. based on an assessment by eye of the size of the proposed IBA in relation to a protected area of known dimensions within the IBA).

- The majority of non-breeding numbers given for congregatory waterbirds are from midwinter counts conducted in December or January as part of (or in collaboration with) annual African Waterbird Census surveys. Particularly relevant sources of information for individual sites are listed under ‘Further reading’ and all sources are listed in the Bibliography.
- Non-bird species information is taken principally from DPN (1998), Happold (1973), IUCN (1987a), MacKinnon and MacKinnon (1986) and WCMC (1989). Categories of threat for other (non-bird) species are those listed in WCMC (1989).

ACKNOWLEDGEMENTS

The site accounts were written using information from published sources and correspondence with ornithologists with detailed knowledge of particular sites and species-groups. Reference was made throughout to Morel and Morel (1990) and Kanyambwa (1995) was used as a source of further references. The annual Wetlands International African Waterbird Census accounts (1992–1997) and various excellent WIWO reports, especially Schepers *et al.* (1998 and Keijl *et al.* (1999), provided much of the information for wetland sites and species, and Pierre Reynaud (IRD) provided information on the threatened ‘niayes’ (site SN009). Sauvage and Rodwell (1998) give a useful summary of observations by many observers at different sites over 10 years. The introduction was compiled from information in DPN (1996, 1998), IUCN (1987a, 1991a), Morel and Morel (1990), Rémy (1981) and WCMC (1989).

Individuals who supplied data were (in alphabetical order): Phil Atkinson, François Baillon (IRD), Robert Brasseur, Richard Cruse, Amadou Matar Diouf (IUCN), Tim Dodman (Wetlands International), Alison Duncan (LPO), Soren Hastrup (Ornis Consult), Edith Hubert (Wetlands International), Sam Kanyambwa (WCMC), Michael King, Jean Larivière (Fondation Nicolas Hulot pour la Nature et l’Homme), Mélanie Miettinen (OMPO/CIC), Gérard and Marie-Yvonne Morel, Jacques Peeters (DPN, Dakar), Jean-Yves Pirot (IUCN), Michael Poulsen, Pierre Reynaud (IRD), Stephen Rodwell, Alain Sauvage, Frans Schepers (WIWO), Seydina Issa Sylla (Wetlands International) and Jan Veen (Institute for Forestry and Nature Research [IBN-DLO], Wageningen, The Netherlands). François Baillon kindly made available all his unpublished notes of observations between 1986 and 1991 in Senegal (cited as Baillon pers. comm.).

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GLOSSARY

- CIC** Conseil International de la Chasse et de la conservation du gibier (France).
DEFPCPS Direction des Eaux et Forêts, Chasse, Pêche et Conservation des Sols (Senegal).
DPN Direction des Parcs Nationaux (Senegal).
Ferlo vast sandy plain (thorn-bush savanna), covering much of the interior of northern Senegal.
GTZ Deutsche Gesellschaft für Technische Zusammenarbeit.
IRD Institut de Recherche pour le Développement.
NGO non-governmental organization.
niaye wetland lying in a depression along the coast (relict marshland or permanent freshwater lake).
OMPO ‘Oiseaux migrants du Paléarctique Occidental’ (working group of CIC).
OMVS Organisation pour la Mise en Valeur du fleuve Sénégal.
ONC Office National de la Chasse (France).
PNOD Parc National des Oiseaux du Djoudj.
RZHS Le Réseau Zones Humides du Sénégal.
walo traditional flood-recession agriculture practised in the Senegal river flood-plain.
WCMC World Conservation Monitoring Centre.
WI Wetlands International.
WIWO International Working Group on Waterbirds and Wetlands (The Netherlands).

SITE ACCOUNTS

Djoudj wetlands

Admin region St Louis

Coordinates 16°20'N 16°15'W

Area c.56,000 ha

Altitude c.0–20 m

SN001

A1, A4i, A4ii, A4iii

National Park, Ramsar Site,
World Heritage Site, Unprotected

Site description

The Parc National des Oiseaux du Djoudj (PNOD; 16,000 ha) forms the core of this site, which consists of an inland delta in a shallow depression lying within the flood-plain of the Senegal river, in north-western Senegal, on the border with Mauritania, where it is contiguous with Diawling National Park (MR021). The park lies about 60 km north-east of the city of St Louis and some 20 km north-west of the Ndiaël basin (site SN002). Objectives for the park include environmental education and promotion of ecotourism as well as wildlife conservation.

The PNOD consists of an extensive complex of seasonally inundated brackish lakes and pools lying on impermeable saline soils and linked by channels to a branch of the Senegal river. It lies within the Sahel zone at sea-level and the terrestrial vegetation consists of *Tamarix* and *Acacia* savanna with a ground layer of herbs and grasses. Areas subjected to inundation support *Typha*, *Sporobolus robustus*, *Phragmites* and *Nymphaea*. The surrounding landscape outside the park is flat, open thorn-bush savanna used for livestock-rearing, hunting and some rice cultivation. There are seasonally inundated and marshy areas and small channels, especially adjacent to the river, and some of these are extremely important for birds in some years or at certain times of year, depending on flood and rain water-levels. These additional areas are therefore incorporated in the IBA and include an area known as 'Débi' to the north of the park and the 'Zone d'intérêt cynégétique' (or hunting zone) du Djeuss to the south. The IBA also extends downstream of the park along the river as far as the Maka Diama dam. Most of these areas are incorporated within the management plan for the PNOD and its buffer zone (see 'Conservation issues').

Birds

See Box for key species. The park is internationally important for breeding, staging and wintering waterbirds. The Wetlands International African Waterbird Census has recorded more than 200,000 waterbirds in January every year since 1992 (except 1996), with peaks of over 400,000 in 1992 and 1997. Around 95% of these numbers (i.e. 170,000 or more in most years) are migrant Palearctic wildfowl (Anatidae).

Phoenicopterus minor has occurred regularly, and in increasing numbers in the park from 1993 (2,800 birds) to 1996 (11,655) with maximum counts of 15,000 and 46,500 in 1990. Small numbers of wintering *Aythya nyroca* have been recorded sporadically, with a maximum of 230 in 1972 and one record of 50 in 1991/92 (five-year mean of 12). *Falco naumanni* is a regular winter visitor and occurs on passage throughout the lower Senegal valley; it is often recorded from drier areas outside the park boundary. Numbers were highest in the 1950s and 1960s, but several hundred were seen more than once in the 1990s, peaking at 3,200 in 1994. *Prinia fluiatililis* is recorded as resident in the park, but there are no other details.

Three other globally threatened species are recorded from the site. For *Marmaronetta angustirostris* there is one breeding record from 1979, but only sporadic individual sightings subsequently. *Circus macrourus* is apparently declining in comparison with previous decades; the maximum recent record is 15 birds in 1994. *Acrocephalus paludicola* was captured regularly in the reeds in the delta in the 1960s and 1970s and there are occasional more recent records from the 1980s and 1990s.

The site also holds at least eight of the 12 species of the Sahel biome (A03) which occur in Senegal (see Table 2), including *Ardeotis arabs*, which is still seen regularly and breeds in the park, despite a marked decline in the north of the country since the 1960s.

In addition to those in the Box, other waterbird species recorded in significant numbers close to IBA thresholds include *Plegadis falcinellus*, *Platalea alba*, *Glareola pratincola* and *Limosa limosa*. There is one record (not repeated) of 37,760 *Dendrocygna bicolor* in the park. Breeding birds include *Pelecanus onocrotalus*, *Anhinga rufa* (maximum

100 nests) and mixed colonies of *Egretta garzetta*, *Casmerodius albus*, *Nycticorax nycticorax*, *Platalea alba*, *Mesophoyx intermedia* and *Threskiornis aethiopica*. Many migratory passerines also use the site, e.g. roosts of up to 250,000 *Motacilla flava*.

The site is closely linked with other wetlands throughout the delta of the Senegal river on both the Senegalese (e.g. sites SN002 to SN005 inclusive) and Mauritanian sides. Wetland species move between sites to forage and roost, and breeding numbers in any one year may also depend on relative water-levels in sites such as Djoudj and, in Mauritania, the Aftout-es-Saheli wetland and the Diawling Ramsar Site. The African Waterbird Census has covered all these major sites since 1995 and recorded considerable movements between PNOD and Diawling in particular. Ongoing counts should further demonstrate the complementarity of these sites and allow for fuller examination of numbers and movements of birds in relation to water-levels.

Key species

A1	<i>Phoenicopterus minor</i>	<i>Falco naumanni</i>	
	<i>Aythya nyroca</i>	<i>Prinia fluiatililis</i>	
A4i		Breeding (pairs)	Non-breeding
	<i>Pelecanus onocrotalus</i>	8,500 (1982)	16,868 (1986)
	<i>Casmerodius albus</i>	807 (1986)	3,413 (1991)
	<i>Nycticorax nycticorax</i>	1,000+ (1981)	5,163 (1997)
	<i>Platalea leucorodia</i>	—	1,965 (1992)
	<i>Phoenicopterus ruber</i>	—	24,755 (1989)
	<i>Dendrocygna viduata</i>	—	66,050 (1986)
	<i>Anas acuta</i>	—	240,984 (1986)
	<i>Anas querquedula</i>	—	181,410 (1987)
	<i>Anas clypeata</i>	—	33,700 (1987)
	<i>Porphyrio porphyrio</i>	—	550 (1991)
	<i>Recurvirostra avosetta</i>	—	3,050 (1990)
	<i>Philomachus pugnax</i>	—	200,000 (1992, 1996)
	<i>Larus genei</i>	—	200 (1993)
A4ii	<i>Falco naumanni</i>	—	3,200 (on passage, 1994)
	<i>Riparia riparia</i>	—	2,000,000 (wintering)
A4iii	Up to 400,000 waterbirds have been recorded at this site.		

Other threatened/endemic wildlife

Mammals include a small number of reintroduced *Trichechus senegalensis* (VU), which occurred naturally in the park until the 1980s, *Gazella dorcas* (VU) and *G. rufifrons* (VU).

Conservation issues

The park was placed on the 'Montreux Record' (the list of threatened Ramsar Sites requiring monitoring) in the late 1980s because of the perceived risk to water-levels resulting from the construction of the Maka Diama dam downstream of the park on the Senegal river. The dam (completed in 1986) prevents the flow of salt (sea) water up the Senegal river during the dry season, which used to reach several hundred kilometres upstream. Its intended function, together with Manantali dam in Mali, was to create an artificial annual flood in the Senegal river flood-plain, to mimic the natural processes, but this function has never been realized. Plans for extensive irrigated agriculture in the flood-plain, dependent on the dams and miles of constructed embankments and irrigation channels, have not been achieved on anything like the scale envisaged. The effect on the park, however, was to create a guaranteed supply of water, which was assured by the construction of a channel into the park from the river above the dam at Diama. As a result, the park was removed from the Montreux Record in 1988. However, it was returned to the Record in 1993, at the request of the Senegalese government, because of ecological perturbations arising from changes in the hydrological regime (the water-supply is now entirely fresh water where previously salt water entered the park during the dry season). In particular, large areas of previously open water have become infested with the weeds *Pistia stratiotes* and *Paspalum vaginatum*. Other threats to the integrity of the site include salinization of soils (resulting from the fact that there is no longer any 'flushing out' by floods) and pollution resulting from fertilizers and pesticides used in surrounding irrigated agriculture. There is also degradation due to livestock-grazing and loss of natural vegetation such as the 'gonakier' *Acacia nilotica*, exploited for fuelwood.

A management plan was prepared in 1988 with the support of IUCN, WWF and the Netherlands Royal Institute for Nature Management. In 1997 the situation in the park improved considerably as a result of clearing out of water-supply canals and management to control weed on open water-bodies, coupled with good rains and a good flood-level in the river. A five-year integrated management plan, for the park and its buffer zone ('Plan Quinquennal de gestion intégrée du Parc National des Oiseaux du Djoudj'), is currently being implemented (1995–1999) with further support from IUCN. This is based on a collaborative approach involving local communities in management of the park and buffer zone areas. A 'Station Biologique du Parc National des Oiseaux du Djoudj' was established in 1993 with support from IUCN, The Netherlands government, Fondation Friedrich Ebert, GTZ and two other German institutions (Biological Station of Zwillbrok and the regional Ministry of Environment of Northern Westphalia). Extensive research programmes are under way, including investigations into biological and mechanical control of the aquatic weeds in the park (funded by the European Commission) and regular bird surveys carried out by the Senegalese Direction des Parcs Nationaux in collaboration with the French Office National de la Chasse (ONC).

Tourism (involving both international and Senegalese tourists) is very important to the park (for awareness-raising and as a source of revenue); visitors (from October to April) can number up to 100 a day. Facilities include an information centre, observation hides, a campsite and huts for accommodation, boat trips to see pelicans and flamingos and information leaflets. Tourism could pose some problems through disturbance to birds, especially breeding species, but to date it appears to be well regulated and organized.

Further reading

Chappuis *et al.* (1988), Diouf *et al.* (1996, 1997), Hughes and Hughes (1992), IUCN (1994), Jones (1993), Morel and Morel (1990), Rodwell *et al.* (1996), Sloomweg and van Wetten (1994), Triplet and Yésou (1994), Triplet *et al.* (1993, 1995), Trolliet *et al.* (1993), van Wetten (1995).

Ndiaël basin (including the 'Trois Marigots')

SN002

Admin region St Louis

A4i, A4iii

Coordinates 16°09'N 16°12'W Avifaunal Reserve, Hunting Reserve,

Area c.140,000 ha Altitude c.0–20 m Ramsar Site, Unprotected

Site description

The site consists of the alluvial Ndiaël basin and the 'Trois Marigots' marshes which lie in the flood-plain of the Senegal river, about 60 km north-east of St Louis. The basin lies south of the main road (RN3) linking St Louis and the other northern towns along the Senegal river, about 3 km east of Ross-Bethio and 20 km south-east of the Djoudj wetlands (site SN001). The 'Trois Marigots' area lies immediately to the south-west of Ndiaël basin. It consists of three marshes in parallel depressions separated by dunes, varying in length from c.15 km to c.20 km and each only a few hundred metres wide. In the past, and under natural conditions, the basin filled with water annually, as the Senegal river flooded out onto its flood-plain between July and October, and the habitats included areas of *Acacia* spp. scrub and open water. The basin was fed directly from the river and from nearby Lac de Guiers (site SN003) and, when flooded, the site attracted large numbers of waterbirds; both Afrotropical and Palearctic migrant species.

However, the extensive engineering works (dams, embankments, sluices, etc.) that have been carried out in order to promote irrigated agriculture (mainly rice) in the flood-plain, and described under sites SN001 and SN004, have resulted in the Ndiaël basin remaining largely dry since the 1960s. The water-supply to the Trois Marigots was also greatly reduced by management works at Ndiaoudoum, cutting off this source of flow into the basin. The soils in the basin are impermeable and saline and the vegetation is dominated by annual grasses (Gramineae), such as *Paspalum*, *Panicum* and *Eragrostis* spp., with small *Tamarix* sp. trees and *Typha* sp. along the banks of canals and ditches. Some irrigated areas of the site are used for rice cultivation, but the traditional activities of fishing and flood-recession agriculture/pastoralism have declined along with the regime of natural floods. Starting in 1993, a major effort has been made by the Senegalese

Direction des Eaux et Forêts and the French 'Oiseaux Migrateurs du Paléarctique Occidental' (OMPO) to re-flood the basin annually (see 'Conservation issues').

Birds

See Box for key species. The site appears to have been extremely important in the past for a wide variety of resident and migratory waterbirds. There are counts from the 1960s and 1970s of tens of thousands of *Anas querquedula* and *A. acuta* and large numbers of *Phoenicopterus ruber* (5,000), *Philomachus pugnax* (200,000) and *Larus genei* (200). Following the re-flooding of the basin and marshes since 1994, recent counts show that even periodic availability of water makes the site very attractive again for a range of herons, ducks and waders, especially wintering and staging Palearctic migrants. Thus it can be said once again to hold regularly in excess of 20,000 waterbirds. Lower water-levels appear to favour waders, while ducks are more attracted to deeper water conditions. In addition to those species in the Box, there are regular records of other species, including *Pelecanus onocrotalus*, *Casmerodius albus*, *Plegadis falcinellus*, *Platalea leucorodia* (including a count of 150 birds near the site at Ross-Bethio in 1987) and *Phoenicopterus ruber*. A maximum count of 10,935 *Limosa limosa* was recorded on the site in 1993, but it appears that usually no more than 3,000–5,000 birds of this species overwinter in the whole Senegal river delta. *Anas acuta* has also been recorded recently in numbers (7,860 in 1996) close to the IBA threshold (A4i) for this species. Four of the 12 species of the Sahel biome (A03) that occur in Senegal are recorded from this site (see Table 2).

The site forms part of the wider complex of Senegal river delta wetlands and there is considerable movement of birds between this site and others, including Djoudj wetlands (site SN001), Lac de Guiers (SN003), River Senegal (SN004), Guembeul Avifaunal Reserve and St Louis lagoons (SN005) and sites on the northern side of the river in Mauritania. For example, a 'pre-roost' of 134,000 *Philomachus pugnax* was recorded on the site en route to Djoudj wetlands in 1997, and there are frequent exchanges of wintering *Phoenicopterus ruber* between all the Senegalese sites and Aftout Es Saheli in Mauritania.

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Anas querquedula</i>	—	32,000 (1998)
<i>Charadrius alexandrinus</i>	—	1,410 (1994)
<i>Philomachus pugnax</i>	—	75,000+ (1993)
A4iii	More than 20,000 waterbirds occur regularly at this site.	

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The 'Trois Marigots' area is a Hunting Reserve ('Zone d'intérêt cynégétique'). Part of the Ndiaël basin is an Avifaunal Reserve (Réserve de faune du Ndiaël, 46,550 ha) and was designated as a Ramsar Site in 1977 and placed on the 'Montreux Record' (the list of the world's most threatened Ramsar Sites) in 1987. At the time of designation, the site had been dry for many years and it was accorded Ramsar status on the basis that the government of Senegal, together with international partners, would implement a hydrological restoration plan. This began in 1993/94 with the construction of a canal linking the northernmost of the Trois Marigots with the south-western corner of the basin. This has resulted in re-flooding of parts of the basin, notably in 1996/97, when there were high flood levels throughout the flood-plain. However, the flow of water into the Trois Marigots and subsequently into the Ndiaël basin is very dependent on flood levels in the main river and the operation of sluices and barrages downstream, which control water-supply to the town of St Louis. Currently, partial inundation of the basin will only happen when flood levels are high. The site is now the subject of a management plan prepared by the Senegalese Direction des Eaux et Forêts and the French Conseil International de la Chasse (CIC) working group 'Oiseaux Migrateurs du Paléarctique Occidental' (OMPO). The main objectives are to restore the international importance of the site for birds, to encourage traditional activities such as fishing and livestock-rearing at sustainable levels and to reforest suitable areas for erosion control and fuelwood-supply. The plan (1999 to 2003) also includes a programme of water-level and ecological monitoring to gauge the success of the re-flooding efforts and impact, especially on birds.

Further reading

Direction Générale des Eaux et Forêts du Sénégal/Oiseaux Migrateurs du Paléarctique Occidental (1998), IUCN (1987b), Ramsar (1988), Triplet (1998), Triplet and Yésou (1998).

Lac de Guiers

Admin region St Louis, Louga

Coordinates 16°14'N 15°50'W

Area c.17,000 ha Altitude c.0–20 m

SN003

A1, A4i

Unprotected

Site description

Lac de Guiers, lying in the far north of the country, c.20 km south-west of Richard-Toll, is the only large freshwater lake in Senegal. It lies in the dry valley of the Ferlo river and is fed only by rainfall or by floodwaters coming down the Senegal river and allowed to flow south into the lake through sluices and a canal at Richard-Toll. The lake is 35 km long and 7.5 km wide at its widest point. At high-water it covers an area of nearly 17,000 ha. It is used as a water-supply for Dakar, as well as for local consumption and to supply water for the sugar refinery at Richard-Toll. It is surrounded by Sahel thorn-bush savanna, used for livestock-rearing and 'walo' (flood-recession agriculture) and areas of irrigated cultivation, including extensive sugar-cane plantations and rice-fields. There are permanent herb swamps dominated by *Phragmites* and *Typha* along parts of the lake shore and scattered acacias and other trees used for roosting and breeding by a wide variety of colonial nesting herons and egrets.

Birds

See Box for key species. The site is particularly important for breeding colonial waterbirds (mixed colonies of herons, egrets, spoonbills and ibises) and for wintering waterbirds, but it has never been surveyed regularly. Only one comprehensive survey of the whole lake has been carried out, in 1991 (Baillon pers. comm.). *Phoenicopterus minor* is recorded from the site, with a maximum count of 1,170 in 1991, making this the "largest concentration in Senegal after Djoudj" (Baillon pers. comm.). *Prinia fluviatilis* was recorded from the site in the 1980s, with no details given except location (Lac de Guiers, 16°25'N 15°45'W) and the interpretation that "it is likely that the entire lake region is inhabited". One other threatened species, *Aythya nyroca*, was recorded frequently, but irregularly, wintering in the lake in the 1960s and 1970s, but there are no more recent records. A higher total than that given in the Box for *Platalea leucorodia* was recorded for the site and "the Ferlo": 440 birds in 1991. In addition to species listed in the Box, the site provides the most easterly records in Senegal for *Phoenicopterus ruber* (400 in 1991), *Philomachus pugnax* is regularly recorded in rice-fields adjacent to the lake and a suspected roost was reported just north of the lake in 1992. A total of 155 *Sterna nilotica* was recorded for the area including the lake in 1990, together with sites SN001 and SN004 (but the majority of these birds on the lake itself). Five of the 12 species of the Sahel biome (A03) that occur in Senegal have been recorded from this site (see Table 2). Numbers of many species will depend very much, from year to year, on water-levels within the lake and in other large water-bodies in the region. Waterbirds are known to move (both within and between seasons) between several sites within the wider Senegal river delta area, including the Djoudj wetlands (site SN001), the Ndiaël basin (SN002), the River Senegal (SN004) and the Diawling National Park in Mauritania. These movements appear to depend on the relative water-levels as well as other factors and, as part of a wider network of fresh and brackish water-bodies, the lake is likely to be important for certain species.

Key species

A1	<i>Phoenicopterus minor</i>	<i>Prinia fluviatilis</i>	
A4i		Breeding (pairs)	Non-breeding
	<i>Plegadis falcinellus</i>	—	2,600 (1984)
	<i>Platalea leucorodia</i>	—	170 (1986)
	<i>Platalea alba</i>	—	250 (1986)
	<i>Chlidonias leucopterus</i>	—	2,700 (1988)

Other threatened/endemic wildlife

The lake contained a resident population of the mammal *Trichechus senegalensis* (VU) until the mid-1980s, but this population was isolated

from animals in the main Senegal river and appeared to be declining. It is probably now extinct.

Conservation issues

The lake has no protected status in national legislation and there is no management plan for its conservation. Its value as wildlife habitat may be threatened by water abstraction, degradation and pollution from surrounding land-use (overgrazing, use of chemical inputs on the sugar-cane fields). A workshop in 1995 discussed the problems of managing reservoirs and other water-bodies in the Senegal river basin and resulted in recommendations for minimizing environmental and health impacts. An initiative to establish a National Wetlands Network (le Réseau Zones Humides du Sénégal) is also intended to lead to wider application of the Ramsar principles of wise use, to cover areas such as Lac de Guiers, even though they have no formal protected-area status. It is not clear how effective these measures will be in relation to the site.

Further reading

Chappuis *et al.* (1988), Delaporte and Dubois (1990), Hughes and Hughes (1992), Trolliet *et al.* (1992).

River Senegal (Ntiagar to Richard-Toll)

Admin region St Louis

Coordinates 16°29'N 15°46'W

Area c.8,000 ha Altitude c.0–20 m

SN004

A3 (A03), A4i, A4iii

Unprotected

Site description

The site consists of a length of about 21 km of the Senegal river and its immediate riparian habitat. It lies upstream of Djoudj wetlands (site SN001) and north of both Ndiaël basin (SN002) and Lac de Guiers (SN003). The habitat consists of highly modified and cultivated areas of land, with extensive rice-fields and market gardens and associated irrigation and drainage canals and ditches, adjacent to areas of fairly dense human habitation. The site is very closely linked to Lac de Guiers, which receives water from the river through sluices and a canal located at Richard-Toll. Between this site and Lac de Guiers lie extensive sugar-cane plantations. The site lies in the Sahel zone and the original habitat would have been thorn-bush savanna, dominated by *Acacia* spp. and *Balanites aegyptiaca*, shrubs of *Boscia senegalensis* and *Salvadora persica*, and larger trees adjacent to the river itself, including *Combretum aculeatum*, *Grewia bicolor*, *Bombax costatum* and *Borassus aethiopicum*. There were once extensive forests of *Acacia nilotica* along the banks of the Senegal river that were regularly inundated by floods and formed important refuges for Palearctic migrants. These forests have largely disappeared as a result of drought and exploitation for fuelwood.

Birds

See Box and Table 2 for key species. This site is unique in Senegal due to the presence (for more than 35 years) of ornithologists Gérard and Marie-Yvonne Morel at the 'Station d'Ecologie' in Richard-Toll, funded by the French overseas research organization IRD (formerly 'ORSTOM'). As a result of their work and that of other visiting research staff using the station, the intensity of bird observations for Richard-Toll and the immediate area far exceeds that for almost any other area of the country. The site is important for many waterbirds and some raptors. There are past records of the globally threatened *Marmarometta angustirostris* (but none recorded since the 1970s), and more recent records in the general area of the site for *Circus macrourus* and *Falco naumanni*, both of which are recorded on passage in "the lower Senegal valley". There is also a record of 'thousands' of *F. naumanni* from Richard-Toll in 1958. Observer effort is reflected particularly in the biome-restricted species lists. Seven species of the Sudan-Guinea Savanna biome (A04) have been recorded from the site (Table 2). In addition to the count of 26,000 *Philomachus pugnax* in 1994, there are several other recent records of significant totals of this species as well as suspected roosts or pre-roosts in rice-fields in the general area of the site (e.g. at Boundoum), suggesting that the species is "regularly occurring". Other records of waterbirds at Richard-Toll include breeding *Casmerodius albus*, *Threskiornis aethiopicus* and *Platalea alba*, and wintering *Nycticorax nycticorax*

(though several of the breeding records in particular are from earlier decades).

Key species

A3 (A03) Sahel biome: All 12 species of this biome that occur in Senegal have been recorded at this site; see Table 2.

A4i	Breeding (pairs)	Non-breeding
<i>Philomachus pugnax</i>	—	26,000 (1994)
A4iii	More than 20,000 waterbirds occur regularly at this site.	

Other threatened/endemic wildlife

The mammal *Trichechus senegalensis* (VU) probably still occurs in the river, although sightings are infrequent (a stranded individual was rescued from the river at Matam in 1997, several hundred kilometres upstream of Richard-Toll).

Conservation issues

The site is completely unprotected and there are dense centres of human population on the riverbanks, especially at Richard-Toll and Rosso (a river and border crossing to Mauritania). Overgrazing, deforestation, pollution and disturbance constitute existing or potential problems throughout the entire site. Despite this degradation, the site remains important for birds (especially biome-restricted species) and is considered to merit IBA status. Future work may lead to the identification of a smaller site of greatest importance, which would be amenable to some form of conservation action, and possibly the designation of protected-area status.

The 'Organisation pour la Mise en Valeur du fleuve Sénégal' (OMVS) was established to ensure sound and integrated management of the whole river basin (including artificial flood releases controlled by two major dams—one in Mali and the other above St Louis at Maka Diama). This has never functioned as intended and the main objectives were, in any case, increases in irrigated agriculture (especially rice) rather than any environmental considerations. A workshop in 1995, under the auspices of the OMVS, discussed the problems of managing water-bodies in the Senegal river basin and resulted in recommendations for minimizing environmental and health impacts. An initiative to establish a National Wetlands Network (Réseau Zones Humides du Sénégal) is also intended to lead to wider application of the Ramsar principles of wise use, to cover wetland areas which have no formal protected-area status. It is not clear how effective these measures will be in relation to the site.

Further reading

Hughes and Hughes (1992), Morel and Morel (1990), Triplet and Yesou (1998).

Guembeul Avifaunal Reserve and St Louis lagoons

SN005

Admin region St Louis

A4i

Coordinates 15°59'N 16°28'W

Avifaunal Reserve,

Area c.1,500 ha Altitude c.0 m

Ramsar Site, Unprotected

Site description

This site lies some 12 km south of St Louis and about 60 km south-west of Djoudj wetlands (site SN001). The reserve consists of an extensive lagoon of variable salinity in a shallow depression, with a relict mangrove along the shores. The lagoon is replenished both by seasonal rainfall and by inflow of salt water from the Senegal river mouth and water-levels can be controlled artificially by means of a sluice gate. In addition to the official reserve, a number of brackish lagoons around the town of St Louis, all linked to the river estuary, are included in the IBA. These vary significantly in size, depending on the water-level in the Senegal river and the rainfall. The vegetation around the lagoons is Sahelian thorn-bush savanna dominated by *Acacia* spp. The lagoons are highly productive and those outside the reserve support important local fishing economies. The surrounding areas are used for livestock-grazing, agriculture and fuelwood-collection, all of which (together with fishing) are prohibited in the reserve itself.

Birds

See Box for key species. The site harbours a wide variety of Palearctic migrant ducks and waders, and important numbers of gull and tern

species. *Larus audouinii* is recorded regularly in small numbers along the river and lagoons (maximum 17 birds recorded from St Louis lagoons and Parc National de la Langue de Barbarie [site SN006], combined, in 1994).

In addition to the species listed in the Box, large numbers of *Anas clypeata*, *Limosa limosa*, *Calidris minuta* and *C. ferruginea* have been recorded and *Egretta gularis* occurs regularly along the lagoon edges. *Pelecanus onocrotalus* occurs in winter numbers close to the IBA thresholds (e.g. 650 at Guembeul, 525 at St Louis lagoons in the late 1980s and 1990s), and *Sterna sandvicensis* and *S. albifrons* are recorded wintering in numbers which exceed IBA thresholds, but these records cover the whole coastline from St Louis to Kayar (i.e. also including Parc National de la Langue de Barbarie [site SN006]). There is a record from 1988 of 4,000 *Larus genei*, but subsequent numbers have never exceeded the hundreds (still regularly over the IBA threshold for the species). *Sterna nilotica* and *S. albifrons* are recorded breeding at Guembeul. There is considerable interchange of birds between this site and site SN006, which lies to the south, further out to sea along the extensive Senegal river mouth. In addition, five species of the Sahel biome have been recorded (see Table 2).

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Platalea leucorodia</i>	—	477 (1997)
<i>Phoenicopiterus ruber</i>	—	4,500 (1996)
<i>Recurvirostra avosetta</i>	—	7,000 (1988)
<i>Larus cirrocephalus</i>	—	1,050 (1997)
<i>Larus genei</i>	—	678 (1995)

Other threatened/endemic wildlife

A project to reintroduce mammals and reptiles which were previously common in the Sahel region is based at Guembeul Avifaunal Reserve, where there is a captive-breeding enclosure for *Gazella dama* (EN), *Oryx dammah* (EW) and the tortoise *Geochelone sulcata* (VU). The plan is for reintroductions to be made in the northern Ferlo region (see Ferlo North, site SN007).

Conservation issues

The site incorporates Guembeul Avifaunal Reserve (720 ha), which is also a Ramsar Site. Conservation measures have resulted in regeneration of degraded vegetation around the lagoon of Guembeul, but there is no official management plan for the reserve and no control of activities such as fuelwood-collection and fishing within the rest of the IBA. Ongoing problems include illegal fishing and salt extraction (within the reserve) and cutting of *Acacia* trees. Nature conservation activities carried out within the reserve include the experimental breeding centre for Sahelian mammals and reptiles, conservation education and some tourism. The town of St Louis is a major tourism centre and there is no control of visitors or recreational use of the lagoons around the town. Recent problems in the reserve have been caused by the breach of the sluice gate in 1996, which meant that water-levels could not be maintained and the lagoon began drying out two months earlier than normal, reducing its value for waders and flamingos. There is an urgent need to replace and renew the water-control mechanisms to allow for effective control of water-levels. Lack of funding for repair and maintenance jeopardize proper management of the reserve and the breeding centre.

Further reading

DPN (1996), Sauvage and Rodwell (1998), Triplet and Yesou (1998).

Parc National de la Langue de Barbarie

SN006

Admin region St Louis

Coordinates 15°55'N 16°30'W

A4i

Area c.2,000 ha Altitude c.0 m

National Park

Site description

The Langue de Barbarie National Park lies south-west of the Guembeul Avifaunal Reserve (part of site SN005), about 25 km from St Louis. It consists of a 20-km length of intertidal flats and sand-dunes on a spit formed across the mouth of the Senegal river. It includes both marine and riverine (brackish) waters. The terrestrial part of the park is formed by three main islands, the Ile de Gandiole (2 ha) being

the largest. The vegetation on the infertile sandy soils is Sahelian in composition and includes the species *Ipomoea pes-caprae*, *Alternanthera maritima*, *Sporobolus spicatus* and *Sesuvium portulacastrum*. There are no trees.

■ Birds

See Box for key species. The site is particularly important for the large numbers of breeding and wintering gulls and terns, including breeding *Sterna nilotica* at the southern limit of its breeding range. *Larus audouinii* (LR/cd) is recorded regularly in small numbers along the river and lagoons (maximum 17 birds recorded from the Langue de Barbarie and St Louis lagoons [part of site SN005] combined in 1994). *Sterna sandvicensis* and *S. albifrons* are also recorded wintering in numbers which exceed IBA thresholds, but these records cover the whole coastline from St Louis to Kayar (i.e. also including site SN005, Guembeul Avifaunal Reserve and St Louis lagoons). The site is frequently used by wintering *Phoenicopterus ruber*; which move between this and all the other sites in the delta area of the Senegal river (i.e. sites SN001 to SN005 inclusive) and south-western Mauritania. Wintering *Pandion haliaetus* are common. *Egretta gularis* is recorded breeding (126 pairs in 1998). There is considerable interchange of birds of several species between this site and site SN005, which lies to the north, further upstream along the extensive Senegal river mouth.

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Larus cirrocephalus</i>	3,000 (1998)	1,838 (1997)
<i>Larus genei</i>	2,850 (1991)	1,000 (1988)
<i>Sterna nilotica</i>	200 (1984)	—
<i>Sterna caspia</i>	150 (1991)	424 (1997)
<i>Sterna maxima</i>	2,650 (1991)	—
<i>Sterna albifrons</i>	35 (1998)	—

■ Other threatened/endemic wildlife

The marine fauna includes the turtles *Chelonia mydas* (EN), *Dermochelys coriacea* (EN), *Eretmochelys imbricata* (CR) and *Caretta caretta* (EN).

■ Conservation issues

The National Park is zoned and managed by a conservator and staff, and access is restricted to prevent disturbance to breeding birds. Conservation management efforts are limited by lack of funds. The site is close to the town of St Louis and attracts significant numbers of tourists and birdwatchers.

■ Further reading

Delaporte and Dubois (1990), Hughes and Hughes (1992), Keijl *et al.* (1999).

Ferlo North

Admin region St Louis

Coordinates 15°35'N 13°55'W

Area c.600,000 ha Altitude <100 m

SN007

A3 (A03, A04)

Avifaunal Reserve

■ Site description

The site lies in north-eastern Senegal, south of the Senegal river which forms the border with Mauritania at this point. The site lies between the valleys of the Senegal river and the Ferlo river (the latter usually remains dry) at an altitude of less than 100 m, even though it is over 300 km inland. Although crossed by a number of river channels, the area is mainly very dry with sandy soils and occasional pockets of clay. In the rainy season, water accumulates in old river channels and depressions, leading to concentrations of animals in these areas and more lush vegetation along these ancient watercourses. The vegetation is Sahel thorn-bush savanna, dominated by *Acacia* spp. and *Balanites aegyptiaca*, larger trees such as *Bombax costatum*, *Pterocarpus erinaceus* and *Combretum glutinosum*, and shrubs of *Boscia* spp. Episodes of low rainfall combined with overgrazing by cattle and goats have turned many areas into semi-desert and sandstorms are common as a result.

■ Birds

See Box and Table 2 for key species. Until 1996, the site had not been comprehensively surveyed for birds, but in January to March of that

year Ornis Consult conducted detailed survey work in this site and in Ferlo South (site SN008). A total of 184 bird species are now recorded from the two reserves combined. The site is important for Palearctic migrants, especially raptors. These include *Circus macrourus* (individuals or small numbers recorded in each month of the 1996 surveys and reported as “fairly common wintering in the north down to 15°N”), *C. pygargus*, and *Falco naumanni*, also recorded on the site and said to be “scarce to frequent in northern and central Senegal”. The Sahel biome species found at this site include *Ardeotis arabs*, declining throughout northern Senegal, and *Passer luteus*, which is found throughout the north and spreading south, indicating a general drying-out of northern areas. *Ploceus heuglini*, one of the Sudan–Guinea Savanna biome species, is recorded from no other IBA in Senegal. Two species restricted to the Sahara–Sindian (A02) are also recorded (*Alaemon alaudipes* and *Ammomanes deserti*). Ostriches, *Struthio camelus*, were known to occur previously in the northern Ferlo and were recorded in the 1996 surveys, but their range has been greatly reduced and the residual population is probably very small.

Key species

A3 (A03) Sahel biome: 10 of the 12 species of this biome that occur in Senegal have been recorded at this site; see Table 2

A3 (A04) Sudan–Guinea Savanna biome: Nine of the 33 species of this biome that occur in Senegal have been recorded at this site; see Table 2.

■ Other threatened/endemic wildlife

Residual populations of *Gazella rufifrons* (VU) and *G. dorcas* (VU) are reported as still extant in the Ferlo, but these species, along with most other wild mammals, have been hunted very heavily and are extremely rare in the region. The tortoise *Geochelone sulcata* (VU) occurs within the site.

■ Conservation issues

Until recently, the Ferlo North Avifaunal Reserve was really only a reserve in name or on paper. Overgrazing throughout the area, coupled with periodic droughts, reduced many areas to semi-desert; grasses that sprouted following rainfall were often grazed away before seeding, leaving large areas of bare sand. In 1995, a three-year programme was established by the Senegalese Department of National Parks, the Department of Water and Forests, the ‘Centre de Suivi Ecologique’, the IUCN office in Senegal and Ornis Consult Ltd (Denmark). This will prepare an integrated rural development plan for both the Ferlo North and Ferlo South (site SN008) Avifaunal Reserves. The programme is funded by Danida (the Danish Department of International Development Cooperation) and aims to protect and restore the Sahelian ecosystem and biodiversity within the reserves, while also developing sustainable local uses of the reserves’ resources. There are plans for the reintroduction of Sahelian mammals and reptiles into the reserve from the captive-breeding programmes at Guembeul Avifaunal Reserve (site SN005), but these have not yet been implemented successfully.

■ Further reading

DPN (1996), Morel and Morel (1990), Nøhr and Jørgensen (1997), Ornis Consult (1997), WCMC (1989).

Ferlo South

Admin region St Louis

Coordinates 14°55'N 13°55'W

Area c.633,700 ha Altitude <100 m

SN008

A3 (A03)

Avifaunal Reserve

■ Site description

The site lies due south of Ferlo North (site SN007) and almost due east of Dakar, separated from the eastern Senegal border with Mali by low hills, the northern outliers of the Bassari hills in the south-east of the country. It is almost contiguous with Ferlo North, separated only by the main road running west–east from Linguère to Matam (on the border with Mali). The altitude, relief, climate and vegetation are very similar to those described above for Ferlo North. However, because it lies further south, Ferlo South receives slightly higher rainfall. The soils tend to be ferruginous and there is more woodland and secondary grassland (especially towards the south of the site) than in Ferlo North.

Birds

See Box and Table 2 for key species. Ornis Consult comprehensively surveyed this site, together with Ferlo North (site SN007) for birds for the first time in January to March 1996. A total of 184 bird species are now recorded from the two reserves combined. The site is important for Palearctic migrants, especially raptors on passage or wintering. *Circus macrourus* is “fairly common wintering in the north down to 15°N” and *Falco naumanni* is reported as “scarce to frequent” in the area, though not specifically within the reserve. Within the Ferlo South site, the majority of the species restricted to the Sahel biome (A03), and recorded from Senegal, are found (although two of these, *Caprimulgus eximius* and *Anthoscopus parvulus*, are recorded in the joint list for both Ferlo North and South Avifaunal Reserves, so it is not clear that they have been observed strictly within the Ferlo South site) (see Table 2). Seven species of Sudan–Guinea Savanna biome (A04) have been recorded from the site (see Table 2). *Pelecanus onocrotalus* was reported in 1989 in ‘the southern Ferlo’ in numbers which exceeded the IBA threshold for this species (1,450, Baillon pers. comm.). However, there is no permanent watercourse or standing water in the area and it is not clear whether this record was a single unusual occurrence (for example, following rainfall creating a temporary wetland).

Key species

A3 (A03) Sahel biome: At least eight (and probably 10) of the 12 species of this biome that occur in Senegal have been recorded at this site; see Table 2.

Other threatened/endemic wildlife

No specific details are available, but it is likely that the Sahelian species occurring in Ferlo North (site SN007) will also occur in the northern part of Ferlo South, although all these species have been heavily hunted and any remaining populations are likely to be small and threatened.

Conservation issues

The integrated rural development initiative described under Ferlo North (site SN007) also covers this site and aims to protect and restore the Sahelian ecosystems and biodiversity within both Ferlo North and South reserves. Issues and threats in Ferlo South are similar to those in Ferlo North, although the problems of drought and overgrazing have been less severe (especially towards the south of the site) due to the higher rainfall and more abundant vegetation.

Further reading

Morel and Morel (1990), Nøhr and Jørgensen (1997), Ornis Consult (1997).

Niayes (from Dakar to St Louis)

Admin region Cap Vert, Thiès
Coordinates 15°08'N 16°55'W
Area c.4,000 ha Altitude c.0 m

SN009

A4i
Unprotected

Site description

This site consists of a string of permanent freshwater lakes and additional temporarily wet depressions (niayes) lying along a line running north-east from the outskirts of Dakar to around 60 km south-west of St Louis. The lakes lie behind the ridge of coastal sandy dunes, in shallow depressions at 1–4 m above sea-level, over a distance of c.150 km. They are replenished both by rainfall and from the underlying water-table, which lies close to the surface. The wetlands cover 40 km² at low water; at high water, all the lakes can increase their surface area five-fold. The largest lakes lie at the southern end and include Nhiarhol Pool and the lakes Mbaou, Mbeubeussé, Retba, Tanma, Youyi (or Malika) and Ourouaye. Lake Retba is the largest, with an open water surface of 5 km by 1.7 km wide at low water. Niaye Hann Mariste consists of a depression covering a surface area of about 30 ha (1.3 km by 200 m), but this dried out completely in 1997 due to evaporation, compounded by abstraction of water for agriculture and building construction. The surrounding vegetation is subjected to seasonal inundation and the area is characterized by the oil-palm *Elaeis guineensis*. There are also elements of vegetation more typical of the Sudan–Guinea Savanna biome and Guinea–Congo Forests biome (e.g. *Prosopis africana* and *Ficus capensis*). These are able to flourish here due to the high moisture content of the soils, which results from the water-table lying close to the surface and the moisture-bearing Alizé winds blowing in from the Atlantic. The whole site is very important

in terms of human use, for cattle-grazing, fishing, vegetable, fruit and rice-growing and market gardening (estimated at 90% of national production). Many of the individual lakes also have religious and cultural significance.

Birds

See Box for key species. The lakes were included for the first time in the African Waterbird Census in 1997, when nearly 4,000 birds were counted. The niayes have also been the subject of a number of recent more detailed studies (notably by Pierre Reynaud and colleagues at the Institut de recherche pour le développement, IRD), which reveal them to be some of the most ornithologically diverse and most threatened sites along the whole coast of Senegal. In Niaye Hann Mariste alone, Reynaud has recorded 147 bird species, including 51 breeding. The niayes as a whole are particularly important for a wide variety of breeding and wintering waterbirds and also raptors. Up to 500 *Phoenicopterus minor* were recorded at Lac Tanma in 1990, *Falco naumanni* is reported in small numbers from the site and there are huge roosts of *Milvus migrans*.

Phoenicopterus ruber is a regular winter visitor and the site appears to play a key staging role for birds coming from regions further north (Baillon pers. comm.). A maximum count of 3,000 was recorded in 1975 on Lac Tanma; if these numbers are a regular occurrence, they will additionally qualify the site as an IBA. Similarly, a maximum number of 3,200 *Recurvirostra avosetta* recorded on Lac Youyi in 1975 would qualify this lake as an IBA in its own right, if regularly occurring; the species is also regularly recorded elsewhere within the site. In addition to those in the Box, other species wintering in significant numbers include *Egretta garzetta* and *Anas clypeata*. There are records of large numbers of wintering and passage *Sterna sandvicensis* (7,500 between site SN006, Parc National de la Langue de Barbarie, and the town of Kayar; plus 13,000 from Kayar to Cap Vert) and *S. albifrons* (1,500 between Kayar and Cap Vert). In both these cases, the numbers will include birds using the niayes, but these counts also cover a wider area including the whole coastal strip. Breeding birds recorded on the site include *Phalacrocorax africanus*. Six species of the Sudan–Guinea Savanna (A04) biome have been recorded from this site (see Table 2), reflecting the humid coastal climate, which encourages vegetation-types typical of more southerly zones.

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Tachybaptus ruficollis</i>	c.250 (1996–1999)	500 (1996–1999)
<i>Egretta ardesiaca</i>	250+ (1996–1999)	—
<i>Porphyrio porphyrio</i>	—	104 (1996–1999)
<i>Larus genei</i>	—	145 (1999)
<i>Chlidonias leucopterus</i>	—	2,000 (1988)

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The niayes have no protected status under national conservation legislation and there is no active conservation management (despite representations made to the authorities about the ecological and educational values and threats to the site). The whole site is threatened by human encroachment and various forms of development, particularly those niayes such as Hann Mariste and Pikine-Guédiawaye that are within or close to Dakar and to the main road leading east and north out of the capital. One of the main threats is from drainage and land reclamation for building, which is proceeding very fast. Over-abstraction of water and various forms of pollution threaten the hydrology and water quality of the underlying water-table. In addition to their immediate conservation value, the niayes represent a huge educational resource (large numbers of easily visible, interesting birds, very close to dense urban centres), which will also be lost if the site is further degraded. This situation is extremely urgent, with one niaye (Thiaroye) almost completely destroyed and bulldozers removing the trees and hedges which stabilized the dunes around Niaye Hann Mariste in late 1998. For the purposes of this publication, the whole group of lakes and depressions has been grouped together as one IBA because the data are not sufficient to distinguish smaller individual IBA sites. Further work should help to identify those sites of particular importance and which should be nominated for protected-area status and/or conservation action.

Further reading

Diatta *et al.* (1998), Hughes and Hughes (1992), Reynaud (1999).

Parc National des Iles de la Madeleine

SN010

Admin region Cap Vert

Coordinates 14°39'N 17°28'W

Area c.45 ha Altitude 0–35 m

A4ii

National Park

Site description

The park consists of three rocky, volcanic islands lying about 4 km west of the Senegal coast, off the southern end of the Cap Vert peninsula on which Dakar lies, and the areas of sea between the islands. The largest, the 'Iles aux serpents', is about 15 ha. The islands are covered in steppe-grassland. Trees include baobabs *Adansonia*, jujubas *Ziziphus*, prickly-pear *Opuntia* and tamarinds *Tamarindus*.

Birds

See Box for key species. The 30 or more pairs of *Phaethon aethereus* are the only breeding birds of this species known from a mainland African country. The islands harbour a varied avifauna including a breeding colony (400 nests) of *Phalacrocorax carbo* (introduced in the 1980s from the Parc National des Oiseaux du Djoudj, part of site SN001), and breeding *Coryvus albus*, *Milyus migrans*, *Galerida cristata* and *Euplectes orix*. *Sterna anaethetus* breeds on the islands and there are records of *Sula leucogaster*, *Morus bassanus*, *Larus cachimans*, *L. cirrocephalus* and *L. fuscus*. *Alaemon alaudipes*, restricted to the Sahara–Sindian (A02) biome, has been recorded from the site.

Key species

Key species	Breeding (pairs)	Non-breeding
A4ii <i>Phaethon aethereus</i>	30+	—

Other threatened/endemic wildlife

The sea-turtle *Caretta caretta* (EN) has nested on a small beach and the dolphins *Steno bredanensis* (DD) and *Stenella coeruleoalba* (LR/cd) have been recorded within the park. The tortoise *Geochelone sulcata* (VU) has been introduced to the islands.

Conservation issues

The uncontrolled development of sport-fishing and other marine sporting activities may pose some threat to the National Park's integrity and cause disturbance in the region of the park. Casual visitors to the park are not controlled and may cause hazards through lighting fires and disturbance to nesting birds.

Further reading

IUCN (1987a), WCMC (1989).

La Petite Côte

Admin region Thiès

Coordinates 14°26'N 17°01'W

Area c.14,000 ha Altitude c.0–74 m Avifaunal Reserve, Unprotected

SN011

A1, A4i

Site description

The site consists of the coastal strip (c. 70 km long) south of Dakar, running from Bargny (20 km south-east of Dakar), south to the village of Mbodiène, which lies just north of Joal-Fadiouth (site SN012). It consists of mainly sandy, narrow beaches, offshore sandbars, dunes and saltmarsh, crossed by several small rivers and estuaries. There are a number of shallow lagoons and temporary wetlands in depressions behind the dunes, of varying size and salinity (depending on seasonal rainfall), some with associated mudflats and saltmarsh. The lagoons include Yène-Tode (c.150 ha), Popenguine (c.10 ha), Somone estuary (c.30 ha) and Sarène. Vegetation is generally sparse; there are some thickets of *Tamarix* sp. on higher ground behind the dunes and, towards the southern end of the site, mangroves (*Rhizophora* sp. and *Avicennia* sp.) on the mudflats. Along c.15 km at the northern end of the site there are sandy hills and cliffs with occasional rocky outcrops behind the dunes, reaching a maximum height of 74 m. One of the rocky outcrops (Cap de Naze) lies just behind Popenguine Avifaunal Reserve, the only officially designated

site within the IBA. Popenguine consists of a freshwater lagoon and marsh, contained by a man-made barrage.

Birds

See Box for key species. The site is important for breeding and wintering waterbirds, and for wintering and passage raptors. A total of 12,935 birds of 66 species was recorded by the African Waterbird Census in January 1997; somewhat lower numbers were recorded in 1998, which may have been at least partly a result of the drying-out of two key lagoons, Bargny and Yène-Tode. *Phoenicopterus minor* was recorded from the site in "small groups" in the 1980s. *Falco naumanni* is regularly seen on passage, with a maximum single count of 39 individuals at Mbour in February 1993. *Larus audouinii* is observed all along the Petite Côte, with maximum counts of 160 and 144 individuals, both at Yène-Tode lagoon, and 104 at Toubab-Dialao. Eleven species of the Sudan–Guinea Savanna biome (A04) have been recorded from the site (see Table 2).

The site is the most important breeding ground for *Pelecanus rufescens* in Senegal, with a colony 2 km east of Mbour estimated at 4,000 individuals, which disperse along the Petite Côte after breeding. *Phoenicopterus ruber* is a winter visitor in the salt water of the Delta du Saloum and the coastal lagoons of the Petite Côte, in combined numbers (1,300) which exceed the IBA threshold, but most records are from the delta itself (site SN013). Large numbers of *Calidris ferruginea* (over 3,000) occur, with smaller numbers of *C. minuta* and *Arenaria interpres*. *Circus pygargus* is a frequent winter visitor, occasionally very abundant, especially when locusts are numerous, e.g. a roost of 1,000 between Mbour and Joal. *Pandion haliaetus* is reported from all parts of the site. There are mixed breeding colonies of herons and egrets in several villages, e.g. *Casmerodius albus*, with *Mesophoyx intermedia*, *Bubulcus ibis* and *Phalacrocorax africanus* at Fatick and *Casmerodius albus* with *Ardea melanocephala* at Mbodiène (Baillon pers. comm.). There is considerable interchange and movement of birds between La Petite Côte and the two coastal IBAs to the south (sites SN012 and SN013), all of which are of very high importance for wintering, passage and resident waterbirds and seabirds.

Key species

Key species	Breeding (pairs)	Non-breeding
A1 <i>Larus audouinii</i>		
A4i <i>Pelecanus rufescens</i>	1,500–2,000	—
<i>Larus genei</i>	—	1,185 (1998)
<i>Sterna caspia</i>	—	240+ (1998)

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The site includes the Popenguine-Guéréo Avifaunal Reserve (1,009 ha), but is otherwise unprotected. Most of the IBA is quite heavily populated and cultivated behind the dunes (and even on some of the offshore sandbars), particularly for market gardening and also for grazing livestock. There are many fishing villages along the coast and intensive fishing activity close to shore, using motorized canoes. There are also high levels of tourist activity in some areas and all these factors could lead to localized disturbance and loss of habitat. Catching of terns by children was reported to occur all along the Petite Côte in 1990. No such activity was seen during survey work in 1997, but it was presumed still to occur on fishing beaches that were not visited during the surveys. Following serious deforestation and drought in the area around Popenguine-Guéréo Avifaunal Reserve (including destruction of the classified forest on the hills of the Cap de Naze) a reforestation and sustainable development programme has been established, run by 1,500 women from eight peripheral villages (known as the 'Regroupement des Femmes de Popenguine pour la Protection de la Nature'). The group operates within an area around the designated reserve, known as the 'Community Natural Heritage Area of Kër Cupaam', with support from the Fondation Nicolas Hulot pour la Nature et l'Homme and the European Commission. The conservator of the Popenguine-Guéréo reserve is seconded from the Department of National Parks to the community programme, giving the local population responsibility for management of this protected area. The American Peace Corps has supported an environmental education programme at Popenguine.

Further reading

Cormier and Baillon (1991), Dubois and Rouge (1990), Larivière (1998–1999), Schepers *et al.* (1998).

Joal-Fadiouth

Admin region Thiès

Coordinates 14°08'N 16°49'W

Area c.1,800ha Altitude c.0–40 m

SN012

A1, A4i

Unprotected

Site description

The site lies just west and south of the town of Joal-Fadiouth and incorporates a length (c.5 km) of sandy coastline and a fairly large estuary with mangroves, mudbanks and small islands. The estuary consists of expanses of mud and mangroves intersected by creeks, which become at least partially inundated at high tide. At low tide, the mudbanks are important feeding areas, especially for waders. Inland, the eastern end of the estuary includes areas of dryer land and salt steppe that are not inundated. The site lies about 10 km south of the southern boundary of La Petite Côte (site SN011) and just north (c.4 km) of the northern boundary of Delta du Saloum (SN013).

Birds

See Box for key species. The site is particularly important for wintering waders and terns. Over 6,300 waders of 20 species were recorded in 1998. *Larus audouinii* is a regular wintering species, with frequent observations of numbers in the hundreds on the site, including a maximum count of 350 individuals in the estuary just south of the town of Joal-Fadiouth in 1991. In addition to the species in the Box, there are records of 1,200 wintering *Recurvirostra avosetta*, while *Charadrius hiaticula* and *Calidris canutus* have also been recorded in numbers exceeding 1,000 birds. Breeding birds include mixed heronries in trees in villages inland of the estuary, e.g. *Mesophoyx intermedia* with nests of *Egretta alba*, *Ardea melanocephala* and *Phalacrocorax africanus* at N'Dianda near Joal. There is considerable interchange and movement of birds between this site and sites SN011 and SN013, and all three sites are of very high importance for wintering, passage and resident waterbirds and seabirds.

Key species

A1	<i>Larus audouinii</i>		
A4i		Breeding (pairs)	Non-breeding
	<i>Arenaria interpres</i>	—	488 (1998)
	<i>Larus genei</i>	—	924 (1998)
	<i>Sterna caspia</i>	—	435 (1997)
	<i>Sterna maxima</i>	—	825 (1998)

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

In terms of use by waterbirds and seabirds, the site is closely linked to Delta du Saloum (site SN013) to the south and La Petite Côte (SN011) to the north. It is, however, a discrete site in its own right, which has been surveyed separately since 1997 as part of the African Waterbird Census. It is not included in the Delta du Saloum Biosphere Reserve and has no designated status, but Peeters *et al.* (1998) suggest that it merits classification as a Ramsar Site (and IBA) on the basis of waterbirds regularly occurring in high numbers.

Further reading

del Nevo *et al.* (1994), Peeters *et al.* (1998), Schepers *et al.* (1998).

Delta du Saloum

Admin region Fatick, Kaolack

Coordinates 13°52'N 16°36'W

Area c.180,000 ha

Altitude 0–41 m

SN013

A1, A3 (A04), A4i, A4iii

National Park, Biosphere Reserve,

Ramsar Site, Unprotected

Site description

The site consists of the deltas of the seasonal Sine, Saloum and Diombos rivers. It lies south-west of Kaolack, and forms the border

with The Gambia at the Atlantic coast, where it is contiguous with Niuni National Park (IBA GM003). The whole delta area covers a linear distance of 72.5 km along the Atlantic coast and stretches 35 km inland. Much of the delta area consists of mangroves (principally *Rhizophora* spp. and *Avicennia nitida*), which extend 70 km upstream to Kaolack. The Biosphere Reserve (and IBA) covers an area of 180,000 ha, of which 95,000 ha is marine, rivers or inundated areas (30,000 ha of which is intertidal), and 85,000 ha is terrestrial savanna or forest (either mainland or islands in the river channels). Part of the site (76,000 ha) is designated as a National Park and Ramsar Site (the Parc National du Delta du Saloum). This consists of 61,000 ha of sea and rivers, 7,000 ha of intertidal mangroves and saltwater vegetation and 8,000 ha of terrestrial savanna or forest (including the dry sand-dune forest of 'Fathala').

The site consists of sea and sandy coast (including the 'Pointe de Sangomar'), sand, mud and shell islands and islets, tidal swamps, mangroves, sandbars, lagoons, streams and creeks or 'bolongs', savanna and forest. North of the main Saloum river channel, the islets tend to be sandy and subject to infrequent tidal flooding. These areas are either almost devoid of vegetation or colonized by a herb layer, e.g. *Sesuvium portulacastrum*, *Paspalum vaginatum*. At the edges, where flooding is seasonal not tidal, flood-plain grasses develop. There are also large areas of saline sand and fossil mangroves ('tanns') which support little vegetation, and some mangrove-covered islets. South of the river channel, mangroves growing on mud islets (almost entirely covered at high tide) dominate the area. There is a network of inter-linking channels and additional, seasonal freshwater streams flow in to the delta from the landward side. Towards the eastern end of the site, on areas that are never inundated by salt water, there are baobabs *Adansonia digitata* and *Acacia* trees. Some areas of saltmarsh and lagoon are exploited for the production of salt, for example the 'Salines de Kaolack', south-west of the town.

The core area (the National Park) and part of the buffer zone of the Biosphere Reserve are owned by the State, but the remainder is owned by the local community and managed through liaison between a rural council and National Park and forest service authorities. Human uses within the park include nature conservation, tourism, and gathering of grasses and other plant products. Activities in areas around the site include livestock-rearing, agriculture (mainly growing of millet), fishing and hunting.

Birds

See Box and Table 2 for key species. The site is important for a very wide variety of waterbirds and seabirds, some occurring in large congregations. The marine and coastal zone, and particularly the sandbars and islands, are of huge importance for breeding terns and gulls. On one island alone (Ile aux Oiseaux) a total of 40,000 nests of four species was recorded in 1991, and the largest breeding colony of *Sterna maxima* in the world (estimated at 40,000 nests in 1999) also occurs here. This makes Ile aux Oiseaux and the Delta du Saloum IBA the most important breeding site for gulls and terns on the coast of Senegal. The highest counts of wintering *Larus audouinii* in Senegal are recorded from Palmarin, within the site, where it is frequent to abundant, with a maximum single count of 522 birds in January 1997. Occasional small numbers of *Phoenicopterus minor* occur on the site and there are also sporadic breeding records for the species, but no recorded numbers and most authors agree that the only known West African breeding site is in Mauritania. In addition, five species of the Guinea–Congo Forests (A05) biome have been recorded at this site (see Table 2). These include *Anthreptes gabonicus*, currently only known from this IBA in Senegal; however, it may be expected to occur on Parc National de Basse Casamance (site SN014), as its habitat does.

The central intertidal zone of river channels, islands, creeks, mangroves and exposed sand and mud is particularly important as a feeding area (especially at low tide) and roosting area for waders and herons. This is the most important site for wintering *Casmerodius albus* in West Africa, probably the most important site in Senegal for *Ardea goliath* and the only known breeding site in Senegal for *A. cinerea*. In addition to its importance for the species listed in the Box, there are significant numbers, close to IBA thresholds, of many other waders, including *Haematopus ostralegus*, *Himantopus himantopus*, *Burhinus senegalensis* and *Numenius phaeopus*. The zone furthest inland becomes very dry during the dry season, the saltmarshes and salines are of particular importance for *Phoenicopterus ruber* (including occasional breeding records) and 100 nests of *Larus genei* were recorded in the

‘Salines de Kaolack’ in 1998. The largest concentrations of wintering *Pandion haliaetus* recorded in Senegal occur in the site. The Delta du Saloum is very closely linked to sites SN011 and SN012 to the north. There is considerable interchange and movement of birds between these three sites, all of which are of very high importance for wintering, passage and resident waterbirds and seabirds.

Key species

A1	<i>Larus audouinii</i>		
A3 (A04)	Sudan–Guinea Savanna biome: 18 of the 33 species of this biome that occur in Senegal have been recorded at this site; see Table 2.		
A4i		Breeding (pairs)	Non-breeding
	<i>Pelecanus rufescens</i>	20 (1986)	2,254 (1997)
	<i>Egretta gularis</i>	1,750 (1998)	1,729 (1997)
	<i>Casmerodius albus</i>	—	852 (1997)
	<i>Platalea leucorodia</i>	—	217 (1997)
	<i>Phoenicopterus ruber</i>	c.200 (1979)	1,300 (1998)
	<i>Recurvirostra avosetta</i>	—	2,328 (1998)
	<i>Charadrius hiaticula</i>	—	5,610 (1998)
	<i>Charadrius alexandrinus</i>	—	2,343 (1997)
	<i>Pluvialis squatarola</i>	—	4,358 (1997)
	<i>Tringa totanus</i>	—	1,952 (1997)
	<i>Arenaria interpres</i>	—	1,995 (1998)
	<i>Calidris minuta</i>	—	14,180 (1997)
	<i>Calidris ferruginea</i>	—	16,256 (1998)
	<i>Larus fuscus</i>	—	7,813 (1998)
	<i>Larus cirrocephalus</i>	4,600 (1998)	1,833 (1997)
	<i>Larus genei</i>	3,350 (1998)	9,086 (1997)
	<i>Sterna nilotica</i>	309 (1997)	612 (1997)
	<i>Sterna caspia</i>	8,610 (1998)	1,773 (1997)
	<i>Sterna maxima</i>	40,000 (1999)	988 (1998)
	<i>Sterna sandvicensis</i>	—	4,050 (1997)
	<i>Sterna hirundo</i>	80 (1998)	—
A4iii	More than 20,000 waterbirds occur regularly at this site.		

Other threatened/endemic wildlife

The marine fauna includes breeding turtles: *Dermochelys coriacea* (EN), *Chelonia mydas* (EN), *Caretta caretta* (EN), *Eretmochelys imbricata* (CR) and *Lepidochelys olivacea* (EN). The site is also an important fish spawning and feeding ground (113 species recorded). Coastal and marine mammal species include *Trichechus senegalensis* (VU), *Sousa teuszii* (DD) and *Stenella* spp. The dry forest (Fathala and other islands) contains threatened mammal species typical of the Sudan–Sahel interface, including *Ptilocolobus badius temminckii* (LR/nt), *Cephalophus rufilatus* (LR/cd) and *Redunca redunca* (LR/cd).

Conservation issues

There are proposals for the National Park to become part of an international park, in collaboration with The Gambia, which would include the mangroves south of the Senegal–Gambia border, at Karenti Bolon. There is a faunal reserve at Palmarin, designated under the auspices of the Biosphere Reserve. A rural council (composed of local community representatives) manages the Biosphere Reserve, in collaboration with National Park and Forest Service authorities. This allows traditional exploitation of mangroves, fish and shellfish, outside the park (which constitutes the core zone of the Biosphere Reserve).

There are potential threats to the whole delta from the extension of rice cultivation, general intensification of agriculture and salinization of soils, forest exploitation, destruction of mangroves, fires in the forest zone and overfishing. Other management problems include the illegal collection of molluscs, bird and sea-turtle eggs and possible over-exploitation of plant products. The saltflats upstream of the park and parts of the Fathala forest are currently unprotected, though proposals exist for their inclusion within the park. Since its inception in 1976 the park has received no external funding and management is hampered by a complete lack of resources and confusion between forestry and National Park services over management responsibilities. The rest of the IBA (the complete Biosphere Reserve) has never been formally designated and efforts to raise awareness and achieve integrated management of the delta area with local communities are only just beginning. The IUCN Wetlands Programme (with funding from The Netherlands government) is now supporting the National Parks Department to establish experimental pilot projects involving community groups under the ‘Integrated Management Programme for the Delta du Saloum Biosphere Reserve’.

This five-year programme (1997–2002) will result in an integrated management plan for the Biosphere Reserve, for submission to donors. Accommodation for tourists and other visitors is available in local villages and there are plans to establish a biological station at the site and to promote use of the site for conservation education.

Further reading

Bengtsson (1995), Jones (1993), Keijl *et al.* (1999), Peeters *et al.* (1998), Schepers *et al.* (1998).

Parc National de Basse Casamance

SN014

Admin region Ziguinchor

Coordinates 12°24'N 16°36'W

A1, A3 (A04, A05)

Area c.5,000 ha Altitude 0–11 m

National Park

Site description

The site lies in the delta of the Casamance river in the south-western corner of the country. It lies to the south of the main river channel, close to the border with Guinea-Bissau, and c.50 km south-west of Ziguinchor. It is low-lying, with the highest areas in the eastern end of the park (maximum altitude 11 m above sea-level). The habitat consists of mangroves fringing tidal channels, seasonally bare saline mudflats, some wooded savanna and terrestrial forest, including the only remaining small area of Guinea–Congo forest in the country. The mangrove areas show a zonation from the water’s edge, with first *Rhizophora racemosa*, then *R. mangle* with *Paspalum vaginatum*, then *Avicennia africana* with *R. mangle*, and *Scirpus littoralis* or other understory species. The mudflats are colonized by *Eleocharis mutata* and *E. geniculata*. The Guinea–Congo forest occurs as islands within the Santiaba–Mandjak forest and includes species such as *Parinari excelsa*, *Pithecellobium altissimum*, *Chlorophora regia*, *Detarium senegalense*, and abundant *Treulia africana* forming the lower canopy.

Birds

See Box and Table 2 for key species. The site is the only IBA in Senegal in which two of the country’s globally threatened species, *Ceratogymna elata* and *Illadopsis rufescens*, are recorded. *C. elata* is said to occur as a small population seen regularly in the park and *I. rufescens* was caught in mist-nets twice in the 1970s and 1980s (one individual on each occasion). *Circus macrourus* has also been recorded at least once in the park. The wooded savanna and Guinea–Congo forest areas hold a number of species restricted to the Sudan–Guinea Savanna (A04) biome, including *Nectarinia coccinigaster*, recorded from no other IBA in Senegal. Nearly all of the species restricted to the Guinea–Congo Forests (A05) biome that are known to occur in the country are also recorded from the site. The site is said to be important for Palearctic migrant waders, but no numerical data are available.

Key species

A1	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
A3 (A04)	Sudan–Guinea Savanna biome: Nine of the 33 species of this biome that occur in Senegal have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 31 of the 37 species of this biome that occur in Senegal have been recorded at this site; see Table 2.	

Other threatened/endemic wildlife

Over 50 mammal species have been recorded from this small area, including *Ptilocolobus badius temminckii* (LR/nt) and *Trichechus senegalensis* (VU). The park hosts a variety of duikers (*Cephalophus* spp.) and *Anomalurus beecroftii* is found nowhere else in Senegal. Reptiles include *Osteolaemus tetraspis* (VU).

Conservation issues

The park itself is well managed, but is small and close to several population centres (Oussouye, Ziguinchor). The ungulate *Kobus kob* has been successfully reintroduced to the park. There are pressures on areas outside the park boundary, including both an estuarine and an offshore fishery and mangrove exploitation. The whole of the lower Casamance river and delta are threatened by increases in salinity resulting from reduced rainfall over the last 30 years and the intrusion of salt water further upstream. This has led to localized losses of fish species and pollution of groundwater. IUCN organized a seminar on behalf of the government and produced recommendations on

‘Conservation and Sustainable Use of Natural Resources in the Casamance River Basin’ in 1990. However, the park was closed in 1992 as a result of the conflict and unrest that has occurred in the Casamance region in recent years, and subsequently no monitoring of birds or the conservation status of the area has been possible.

Further reading

Burnham (1994), Dupuy and Verschuren (1977), Morel and Morel (1990), WCMC (1989).

Kalissaye Avifaunal Reserve

Admin region Ziguinchor
Coordinates 12°40'N 16°46'W
Area c.16 ha Altitude c.0 m

SN015

A4i
Avifaunal Reserve

Site description

The site lies at the mouth of the Kalissaye river in south-western Senegal (Casamance region) and consists of two sandy islands lying off the Pointe de Sankoye. It lies about 35 km north-west of Parc National de Basse Casamance (site SN014). The strong currents in the estuary modify the mobile sand substrate, changing the shape and size of the islands continually. The vegetation on the islands is characterized by littoral sand-loving species such as *Ipomoea pes-caprae*, *Sporobolus spicatus* and *Alternanthera maritima*. The site was established as a reserve and sanctuary to protect breeding seabirds and sea-turtles.

Birds

See Box for key species. *Larus audouinii* is also recorded from the site, but with no details of numbers or frequency (DPN 1996). There is a record of 10,000 pairs of breeding *Sterna caspia*, repeated in two IUCN publications, but there are no details of years nor the original source of this count(s) and other estimates put the total breeding population in Senegal at 5,000–6,000 pairs, so this record must be doubtful. Other species recorded include *Sterna maxima*, *S. nilotica*, *Larus genei*, *L. cirrocephalus* and *Pandion haliaetus*.

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Pelecanus onocrotalus</i>	6,000	—
<i>Egretta gularis</i>	500	—

Other threatened/endemic wildlife

Two species of sea-turtle, *Chelonia mydas* (EN) and *Caretta caretta* (EN), are recorded breeding and the mammal *Trichechus senegalensis* (VU) is reported from the site.

Conservation issues

Concern has been expressed about the erosion by ocean currents of a sandbar and the islands on which the pelican colony and other species breed. Conflict and unrest which has occurred in the Casamance region in recent years has resulted in the cessation of any counts of breeding birds or monitoring of the conservation status of the reserve, which was closed in 1992 as a result of these problems.

Further reading

DPN (1996), Hughes and Hughes (1992), IUCN (1987a), Morel and Morel (1990), WCMC (1989).

Parc National du Niokolo-Koba

Admin region Tambacounda
Coordinates 12°55'N 13°02'W
Area c.913,000 ha
Altitude 16–311 m

SN016

A3 (A04, A05)
National Park, World Heritage Site,
Biosphere Reserve

Site description

The park lies in south-eastern Senegal, straddling the upper Gambia river and its tributaries (the Koulountou and the Niokolo-Koba), and close to and, in part, along the international frontier with Guinea, where it is contiguous with Badiar National Park (GN001). The park is largely flat, but includes a line of low hills in the east, reaching up to around 200 m (maximum 311 m at Mont Assirik). Much of the

area is formed from laterite (iron pans) and sediments overlying Cambrian sandstone beds that outcrop in places. There are large areas of flood-plain and marsh (mainly in abandoned riverbeds and behind levées), inundated during the seasonal rains (June to October); mean annual rainfall is over 1,000 mm. The vegetation includes southern Sudan–Guinea savanna, with gallery forest and more luxuriant vegetation along watercourses and *Vetiveria* grasses or herbaceous savanna dominated by *Andropogon gayanus* in the valleys and plains. Flooded grassland areas are composed of *Paspalum orbiculare* and *Echinochloa* sp. Dry forest contains patches of bamboo *Oxytenanthera abyssinica*. The ravines and gallery forest include typical plant species of the Guinea–Congo Forest biome such as lianas and *Raphia sudanica*, *Baissea multiflora*, *Nauclea latifolia*, *Dalbergia saxatilis* and *Landolphia dulcis*. The vegetation on the slopes and hills, rocky outcrops, alluvial sands and iron pans is different. Semi-aquatic species and annuals appear along rivers and on periodically inundated sands. Dry forest or herbaceous savanna is found along the borders of some ponds, and thickets of thorn-bush, *Mimosa pigra*, occupy the centre of some marshes. Marsh vegetation on higher ground and acid soils includes *Oryza brachyantha* (wild rice) and, on humid banks, localized species such as *Christiana africana*, *Cola laurifolia*, *Cynometra vogelii*, *Syzygium guineense*, and *Ziziphus amphibia* occur. Riverbank species also include *Acacia nilotica*, *Khaya senegalensis*, *Erythrophleum guineense*, *Ceiba pentandra*, *Azelia africana* and *Borassus* sp. Over 1,500 plant species have been recorded in the park.

Birds

See Box and Table 2 for key species. A total of 330 bird species has been recorded from the site, including sporadic records of two species of global conservation concern. *Marmaronetta angustirostris* has been observed wintering in the park and there is also one record of a pair with three chicks in April 1979. There are a number of records of *Falco naumanni* on the site during January, including one record of c.80 birds in 1980. The restricted-range *Lagonosticta virata* has been recorded from a site c.30 km north of the park boundary. Information about the species' presence in this area is lacking, but if further survey work finds that suitable habitat is present and the species appears to be well established this could justify extending the boundary of this IBA to include the relevant area. This is the only IBA in Senegal in which the biome-restricted *Camaroptera chloronata* has been recorded (see Table 2). The first African Waterbird Census of the site in 1997 recorded 2,500 *Plectropterus gambensis*; large numbers of the Afrotropical ducks *Dendrocygna bicolor* and *D. viduata* also use the park's wetlands.

Key species

- A3 (A04) Sudan–Guinea Savanna biome: 23 of the 33 species of this biome that occur in Senegal have been recorded at this site; see Table 2.
A3 (A05) Guinea–Congo Forests biome: Eight of the 37 species of this biome that occur in Senegal have been recorded at this site; see Table 2.

Other threatened/endemic wildlife

Records from the park include 80 mammal species, 38 reptiles, 20 amphibians and 60 fish, as well as numerous invertebrates. Carnivores include *Lycaon pictus* (EN). The only Senegalese populations of the mammals *Taurotragus derbianus* (LR/nt) and *Loxodonta africana* (EN) are found in the park. There are also around 150 *Pan troglodytes* (EN) living in the gallery forest and on the slopes of Mont Assirik, at the north-west limit of their distribution. All three African crocodiles occur in the park, including *Crocodylus cataphractus* (DD) and *Osteolaemus tetraspis* (VU).

Conservation issues

Officially, the park is strictly protected and managed according to a management plan which includes restoration of natural ecosystems. Poaching, especially of large mammals (*Panthera pardus*, *Syncerus caffer*, various antelopes and *Loxodonta africana*) is a problem, causing declines in populations. Dams proposed for both the Gambia and the Niokolo-Koba rivers, and the probable associated developments in industrial mining and quarrying, threaten the hydrology and wetland functions of the park. Fire is still used as a means of savanna management within and outside the park and uncontrolled burning has caused damage to habitats in the park. As with other protected areas in Senegal, the park has suffered from a lack of financial resources and declining numbers of guards. It received its first external

financial support (from the European Union) in 1994 under the 'Projet Régional du Niokolo-Badiar', which has established the site as a component of a cross-border international park, contiguous with the Parc National du Badiar in neighbouring Guinea. Many conservation-management and staff-training activities are now carried out collaboratively under this arrangement. However, the programme is focused on the southern and central parts of the park only, and efforts to raise awareness and to achieve integrated management of the park's natural resources in collaboration with local communities have only just started. Additional funding from French development agencies is supporting a project (1997–2000) to rehabilitate and develop the park and its buffer zone, including ecotourism, monitoring (especially of rare and threatened species) and local community micro-projects. The project will result in a Biosphere Reserve management plan. The American Peace Corps has supported an environmental education programme around the park.

■ Further reading

Dupuy and Verschuren (1977), IUCN (1987a), Morel and Morel (1990), Payne (1997).

Cap Vert

Admin region Cap Vert

Coordinates 14°45'N 17°32'W

Area c.3,800 ha Altitude c.0–40 m

SN017

A1, A4i, A4ii

Unprotected

■ Site description

This marine site consists of the coastline of the peninsula known as Cap Vert, running from les Mammelles and Pointe des Almadies north to Cambérène (c.19 km in length), together with the offshore islands and reefs and the narrow strip of sea between the islands and the mainland (up to about 2 km offshore). Cap Vert is the westernmost point of Africa and is the peninsula on which Dakar stands. The two islands in question are the Ile de Yof (also known as Ile de Tenguène) and the Ile de Ngor. The coast and islands consist of rocky outcrops and some sandy beaches, and there is a string of reefs off the Pointe des Almadies, known as the 'Chaussée des Almadies'. The reefs and islands form a degree of natural protection from the Atlantic Ocean for the narrow sea channel (less than 1 km) between them and the mainland. Many migrating seabirds pass through this marine 'bottleneck', and large numbers also pass on the seaward side of the two islands.

■ Birds

See Box for key species. *Larus audouinii* is frequent to common off the Pointe des Almadies during January to March—numbers in the hundreds have been recorded flying south in October (counts of 132 in 1995 and 280 in 1996, each count consisting of several hours observation over several days, with a maximum single-day total of 77 on 10 October 1996).

The site is of considerable importance for sea- and waterbirds, particularly as a migration route along which move very large numbers of spring- (northward) and autumn- (southward) passage shearwaters, petrels, skuas, gulls and terns. Resident terns also use the site, perching on rocks all along the coast and foraging behind fishing boats at sea. Data on numbers of species are from seawatching counts made by a number of observers, particularly since 1990 (see Marr *et al.* 1998 for references and sources). Most of the observations were made either from the mainland (Pointe des Almadies) or from Ile de Ngor, together with a few pelagic counts made by observers from boats within 25 km of the shore. This means that the numbers listed in the Box are a mixture of birds moving overland or through the narrow sea channel between the islands and the mainland, and also some further out to sea (and not strictly within the IBA as defined here). However, since

counts consist of only a few hours watching per day, over a period of days, they presumably represent considerable underestimates of the total numbers of birds passing through the site; no comprehensive count covering a whole season of passage has been undertaken.

Particularly significant numbers of terns and shearwaters have been recorded (see Box). For *Sterna sandvicensis*, 13,000 individuals have been recorded wintering along the coast from Kayar to Cap Vert (this area includes parts of two other IBAs—sites SN009 and SN010—but it seems safe to assume that a number in excess of the threshold for this species occur within the Cap Vert IBA boundary). There is also a passage count for *S. sandvicensis* of 1,206 birds during 48 hours observation over a period of eight days in October/November 1997. For *Chlidonias niger*, a total of 23,923 birds were observed during 78 hours of observation over 11 days in October 1996, with a single day maximum total of 12,645 on 12 October. Other species on passage include *S. maxima* (421 over a period of eight days in April 1992) and *S. hirundo* (1,580 over a period of eight days in April 1992 and 6,454 over a period of eight days in October/November 1997); these numbers are also close to IBA thresholds for these species. For *Calonectris diomedea*, 4,585 individuals were counted during a total of 64 hours observation over eight days during October and November 1997.

Key species

A1	<i>Larus audouinii</i>		
A4i		Breeding (pairs)	Non-breeding
	<i>Sterna sandvicensis</i>	—	13,000 (1997)
	<i>Chlidonias niger</i>	—	23,923 (passage; 1996)
A4ii	<i>Calonectris diomedea</i>	—	4,585 (passage; 1997)

■ Other threatened/endemic wildlife

The dolphin *Tursiops truncatus* (DD) is regularly seen, and it is likely that other dolphins, including *Steno bredanensis* (DD) and *Stenella coeruleoalba* (LR/cd), and the sea-turtle *Caretta caretta* (EN), recorded from the Parc National des Iles de la Madeleine (site SN010), will also be present in this site.

■ Conservation issues

Many of the large numbers of passage seabirds pass out to sea beyond the offshore islands. However, many others are drawn in around the mainland Pointe des Almadies and the inner sea channel between the mainland and the islands may be particularly important in bad weather or adverse winds. The identification of the coast, inner sea channel and islands as an IBA is also justified by the close interaction between birds and people in this area. The most immediate threats from human disturbance or developments are likely to occur within the defined IBA. The site is not recognized by any formal government designation, but has recently been declared an 'Aire du patrimoine communautaire' or Community Heritage Area. This title formalizes the area's traditional religious protected status and recognizes its natural, historical and religious importance.

Many of the coastal communities depend on fishing for their livelihood and there are strong links between the fishermen and seabirds. The fishermen use birds to indicate rich fishing areas and many foraging birds follow the fishing boats and pirogues (traditional canoes). The whole area is popular with tourists; there are numerous hotels along the mainland coast and regular public passenger ferries out to the islands, which could lead to localized disturbance. Children on surfboards have been observed catching terns (*Sterna sandvicensis*) with baited hooks in the channel on the seaward side of Ile de Ngor, but this practice appeared to have been stopped in 1997, following a report to the Senegalese authorities. Previous reports also noted extensive tern-trapping activity around the Cap Vert peninsula.

■ Further reading

Dubois and Rouge (1990), Marr *et al.* (1998), Meininger (1998).

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