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Conservation of the Environment of
the Red Sea and Gulf of Aden
(PERSGA)

*Status of Breeding Seabirds
in the
Red Sea and Gulf of Aden*

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PERSGA is an intergovernmental organisation dedicated to the conservation of coastal and marine environments and the wise use of the natural resources in the Region.

The Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention) 1982 provides the legal foundation for PERSGA. The Secretariat of the Organization was formally established in Jeddah following the Cairo Declaration of September 1995. The PERSGA member states are Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan, and Yemen.

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EXECUTIVE SUMMARY

The Red Sea and the Gulf of Aden represent a complex and unique tropical marine ecosystem. The Red Sea was formed by the northerly extension of the African rift valley system and is about 2,000 km long. The Gulf of Aden is a branch of the Indian Ocean and has a length of 1,400 km. The region has a remarkably high biological diversity and a high degree of endemism, particularly for fish and corals.

Information available on seabirds for the region is limited, with the majority of studies carried out one to two decades ago. Accounts indicate that there are 17 true seabird species and 14 other water bird species. Among these birds the Jouanin's petrel and swift tern have the smallest sub-populations. The white-eyed gull, endemic to the Red Sea and Gulf of Aden, has large populations on the northern Egyptian Red Sea islands unlike the sooty gull and spoonbill that are apparently abundant in the southern Red Sea.

Lesser-crested, bridled and white-cheeked terns are the most common seabirds in the region. The brown booby was recorded in all countries whilst masked boobies were only recorded on islands located in the southern Red Sea, with the majority in the Gulf of Aden. Other birds, such as osprey, sooty falcon, little green heron and western reef heron, are common breeders in most of the region.

The threats facing seabird populations include human disturbance, human exploitation, introduced predators, habitat destruction (especially from urban expansion), pollution and over-fishing. However, detailed research is needed to investigate the effects of these threats. Conservation activities in the region have increased with the establishment of environmental agencies and protected areas. However, in most countries of the region seabird conservation is not considered a priority for the conservation of the marine environment.

To develop and implement a strategic plan to conserve seabird populations in the PERSGA region, the following points need immediate attention: the lack of accurate information available, lack of institutional effectiveness in conservation, lack of funds to support seabird research and conservation, lack of regional expertise, lack of research on seabird conservation and lack of awareness of the importance of seabird conservation.

For better protection of seabirds it is necessary to: strengthen the capacity for the conservation of seabirds, to improve the protection of seabird breeding areas and to develop a conservation action plan for the seabirds breeding in the region, which should include research and monitoring, legislation and awareness.

RÉSUMÉ ANALYTIQUE

La mer Rouge et le golfe d'Aden constituent un écosystème marin tropical unique et complexe. La mer Rouge, formée par la partie septentrionale du système de la grande vallée du Rift africain, a une longueur de 2 000 km et le golfe d'Aden, branche de l'océan Indien, une longueur de 1 400 km. La région possède une diversité biologique remarquablement élevée et un haut degré d'endémisme, notamment pour les poissons et les coraux.

Les renseignements disponibles sur les oiseaux de mer sont limités, la majorité des études ayant été menées il y a une ou deux décennies. Il existe, selon les rapports, 17 espèces d'oiseaux de mer véritables et 14 autres espèces d'oiseaux aquatiques. Parmi ces oiseaux, les sous-populations les plus réduites sont celles du pétrel de Jouanin et du terne huppé. Il existe de vastes populations du goéland à iris blanc, endémique de la mer Rouge et du golfe d'Aden, sur les îles égyptiennes du nord de la mer Rouge, alors que le goéland de Hemprich et la spatule semblent abondants dans le sud de la mer Rouge.

La sterne voyageuse, la sterne bridée et la sterne à joues blanches figurent parmi les oiseaux de mer les plus communs de la région. Bien que le fou brun ait été observé dans tous les pays de la région, le fou masqué ne l'a été que sur les îles du sud de la mer Rouge et en majorité dans le golfe d'Aden. D'autres oiseaux, tels que le balbuzard pêcheur, le faucon concolore, le petit héron vert et l'aigrette des récifs, nichent communément dans la plupart de la région.

Parmi les menaces auxquelles sont exposées les populations d'oiseaux de mer

figurent notamment les perturbations et l'exploitation d'origine anthropique, l'introduction d'espèces prédatrices, la destruction des habitats (résultant tout particulièrement de l'expansion urbaine), la pollution et la surpêche. Il faut toutefois procéder à des recherches détaillées pour élucider les effets de ces menaces. Des activités de conservation plus nombreuses ont été menées dans la région avec l'établissement d'organismes de protection de l'environnement et d'aires protégées, mais, dans la plupart des pays de la région, la conservation des oiseaux de mer n'est pas encore considérée comme une priorité dans le cadre de la conservation du milieu marin.

Pour élaborer et mettre en œuvre un plan stratégique de conservation des populations d'oiseaux de mer dans la région de PERSGA, il est impératif de prêter une attention immédiate aux points suivants : manque d'informations exactes, manque d'efficacité institutionnelle en matière de conservation, manque de fonds pour appuyer la recherche sur les oiseaux de mer et leur conservation et manque de sensibilisation à l'importance de leur conservation.

Il est nécessaire, pour assurer une meilleure protection des oiseaux de mer, de renforcer les capacités de conservation de ces espèces, d'améliorer la protection de leurs zones de reproduction et de formuler un plan d'action pour la conservation des oiseaux de mer se reproduisant dans la région, plan qui devra comprendre des composantes de recherche, de suivi et d'élaboration de mesures législatives et de sensibilisation.



Offshore island in the Suakin area, Sudan



Lesser crested tern colony



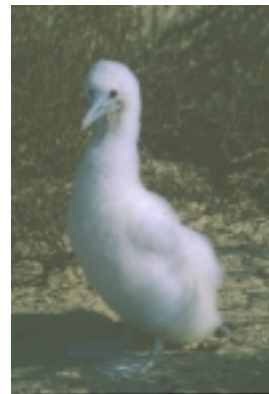
White-checked tern, endemic to the seas surrounding the Arabian Peninsula



White-checked tern chick



Brown booby on her nest



Brown booby chick



Threats: disturbance to breeding seabirds at offshore islands, mainly by fishermen



Red-billed tropicbird one of the endemic species in the region



Osprey chick on nest



Survey for breeding seabirds



Brown booby



White-eyed gull nest

1. INTRODUCTION

The Red Sea and the Gulf of Aden represent a complex and unique tropical marine ecosystem, with extraordinary biological diversity and a remarkably high degree of endemism. This narrow band of water is shared by a number of coastal states and is an important shipping lane, linking the world's major oceans. The diversity of corals is greater than anywhere in the Indian Ocean, and the number of species confined solely to the Red Sea is extremely high (PERSGA/GEF 2003). The Red Sea is one of the most important repositories of marine biodiversity on a global scale and features a range of important coastal habitats. It lies within a deep (maximum depth 2,500 m) trench formed by the northerly extension of the African rift valley system. It has a surface area of ca. 435,000 km² and is 2,000 km long. To the north, the Red Sea divides into the shallow Gulf of Suez (up to 90 m deep) and the deeper Gulf of Aqaba (to 1,850 m deep).

The Gulf of Aden, one of the biologically least known branches of the Indian Ocean, holds fishery resources of international importance. The Gulf of Aden is strongly influenced by the upwelling of cool, nutrient-rich water during the southwest and northeast monsoons and is characterised by a prevailing high-energy climate. These conditions pose major constraints on coral reef development; hence only 5 % of the Yemeni Gulf of Aden coast is lined with fringing reefs. Rocky cliffs, alternating with long stretches of littoral and sub-littoral sand along coastal plains dominate Yemen's coastline. Little is known about the coastal and marine resources of the Gulf of Aden off Somalia.

The Socotra Archipelago is situated at the eastern extreme of the Gulf of Aden, some 400 km south of the Arabian Peninsula. Human impacts in the archipelago are limited and it contains unique aquatic and terrestrial ecosystems as well as endemic species. It consists of Socotra Island and three outlying islands, Abd al-Kuri, Samba and Darsa. Recent surveys have revealed that the

archipelago could be an extremely important area for marine biogeography. The World Wide Fund for Nature (WWF) has described the archipelago as an "Indian Ocean version of the Galapagos," based on the high degree of endemism and unique vegetation types on the islands (PERSGA/GEF 1998).

The Red Sea and the Gulf of Aden (RSGA) region is important for seabirds, with several endemic taxa, including the white-eyed gull *Larus leucophthalmus*, red-billed tropicbird *Phaeton aethereus indicus*, spoonbill *Platalea leucorodia archeri* and brown noddy *Anous stolidus plumbeigularis*. A further group of taxa, at both specific and sub-specific levels, are endemic to the northwest of the Indian Ocean area and important sub-populations of many breed in the RSGA region. Important breeding populations include: Jouanin's petrel *Bulweria fallax*, sooty gull *Larus hemprichii*, swift tern *Sterna bergii velox*, white-cheeked tern *Sterna repressa* and Socotra cormorant *Phalacrocorax nigrogularis*.

In order to develop a regional conservation plan for breeding seabirds in the Red Sea and Gulf of Aden, PERSGA initiated a programme with four stages. The first stage was to develop a set of Standard Survey Methods (SSM); the second stage was to train national seabird specialists to use the SSM; the third stage was to conduct surveys and the fourth was to prepare national reports presenting the current status of seabirds.

The SSM for seabirds was developed by PERSGA for use in determining the status of seabird populations. The SSM will complement other methods developed by PERSGA to conserve the marine environment in the RSGA region. Also, the SSM can be used as a tool to increase the capacity of the region, through training of regional specialists in seabird monitoring. Furthermore, the SSM will facilitate the valid comparison of data collected across the region and thus contribute towards a greater regional

understanding of seabird population fluctuations. The SSM will therefore enable a strategic plan to conserve seabird populations in the region to be developed thus increasing the capacity for their protection.

In order to develop a series of country reports, PERSGA conducted four field surveys in the region. The first was part of a biodiversity project carried out in the Socotra Archipelago (AL-SAGHIER et al. 1999). The other surveys were carried out during the summer of 2002 in Djibouti, Sudan and Yemen (AL-SAGHIER 2002b; SHOBRAK et al. 2002a, 2002b). In addition, four national reports were compiled by regional experts to document the status of seabirds in countries that were not surveyed. The present manuscript is a desktop study, compiling information on the status of breeding seabirds in the RSGA as a regional report derived from the national reports prepared for PERSGA. The objectives of this report are to present:

- the current status of knowledge of breeding seabirds in the RSGA,
- the threats facing seabirds and their habitats in the RSGA,
- the conservation requirements for breeding seabirds in the region, and thereby contribute towards development of a regional action plan for seabird conservation.

1.1 The PERSGA Countries – Geography and Climate

Djibouti

Djibouti is a small country with a surface area of 23,200 km² and a coastline of about 370 km. It is located at the junction of the Red Sea and the Gulf of Aden, bordered by Eritrea to the north, Ethiopia to the northwest, west and south, and Somalia to the southeast (Figure 1). The northern coast, between the Eritrean border and Ras Bir, faces the narrow Strait of Bab al-Mandab. The country is essentially volcanic in origin and is comprised largely of desert. The landscape is

composed of plateaux of medium elevation (500-1,000 m), interspersed with low altitude plains (below 500 m) and a number of mountain ranges (FISHPOOL & EVANS 2001).

The human population is estimated at 620,000 (DIRECTION DE L'ENVIRONNEMENT 1999), of which 65 % live in the capital, Djibouti. The average annual growth rate is 4.9 %. The economy is highly dependent on the tertiary sector (trade, financial services and other services), with the primary and secondary sectors making up just 13 % of the gross national product (EMERTON 1998). The port in the city of Djibouti is linked to Ethiopia by rail and road and plays a major role in the economy. The potentially rich marine resources are relatively under-utilized with statistics showing fluctuations in fisheries production between 1980 and 1994 due to a weak marketing structure for fisheries products and the state of unrest in the north of the country in the early 1990's.

The climate is generally hot and dry, with two distinct seasons. The "cold" season runs from October/November to April. It is characterised by wind, high humidity (60-85 % in the mountains and on the coast, 50-65 % in lower interior regions) and mean monthly temperatures of 22-30 °C in most of the country, 19-22 °C in the mountainous regions. The "hot" season is from June to September, with monthly mean temperatures of 30-40 °C in most of the country and 26-31 °C in the mountains (FAO 1987), strong, hot winds from the west (the Khamsin) and a lower humidity. In transition months (May/June and September/October), the winds are variable, and humidity and temperature relatively high (DIRECTION DE L'ENVIRONNEMENT 1999).

Egypt

The Arab Republic of Egypt occupies the northeastern corner of the African continent, with a surface area of 1,019,000 km². The average temperatures are high, with a mean of 20-30 °C in summer and 10-20 °C in winter. The mean annual rainfall over most of

the country is less than 10 mm. The Nile River is the primary source of fresh water, supplying over 95 % of the nation's water supply. As of 1995, Egypt's Gross Domestic Product (GDP) was US\$ 29 billion growing at a rate of 6-7 % annually. Egypt's population is approaching 70 million, with a growth rate of 2.3 % per annum (DANIDA 1995).

Egypt is a large country, with relatively long coastlines along two seas (Figure 2), which have different marine ecosystems and terrestrial environments. The total Egyptian coastline is about 1,200 km long (PERSGA/GEF 2001). It extends in a northwesterly direction between 22°N and 30°N (at Suez), branches to form two gulfs, the shallow Gulf of Suez and the deep Gulf of Aqaba. The Gulf of Suez extends for about 250 km, ranges in width from 17-45 km and has a maximum depth of about 83 m (PERSGA/GEF 2001). By contrast, the Gulf of Aqaba is shorter (150 km) and deeper, reaching about 1,850 m in the central basin (FRIEDMAN 1985). It ranges in width from 25 km in the south to 16 km in the north. The Egyptian Red Sea coast in general has very limited freshwater resources due to its geographical location in the arid sub-tropical region. Air temperatures range between 6 °C and 39 °C in the north and between 13.5 °C and 42 °C near the Sudanese border (MORCOS 1970).

The human population inhabiting the Egyptian Red Sea coast is concentrated in a number of cities along the coastline and in a few scattered villages in between (BAHA EL DIN et al. 2003). Tourist resorts are spreading along all coastlines. The coastal population is therefore growing rapidly to support the expanding development in the area. Tourism, a large portion of which is nature-based, represents the main economic activity along the Red Sea and is the second largest sector of the nation's tourism industry (PERSGA/GEF 2001). The Egyptian Red Sea is part of a major transport route, due to the Suez Canal, and is also a key location for

petroleum and natural gas production. Fishing is another important economic activity in the region (PERSGA/GEF 2001).

Jordan

The Hashemite Kingdom of Jordan has an area of 90,000 km². It is bordered by Syria to the north, Iraq to the northeast, Saudi Arabia to the east and south, and Israel and Palestine to the west. Four main physiographic and biogeographic regions are identified and they tend to show a north to south alignment. These areas are the Jordanian Rift Valley and Wadi Araba, the highlands, Badia region and the marine environment.

The highest annual rainfall (550 mm) falls in the Ajlun Mountains. In Wadi Araba and southern Jordan annual rainfall is 50 mm. The climate in the Gulf of Aqaba region is arid, with an average annual rainfall of 25-30 mm, and mean air temperatures ranging from 14 °C (January) to 32 °C (August).

The Jordanian Gulf of Aqaba coastline is 26.5 km long. Within this small area are the country's only port, industrial facilities vital to the national economy, and a growing tourism industry. These increasingly threaten its delicate marine ecosystem. The population of Aqaba was 65,000 in 1996 and has been projected to grow to 150,000 by 2020 (PERSGA/GEF 2001).

Saudi Arabia

Saudi Arabia's Red Sea coastline extends southwards approximately 1,840 km from the Jordanian border north of Haql (29° 30'N) to the border with Yemen at Oreste Point (16° 22'N), accounting for 79 % of the eastern seaboard of the Red Sea (MEPA/IUCN 1987) (Figure 3). The continental shelf extends offshore for a distance of less than 1 km in the Gulf of Aqaba to 100 km in the Farasan Bank.



Figure 1: Coastal area of Djibouti

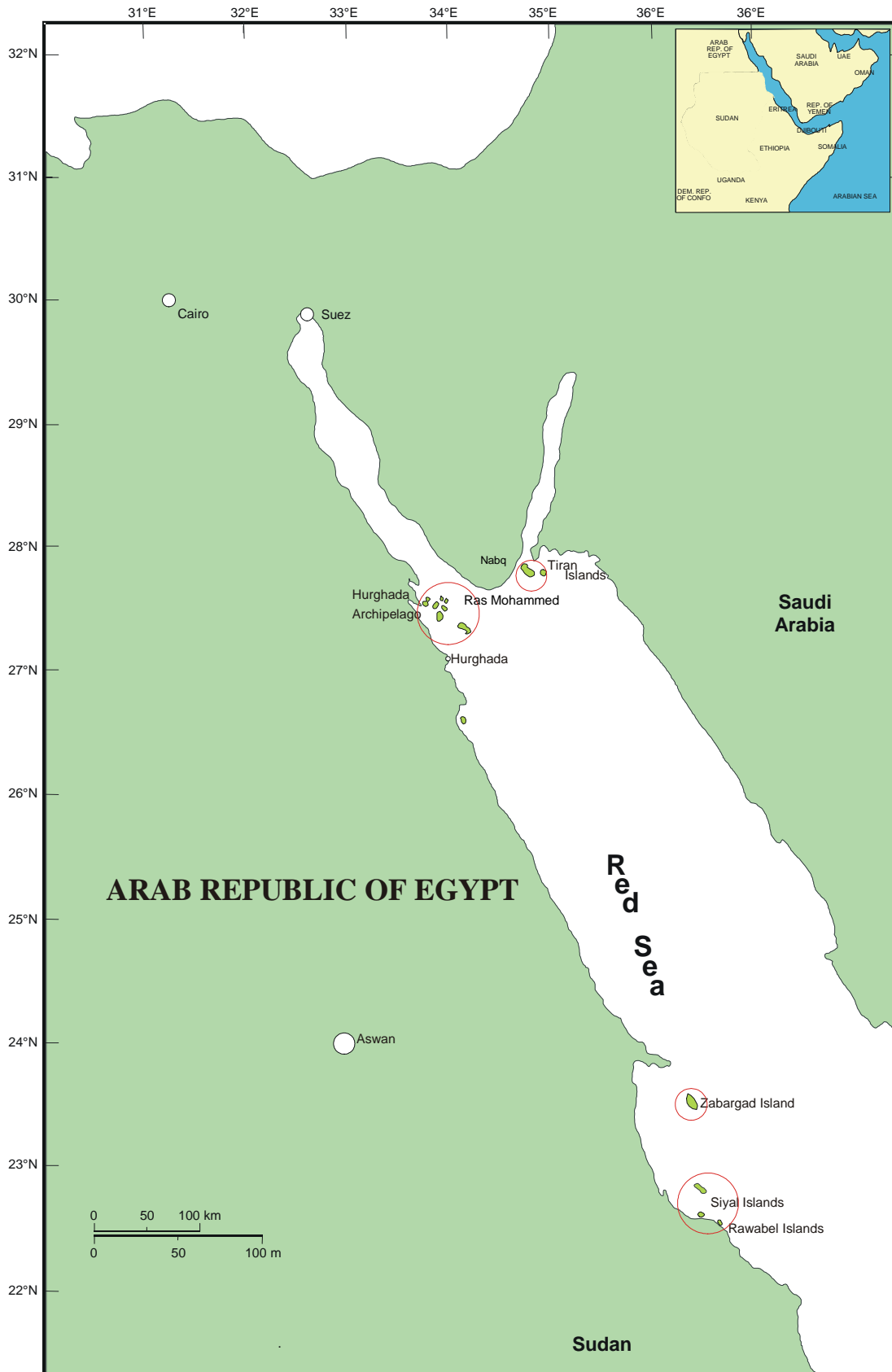


Figure 2: Egyptian Red Sea coastline showing the most important bird sites needing protection

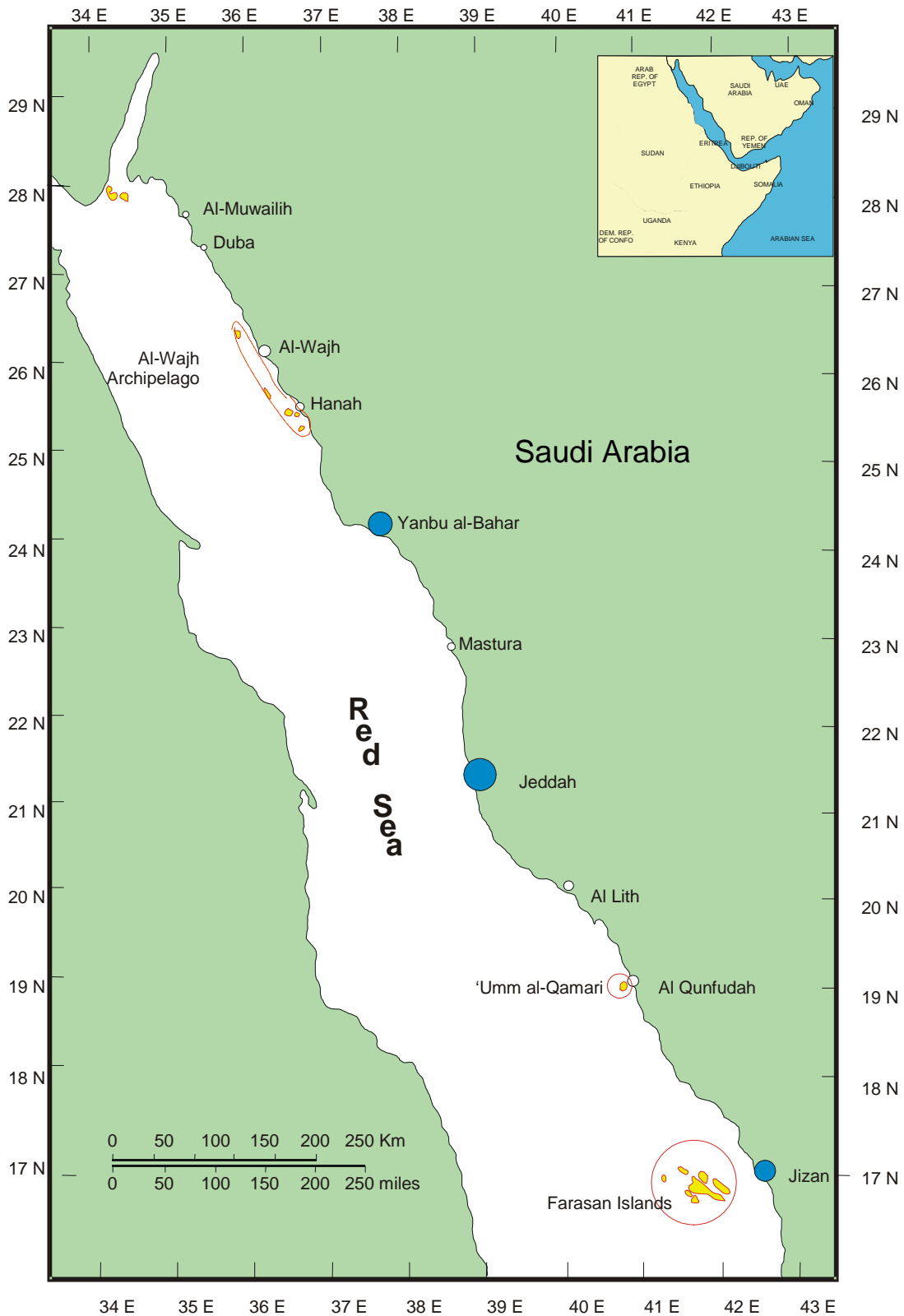


Figure 3: Saudi Arabian Red Sea coastline, showing the most important bird sites needing protection

The Red Sea coast and islands support a variety of coastal and marine habitats. These are related largely to the oceanographic regime, degree of exposure and topographic features, particularly the distribution of suitable antecedent topography for the development of coral reefs, mangrove stands and seagrass beds. However, it may be divided into several relatively homogeneous areas in terms of the variety and distribution of coastal and marine habitats and reefs: the Gulf of Aqaba in the north, the northern central section from immediately south of the Gulf of Aqaba to Jeddah, and the central southern region from south Jeddah to the Yemen border including Farasan Bank and associated islands.

The climate is extremely arid. Much of Saudi Arabia's biological productivity is confined to a narrow coastal strip and originates mostly from habitats such as coral reefs, mangrove and seagrass communities. Average annual rainfall is less than 70 mm along the broad coastal Tihama (16 mm at al-Wajh, 63 mm at Jeddah and Jizan) (PERSGA/GEF 2001). Inland, above the coastal escarpments, it may exceed 200 mm per year.

In the past three decades, Saudi Arabia has undergone a rapid transformation, from an underdeveloped country to a modern industrial one, with sophisticated infrastructures and modern health care (PERSGA/GEF 2001). By 1987, 8 % of the Red Sea coast had been subject to extensive development (CHIFFINGS 1989). By the mid 1990's over 15.2 % of the population lived in the Red Sea coastal zone (MINISTRY OF PLANNING 1995).

Somalia

Somalia has an extensive coastline, with 2,000 km along the Indian Ocean and 1,300 km along the Gulf of Aden (Figure 4). These two coasts meet at Ras Aser (Raas Casey or Gape Guardafui), the Horn of Africa. The largest town along the Gulf of Aden coast is Berbera. Other large

settlements along the coast include Zeila (Saylac), Las Korey (Laas Qoray), Qandala (Candala), Bosaso, Xabo, and Alula (Caluula). Despite rich marine resources, fisheries account for only 2 % of GDP (FAO 1995). Other marine-based activities are even less important. The western part of the north coast between Zeila and Berbera is shallow with exposed, high-energy sandy beaches. The central portion between Berbera and Bosaso consists of mainly shallow, sandy shorelines, occasionally broken by protruding rocky outcrops and cliffs that may extend into the shallow water. In the east, between Bosaso and Ras Aser, high mountains reach the sea.

The climate is arid, with an average annual rainfall of less than 300 mm. Seasonal variations are mainly influenced by the monsoon winds, which also determine the coastal currents. From May to August, the southwest monsoon propels a strong, mainly eastward current that influences the water masses in the Gulf of Aden. Along the northeastern coast there is a counter current that flows westward. From October to March, during the northeast monsoon, waters flow from the Arabian Sea into the Gulf of Aden.

The country's two main rivers are the Jubba and Shabeells, which flow into southern Somalia from Ethiopia. There are no perennial rivers along the northern coast of Somalia. Freshwater reaches the coast only during irregular flash floods following torrential rains. The surface run-off from land has no significant influence on the marine environment. Most nearshore subtidal areas are shallow with a sandy substrate, occasionally interspersed by fields of cobbles or boulders and by rocky outcrops.

There are many offshore islands in Somalia's coastal waters: Aibad (Ceebaad) and Sa'adadin (Saad ad Din or Sacdadiin) Islands lie off the coast of Zeila, by the border with Djibouti. Further east, off the Gulf of Aden coastline, lies Mait (Maydh) Island. The Sa'adadin group near Zeila consists of six small, low-lying, exposed

islands with sandy beaches, while Mait Island in the centre near Ras Khatib is a steep-faced rock about 1.5 km long and 100 m high.

Sudan

The Republic of Sudan is the largest country in Africa, extending for 2,075 km along its north to south axis and 1,810 km along its east to west axis. It has an area of 2,505,815 km² and is bordered by the Red Sea, Eritrea and Ethiopia to the east, Kenya, Uganda and the Democratic Republic of Congo to the south, the Central African Republic and Chad to the west and Libya and Egypt to the north (Figure 5).

In 1997 the population was estimated to be 27,889,000, with a 1.1 % annual rate of increase. The population also includes a significant number of refugees from Ethiopia, Chad, Uganda and Somalia.

Because of the huge latitudinal range, from 03° 31' to 22° 00'N, different parts of the country experience very different climates. Northern Sudan has a desert climate with negligible rainfall and high mean daily temperatures, from 20 °C in winter to 35 °C in summer. The Red Sea coastal plain receives winter rainfall, while the rest of the country south of 10 °N experiences rainfall from March to November. Rainfall increases southwards to a maximum of 1,000-1,200 mm recorded annually on the southern border.

The Sudanese Red Sea coast is approximately 750 km long, inclusive of bays and inlets. The country lies within the desert and semi-desert sub-zones and, although numerous streams drain from the Red Sea hills, no perennial water flows in the lower reaches of the coastal plain and into the Red Sea. Only after torrential rains, which occur mainly in November and December, does freshwater occasionally flow into the Red Sea. The widest and deepest parts of the Red Sea lie off Port Sudan. Along the Red Sea, coastal waters are extremely clear, with visibility sometimes extending to depths of

70 m. Surface temperatures range between 26.2 °C and 30.5 °C, and salinity is high (39-41 ppt). From May to October, surface currents flow in a southerly direction; for the remainder of the year they flow northwards. The maximum tidal range is about 55 cm (SCHRÖDER 1981; SHEPPARD & WELLS 1988; KRUPP et al. 1994). The Sudanese coast contains the most diverse reefs of the Red Sea. Most of the coast is bordered by fringing reefs 1-3 km wide, separated by deep channels from a barrier reef 1-14 km off the coast. At the southern end of Sudan's Red Sea coast, in an area where the coastal shelf widens to 100 km, lies the Suakin Archipelago. A second series of islands lies off the town of Mohammed Qol and there are further offshore islands between the town of Dungonab and the Egyptian border in the north. In addition, another series of islands appears in summer as a result of the strong variation in wind systems between summer and winter monsoons, causing changes of up to 0.5 m in the mean sea level throughout the Red Sea.

Yemen

The Republic of Yemen lies in the southwestern corner of the Arabian Peninsula and includes the Socotra Archipelago. Yemen has a surface area of 531,000 km². The country is bordered by the Red Sea to the west, the Gulf of Aden to the south, Saudi Arabia to the north and Oman to the east (Figure 6). Yemen contains the highest mountain in Arabia, Jabal al-Nabi Shu'ayb, which reaches 3,666 m. According to the 1994 census, the total population of Yemen was around 15,000,000 and the annual growth rate 3.7 % (PERSGA/GEF 2001). Recent information on the Yemeni population showed that there are over 18,000,000 inhabitants, mostly concentrated in the highlands and Red Sea coastal areas. The main economic activities of the coastal population are farming and fishing. The fishing activities, both by foreign vessels and local fishermen, place great pressure on the fishery.

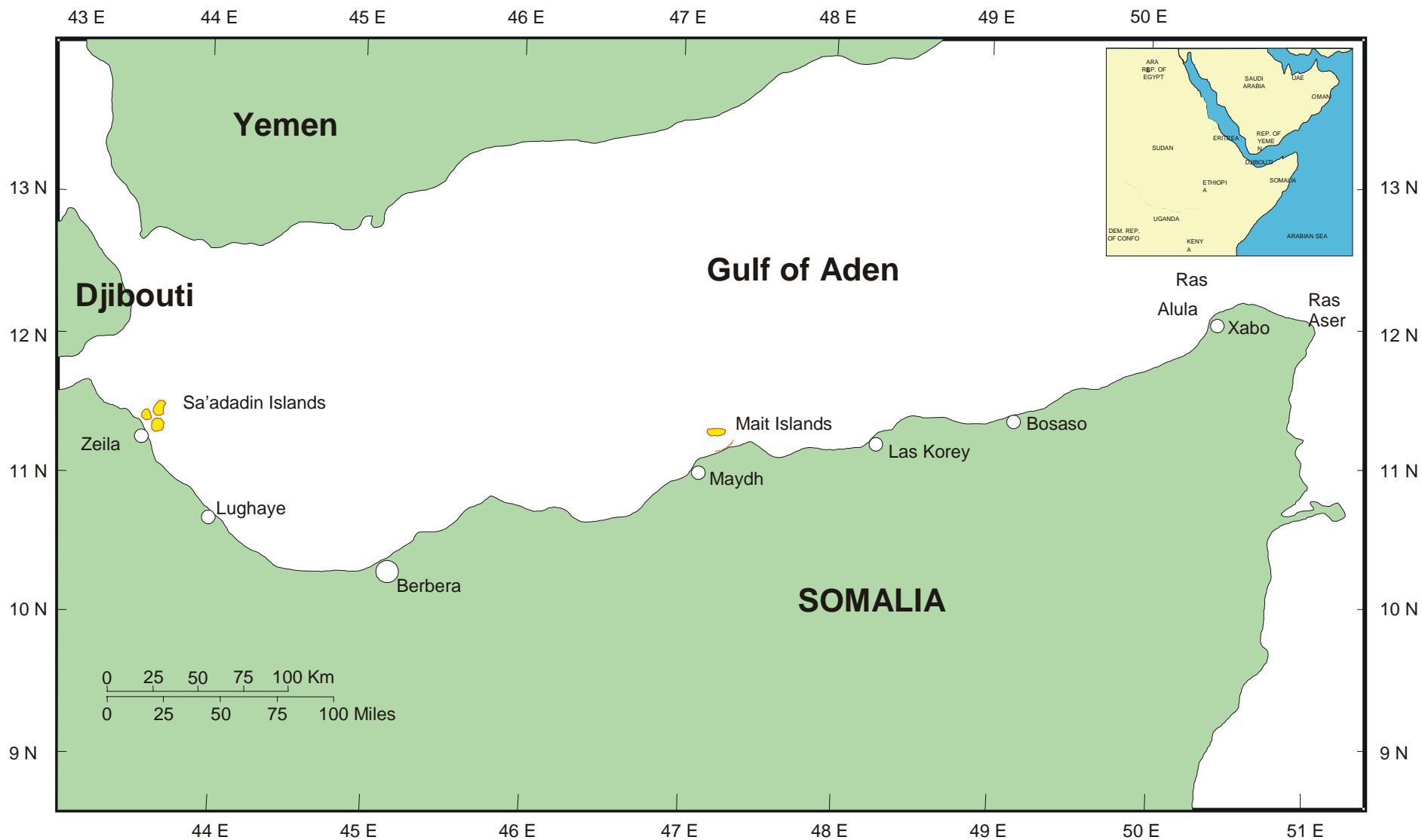


Figure 4: Northern Somali coast, Gulf of Aden, showing the most important bird sites needing protection

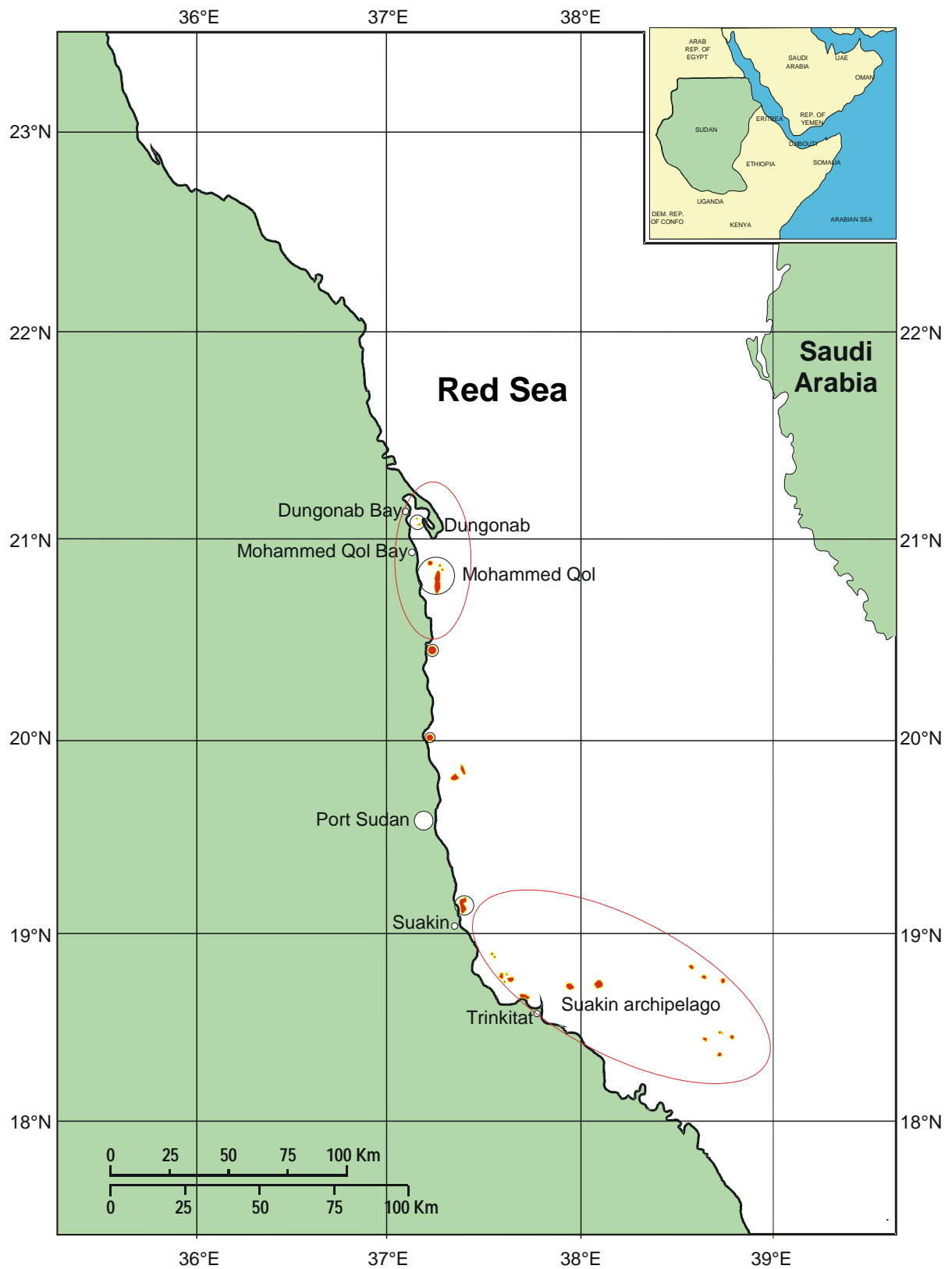


Figure 5: Sudanese Red Sea coast showing the most important bird sites needing protection

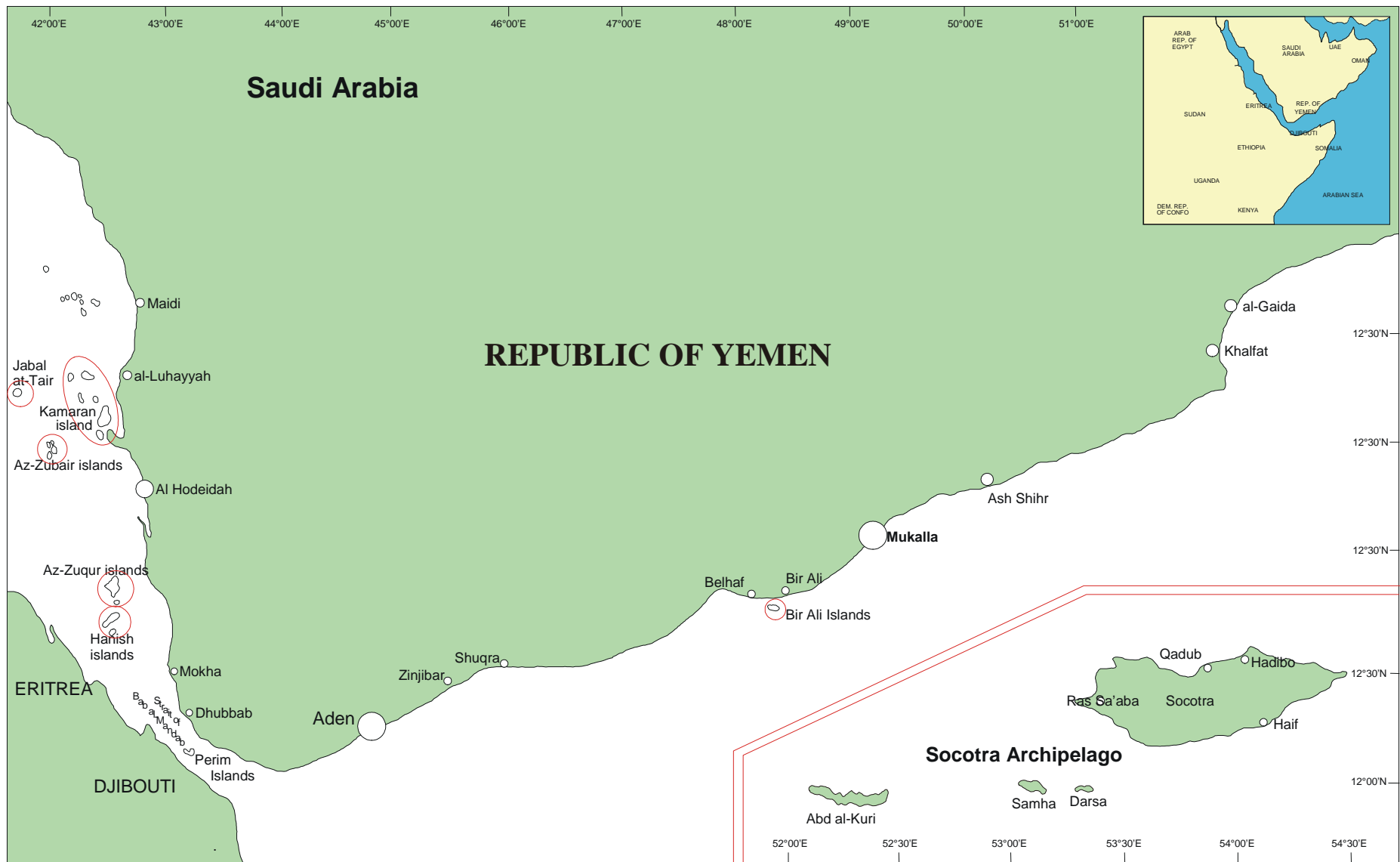


Figure 6: Yemeni Red Sea coast showing the most important bird sites needing protection

The coastline of Yemen is about 2,200 km long, roughly one third of which is in the Red Sea and the remaining two-thirds in the Gulf of Aden.

Along the Red Sea, the climate is dry, with an average annual rainfall of 100-200 mm and a humidity of about 60 %. No perennial surface streams discharge into the Red Sea; however, flash floods are widespread following torrential rain. The Gulf of Aden is dominated by the Indian Ocean monsoon system.

Most rainfall occurs between January and March (northeast monsoon). Between May and September, the southwest monsoon generates winds in a northeasterly direction and the relatively warm surface water of the Gulf of Aden is blown offshore and replaced by cooler, nutrient-rich up-welling water.

The Socotra Archipelago, measuring 125 km by 42 km, lies 400 km south of Yemen, (Figure 6), on the Carlsberg Ridge, an extension of the mid-Indian Ocean ridge system. The archipelago has many unique features. Socotra is the largest of four islands, long isolated from the mainland and surrounded by water more than 3,000 m deep. The archipelago is highly exposed to the monsoonal wave climate of the Indian Ocean. Annual rainfall is approximately 200 mm, mainly falling in June, November and December. Average temperatures range from 17 °C in January to 37 °C in July. Socotra Island has a diverse terrestrial fauna and flora, with a high degree of endemism.

The high productivity of the Arabian Sea, Gulf of Aden and southern part of the Red Sea is caused by the upwelling of cold, nutrient-rich water during the summer monsoon and the presence of numerous offshore islands. This makes it an ideal feeding and breeding area for seabirds, notably Jouanin's petrel, Persian shearwater *Puffinus lherminieri persicus*, masked booby *Sula dactylatra melanops*, and probably Socotra cormorant.

2. REVIEW OF SEABIRD STUDIES IN THE REGION

The seabird populations of the Red Sea and the Gulf of Aden have been reviewed by several authors including COOPER et al. (1984); GALLAGHER et al. (1984); EVANS (1987); and JENNINGS (1995). These works have collated information from a wide variety of sources covering a long time span. In the case of the former two papers, the authors have attempted to estimate approximate population size or orders of magnitude for some breeding species and thereby indicated the potential importance of the RSGA region in an international context.

2.1 Seabird Studies in Djibouti

In Djibouti, the majority of available ornithological information came from observations by Alain and Danielle Laurent (resident in Djibouti between 1981 and 1993) and Geoff and Hilary Welch, who made nine visits to the country between 1984 and 2001. More recently, BirdLife International's publication on Important Bird Areas (IBA) in Africa presents an overall review of bird species (FISHPOOL & EVANS 2001).

These publications provide very limited information on the seabirds breeding in Djibouti. For example, WELCH & WELCH (1998) presented a checklist of the birds of Djibouti and their status. LAURENT (1987, 1990, 1993) recorded several breeding seabirds, such as lesser-crested tern *Sterna bengalensis*, swift tern and the brown booby *Sula leucogaster*, at Les Sept Frères Islands. He documented other birds on Moucha and Maskali Islands, including osprey *Pandion haliaetus*, western reef heron *Egretta gularis*, sooty gulls and white-eyed gulls. However, most records of 'breeding' seabirds were not definitely confirmed.

2.2 Seabirds Studies in Egypt

Early last century the first written information about birds in Egypt was published by MEINERTZHAGEN (1924, 1930). GOODMAN & MEININGER (1989) synthesised a

great deal of new information on the birds of Egypt and to some extent re-evaluated the material available in MEINERTZHAGEN (1930). The study presented an atlas for all species recorded in Egypt, with a review of most of the records and observations available for each species. It also provided a population estimate for each species, which we have used in the present report.

Recent studies show that there are more than 470 bird species in Egypt, most of which are non-breeding migrants (FISHPOOL & EVANS 2001). Only about 150 species are considered as resident with breeding populations (BAHA EL DIN 1999). In total, 16 species of global conservation concern have been recorded in Egypt (COLLAR et al. 1994). Among these species, the white-eyed gull is the most important and the Egyptian Red Sea islands hold the largest known breeding population (FISHPOOL & EVANS 2001). JENNINGS et al. (1985) estimated that 30 % of the world's population of white-eyed gulls breed on islands at the mouth of the Gulf of Suez. The islands of Tiran, Ashrafi, North Qeisum, Tawila and Zabargad are amongst the most important islands in the Egyptian Red Sea for breeding seabirds (BAHA EL DIN 1999).

Inventories of seabirds breeding on the Egyptian Red Sea islands were given by JENNINGS et al. (1985) and GOODMAN & STORER (1987). In addition, FRAZIER et al. (1984) presented their observations taken along the Egyptian Red Sea coast during spring 1982, with notes on migratory and breeding species. More recently HOATH et al. (1997) discussed the breeding birds on islands in the Gulf of Suez. Although their survey did not include all islands covered by JENNINGS et al. (1985), it showed some changes in species composition. GRIEVE & MILLINGTON (1999) produced a report on the northern Red Sea islands, representing the most comprehensive survey of the status of breeding seabirds in this area since the survey of JENNINGS et al. (1985). The report included an appendix with records from a visit to Wadi

Jimal Island (Gimal or Gamal) and Hamatah mangroves in September 2000. BAHA EL DIN (1999) assessed and identified the Important Bird Areas (IBA) in Egypt according to available information and also by including new records.

2.3 Seabird Studies in Jordan

There are no islands in the Jordanian Red Sea territory and there are no breeding seabirds in Jordan. However, several seabird species have been recorded along the Gulf of Aqaba, utilizing the marine environment for feeding and roosting (ANDREWS 1995).

2.4 Seabird Studies in Saudi Arabia

Saudi Arabia has probably received more systematic seabird surveys than other countries in the RSGA. The first systematic seabird surveys were conducted during the summers of 1982 and 1983 by the International Union for the Conservation of Nature and Natural Resources (IUCN) and the Meteorology and Environmental Protection Administration (MEPA). The surveys aimed to determine the status of marine habitats. In total, 129 sites and islands were covered. The results showed the importance of Saudi Arabia for breeding terns and gulls (ORMOND et al. 1984). After the Gulf War in 1991, seabird research was developed. Detailed research and monitoring carried out on the Saudi Arabian Gulf islands between 1991 and 1995 have resulted in refined methodologies for the census of summer nesting terns and winter breeding Socotra cormorants (SYMENS & EVANS 1993; SYMENS et al. 1993; SYMENS & ALSUHAIBANY 1996; SYMENS & WERNER 1996). Following extensive planning, an aerial survey of all Saudi Arabian Red Sea islands was completed in summer 1996. This was the first survey to cover all islands in a period of less than a month in the same summer (NEWTON & AL SUHAIBANY 1996).

In addition, several studies targeted single species or areas, such as the studies of the breeding biology of the bridled tern *Sterna anaethetus* and white-cheeked terns

(SIMMONS 1994; SWEET 1994). These studies showed that predation on eggs may have an effect on the abundance of tern species on the Farasan Islands (TATWANY et al. 1995). Two other studies were conducted on the breeding ecology of the osprey *Pandion haliaetus* and crab plover *Dromas ardeola* (FISHER 1996; GREGORY & GOLDSPIK 1998).

Several other, more localised surveys have been undertaken, such as the surveys of the island north of Yanbu (MEADOWS 1993), Umm al-Qamari Islands protected area survey (SYMENS 1988), several surveys to Kutambil Island between April-July (STAGG 1984a) and two other surveys in the Farasan Islands during spring 1988 (JENNINGS 1988; SYMENS 1988). GAUCHER et al. (1995) studied the distribution and conservation of the sooty falcon *Falco concolor* on the Red Sea coast of Saudi Arabia and also estimated the number of breeding pairs. More recently, regular ornithological monitoring of Umm al-Qamari protected area has been carried out during different seasons in 2001 and 2002 to determine the breeding avifauna and assess their conservation status (OSTROWSKI 2001a, 2001b, 2002).

2.5 Seabird Studies in Somalia

Observations on seabirds were made during an oceanographic survey of offshore waters off eastern Somalia on board RRS "Discovery" from 25 July to 21 August and from 28 August to 5 September 1964 during the International Indian Ocean Expedition. Comprehensive observations were also made on the seabirds while on migration off the north coast of Socotra on 28 June 1963 and in the vicinity of Cape Guardafui and Socotra on 25-26 August and 11-12 November 1963 (BAILEY 1966, 1968, 1971). The reports summarise the distribution of each seabird species observed during the surveys and document the species breeding on the islands in the Gulf of Aden and western part the Indian Ocean.

COOPER et al. (1984) reviewed the seabirds of the East African coastline. They

showed that this region holds a substantial proportion of the total population of several taxa endemic to the Arabian Sea, and a total population probably between 150,000 and 250,000 pairs of seabirds belonging to 17 species. BROWN et al. (1982) summarised the available information on the ecology and biology of seabirds, along with other bird species recorded in Africa. Information reviewed by BROWN et al. (1982) included surveys performed in the 1960's and published observations taken during the British colonisation of northern Somaliland, e.g. NORTH (1946). In addition, there is information for the Somali islands in the south on the occurrence of seabirds such as common and lesser noddy *Anous stolidus*, *Anous tenuirostris*, roseate and sooty terns *Sterna dougallii* and *Sterna fuscata* (ASH 1980; ASH & KARANI 1981). More recently a book titled 'Birds of Somalia' was published, which includes the distribution and status of seabirds in Somalia based on observations made during the 1960's and 1980's (ASH & MISKELL 1998).

2.6 Seabird Studies in Sudan

Information on seabirds breeding in Sudan is generally sparse, anecdotal and out dated, with the majority of studies forming part of an overview of the status of seabirds in the Red Sea. However, while studying sea turtles on several islands off the Sudanese Red Sea coast, at the request of TMRU/IUCN, MOORE & BALZAROTTI (1983) collected detailed information on bird species breeding on these islands. The study has been reviewed by a number of authors: COOPER et al. (1984); GALLAGHER et al. (1984); ORMOND et al. (1984); EVANS (1987) and NIKOLAUS (1987, 1989).

VINE (1985) made some observations on the seabirds on the Sudanese side of the Red Sea and recorded breeding at two sites, the Suakin Archipelago and Mukawwar and two associated islands, Telat (south) and Mayteb (east). BROWN et al. (1982) and URBAN et al. (1986) reviewed all records of breeding and wintering seabirds in Sudan. Numbers of

species recorded by MOORE & BALZAROTTI (1983) and VINE (1985) were not exhaustive, but provide valuable information on the breeding phenology of a number of seabirds in Sudan.

2.7 Seabird Studies in Yemen

Birds in Yemen, especially seabirds, have been poorly studied. The Ornithological Society of the Middle East's (OSME) expedition in autumn 1985 presents observations of seabirds in the Red Sea (BROOKS et al. 1987). EVANS (1989) studied breeding seabirds on some Red Sea islands, especially at Al Luhayyah Archipelago. PORTER & AL-SAGHIER (1998) also recorded seabirds on a few islands in the Al Luhayyah Archipelago.

PORTER & STONE (1996) reviewed previous ornithological studies undertaken on the Socotra Islands, of which the work by RIPLEY & BOND (1966) provided the most valuable ornithological information. Additionally, OSME conducted a one week survey of Socotra in 1993 and presented an overview of the status of birds in Socotra and Abd Al-Kuri (KIRWAN et al. 1996).

Between 1997 and 2002, several surveys have been conducted in the Socotra Archipelago to document the terrestrial and marine species breeding there (AL-SAGHIER 2002a). Of 185 species recorded in Socotra, 12 are breeding seabirds. During the surveys, breeding of Socotra cormorant and Jouanin's petrel (TALEB 2002) were confirmed.

In conclusion, seabird studies in the Red Sea and the Gulf of Aden are still limited, even in countries such as Egypt and Saudi Arabia where detailed studies on individual seabirds have been conducted. An attempt to summarise the known numbers and breeding status of seabirds in PERSGA countries has been included in appendices 1 and 2. Limiting factors for such work include access restrictions, logistics and the need for capacity building.

3. SPECIES ACCOUNTS

This section provides an account for each breeding species that uses the marine environment in the RSGA. The species accounts are split into three categories: true seabirds, which include petrels, tropicbirds, boobies, cormorants, gulls and terns; other water birds, such as pelican, heron, egrets, osprey, crab plover and Kentish plover, which are mostly confined to the marine environment for breeding purposes; and other terrestrial birds that nest on islands, often limited to mangroves, such as African collared dove *Streptopelia roseogrisea*, white-collared kingfisher *Halcyon chloris* and various warbler species. A summary of the distribution, status and breeding population size of each species is given in appendix 2.

3.1 TRUE SEABIRDS

Jouanin's Petrel *Bulweria fallax*

Jouanin's petrel is endemic to the northwest Indian Ocean. The species was first described in 1955 by JOUANIN (1957), who suggested that nesting sites could be in the upwelling areas off Somalia and Oman. Until 2001, the only observations of Jouanin's petrel inland were at Thamarit in the desert north of Salalah, southern Oman, where one adult and two juveniles were recorded (WALKER 1981; GALLAGHER et al. 1984) suggesting that the species may nest in the most inhospitable part of the interior desert. In August 2000 TALEB (2000) counted 50 birds in a colony on the Socotra Islands. On 22 July 2001, birds in the same colony were observed sitting on eggs, representing the first breeding record in the region. Fledglings were observed in November of the same year, indicating that the breeding season may extend from July to November (TALEB 2002). No estimate of the number of breeding pairs is available for the region, and more study is needed to determine the status of the species and to develop a census method.

Persian Shearwater *Puffinus persicus*

Until recently, the Persian shearwater was deemed to be a subspecies of Audubon's shearwater *Puffinus lherminieri persicus*, but DEL HOYO et al. (1992) considered it to be a distinct species. The first breeding record was from Jazair al-Halaniyat in Oman in autumn 1982 (GALLAGHER 1983). The breeding grounds of the species in the PERSGA region were unknown until recently. During an UNDP/GEF expedition 10,000 birds were estimated to be breeding inland on the Socotra Archipelago (AL-SAGHIER et al. 1999). The Socotra population probably represents the most important breeding area in the world. The breeding season is suggested to be in the autumn (GALLAGHER et al. 1984) but, according to local villagers in Socotra, the birds visit the breeding cliffs from March/April to December/January (AL-SAGHIER et al. 1999). Further work is therefore needed to determine the full extent of the breeding season and the number of pairs breeding in the Socotra Archipelago.

Red-billed Tropicbird *Phaeton aethereus indicus*

The Red-billed tropicbird subspecies is endemic to the Red Sea, Gulf of Aden and the Arabian Sea eastwards to the Gulf of Oman and eastern Arabian Gulf (GALLAGHER et al. 1984; DEL HOYO et al. 1992). It commonly nests on rocky islands and probably on mainland coastal cliffs (JENNINGS 1995; GALLAGHER et al. 1984; NEWTON & AL SUHAIBANY 1996). Only a few hundred pairs of this race have been documented, but the inaccessibility of nests suggests that they may be fairly secure and perhaps more numerous (DEL HOYO et al. 1992). Using the available survey data, the estimated number in the region is nearly 800 pairs. The breeding season is probably between April and August along the entire length of the Red Sea and possibly later in the Gulf of Aden.

Brown Booby *Sula leucogaster plotus*

The brown booby is an Indo-Pacific race and breeding colonies are widespread along the length the Red Sea and the Gulf of Aden.

Breeding habitats used are varied and include sandy beaches, open rocky islands and, occasionally, cliffs (JENNINGS 1995; NEWTON & AL SUHAIBANY 1996; AL-SAGHIER et al. 1999; SHOBRACK 2001; AL-SAGHIER 2002b). The highest number was recorded in Yemen with 13,234 breeding pairs, of which the majority are in the Socotra Archipelago (AL-SAGHIER et al. 1999; AL-SAGHIER 2002b). Observations in Egypt showed that the populations of the brown booby breeding on islands at the mouth of the Gulf of Suez decreased between 1984 and 1994 (JENNINGS et al. 1985; HOATH et al. 1997). A survey in 1998 estimated that there were 85 pairs present (GRIEVE & MILLINGTON 1999). The breeding season in the Saudi Arabian Red Sea is complex and there may be several nesting waves at particular colonies. Also, the seasonality of breeding varies, in the south breeding season begins in summer, while in the north it may start earlier, probably in April (SHOBRACK et al. 2002c). However, at Umm al-Qamari protected area in Saudi Arabia, nesting was recorded all year round and the number of breeding adults varied throughout the year in 2001, with a breeding peak around October to December (OSTROWSKI 2001a, 2001b, 2002).

Masked Booby *Sula dactylatra*

The subspecies *Sula dactylatra melanops* is endemic to the western Indian Ocean (DEL HOYO et al. 1992). The majority of nests found in the region were in the Gulf of Aden. In the Red Sea, the masked booby is considered a rare resident, with about 48 breeding pairs on the rocky Abu Ali Islands in Yemen (AL-SAGHIER 2002b). In the Gulf of Aden it breeds on the Socotra Islands off Yemen and on Mait Island off Somalia; estimates range between 1,200 and 1,500 breeding pairs (AL-SAGHIER et al. 1999; SHOBRACK 2002). The breeding season may commence in May and lasts for up to six months. The habitat and the colony type have not been well described. It has usually been recorded on rocky islands and there is a possibility that the birds use trees for nesting (NEWTON & AL SUHAIBANY 1996). The

masked booby is declining rapidly and the few remaining colonies are threatened with extinction (DEL HOYO et al. 1992; AL SAGHIER et al. 1999).

Socotra Cormorant *Phalacrocorax nigrogularis*

The Socotra Cormorant is endemic to the continental shelf from the Arabian Gulf to the Gulf of Aden (GALLAGHER et al. 1984). Although flocks of 10-100 were observed on the Socotra Islands, there was no evidence of breeding in the region until recently, when eggs and chicks were found at Sabooniah islet, located 10 km offshore at Shue'b in Socotra (AL-SAGHIER 2002a). A recent survey on the Bir Ali Islands in the Gulf of Aden, estimated that there were 10,000 breeding pairs present (JENNINGS 2003), which seems to represent the most western breeding ground known in the restricted range of Socotra cormorants. The Socotra cormorant also breeds on islands in the Arabian Sea off Oman and on islands in the Arabian Gulf (SYMENS & WERNER 1996; GALLAGHER et al. 1984; AL-SAGHIER et al. 1999). However, further work is needed to investigate the status of the species in the region.

Sooty Gull *Larus hemprichii*

The sooty gull is endemic to the northwest Indian Ocean. It is a widespread breeding species in the Red Sea and probably the Gulf of Aden. The sooty gull usually nests in solitary pairs (e.g. in Sudan and Saudi Arabia) or in loose colonies (e.g. on Les Sept Frères islands off Djibouti) (SHOBRAK et al. 2002a, 2002b, 2002c). Egg-laying probably commences earlier in the northern Saudi Arabian Red Sea (April/May) than in the southern areas (June/July) (NEWTON & AL SUHAIBANY 1996). However, in Egypt, nests were found between July and September (GOODMAN & MEININGER 1989). GRIEVE & MILLINGTON (1999) believe that the population in the northern Egyptian Red Sea islands has increased. The species has also been recorded breeding in the southern Egyptian Red Sea, with 45 pairs found on Wadi Jimal Island (GRIEVE & MILLINGTON 1999; BAHA EL DIN et al. 2003). Clutch size

is usually 2-3 eggs and nests are often found beside or underneath bushes, and occasionally under rocks (NEWTON & AL SUHAIBANY 1996). The breeding season commences in April and probably lasts until September or October.

White-eyed Gull *Larus leucophthalmus*

The white-eyed gull is endemic to the Red Sea and the Gulf of Aden. It is more numerous on offshore islands in the Red Sea than the sooty gull, which is more common in coastal areas. It breeds in all countries surrounding the Red Sea and the Gulf of Aden, except in the Socotra Archipelago where no nests have been reported (KIRWAN et al. 1996; AL-SAGHIER et al. 1999). A recent estimate of the population in the Egyptian Red Sea indicated that there were 10,000 birds present (BAHA EL DIN 1999). The majority of breeding colonies were found in the Hurgada Archipelago at the mouth of the Gulf of Suez, with at least 3,000 breeding pairs (BAHA EL DIN 1999; GRIEVE & MILLINGTON 1999). The world population was estimated to be 20,000 birds (ROSE & SCOTT 1994). In PERSGA countries, 12,000-13,000 pairs are estimated to breed. In Saudi Arabia there was an increase in the population estimate from 152-155 to 1,500 pairs following surveys carried out in 1982/83 and 1996. This could be due to timing or better coverage of islands rather than to an actual population increase. We believe that the potential threats and poor protection in the region will lead to a decrease in abundance of white-eyed gulls not an increase. Breeding commences in June and the season lasts until August. White-eyed gulls breed in loose colonies and have clutches of 2-3 eggs, rarely four.

Caspian Tern *Sterna caspia*

The Caspian tern is a widespread species in the Red Sea and the Gulf of Aden. In Saudi Arabia it has been recorded nesting in late winter or early spring on the mainland coast south of Yanbu, and on several sandy areas on the Farasan Islands (NEWTON & AL SUHAIBANY 1996). Usually nests are solitary

(one to two pairs). Small, dispersed, loose colonies were found near Yanbu and Jeddah, Saudi Arabia (GALLAGHER et al. 1984). The latest estimate of the species along the Saudi Arabian Red Sea showed that there were between 100 and 200 breeding pairs (NEWTON & AL SUHAIBANY 1996), while in Egypt there were probably between 250 and 350 pairs (BAHA EL DIN et al. 2003) suggesting that the majority of the population occurs in the northern Red Sea. BAHA EL DIN et al. (2003) reported observing eggs between mid-February and late May and the same was recorded in the Farasan Islands (NEWTON pers. comm.) indicating that the egg-laying season extends from January/February to April/May.

Swift Tern *Sterna bergii velox*

The *Sterna bergii velox* subspecies is endemic to the Red Sea and northwest of Somalia (DEL HOYO et al. 1996). The species nests in dense colonies of up to 2,000 pairs, but may occasionally nest in solitary pairs with other species (GALLAGHER et al. 1984). In the 1990s, there were 3,500 breeding pairs in Saudi Arabia. Nearly 76 % of nesting pairs in Saudi Arabia were associated with active colonies of lesser-crested tern (NEWTON & AL SUHAIBANY 1996). In May 2002, 220-250 pairs were recorded nesting on Umm al-Qamari protected island (OSTROWSKI 2002). JENNINGS et al. (1985) found only "circumstantial evidence" of breeding on Ashrafi and Geisum Islands in the Hurghada Archipelago, whereas BAHA AL DIN (1999) reported that the species did breed there, although no nests were counted on Egyptian islands. However, CASTELL (1998) found a breeding colony in the Hurghada Archipelago and GRIEVE & MILLINGTON (1999) estimated 152 pairs on seven islands there, with the majority on Umm el Heimat Saghir Island. Studies on the species in the Saudi Arabian Gulf showed that the breeding sites change from year to year (SYMENS & ALSUHAIBANY 1996). During a survey in the Yemeni Red Sea, no nests were found (AL-SAGHIER 2002b). In Djibouti 500 unfledged young were recorded in September 1985 (LAURENT

1990). In addition, copulation and courtship behaviour were observed on the coast of Djibouti (SHOBRAK et al. 2002a). The breeding season is extended and probably commences between June and October. The breeding population in the Red Sea and the Gulf of Aden seems to be significantly less than in the Arabian Gulf (SYMENS & ALSUHAIBANY 1996). The status of this important sub-population needs more investigation in the region.

Lesser-crested Tern *Sterna bengalensis*

The lesser-crested tern has been recorded breeding along the length of the Red Sea and the Gulf of Aden (AL-SAGHIER 2002a, 2002b; SHOBRAK 2002; SHOBRAK et al. 2002a, 2002b, 2002c; BAHA EL DIN et al. 2003), although breeding areas seem to be confined to sandy islands. In suitable habitat, colonies are large and dense. It may be associated with other species such as the swift tern or in the middle of a white-cheeked tern colony (NEWTON & AL SUHAIBANY 1996; SHOBRAK et al. 2002b). The total number of breeding pairs in the Red Sea is estimated to be between 13,000 and 15,000. The majority of breeding colonies were recorded in the southern Red Sea. In the Gulf of Aden, lesser-crested terns have been observed to breed but no estimate of numbers was made. The breeding season probably commences in June and lasts till August.

White-cheeked Tern *Sterna repressa*

The white-cheeked tern is widespread along the length of the Red Sea and on the Zeila Islands in the Gulf of Aden. In the Socotra Archipelago, there is no proof of breeding. In Saudi Arabia, the largest colonies were recorded in the Al Wajh and Farasan Archipelagos. In Sudan, large colonies were found at several locations along the Sudanese Red Sea (SHOBRAK et al. 2002b) and in Yemen a large colony was located at She'b Island south of Hodeidah, where the estimated number of individuals was 12,000 birds (AL-SAGHIER 2002b). In Djibouti breeding was not known until recently when 58 nests were located on a small islet near Moucha Island (SHOBRAK et

al. 2002a). In the Egyptian Red Sea white-cheek terns were recorded to be breeding on the northern and southern islands (JENNINGS et al. 1985; GRIEVE & MILLINGTON 1999; BAHA EL DIN et al. 2003). The total number of breeding pairs in the Red Sea in PERSGA countries was estimated at 27,000-30,000. The breeding season is probably between May and August.

Sooty Tern *Sterna fuscata*

The sooty tern was recorded in large numbers at Mait Island in the Gulf of Aden off Somalia (URBAN et al. 1986), where the taxon is probably *Sterna fuscata somaliensis* (COOPER et al. 1984). However, BAILEY (1968) reported that the species is abundant in the middle of the India Ocean and is rare along the Somali coast. In the Socotra Archipelago, the species was recorded but there is no proof of breeding (KIRWAN et al. 1996; AL-SAGHIER et al. 1999). In the Red Sea no breeding was recorded, but more surveys of the region are needed.

Bridled Tern *Sterna anaethetus*

The bridled tern is abundant and widespread, especially in the eastern Red Sea where 130,000 breeding pairs were recorded (NEWTON & AL SUHAIBANY 1996; AL-SAGHIER 2002b). In the Sudanese Red Sea, 8,500 breeding pairs were recorded on an island in the Suakin Archipelago during late July 2002 (SHOBRACK et al. 2002b). GRIEVE & MILLINGTON (1999) noted an increase in the population in the northern Egyptian Red Sea islands between the 1983/84 surveys conducted by JENNINGS et al. (1985) and their survey in 1998. JENNINGS et al. (1985) estimated the breeding population to be between 200-300, while GRIEVE & MILLINGTON (1999) estimated there to be 500 breeding pairs. In the Gulf of Aden more than 100,000 breeding pairs were recorded at Sa'adadin Island (FISHPOOL & EVANS 2001). A smaller population of 1,100 breeding pairs were found in the Socotra Archipelago. In order to estimate the total breeding population, more surveys are needed in the western Red Sea. Bridled terns nest under

vegetation, rock overhangs and in crevices (SHOBRACK et al. 2002c; BAHA EL DIN et al. 2003). The breeding season starts in late May and lasts until August.

Little Tern *Sterna albifrons albifrons*

The only breeding record for the little tern is from the northern Egyptian Red Sea, where three pairs were scraping with other terns on a small sandy islet in July 1998 (GRIEVE & MILLINGTON 1999). It was thought that little terns could possibly be breeding, representing the first evidence that little terns may be colonising the region. Earlier records for Egypt were from inland freshwater areas and Mediterranean wetlands. Eggs are generally laid in Egypt between late March and June (GOODMAN & MEININGER 1989).

Saunders's Little Tern *Sterna saundersi*

Saunders's little tern was recorded to be breeding in Saudi Arabia, Yemen and along the Somali coast (COOPER et al. 1984; NEWTON & AL SUHAIBANY 1996; AL-SAGHIER 2000, 2002b). In addition, some breeding colonies have been found inshore along the mainland coast of Saudi Arabia (NEWTON & AL SUHAIBANY 1996). If the species breeds at mainland sites in other areas of the PERSGA region, similar to the Saudi population, it will be necessary to survey all suitable areas along the Red Sea and the Gulf of Aden coast to determine the total breeding population. The species nests in spring commencing in April/May.

Brown Noddy *Anous stolidus*

The brown noddy is widespread in the southern Red Sea, usually on well-vegetated or rocky islands and offshore. In Saudi Arabia, brown noddys were recorded in 1983 at a small island north of Jeddah (MEPA/IUCN 1987), whereas in a 1996 survey, colonies were found to the south of Jeddah (NEWTON & AL SUHAIBANY 1996). In the Sudanese Red Sea, a colony of 300 pairs was recorded on an island south of the Suakin Archipelago (MOORE & BALZAROTTI 1983). A large colony was recorded on Mait Island

off Somalia in the Gulf of Aden, with nearly 10,000 breeding pairs (FISHPOOL & EVANS 2001). The total number estimated in the region during the last two decades is probably greater than 30,000 breeding pairs. The breeding season probably commences in June and lasts until September.

3.2 OTHER WATER BIRDS

Pink-backed Pelican *Pelecanus rufescens*

The pink-backed pelican is not considered a true seabird as it is also found on mainland lakes and rivers. However, in the RSGA it is usually associated with marine environments during the breeding season and typically for much of its annual cycle (BROWN et al. 1982). The first description of nesting in Arabia comes from the Saudi Arabian Red Sea (JENNINGS et al. 1982). NEWTON & SYMENS (1996) recorded the species in the southern part of the Saudi Arabian Red Sea, with major breeding colonies in the Farasan Archipelago. In Yemen, pink-backed pelicans occur mainly near the coast. Occasionally it is also found on remote islands surrounded by shallow sea (AL-SAGHIER 2002b). The species usually nests on top of tall mangrove trees such as *Avicennia marina* and occasionally *Rhizophora mucronata*, on bushes or, exceptionally, on the ground. In the Red Sea area the nesting season is during winter, sometimes starting as early as November and lasting up to March (NEWTON & SYMENS 1996). Further work is needed.

Little Green Heron *Butorides striatus*

The little green heron is widespread in the whole of the Red Sea and the Gulf of Aden. It often nests among colonies of western reef herons and Eurasian spoonbills usually in dense vegetation and occasionally in holes and crevices found in fossil coral (NEWTON & AL SUHAIBANY 1996). In the northern islands of the Egyptian Red Sea, eggs and chicks were found between March and August (JENNINGS et al. 1985). In addition, GOODMAN & STORER (1987) collected an egg in the Egyptian Red Sea region at the end of August and found young in early September. In

Yemen, 65 nests were recorded on the Red Sea islands (AL-SAGHIER 2002b). In Sudan, birds were flushed from a nest with one egg in July (SHOBRAK et al. 2002b). In Saudi Arabia, birds are known to be spring nesters (SYMENS 1988). It therefore appears that the breeding season probably commences in spring and lasts until early autumn. No proper estimate of the number of breeding pairs in the PERSGA region could be made as most of the records were for individuals only.

Cattle Egret *Bubulcus ibis*

Similar to the pink-backed pelican and herons, the cattle egret is not considered a true seabird; it is known to use inshore islands for nesting but does not utilise the marine environment as a food source (JENNINGS 1995). Although it is known to nest throughout the year, on the Saudi Arabian and Yemeni Red Sea nests were found between May and July (NEWTON & AL SUHAIBANY 1996; AL-SAGHIER 2002b). In Yemen, a breeding colony was found in mangroves on Al-Gandala Islets close to Hodeidah (AL-SAGHIER 2002b). In Saudi Arabia, 1,050 nests were counted in three large active colonies in Qunfudah and Al Lith (NEWTON & AL SUHAIBANY 1996). Records from the Umm al-Qamari protected area in Saudi Arabia showed that cattle egrets seem to use the islands only as a breeding ground and leave after the breeding season is over. Cattle egrets probably change breeding sites in some years. For example, in Saudi Arabia the species was not recorded during the IUCN/MEPA surveys in 1982/1983, but later in the 1980s SYMENS (1988) recorded a small colony in Umm al-Qamari protected area. No birds were observed there in 2001, whereas in May 2002 between 120 and 150 individuals and a number of occupied nests were recorded there (OSTROWSKI 2002).

Western Reef Heron *Egretta gularis*

Western reef herons were recorded along the length of the Red Sea and the Gulf of Aden (JENNINGS 1995). The species uses a variety of vegetation types for nesting; it is especially found in mangroves with other

habitats including low bushes and low cliffs (NEWTON & AL SUHAIBANY 1996). However, in Al Wajh in northern Saudi Arabia, the species was only recorded nesting on mangrove trees (ORMOND et al. 1984; NEWTON & AL SUHAIBANY 1996). In the Shobuk Islands in the Sudanese Red Sea, it uses low bushes for nesting, fledged chicks were found in nests on large trees in Port Sudan in late July (SHOBRAK et al. 2002b). Some western reef herons may nest as solitary pairs, but others nest in loose colonies (NEWTON & AL SUHAIBANY 1996). The largest known colony on the Red Sea coast was recorded in Egypt, with 40-60 pairs in mangroves off Manqata north of Nabq (GOODMAN & MEININGER 1989). It is not possible to provide a population estimate for the species at this stage and more data is needed from the region. The breeding season probably commences in March and lasts up until September.

Purple Heron *Ardea purpurea*

The purple heron has been recorded breeding in two areas. The first was in the Saudi Arabian Red Sea, where birds were recorded incubating eggs in April (JENNINGS 1995). It was also reported that the purple heron was a common and widespread migrant with few wintering and breeding birds in the Farasan Islands and Al Lith Lagoon, Saudi Arabia. NEWTON & AL SUHAIBANY (1996) did not observe any individuals on the Farasan Islands, but recorded them at the Qishran Lagoon in Al Lith. The second area was at Eounda Dabali Island in Djibouti where a nest contained two chicks aged 7-14 days old (SHOBRAK et al. 2002a). The purple heron probably nests on dense mangrove and on rocky islands, and is unlikely to be colonial (JENNINGS 1995). No population estimate can be made at this stage.

Black-headed Heron *Ardea melanocephala*

Although black-headed herons are of African origin, small colonies were found breeding in Aden and Hodeidah (AL-SAGHIER 2002b). The colony at Hodeidah was breeding on the small islet of Al-Gandala and

on other high trees in the area. In total, 15 pairs were counted. Black-headed herons are more associated with fresh water habitats and at Hodeidah it was found at the sewage treatment plant and along its effluent to the sea. In other areas in the RSGA, no birds were recorded breeding. The breeding season probably extends from May to August (AL-SAGHIER 2002b).

Goliath Heron *Ardea goliath*

The goliath heron is widespread in low numbers in the Red Sea and probably also in the Gulf of Aden (JENNINGS 1995). Birds were recorded breeding on the Egyptian Red Sea coast and it is considered as a rare breeding resident of mangrove along the southern Egyptian Red Sea (GOODMAN & MEININGER 1989; BAHA EL DIN et al. 2003). In Yemen 10 pairs were recorded (AL-SAGHIER 2002b). Nests are usually solitary in areas with plenty of mangrove. NEWTON & AL-SUHAIBANY (1996) recorded the main breeding season in the Farasan Islands as winter; but JENNINGS (1995) observed young at nests in April and July. In addition one fledged juvenile was observed in the Farasan Islands in August 1988 (SYMENS 1988). Thus, the breeding season probably commences in spring and lasts until early winter.

Spoonbill *Platalea leucorodia*

The race *Platalea leucorodia archeri* is found in the Red Sea and in the Gulf of Aden off Somalia. Although the species is widespread, the Red Sea race is probably declining (DEL HOYO et al. 1992). In the northern Egyptian Red Sea, the population appears to have declined by up to 50 % (JENNINGS et al. 1985; GRIEVE & MILLINGTON 1999). The estimated breeding population in Sudan was 200-500 pairs, while in Saudi Arabia a total of 22 colonies supporting 103 pairs was found during an aerial survey (NEWTON & AL SUHAIBANY 1996; SHOBRAK et al. 2002c). In addition, SHOBRAK (2001) recorded 28 nests with eggs in early April on small islands near Al-Qunfudah port in Saudi Arabia. In Egypt 30-50 pairs were recorded (DEL HOYO et al. 1992). In Djibouti four nests

with eggs were observed on two small islets near Moucha Island (SHOBRAK et al. 2002a). Additionally, in Yemen two breeding colonies were found in mangrove habitat, 15 pairs on Kamaran Island and 18 pairs on the Al-Badi islands (AL-SAGHIER 2002b). The breeding season is from March to September.

Sacred Ibis *Threskiornis aethiopicus*

The sacred ibis is not normally associated with the marine environment, but high numbers were recorded breeding on small islands south of Haramous, and on a broken ship south of Djibouti (SHOBRAK et al. 2002a). It has also been observed feeding on mudflats. In Yemen, it was recorded breeding on flooded land, estuaries and in areas around waste-water treatment plants in Hodeidah and Aden (AL-SAGHIER 2002b). Only one pair was recorded on Al-Gandalah Islet at Khour Katib near Hodeidah (AL-SAGHIER 2002b).

Osprey *Pandion haliaetus*

In the PERSGA region, the osprey is dependent on the marine environment. JENNINGS (1995) considered it to be a common breeding bird in all coastal areas of the Arabian Peninsula. It builds large nest structures in a variety of habitats, including rocky and sandy substrates, mainly in the open. During the seabird survey of 1993 about 160 birds were recorded in the Farasan Islands (Saudi Arabia), of which 51-65 were breeding in late autumn (FISHER 2001). In addition, the survey carried out by NEWTON & AL SUHAIBANY (1996) showed that osprey were abundant in the Al Wajh Archipelago off northern Saudi Arabia, where nest density appeared to be the highest along the Saudi Arabian Red Sea coast. In the Yemeni Red Sea, 66 pairs were recorded (AL-SAGHIER 2002b). The population in the Egyptian Red Sea region is considered to be the second largest in the world, after that of North America (GOODMAN & MEININGER 1989). GRIEVE & MILLINGTON (1999) recorded an increase of 50 % in the northern Egyptian population. In recent surveys in Sudan, 20 birds were recorded (SHOBRAK et al. 2002b). However, more surveys are needed to

determine the status of the species breeding in the region.

African Fish Eagle *Haliaeetus vocifer*

To our knowledge, only one pair of fish eagles has nested in the region, on the north side of Sa'adadin Island in the Gulf of Aden off Somalia (IUCN 1997). This seems to be the northern limit of the fish eagle's breeding distribution. However, further work is needed to determine the status of the species on the northern coast of Somalia.

Crab Plover *Dromas ardeola*

Recent surveys in the Red Sea showed that it supports probably between 3,000 and 3,500 breeding pairs of crab plovers. Eggs are laid between April and June and juveniles leave the nest in August. The only detailed study on the species was conducted in Saudi Arabia in the Farasan Islands. The work provided information on the distribution, status and feeding ecology of the crab plover, with particular reference to its conservation and management (GREGORY & GOLDSPIK 1998). MORRIS (1992) studied the breeding biology in Abu Al Abyadh in the Arabian Gulf, where 200 pairs bred. The largest colony of the species was recorded in Yemen at Kadaman Island, with 680 breeding pairs (AL-SAGHIER 2002b). The northernmost colonies were found on Al Wajh Bank in Saudi Arabia (NEWTON & AL SUHAIBANY 1996; SHOBRAK et al. 2002c). On the western side of the Red Sea colonies were recorded on Mohammed Gol, in the north Sudanese Red Sea and on Shubok Islands in the Suakin Archipelago off southern Sudan (SHOBRAK et al. 2002b). Although there has been an increase in observations of crab plovers in the Egyptian Red Sea, there are no confirmed breeding records (BAHA EL DIN et al. 2003).

Kentish Plover *Charadrius alexandrinus*

The Kentish plover has been recorded breeding on islands and mainland coastal sandy areas in the eastern Red Sea (AL-SAGHIER 2002b; NEWTON & AL SUHAIBANY 1996). In Saudi Arabia, breeding was

recorded in the Farasan Islands (NEWTON & AL SUHAIBANY 1996). The first author also found one chick with its parent on Sumair Island. On the Yemeni Red Sea islands 40 pairs were recorded breeding in July 2002 (AL-SAGHIER 2002b). Along the Egyptian Red Sea coast as a whole no estimates were made; however, on the northern Egyptian Red Sea coast less than four breeding pairs were found (JENNINGS et al. 1985). The breeding season probably starts in early spring and lasts up until July.

3.3 TERRESTRIAL BIRDS

Sooty Falcon *Falco concolor*

The sooty falcon utilises islands for nesting but its food typically comprises small passerine and non-passerine migrants. The breeding season is timed to coincide with southbound late summer/autumn migration. In Yemen, the total number recorded was 99 individual birds and 45 nests (AL-SAGHIER 2002b). In Saudi Arabia, GAUCHER et al. (1995) estimated that the population of 260-381 pairs was one-third of the world population. The previous, unsubstantiated, world population estimates of the species were 4,000-10,000 pairs (MOREAU 1969; BROWN et al. 1982; CADE 1982). GRIEVE & MILLINGTON (1999) recorded 185 pairs breeding on Wadi Jimal Island in the Egyptian Red Sea. In a recent survey of Sudanese islands, sooty falcons were found on all of the islands visited (SHOBRAK et al. 2002b).

African Collared Dove *Streptopelia roseogrisea*

The African collared dove is considered a summer visitor to some islands in the southwest Saudi Arabian Red Sea (OSTROWSKI 2002). It was also recorded breeding in vegetated areas along the Saudi Arabian Red Sea coast (SHOBRAK 2001). Egg-laying takes place in March/April and birds move inland by the early summer (OSTROWSKI 2002).

Mangrove Reed Warbler *Acrocephalus avicenniae*

ASH et al. (1989) named the species from the northeast of Africa and the Red Sea coast of Saudi Arabia as the subspecies *Acrocephalus baeticatus avicenniae*. However, the subsequent mitochondrial DNA study carried out by LEISLER et al. (1997) showed that these populations are closer to the European reed warbler *Acrocephalus scirpaceus*, from which it differs in song, colouration of the upperparts, wing and foot structure, and habitat preferences. Therefore, it was proposed to nominate it as a separate species, the mangrove reed warbler *Acrocephalus avicenniae*. The mangrove reed warbler was recorded associated with mangrove habitat in the region (ASH et al. 1989; NEWTON & NEWTON 1994; JENNINGS 1995; HANSBRO & SARGEANT 2000). Egg-laying probably starts in February (URBAN et al. 1997). Fledglings were observed in Saudi Arabia in July (JENNINGS et al. 1987; JENNINGS 1995) and on Al-Badi Island in the Yemeni Red Sea, five pairs were observed defending territories in July 2002.

Clamorous Reed Warbler *Acrocephalus stentoreus*

The clamorous reed warbler is considered a breeding resident in the coastal region of Arabia, especially in mangrove habitat (JENNINGS 1995). In Egypt the species was recorded breeding in Sharm el Sheikh and south of Suez Tunnel (GOODMAN & MEININGER 1989). In addition, the remains of an individual were found in a sooty falcon nest on a small islet 25 km north of Al Lith, Saudi Arabia (GAUCHER et al. 1988). URBAN et al. (1997) suggested that the subspecies occurring in Arabia, the coast of Sudan and NW Somali is *Acrocephalus stentoreus brunnescens*. The period of egg-laying was thought to extend from March to June (URBAN et al. 1997). However, in Saudi Arabia young were recorded in March and an adult examined in the hand in July had a well-developed brood patch indicating egg-laying probably lasts until late July (JENNINGS 1995).

Graceful Prinia *Prinia haesitata*

The graceful prinia is considered to be widespread and sedentary, mainly in eastern, southern and western Arabia (JENNINGS 1995). URBAN et al. (1997) reported that it breeds along the Red Sea, the Gulf of Aden, in the Red Sea Hills south of Gebel Elba and northwest of Somalia. Singing birds were recorded in Umm al-Qamari Islands protected area (SHOBRAK 2001). In Yemen the species is a widespread breeding resident in the vegetated islands and coastal area along the Red Sea and the Gulf of Aden (MARTINS et al. 1996). The first author recorded the species on vegetated islets in Djibouti and Sudan during a PERSGA seabird survey in July 2002. The breeding season commences in January and probably lasts until September (JENNINGS 1995).

Olivaceous Warbler *Hippolais pallida*

The olivaceous warbler is a songbird and was considered to be an abundant summer breeding visitor to Egypt (GOODMAN & MEININGER 1989). Nesting was recorded in mangroves along the Egyptian Red Sea (BAHA EL DIN et al. 2003). Nest building was recorded in April and young in the nest were observed in May and June (JENNINGS 1995). The remains of an individual were recorded in a sooty falcon nest on a small islet north of Al Lith, Saudi Arabia (GAUCHER et al. 1988). The breeding season probably lasts between April and October in Egypt (BAHA EL DIN et al. 2003).

White-collared Kingfisher *Halcyon chloris*

The first record of white-collared kingfishers was in April 1982 when a group of four was seen near Al Birk, Saudi Arabia (STAGG 1984b). In August 1989 SYMENS (1990) rediscovered the population in the Ash-Shuqaiq area, 80 km south of the previous sighting. JENNINGS (1995) considered the species as a local resident in the Ash-Shuqaiq mangroves. White-collared kingfishers have also been recorded as sooty falcon prey following identification of remains in a nest (GAUCHER pers. comm. cited in NEWTON & NEWTON 1994). The sooty

falcon nests were located 25 km north of Al Lith, which is more than 200 km from Al Birk, resulting in the conclusion that white-collared kingfishers are probably breeding residents in the mangrove area south of Jeddah. The breeding season probably commences in April and lasts to June (JENNINGS 1995). More surveys are needed to determine the true status of this species in the region.

Additionally to the species already discussed, other terrestrial bird species use the islands of the Red Sea and the Gulf of Aden for feeding or breeding. This would include the lanner falcon, *Falco biarmicus*, and the Barbary falcon, *Falco pelegrinoides* (BAHA EL DIN et al. 2003). Other species such as hoopoe lark *Alaemon alaudipes* and black-crowned finch lark *Eremopterix nigriceps* are breeding residents of medium to large, flat, sandy islands in the Red Sea. The collared dove, *Streptopelia decaocto*, uses vegetated islands for breeding only (JENNINGS 1995; BAHA EL DIN et al. 2003). The hooded crow, *Corvus corone*, and brown-necked raven, *Corvus ruficollis*, were recently observed breeding on coastal islands in the Egyptian Red Sea (BAHA EL DIN et al. 2003).

4. THREATS

Several authors have discussed the threats facing the seabirds of the Red Sea coast (e.g. GALLAGHER et al. 1984; EVANS 1987). Recent national reports prepared for PERSGA discuss the status of seabirds in the RSGA region. The threats facing seabirds have been identified as: human disturbance, human exploitation, introduced predators, habitat destruction, pollution and overfishing.

4.1 Human Disturbance

Casual human visits to breeding islands, whether by fishermen or for recreational purposes, can cause disturbance to nesting birds even if there is no deliberate interference. Fishermen in the Red Sea and Gulf of Aden use some islands as meeting places or as sources of firewood. There are

seasonal fishing camps on some islands. In addition, the region has witnessed an unprecedented development of the tourist industry. Most development has taken place with little regard for the natural environment. Important islands for seabirds have been targeted for tourist development, especially in the northern Red Sea and, more recently, in the south. In Egypt, vehicles on islands pose a major risk to ground nesting seabirds (BAHA EL DIN 2001; BAHA EL DIN et al. 2003). There are military bases on some islands in the Red Sea, especially in the south (AL-SAGHIER 2002b, JENNINGS 2003), which can have a large impact on the number of breeding seabirds.

4.2 Human Exploitation

Human exploitation can take the form of the collection and/or consumption of eggs or chicks. In the past, seabird eggs formed an important addition to the diet, principally of fish, to which Arab fishermen and other coastal people were accustomed (GALLAGHER et al. 1984). In the RSGA region these activities are still practiced by fishermen and the military (AL-SAGHIER 2002a; SHOBRAK et al. 2002a, 2002b, 2002c) and could result in significant impacts on the distribution and overall breeding success of seabirds. In Yemen, fishermen were recorded eating Socotra cormorant and petrel chicks (TALEB 2002; JENNINGS 2003). Today, powerful motors available in most countries in the region are fitted to even small crafts, making any known offshore breeding site easily accessible.

4.3 Introduced Predators

Several species of predators have been recorded in the RSGA region, including feral cats, mongoose, rats and mice. Fishermen or the coastguard deliberately brought feral cats to offshore islands, whereas rats and mice were probably introduced accidentally. EVANS (1987) recorded the black rat, *Rattus rattus*, on Suakin Archipelago in Sudan and it is known to prey on birds' eggs and chicks. The black rat is known to affect gulls (CLAPHAM 1964). In addition, the white-

tailed mongoose *Ichneumia albicauda*, along with other small carnivores, has been shown to have a severe adverse affect on the breeding success of the osprey (FISHER 2001). The mongoose is probably the principal factor preventing ground nesting seabirds from using certain islands. The spread of the Indian house crow, *Corvus splendens*, to most of the major cities and small villages along the Red Sea, and recently to offshore islands such as the Socotra Archipelago, is a cause of deep concern (SHOBRAK et al. 2002a, 2002b; AL-SAGHIER et al. 1999) and could seriously affect breeding seabirds in the region.

4.4 Habitat Destruction

The building of industrial plants, hotels, holiday homes and roads may destroy important breeding sites for seabirds. These activities are ongoing in the vicinity of large coastal cities in the region. In addition small islands near these cities are used for recreational camping. Another important form of habitat destruction arises from the growing number of shrimp farms in the region. Shrimp-farming activities are often very damaging to the ecological equilibrium of neighbouring lagoons. Shrimp farms are usually in shallow tidal and mangrove areas and inevitably affect these fragile ecosystems, which are major nursery areas for fishes and crustaceans. Camels browsing on mangroves can also have a significant impact (PERSGA/GEF 2001).

4.5 Pollution

Pollution in small seas where there is little water exchange, such as the Red Sea, causes severe damage to the marine environment. Pollution in the region comes from three major sources: oil spills, sewage, and industrial waste. In the RSGA, between 20,000 and 35,000 oil tankers enter the region annually (PERSGA/GEF 1998) and thus the likelihood of an accidental oil spill is high. The Red Sea receives 6,836 t or 14.61 kg per square kilometre per year of oil from shipping AWAD (1995). Dirty ballast water dumped from ships results in the formation of tar balls and these have been found along the coastline

of the Gulfs of Aden and Suez (EC & MFM 1995) and some parts of the Red Sea coast (RUSHDIE et al. 1991; PERSGA/GEF 2001). The global refinery input of oil is 0.56 kg per square kilometre per year, whereas the Red Sea receives 6.64 kg per square kilometre per year, nearly 11 times as much. In 1960 more than 800 dead Socotra cormorants were found near Aden suffering from oil pollution (GALLAGHER et al. 1984). Although there has been no assessment of the recent Limburg oil spill that occurred between Al Mukalla and Bir Ali in the Gulf of Aden, the affect could be severe for the newly discovered breeding colony of the Socotra cormorant. A tour party reported that beaches near Bir Ali were badly fouled with oil from the M.V. Limburg and covered with thousands of feathers (JENNINGS 2003).

Although oil pollution mostly affects diving birds such as cormorants, auks and divers, it can also cause damage to seabirds during various stages of their life cycle. Large numbers of adults can be killed by oil fouling. Oiling of eggs by contaminated incubating birds can also cause serious problems (FREEDMAN 1989). Beached oil near bird colonies can have a severe impact on flightless chicks. BAHA EL DIN et al. (2003) reported that the melting of tar mats during hot weather affected adults and young birds on northern Egyptian islands. Oil spills can also affect seabirds indirectly through the food chain, as toxic hydrocarbons, and may damage the ecosystems within which the birds' food resources are produced. Additionally, the disruption of the breeding cycle of prey fish species can cause a drastic decline in the breeding success of seabirds.

Sewage waste has been observed near large cities along the Red Sea and the Gulf of Aden, as treatment plants in all PERSGA countries are inadequate. The effect of sewage on fishes may reduce food availability/quality for seabirds.

4.6 Over-fishing

The status of fisheries in the region is unknown due to incomplete stock assessments and fisheries statistics. However, overfishing has been documented as one of the threats to the living marine resources of all countries in the region (PERSGA/GEF 2001). In Saudi Arabia, the increase in fishing pressure could affect breeding seabirds on the Farasan Islands (TATWANY et al. 1995). In 1993, 400 boats were based on the Farasan Islands, a number likely to increase as more and more fishermen are recruited from the mainland (GOLDSPINK & MORGAN 1996). Feeding flocks of species such as the Socotra cormorant could get trapped in fishing nets. Furthermore, fishermen sometimes kill cormorants and pelicans found in fishing nets (GALLAGHER et al. 1984). Unsustainable and environmentally damaging fishery practices were recorded in Egypt (BAHA EL DIN et al. 2003). Fishing practices therefore require more investigation at both national and regional levels.

5. CONSERVATION IMPLEMENTATION

The Marine Protected Areas (MPAs) and Important Bird Areas (IBAs) in the RSGA that are discussed in the current section have been summarised in appendix 3 based on the findings of EVANS (1994) and FISHPOOL & EVANS (2001).

5.1 Marine Protected Areas for Breeding Seabirds

Marine Protected Areas in Djibouti

Djibouti has declared two MPAs, at Moucha and Maskali Islands. They have been established for more than a decade. In addition, two IBAs are proposed for protection at Godoriya and Les Sept Frères Islands. The location of all four of the sites can be seen on Figure 1. Moucha and Maskali and Les Sept Frères Islands are probably the most important seabird areas in Djibouti (SHOBRACK et al. 2002a). The numbers of breeding seabirds recorded were small

compared with the nearby islands in Somalia, which was probably due to disturbance, especially at Moucha and Maskali Islands where tourists and the military are commonly seen at weekends.

Moucha and Maskali Islands

These comprise two coral islands and five associated islets, situated in the Gulf of Tadjoura north of Djibouti City. The large island Moucha has extensive stands of two species of mangrove. An estimated 30 % of the islands were recorded as 'sandy', while vegetation cover ranged between 35 % and 90 % (SHOBRAK et al. 2002a). Although the islands are large, all seabirds were recorded on the small associated islets. Several species of seabirds were recorded breeding on these islets, including the red-billed tropicbird, western reef heron, little green heron, spoonbill, osprey, white-eyed gull, sooty gull, bridled tern, white-cheeked tern, lesser crested tern, swift tern and brown noddy (SHOBRAK et al. 2002a).

Les Sept Frères Islands

The site is an archipelago of six volcanic islands at the mouth of the Red Sea at Bab al Mandab Straits. The small hillock on the coast at Ras Siyyan marks the seventh member of the group, giving the archipelago its name (Les Sept Frères). The islands are rocky and un-vegetated except for Eound Dâbali Island, where the vegetation was estimated to cover 2 % of the island surface. Small sandy beaches were found on Kadda Dabali Island, which tourists and fishermen use for landing and for picnics (SHOBRAK et al. 2002a).

The islands support breeding colonies of red-billed tropicbirds, brown booby, western reef heron, little green heron, osprey, sooty falcon, white-eyed gull, sooty gull, swift and lesser crested terns. In addition the islands are important for migrating raptors, assisting them to complete their crossing of the Bab al-Mandab Straits.

Les Sept Frères Islands and Ras Siyyan were proposed as a protected area to protect the diversity of coral reef, mangrove and endemic fishes in both the Red Sea and Gulf of Aden, as well as the migrant birds passing over the islands. A management plan for the area is planned, sponsored by PERSGA.

Marine Protected Areas in Egypt

At present there are six protected areas along the Egyptian Red Sea and more are proposed (BAHA EL DIN et al. 2003). The protected area system plan for Egypt proposed that the boundaries of Red Sea islands and mangrove should be extended north to include all the islands at the mouth of the Gulf of Suez (BAHA EL DIN 1998). The location of some MPAs discussed in the following section can be seen in Figure 2.

Ras Mohammed National Park

This south Sinai Park protects Ras Mohammed Peninsula and the coral reefs along the southern Sinai coast eastwards to the Gulf of Aqaba. Included within the area is Tiran Island, which is an IBA. Tiran is a large crescent-shaped island situated at the mouth of the Gulf of Aqaba. Mangroves are found on both the peninsula and Tiran Island. As the island supports a military base and mining areas, access is restricted. Seabirds breed in the mangroves at Ras Mohammed. The tidal flats along the Gulf of Suez coast are feeding and roosting sites for seabirds.

Nabq Protected Area

This protected area in south Sinai includes the terrestrial and marine environment along the southern Gulf of Aqaba coast. The most extensive mangrove in the northern Egyptian Red Sea is included in the reserve and is considered the most northerly mangrove in the world. The mangrove and the associated tidal flats provide breeding habitat for seabirds, as well as important feeding and roosting sites.

Abu Galum Protected Area

This marine and terrestrial protected area is situated on the Gulf of Aqaba coast between Dahab and Nuweiba. The area protects the coral reefs, beaches, the coastal plain and mountains. The osprey is present, but no true seabirds are known to breed in this area.

Gabel Elba Protected Area

Gabel Elba protected area is the largest protected area in the country, 30,000 km² in the southeast corner of the Eastern Desert from the border with Sudan to north of Shalateen. Gabel Elba is a marine and terrestrial protected area including extensive fringing reefs, a number of small islands, mangroves and sandy and rock beaches. Seabirds are said to breed on the islands. The largest mangrove stand in the country occurs south of Shalateen at Abu Sha'ab and has not been surveyed adequately for breeding seabirds.

Wadi El Jimal-Hamatah Protected Area

This is Egypt's newest reserve, declared in January 2003. It is a marine and terrestrial reserve encompassing some 40 km of coastline south of Marsa Alam from Wadi Jimal south to Lahmi Bay. Included within the reserve is a large stand of mangroves at Hamatah, coral reefs, seagrass beds and islands are included at Wadi Jimal and the Qulân Island chain.

Red Sea Islands and Mangroves Protected Area

A decree extended the boundaries of the Gabel Elba Protected Area to include all the islands along the Red Sea coast from the borders with Sudan north to Hurghada, as well as all the mangroves along the Red Sea coast. It is now being managed as a separate protected area. The reserve includes the islands off the coast of Hurghada, Zabargad Island and the other islands to the south that are not part of other protected areas, as well as all coastal mangroves from north of Hurghada to Wadi Jimal. The management of

this area is currently under review and is being zoned into different sectors that will be managed as separate units.

Marine Protected Areas in Jordan

The Aqaba Marine Park stretches for approximately 7 km along the southern portion of the Jordanian Gulf of Aqaba. The official designation was issued in July 1997 (PERSGA/GEF 2003). There are no important seabird breeding sites in the Park.

Marine Protected Areas in Saudi Arabia

The Kingdom of Saudi Arabia has established a number of extensive terrestrial protected areas, but lags behind in the development and implementation of MPAs. With the exception of the Farasan Islands, Umm al-Qamari Islands and Yanbu Royal Commission Protected areas, nearly 32 marine protected areas have been proposed dating back to the mid and late 1980s. Several reports had been published presenting these areas (EVANS 1994; DEVANTIER & PILCHER 2003; PERSGA/GEF 2001).

Yanbu Royal Commission Protected Area

This area is protected by the Royal Commission through an agreement with MEPA. It covers an area of ca. 5 km² and encompasses fringing reefs, mangroves and seabird nesting sites. The site has a representative mangrove avifauna and two species of seabird breeding on offshore islands; Saunder's little tern and white-cheeked tern.

Umm al-Qamari

Established in 1977 and covering an area of less than 0.1 km², this small protected area in the southern Red Sea is composed of two small islands with surrounding fringing reefs and sand banks (Figure 3). It is an important breeding site for hundreds of African collared doves, little green herons, reef heron, cattle egrets, swift terns, brown boobies, sooty gulls and one to two pairs of ospreys.

Farasan Islands

Established in 1996 and covering an area of 3,310 km², this terrestrial and coastal reserve is an archipelago of small islands at the southern extreme of Saudi Arabia's Red Sea shoreline (Figure 3). It is an important area for mangroves, seagrasses, coral reefs, marine mammals, marine turtles, seabirds and an endemic gazelle. It is threatened by fishing, development and recreational activities. The site is categorised as an IBA by BirdLife International because a large proportion of the Red Sea's seabirds breed in the archipelago.

In addition there are other proposed protected areas in the Saudi Arabian Red Sea, which are: Straits of Tiran, Ras Suwayhil, Sharm Zubayr, Ghubbat Bal'aksh, Al Wajh Bank, Qalib Islands, Al-Hasani and Libanah Islands, Ras Abu Madd and Sharm Hasi, Ras Baridi and Sharm Al-Khawr, Shi'b al Qirin Ras Hatiba, Ash-Shu'aybah and Mastaba, Qishran, Outer Farasan Bank, Khawr Itwad, Shi'b Abu al-Liq and Shi'b al-Kabir.

Straits of Tiran

Straddling the Saudi Arabian/Egyptian border, the straits encompass islands and extensive coral reefs with a diverse reef-associated fauna in the transition area between the Gulf of Aqaba and the Red Sea. It includes important marine turtle and dugong habitat. Tourist activities occur on the Egyptian side.

Ras Suwayhil

Proposed to cover an area of 267 km², the site encompasses pristine and diverse coral reefs and reef-associated fauna, and is a prime example of the reefs and high cliffs typical of the Gulf of Aqaba. It contains suitable habitat for seabirds and dugong.

Sharm Zubayr

Covering 80 km², the area encloses open coastline and a sharm with fossil reef cliffs, narrow fringing reefs and the northernmost

mangroves in the Red Sea. A causeway has been proposed to cut through the area.

Ghubbat Bal'aksh

Covering 33 km², this is a sharm and open coastline with coral reefs with particularly high species diversity, seagrass beds and seabirds. It is subject to unregulated recreational activities.

Al Wajh Bank

Including Sharm Habban and Sharm Munaybirah, this protected area will cover 2,840 km² and is home to the most extensive coral reef system of the entire Red Sea, diverse reef-associated fauna, seagrass beds and mangroves. It is inhabited by marine turtles and seabirds, and is a key area for dugong.

Qalib Islands

Actually included in the Al-Wajh Bank, these islands are surrounded by fringing reefs and are important nesting sites for seabirds and marine turtles.

Al-Hasani and Libanah Islands

These are high-aspect islands with extensive fringing reefs and are important nesting sites for seabirds and marine turtles.

Ras Abu Madd and Sharm Hasi

These comprise scenic sharms and high quality fringing coral reefs, fossil reef terraces and an important seabird area. The area is to be combined with the Al-Hasani and Libanah Island protected area. It is threatened by fishing activities.

Ras Baridi and Sharm Al-Khawr

The area encompasses sandy beaches, small islands, high quality coral reefs and seagrass beds. It is a very important marine turtle nesting site for the Red Sea. It is threatened by unchecked fallout from a nearby cement factory.

Shi'b al-Qirin

Extending over 30 km², this is a high quality inshore reef complex that is also an important seabird area.

Ras Hatiba

Covering ca. 450 km², this is a large lagoon with sandy and coralline spits, small mangrove stands, extensive offshore reefs and is a prime site for environmental and educational programmes. It is currently threatened by recreational activities and unregulated development.

Ash-Shu'aybah and Mastaba

Proposed to cover ca. 100 km², this is a large lagoon with extensive mangroves, fossil reef terraces and good quality offshore reefs. It is a key site for seabirds, and is threatened by unregulated development, mangrove felling and a possible major highway project.

Qishran

This is a complex of coral reefs, coral spits, seagrass beds and extensive mangroves. It contains important seabird and dugong habitat. The development of an extensive shrimp-farming project poses a major threat.

Outer Farasan Bank

This is a major reef and island system contiguous with the Farasan Islands. It has diverse mangroves, seagrass and coral reef habitats and is an important turtle and seabird nesting area.

Khawr Itwad

Proposed to cover ca. 70 km², this is a lagoon with fringing corals, seagrass beds and mangroves.

Shi'b Abu al-Liqa and Shi'b al-Kabir

Proposed to cover ca. 140 km², these are two lagoons with abundant fringing corals and mangroves.

Marine Protected Areas in Somalia

Although there are no declared protected areas in Somalia, two sites in the Gulf of Aden have been proposed for protection: Mait Island; and Aibat, Sa'adadin and Saba Wanak, two islands and an adjacent stretch of coastline near Zeila (Figure 4). The areas are considered to be IBAs (FISHPOOL & EVANS 2001).

Aibat and Sa'adadin Islands

Extending over an area of some 300 km², the proposed protected area encompasses low-lying mangrove islands with possibly the largest coral reef area in the Gulf of Aden. The site consists of two adjacent islands close to the border with Djibouti in the extreme northwest of the country (Figure 4). Aibat Island lies 16 km north of the coastal town of Zeila. It is low-lying and exposed, with sandy beaches and sand flats plus coral reefs that are uncovered at low tide. In contrast, Sa'adadin Island has the largest mangrove stands and coral reefs along the Gulf of Aden coast of Somalia. There is no recent information on the avifauna in the islands, but thousands of white-eyed gulls bred on both islands during the first half of the twentieth century (CRAMP & SIMMONS 1983; URBAN et al. 1986). Other species present include the brown booby, sooty gull, white-cheeked tern, swift tern and lesser-crested tern. The masked booby was recorded at Sa'adadin Island. In addition, numerous species of Palearctic migrant waders and waterfowl, exceeding 20,000 birds, occur seasonally (FISHPOOL & EVANS 2001).

Mait (Maydh) Island

The island is located in the Gulf of Aden and lies 13 km to the north of the town of Maydh (Figure 4). It is a little over 1.5 km in length, with a maximum width of 300 m and an average height of 100 m. The island is steep-sided, rising abruptly out of the sea, and along the southern face rocky buttresses alternate with scree-filled gullies, while the northern face is an unbroken rock face. The rock is granitic gneiss, which is covered with guano deposits, and the surface is split in

places by great fissures. The island is un-vegetated. Early records estimated 100,000 breeding birds (FISHPOOL & EVANS 2001) including the red-billed tropicbird, the masked booby, sooty terns and bridled terns.

Marine Protected Areas in Sudan

The Sanganeb National Park is presently the only Marine Protected Area in the Sudanese Red Sea, although six marine sites are proposed for protection: Mukawwar Island and Dunganab Bay, Shuab Rumi, Suakin Archipelago, Jebel Elba, Khor Kilab bird sanctuary and Abu Hashish recreational park.

The Sanganeb National Park

Sanganeb National Park was established in 1990. PERSGA describes the park as an atoll with a highly diverse and complex coral reef, diverse reef-associated fauna, sharks and marine mammals. No breeding seabirds were recorded in the park.

Mukawwar Island and Dunganab Bay

A management plan for Mukawwar Island and Dunganab Bay has recently been drawn up with the support of PERSGA. The site includes a narrow coastal strip and mangroves around the bay as well as the archipelago and the shallow coastal waters in between (Figure 5). The area supports breeding colonies of osprey, sooty falcon, sooty gull, white-eyed gull, bridled tern, white-cheeked tern and crab plover (SHOBRAK et al. 2002b). In addition Mukawwar Island is important for breeding turtles (FISHPOOL & EVANS 2001; PERSGA/GEF 2001).

Among the five other proposed protected areas in Sudan, the Suakin Archipelago is a very important area for breeding seabirds (Figure 5). Also, Jebel Elba supports a significant variety of terrestrial wildlife, while Khor Kilab bird sanctuary provides important habitat for migratory species.

Marine Protected Areas in Yemen

In Yemen only the Socotra Archipelago is designated as a protected area. Six other coastal and marine areas have been proposed for protection; Ras Shama, Dhobba (Shihr), Belhaf and Bir Ali area, Ras Isa/Kamaran Island, Khor Umaira and Bab al-Mandab and Perim Island. Among these, three are probably important for nesting seabirds: Bir Ali and Kamaran Islands are important for breeding Socotra cormorants (JENNINGS 2003), while the Kamaran Islands are an important breeding area for bridled tern and crab plover (AL-SAGHIER 2002b). Bab al-Mandab Islands are important for the brown noddy and masked booby.

Socotra Archipelago Protected Area

The Socotra Archipelago lies in the Gulf of Aden and consists of Socotra Island and three outlying islands: Abd al-Kuri, Samba and Darsa (Figure 6). The protected area was established in 1996 and has an area of 3,626 km². A recent survey revealed that the archipelago is an extremely important area for marine biogeography. The archipelago is also an important area for breeding Jouanin's petrel, Persian shearwater, masked booby and probably Socotra cormorant (AL-SAGHIER et al. 1999; AL-SAGHIER 2000, 2002a).

5.2 Important Bird Areas in the Red Sea and Gulf of Aden

Important Bird Areas in the Djiboutian Red Sea

FISHPOOL & EVANS (2001) reported two important bird areas in the Djiboutian Red Sea, Kadda Guéini-Doumêra and the Sept Frères Islands. The latter has already been described above, but the former is only partly included in the proposed protected area. This IBA is a 61 km stretch of coast in the northeast of the country (12° 27'N 43° 17'E), between the rocky outcrop at Kadda Guéini and the border town of Doumêra, and includes the peninsula at Ras Siyyan and Doumêra (Figure1). The shoreline is a mixture of rocky areas, old coral reefs, which are exposed at low tide, and sandy beaches.

There is a lagoon with sandy shores and a small area of mangrove at Ras Siyyan, and further small areas of mangrove at Khôr Angar and Godoriya. Lying at the narrowest point of the Bab al-Mandab Straits, the site is a migration bottleneck, with huge numbers of raptors and significant numbers of other birds crossing the Red Sea from the Arabian Peninsula in the autumn.

Important Bird Areas in the Egyptian Red Sea

BAHA EL DIN (1999) describes the IBAs of Egypt, of which 15 are located on the Red Sea. Among these, seven IBAs are important for seabirds: Hurghada Archipelago, Tiran Island, Wadi Jimal Island, Qulân Islands, Zabargad Island, Siyal Islands and Rawabel Islands (Figure 2). Among these important seabird areas, the southern islands have been the least studied by ornithologists, resulting in little available information on breeding seabirds.

Hurghada Archipelago

In this archipelago of 22 uninhabited islands, six are protected as part of the Elba National Park: Giftun El Sagir, Giftun El Kabir, Abu Mingar, Abu Ramathi, Umm Gawish El Saghir and Umm Gawish El Kabir. Most of the islands are small or medium in size and are fairly flat coralline islands with elevated rocky shores and sloping sandy shores (BAHA EL DIN 1999). These islands probably hold the largest breeding population of the white-eyed gull in the world, with 3,000 breeding pairs (BAHA EL DIN 1999). In addition the archipelago supports 14 other species of breeding seabirds including brown booby, red-billed tropicbird, little green heron, reef heron, spoonbill, osprey, sooty falcon, Kentish plover, sooty gull, Caspian tern, swift tern, lesser crested tern, bridled tern and white-cheeked tern (BAHA EL DIN 1999). The archipelago is also important for migrants crossing the mouth of the Gulf of Suez and also for breeding turtles. In addition, the mangroves found on the islands are probably among the most extensive in the northern Red Sea.

Tiran Island

Tiran Island is flat in the northern part and hilly in the southern part rising to an altitude of 524 m. Nine species of birds were recorded breeding on this island; western reef heron, little green heron, spoonbill, white-eyed gull, white-cheeked tern, lesser crested tern, Caspian tern, osprey and sooty falcon (BAHA EL DIN 1999). The island is important for breeding green turtles (FRAZIER et al. 1984). In addition, a large mangrove stand in the southern part of the island supports nesting sites for herons and spoonbills.

Wadi Jimal Island

This island is also part of the Elba National Park. It is a coralline island with small mangrove stands located in the middle and on the southwest shore. The island supports nine species of breeding seabirds in small numbers: red-billed tropicbird, little green heron, western reef heron, spoonbill, osprey, sooty falcon, sooty gull, white-eyed gull and Caspian tern.

Qulân Islands

This is a small archipelago that is also part of Elba National Park and is comprised of four small coralline islands: Siyul, Showarit, Umm Ladid and Mahbis. The islands are flat and sandy with an elevated rocky area at the northern shore. The islands support eight species of breeding seabirds: red-billed tropicbird, little green heron, western reef heron, spoonbill, sooty falcon, sooty gull, white-eyed gull and Caspian tern.

Zabargad Island

Zabargad or St. John's Island is another part of Elba National Park. The island is small and composed of uplifted mantle and lower crust metamorphic rocks (COLEMAN 1993). Eight species of birds have been recorded breeding here: brown booby, spoonbill, white-eyed gull, Caspian tern, lesser crested tern, bridled tern, white-cheeked tern and sooty falcon (BAHA EL DIN 1999). The island supports the largest number of breeding sooty falcons, with 150 breeding

pairs recorded in October 1994 (BAHA EL DIN 1999).

Siyal Islands

The Siyal Islands are three flat, sandy, coralline islands. The five species of birds that have been found breeding here are the osprey, white-eyed gull, sooty gull, Caspian tern and white-cheeked tern. The islands are also important for breeding turtles (BAHA EL DIN 1999).

Rawabel Islands

These small, flat, coralline islands are part of the Elba National Park. They support four breeding bird species: osprey, white-eyed gull, sooty gull and Caspian tern (BAHA EL DIN 1999). In addition the islands are probably visited by turtles for breeding (GOODMAN 1985).

Important Bird Areas in the Jordanian Red Sea

Jordan has a limited coastal plain and a small marine area. The area is very important economically for Jordan and it has been altered substantially by human activities. The area is a migratory bottleneck, especially for birds of prey such as Levant sparrowhawk, *Accipiter brevipes* and common buzzard, *Buteo buteo*. The area supports a breeding bird community representative of the Rift Valley, with species such as Tristram's grackle, *Onychognathus tristramii* (EVANS 1994). In addition, a diverse range of non-breeding seabirds has been recorded offshore, including the white-eyed gull, wedge-tailed shearwater *Puffinus pacificus*, brown booby, bridled tern and white-cheeked tern.

Important Bird Areas in the Saudi Arabian Red Sea

Al Wajh Bank

Al Wajh Bank is a group of islands located in the northern Red Sea (Figure 3). The islands are important for several breeding seabirds, including the brown booby, osprey, sooty falcon, crab plover, sooty gull, white-eyed gull, white-cheeked tern, bridled tern, Caspian tern and lesser crested tern (EVANS

1994). The site is proposed as a Resource Use Reserve in the National Commission for Wildlife Conservation and Development (NCWCD) system plan for protected areas.

Qishran Bay

This is a shallow bay approximately 525 km² in size, almost closed by a long narrow island and containing eight other islets. It is situated near Al Birk at a point where the Asir Mountains run close to the Red Sea. Most islets are surrounded by the mangrove tree *Avicennia*, and have dense *Salicornia*. This IBA holds the densest population of sooty falcon in Saudi Arabia. The site is proposed as a Special Natural Reserve in the NCWCD system plan for protected areas.

Kutambil Island

This island lies 5 km off the coast of southwest Saudi Arabia, midway between Shuqaiq and Al Birk. It is dominated by a mound of volcanic clinker rising to 100 m. The site is an important breeding area for the Red Sea subspecies of the Eurasian spoonbill *Platalea leucorodia archeri*.

Important Bird Areas in the Somali Gulf of Aden

Four areas were identified as IBAs in the Gulf of Aden off Somalia. Two were island areas – the Aibat and Sa'adadin Islands, and Mait Island, and the other two were coastal areas, Daalo and Zeila. PERSGA has started to develop a conservation programme with the existing authority for the former two areas described above.

Daalo

This IBA is located in central northwest Somalia, extending eastwards along the coast from Mait village and inland towards the town of Cererigaabo, which lies at the top of the limestone mountain that rises steeply from the coastal plain. The coastal section consists of sandy plains with sparse grass cover. The site is important for rock dove *Columba livia*, Somali Thrush *Turdus*

ludoviciae and Warsangly Linnet *Carduelis johannis*.

Zeila

This IBA consists of an extensive area of arid bushland merging into coastal saltmarsh and swamp. It lies immediately south of the northern coastal town of Zeila close to the border with Djibouti (10° 44'N, 43° 28'E) and extends along the coast as far as Lughaye and inland almost as far as the town of Cabdikaadir near the Ethiopian border (Figure 4). Numerous seasonal watercourses flow through the area and these carry run-off to the fringing coastal swamps and mangroves. Large numbers of Palearctic waders and waterfowl are known to occur on the coastal wetland, including Kentish plover, greater sand plover *Charadrius leschenaultii* and lesser sand plover *Charadrius mongolus* (FISHPOOL & EVANS 2001). Western reef heron breed in the mangroves.

Important Bird Areas on the Sudanese Red Sea

Two IBAs occur on the Sudanese Red Sea - Mukawwar Island and Dugonab Bay, and Suakin Archipelago. The former IBA has already been described above, but more surveys are needed to clarify the species breeding in these areas, especially the southern Red Sea coastal areas.

Suakin Archipelago

The archipelago is the largest group of islets on the Red Sea coast of Sudan, extending southeast from the former port of Suakin and almost reaching the southern border (Figure 5). The islets in this archipelago support large numbers of breeding seabirds, with large colonies of crab plover and bridled terns, white-cheeked terns and lesser-crested terns (SHOBRAK et al. 2002b). In addition western reef heron, little green heron, osprey, sooty falcon, brown booby and common noddy have been recorded breeding in the archipelago (MOORE & BALZAROTTI 1983; SHOBRAK et al. 2002b). It is also important for four species of turtles.

Important Bird Areas in the Yemeni Red Sea and Gulf of Aden

Yemen's marine territories have a high diversity of breeding seabird species. This is probably due to the upwelling of cold, nutrient-rich waters during monsoons, together with the presence of numerous offshore islands, making it an ideal feeding and breeding area for seabirds. Of 37 marine IBAs identified in Yemen, 10 are in the Red Sea and 27 in the Gulf of Aden; of the latter, 19 are in Socotra Island alone. We have divided these IBAs into four categories: island IBAs in the Red Sea, coastal IBAs in the Red Sea, coastal IBAs in the Gulf of Aden and island IBAs in the Gulf of Aden. The most important seabird areas in the Yemeni region are shown in Figure 6.

I. Island IBAs in the Yemeni Red Sea

EVANS (1994) identified three groups of islands: islands north of Al-Hodeidah, Jaza'ir al-Zubayr and Jaza'ir al-Hanish. In addition Az-Zuqur Islands were presented as part of a coastal IBA of Bab al-Mandab-Mawza. A PERSGA survey in summer 2002 identified another group of islands in the Red Sea as an IBA, namely Kamaran Island and its associated islets (AL-SAGHIER 2002b).

Islands north of Hodeidah

During a PERSGA survey in 2002, several seabird species were recorded breeding on these islands (AL-SAGHIER 2002b). In the northern islands these included white-cheeked tern, crab plover, little green heron, black-headed heron and sacred ibis. On the islands south of Hodeidah, large numbers of true seabirds were breeding such as lesser-crested tern (7,000) white-cheeked tern (5,000) and Saunder's terns (1,900). In addition 40 crab plover were also recorded on these islands. The difference in species composition between the northern and southern islands can be explained by the fact that the southern islands are flat and sandy, whereas the northern islands are covered partly or fully by mangroves.

Jaza'ir Al-Zubayr (Az Zubayer Archipelago)

The islands associated with this archipelago are volcanic, with elevations of up to 173 m on some islands. During the PERSGA summer survey, ten islands were visited (AL-SAGHIER 2002b). It was found that the archipelago is an important breeding area for the brown booby, with more than 6,000 pairs being recorded. The majority of nests were at Al-Alam (Jazirat Az-Zubayer) and Al-Asal (Saba) Islands. Other seabirds recorded breeding in this archipelago included the white-eyed gull, sooty gull and masked booby, while non-seabird species included sooty falcon, osprey, little green heron and western reef heron.

Bahr Ibn Abbas-Ras Isa

Ras Isa is a headland pointing northwest towards the adjacent island of Kamaran, which is the most populated island in the Red Sea with nearly 10,000 inhabitants. Six islands associated with Kamaran were surveyed by PERSGA during summer 2002: Al Badi to the northwest, Kadaman Island and Hataban to the north and northwest, Uqban Island west of Al Badi, Kutamah Island and Tigfah Island (Tiqfash). The islands are mostly flat and sandy and covered with *Suaeda*, *Limonium*, *Zygophyllum* sp., *Juncus* and *Salvadora persica*. The islands are important for bridled terns, with more than 7,500 breeding pairs, the majority of which bred on Kadaman Island. In addition, large colonies of crab plover were found breeding on Kadaman Island (680 breeding pairs) and Al Badi Island (300 breeding pairs). Sooty gull, white-eyed gull, white-cheeked tern and lesser-crested tern were also recorded breeding on the islands.

Jaza'ir al-Hanish (Hanish Archipelago)

Most of the islands and islets in this archipelago are composed of volcanic rock, with elevations ranging from 8-407 m. There are scattered patches of sand and vegetation. The largest island is Hanish Al Kubra. A large colony of bridled terns, numbering 42,000 breeding pairs, was recorded on Jabal Al Milh Island. The brown noddy was also

recorded in large numbers on several islands and AL-SAGHIER suggested that this species was breeding in the archipelago. Although white-eyed gulls were recorded on almost all the islands in the archipelago, the majority were found at Al-Nuqrah Al Gharbiah Island, with nearly 1,300 breeding pairs (AL-SAGHIER 2002b).

Bab al-Mandab-Mawza

This is a rocky promontory jutting out at the southwest extremity of Yemen towards Djibouti. The site is a major bottleneck for soaring, migratory birds, especially birds of prey such as steppe eagle, *Aquila nipalensis*, and common buzzard, flying between Africa and their Eurasian breeding grounds. Offshore there are volcanic islands, the Az-Zuqur Archipelago. During a PERSGA survey in summer 2002, several species of seabirds were recorded breeding on the island, including the bridled tern, which was present and breeding in high numbers, especially on the Abu Ali Islands where 3,300 breeding pairs were recorded (AL-SAGHIER 2002b). The brown booby was breeding on all islands, with the majority on Qattan and Abu Ali Islands. In addition the white-eyed gull, sooty gull, brown noddy and masked booby were recorded breeding on Az-Zuqur Islands (AL-SAGHIER 2002b).

II. Coastal IBAs on the Yemeni Red Sea

IBAs in Yemen include Midi-Al-Luhayyah, Al-'Urj, Nukhaylah-Ghulayfiqah and Al-Fazzah, Al-Mukha-Al-Khawkhah.

Midi-Al-Luhayyah

This is a flat sabkha coastline with extensive offshore sandbars and intertidal mudflats. More than 60 km of coast are fringed by well-developed mangrove *Avicennia marina*. The habitat is ideal for several species such as western reef heron, clamorous reed warbler, mangrove warbler and white-collared kingfisher. The area is also important for migratory species such as

the pied avocet *Recurvirostra avosetta* and Terek sandpiper *Xenus cinereus*.

Al-'Urj

This site includes a 15 km stretch of coast with a mangrove-lined tidal inlet important as a spawning ground and nursery area for shrimps and fish. The site also supports several bird species such as little green heron, osprey and probably mangrove warbler.

Nukhaylah-Ghulayfiqah

This is about 90 km long, with patchy mangrove. The area is important for migrating waterbirds.

Al-Fazzah

Covering a 35 km stretch of Red Sea coast, Al-Fazzah is an important area for waterbirds, especially migratory species.

Al-Mukha-Al-Khawkhah

This area is important for migratory species. It is about 70 km of southern Red Sea coastline, with sandy patches in the north and sabkha areas in the south.

III Coastal IBAs on the Yemeni Gulf of Aden

Four sites are identified as IBAs in the Gulf of Aden: Aden, Qishn Beach, Abdullah Gahrib Lagoons and Ras Fartak.

Aden

This is an important coastal wetland for wintering and migrating waterbirds. The site is also an important feeding area for waders.

Qishn Beach

This is a shallow beach, 6 km in length. The site is important for non-breeding and migratory sooty gulls and may be important for waders during migration.

Abdullah Gahrib lagoons

These are large coastal lagoons separated from the sea by sand dunes. The site is important for feeding and roosting gulls.

Ra's Fartak

This is a feeding area for a representative assemblage of pelagic birds such as Jouanin's petrel and Persian shearwater.

IV Island IBAs in the Gulf of Aden (Yemen)

Islands of Bir Ali

This IBA contains three islands important for breeding Socotra cormorants, with 10,000 pairs recorded during summer 2002 (JENNINGS 2003).

Sabuniya and Ka'l Fir'awn

These are two small islands important for masked boobies, osprey and probably Jouanin's petrel.

Abd al-Kuri

This is a large island 32 km long and less than 5 km wide. The island is probably important for the Socotra sparrow *Passer insularis*.

Al-Ikhwan

This is comprised of two inaccessible islands, both 10-15 km long. The site is important for brown and masked boobies.

Socotra Island

Socotra Island has 19 sites identified as IBAs. Socotra Island has several endemic terrestrial bird species such as golden-winged grosbeak *Rhynchostruthus socotranus*, Socotra sunbird *Nectarinia balfouri*, Socotra starling *Onychognathus frater* and Socotra cisticola *Cisticola incanus*. In addition the island is an important site for breeding sooty gull, masked booby and Jouanin's petrel.

5.3 Institutional Frameworks

Environmental Institutions in Djibouti

Several institutions in Djibouti are involved with coastal and marine areas and resource management: the Ministry of Agriculture through the Stock-farming and Fisheries Directorate; the Ministry of Transport through the Maritime Affairs Directorate; the Ministry of Youth, Sport and

Tourism through the National Office for Tourism; the Presidency of the Republic, through the Institute of Higher Studies Scientific and Technical Research; and the Ministry of Housing, Urban Affairs, Environment and Land Management through the Directorate of Management and Environment.

Environmental Institutions in Egypt

Several institutions carry out monitoring activities along the Egyptian coastline: the Egyptian Environmental Affairs Agency, the Tourism Development Agency, the National Institute of Oceanography and Fisheries and the three Red Sea Governorates. In addition, several scientific institutions and secondary agencies also work in this field.

The Egyptian Environmental Affairs Agency (EEAA)

This organisation was established by Presidential Decree 631/1982 and amended by Law 4/1992 to be the central coordinating body for the environment in Egypt. The EEAA is affiliated with the Ministry of State for Environmental Affairs. The EEAA is also tasked with overseeing the implementation of environmental protection policy and legislation with other responsible authorities. It has responsibilities for coastal zone management, law enforcement, reviewing environmental impact assessments and monitoring pollution. The EEAA is the body that follows up on regional and international conventions.

The Nature Conservation Sector (NCS)

This department is under the EEAA and is responsible for nature conservation. It oversees the national network of protected areas and supervises the management of the six protected areas in the Red Sea. It also follows up on species conservation and the implementation of international conventions related to biodiversity.

The Tourism Development Agency (TDA)

This body, under the Ministry of Tourism, was established to support the private sector tourist industry and to develop an institutional framework for environmentally sound tourism. This includes developing guidelines for hotel management and following-up the application of environmental regulations and procedures.

The Red Sea Governorates (RSG)

There are three governorates on the Egyptian Red Sea: South, Suez and Red Sea. The governorates are responsible for regional administration, planning and development. They are involved in promoting tourism and regulating land allocation and hotel construction within city limits through zoning and the issue of permits. Additionally the RSGs are responsible for environmental management in their governorates in cooperation with the relevant national authorities.

Scientific Institutions

A number of scientific research centres have conducted research on the marine environment. The National Institute of Oceanography and Fisheries (NIOF) has carried out investigations on fisheries, corals and associated fauna in the Hurghada region for 70 years. The Academy of Science has supported research in the region. Universities in Egypt, including Suez Canal and Al-Azhar, also conduct research on a variety of topics related to the Red Sea, including coastal zone planning and management, fisheries, coral reefs, mangroves, pollution and other environmental issues. Little if any research has been conducted on breeding seabirds.

Secondary Agencies

These bodies are playing a role in environmental management. The Egyptian General Petroleum Corporation (EGPC) is responsible for oil and gas exploration, controls the activities of international oil companies and has developed an oil spill response capability in Ras Ghareb on the Gulf

of Suez. The National Committee for Integrated Coastal Zone Management (NCICZM) develops guidelines and coordinates coastal activities among the relevant authorities. The NCICZM is responsible for harmonising development with the carrying capacity of coastal ecosystems.

Environmental Institutions in Jordan

The Aqaba Regional Authority (ARA) is responsible for development of the Aqaba region, with conservation work carried out by the ARA Environment Unit. ARA supervises town planning, tenders and public works, finance, administration, regional planning and research and studies. Although Jordan has no islands that could be used by breeding seabirds, monitoring of bird migration and other seabirds is carried out in Aqaba. The majority of bird work in Jordan is carried out by non-governmental organisations (NGOs) such as The Royal Society for the Conservation of Nature (RSCN), and the Jordan Royal Ecological Diving Society (JREDS), which organizes underwater clean-ups, awareness programmes and monitoring of coral reefs. In addition, several government institutions in Jordan are involved with the protection of the marine environment. The Water Authority of Jordan (WAJ) is responsible for monitoring industrial discharges on a semi-monthly basis to ensure compliance with Jordanian Standard Specifications (212).

The Aqaba Marine Science Station (MSS) monitors coral reefs and provides facilities for training and research. Studies are conducted on water quality, impacts of pollutants and baseline coral reef ecology. MSS also administers the Aqaba Marine Science Centre.

Environmental Institutions in Saudi Arabia

Although environmental protection and related issues are shared among several government agencies and scientific institutions in Saudi Arabia, they all come under the umbrella of the Ministerial

Committee for the Environment. The Committee is in charge of overall environmental strategies for the Kingdom.

Presidency of Meteorology and Environment (PME)

The PME (formerly Meteorology and Environmental Protection Administration MEPA) is responsible for marine conservation and environmental protection through setting up policy guidelines and standards for pollution control (both aquatic and atmospheric).

National Commission for Wildlife Conservation and Development (NCWCD)

NCWCD deals with wildlife conservation and management of protected areas.

Ministry of Agriculture

This ministry deals with rangeland management, the control of pests, the development of fisheries and other marine resources, and forestry.

Ministry of Water

The Ministry of Water is concerned with water resource management.

Ministry of the Interior

This ministry protects the environment and wildlife in coastal areas, including hunting control and guarding of pastures and national resources.

Ministry of Municipal and Rural Affairs

Through its municipalities, this ministry is responsible for cultivation works in cities and small towns and the control of rainwater drainage projects in urban areas.

Ministry of Health

This manages medical wastes and the effect of chemicals on the well being of people.

High Commission for Tourism

This is a new government agency established in 2001. It is involved in environmental issues through the development and management of eco-tourism in natural sites and the protection of resources for the benefit of local communities.

The Ministry of Petroleum and Mineral Resources and the Ministry of Industry and Electricity

These are operational agencies. They retain actual regulatory control over operational activities carried out under their respective mandates (while PME sets environmental performance standards, monitors the activities of operational agencies and serves as a central coordinator for environmental management).

Scientific Institutions

These include the King Abdul Aziz University (Faculty of Marine Sciences), the King Fahd University of Petroleum and Minerals Research Institute and the King Abdul Aziz City for Science and Technology. The functions of the universities are to undertake direct studies and applied research on the natural environment and wildlife, and to develop monitoring and development methods. The King Abdul Aziz City for Science and Technology has a positive role in financing and organising studies related to wildlife and the environment.

Environmental Institutions in Somalia

Under the current conditions in Somalia very little of the original conservation infrastructure remains. A detailed description of the former institutions in charge of the marine environment, and conservation in general, is given in FISHPOOL & EVANS (2001). These included:

National Marine Affairs Committee

This committee was established to oversee the overall development of the maritime sector, including minerals and water resources, fisheries and marine resources,

foreign affairs, education and defence ministries.

Ministry of Marine Transport and Ports

This ministry had a mandate to develop maritime transport and improve port facilities, and was responsible for environmental control of coastal areas, including ports, the prevention of marine pollution and navigation safety. The implementation of the Maritime Code, other laws and regulations relating to the marine environment applicable to ships in ports, and the implementation of regional and international conventions were under this ministry's responsibility.

Ministry of Fisheries and Marine Resources

This ministry was established in 1977 to develop and manage Somalia's fisheries resources. Basic marine fisheries legislation is contained in the Maritime Code of 1959.

National Range Agency and Ministry of Tourism

This was responsible for national parks and establishing MPAs; legislation was prepared for a network of protected areas before the political unrest.

In the absence of central government, Regional and District Councils and Councils of Elders have taken the role of principal coordinating organisations for the inflow of aid to their respective jurisdictions. Currently, the management of fisheries is carried out through the Ministry of Fisheries and Marine Resources of the local administrations in NW Somalia and in NE Somalia.

Environmental Institutions in Sudan

Environmental management in Sudan is under the responsibility of the Ministry of Agriculture and Natural Resources. In the Northern Region, the Wildlife Conservation and National Parks Forces of the Ministry of the Interior are responsible for implementing wildlife policies and the establishment and management of terrestrial and marine protected areas. The management of forests

comes under the National Forestry Corporation within the Ministry of Agriculture and Natural Resources. The Sudanese Marine Conservation Committee, a subcommittee of the National Committee for the Environment, undertook marine conservation work. Presently the Ministry of Environment and Tourism and the Ministry of Animal Health and their research centres are directly involved in the use and management of coastal and marine areas and their resources. The universities of Port Sudan and Khartoum as well as several research institutions located at Port Sudan and Suakin provide scientific support.

Environmental Institutions in Yemen

Several governmental agencies have responsibility for coastal and marine areas. In April 2001 the new government established The Ministry of Tourism and Environment by merging the tourism sector and the former Environment Protection Council (EPC). The ministry has two authorities, the Environment Protection Authority (EPA) and the General Tourism Authority (GTA).

Environment Protection Authority (EPA)

The EPA is the official agency in charge of the development and implementation of national policy planning for environmental protection and control. It is achieved by direct execution or coordination with other related ministries and institutions. In addition it plans and implements projects and natural conservation policy at a field level by coordination with line ministries. There are four directorates under the EPA: Directorate General (DG) for planning and data, DG for natural resources and biodiversity, DG for monitoring and DG for administration and finance. It is planned to establish a new DG for environmental awareness.

General Tourism Authority (GTA)

The GTA is responsible for tourism activities throughout the country, including eco-tourism. In addition the GTA is in charge of issuing permission for building tourist

villages along the coast or on islands. In 1995 the GTA developed a set of regulations and guidelines for tourists to regulate snorkelling and diving.

Ministry of Fish Wealth (MFW)

The MFW regulates fishing, issues licences, supervises processing and marketing of fish and fisheries products for local consumption and export. Import and/or manufacturing of fishing gear and other relevant equipment must be in accordance with specifications of the MFW. The ministry is responsible for the management and development of Yemen's fish resources. The MFW, through the department of monitoring and surveillance, is responsible for the enforcement of laws and regulations concerning marine resources. The MFW has two marine research centres, one in Aden and one in Hodeidah, both are capable of marine environment and fish stock assessments.

Public Corporation for Maritime Affairs (PCMA)

This is the main governmental body concerned with maritime safety and marine pollution control. It also plays an important role in developing a legislative framework to protect the marine environment.

5.4 National & International Agreements

Djibouti

Djibouti has national regulations for the protection of the marine environment, including provisions for marine pollution, protection of endangered species and the creation of protected areas. However, the majority of these regulations concern sea pollution and fisheries. A law banning hunting of wildlife was passed in 1971, but some hunting and capture of animals still takes place.

Internationally, the Republic of Djibouti is a signatory to a number of IMO conventions related to the safety of shipping and the prevention of marine pollution; see table of International Treaties and Agreements in appendix 4. The Intervention

Convention 1969, the Fund Convention 1971 and the London Convention 1972 were approved by Law No. 94/AN/89 2° L in 1989, while UNCLOS 1982 was approved by Law in 1985.

Decree 80-62/PR/MCTT of 25 May 1980 provides for the protection of the seabed and marine fauna, whereby the capture of marine mammals and turtles is illegal, as well as the trade with or export of these animals. Spear-fishing is also illegal in Djibouti. The country has also ratified the Convention on Biological Diversity (CBD) 1992, the UN Framework Convention on Climate Change (FCCC) 1992, and other valuable agreements; see appendix 4. At the regional level, an agreement was signed with Yemen and Somalia on the establishment of a sub-regional centre to combat oil pollution in the Gulf of Aden. Currently Yemen and Djibouti are negotiating a bilateral agreement regarding the use of equipment for an oil spill response.

Egypt

A number of Presidential decrees and public laws have been formulated dealing with bird protection and conservation of the marine environment:

- Law 4/1994 for the Environment: This law focuses largely on pollution, but has provisions addressing the protection of threatened species. Environmental impact assessments, and coastal and marine management are mandatory under this legislation.
- Law 102/1983 for Protected Areas: This law concerns protected areas and it established a legal framework for the creation and management of protected areas in the country.
- Law 53/1966 The Agriculture Law: This law provides protection for birds useful to agriculture, as well as for a number of endangered birds, mammals and reptiles.

Egypt is a Signatory or Party to many international agreements and conventions as shown in appendix 4.

Jordan

A number of national laws exist that directly or indirectly are pertinent to bird conservation and also to the marine environment, especially with respect to reef conservation:

- Agriculture Law no. 20 1973 (Chapter 3, “Protection of wildlife and birds. Regulations for their hunting” articles 144-155; as amended by Act No. 14 of 1974) and Regulation No. 113 (1973; issued in accordance with article 199 of Agriculture Law No. 20) provide the legal tools for monitoring all hunting activities.
- Law of the Aqaba Regional Authority No. 7 (1987) delegates the power to plan and implement tourist, industrial and agricultural projects in the region. The law has been the key instrument for strengthening environmental controls, including the use of Environmental Impact Assessments (EIAs) and coastal zone management guidelines. Regulations for the Jordanian Red Sea Marine Park are being developed under this law.
- Law of Environmental Protection No. 12 (1995) establishes a national framework for environmental policy, including the formation of a Higher Council for Environmental Protection (HCEP). The HCEP sets national environmental policy and reviews proposed laws, specifications and standards prepared by the General Corporation for Environmental Protection (GCEP). The GCEP implements pollution prevention regulations, including inspection and monitoring. The law also harmonises existing laws and settles jurisdictional conflicts.
- Law of Environmental Protection (Article 35) bans the removal, damage to and use of corals and shellfish from the Gulf of Aqaba.

- Jordan Standard Specifications No. 212 (1982 updated 1991) establishes maximum allowable limits for pollutant use and discharges into streams, wadis or the sea, and includes standards for the protection of aquatic life.
- Jordan Standard Specifications No. 893 (1994 updated 1995) sets maximum limits for pollutants in sewage plant discharges, which include publicly owned wastewater works operated by the WAJ.
- Shipping Law No. 51 (1961) bans ships from dumping soils, stones, sand, scum, toxic and chemical waste or any other material into the sea. Spills that occur during the loading and unloading of ships are also classified under this law.
- Aqaba Port Quarantine Law No. 32 (1972) bans the discharge of ship-based pollution, including bilge water. The law may impose fines and order remediation works.
- Agricultural Law No. 20 (1973) issues fishing licences and prohibits the removal of corals.

Jordan's status regarding the major international conventions on wildlife conservation and the prevention of marine pollution can be seen in appendix 4.

Saudi Arabia

Numerous national decrees and laws address the conservation of the marine environment in Saudi Arabia in general and seabirds in particular, including a hunting law, a wildlife trade law (fauna and flora), and protection for protected areas. Important resolutions that help protect the marine environment include: the environmental protection standards (Document No. 1401-01, 1402), the national oil spill and hazardous substances contingency plan, the resolutions adopted by the Environment Protection Council Committee (EPCCOM) and proposed to the Council of Ministers for their consideration (in protectorates), the Council of Ministers Decision No. 271 (23.11.1404)

obliging the use of best available technology to reduce pollutant emissions (such as cement dust), the rules and regulations for seaports and the draft national fisheries regulations.

Saudi Arabia is a signatory to a number of regional and international agreements that oblige it to protect the environment. A summary of these can be seen in appendix 4. Of particular note are the Kingdom's plans to ratify the RAMSAR Convention.

Somalia

National environmental legislation is poorly developed and inadequate for environmental management and conservation. Somalia has not formulated a national policy for the exploitation of marine resources. In the present situation any existing laws and regulations are not enforced and national institutions are of no relevance.

Internationally, Somalia is a signatory to several agreements and has ratified several conventions and protocols that are relevant to the marine environment; see appendix 4.

Sudan

National laws and regulations relating to the coastal and marine environment and resources were initiated in the region with the marine fisheries ordinance of 1937, amended in 1975 and 1978. The regulation prohibits over-fishing, dumping refuse including oil into the sea, and the collection of corals, shells, aquarium fish and seabird eggs. In addition, the Environmental Health Act, established in 1975, prohibits the dumping into the sea of any item that is harmful to humans or other animals.

Sudan's international record is listed in appendix 4.

Yemen

In recent years Yemen has established a number of significant instruments, laws and regulations that concern the conservation of the marine environment:

- Law No. 11 (1993), protecting the sea from pollution, is mainly concerned with pollution by oil and from passing ships.
- Law No. 42 (1991), for fisheries, is the main legal framework for the organisation, exploitation and protection of fishing and aquatic resources.
- Law No. 37 (1991) defines territorial waters, the exclusive economic zone of 200 nautical miles and island boundaries. It prohibits the dumping of any wastes into these zones.

Yemen's international record is given in appendix 4.

6. GENERAL DISCUSSION

The main objective of this report is to review the status of, and threats to, the seabird populations in the Red Sea and the Gulf of Aden. It is necessary to discuss the major problems in order to develop a strategic action plan to conserve seabird populations. The following points need immediate attention for the development and implementation of seabird conservation strategies: lack of accurate and available information, lack of institutional effectiveness in conservation, lack of funds to support seabird research and conservation, lack of capacity regarding regional expertise, lack of research on seabird conservation and lack of awareness of the importance of seabird conservation.

Lack of Accurate and Available Information

The overview of the status of breeding seabirds in the RSGA region presented above shows that there are many gaps in the availability and accuracy of information. These can be summarised as follows: firstly, most data were from surveys carried out more than one or two decades ago; secondly, there is no current systematic monitoring of seabirds in the region; thirdly, some of the surveys were conducted outside of the breeding season (spring or autumn) and thus

the accuracy of species population estimates is questionable. In addition, some species were estimated according to the number of individuals seen rather than of breeding pairs. This may increase the possibility of overestimating species numbers.

In conclusion, we believe that there was insufficient data to formulate an accurate estimate of breeding seabird numbers in the RSGA region. However, the information gathered in this report should be used as a baseline for future work concerning the conservation and monitoring of the breeding seabird populations and assessments of the threats facing these populations.

Lack of Institutional Effectiveness in Seabird Conservation

Although most of the PERSGA countries have national laws and regulations protecting the marine environment and many are signatories to international conventions concerning the conservation of seabirds, these are not regulated or enforced adequately or effectively. The underlying reason for the lack of enforcement is probably because seabirds are not considered as a priority for management. Most of the work carried out on seabirds in the region has been by non-national institutions or researchers. As soon as a project is finished, the work is usually discontinued.

Responsibility for the marine environment is shared between different departments, thus creating difficulties in administration. Most of the important protected seabird areas are not properly managed, while other seabird areas in the region have been protected for their strategic or political importance rather than for their avifauna. For example, in Saudi Arabia, the Farasan Islands have been protected since the late 1980's but egg collection is still practiced by the local fishermen (SHOBRAK et al. 2002c). Umm al-Qamari protected area is supposed to be guarded by the coastguard, but human activities have been recorded on the islands (OSTROWSKI 2001a, 2001b, 2002). In Egypt,

some islands are protected but they are also under pressure from tourists, who have already caused a negative impact on breeding terns on inshore islands (HOATH et al. 1997). A similar situation is present on the Moucha and Maskali Islands protected area in Djibouti (SHOBRAK et al. 2002a).

Disturbance, consumption of eggs and chicks, introduced predators (cats, rats, mongooses and dogs) and pollution are the main threats currently affecting breeding seabirds in the region and these frequently occur on islands that have military activity. The military may pose a serious threat to breeding seabirds in the region, especially in Yemen, where several islands important for seabirds are occupied by the military (AL-SAGHIER 2002b).

In conclusion, the institutions in the region should increase their efforts to protect at least the existing protected areas and areas with a high diversity of seabird species. Figure 7 shows the important seabird areas in the region, which have a high priority for conservation and where immediate action should be taken to protect the populations. Three criteria were used for a site to qualify for high priority for protection:

- The site supports breeding seabirds of local or national interest.
- The site supports a significant number of breeding seabirds in the region.
- The site supports >1 % of the biogeographical population of one or more species.

The northern islands in the Egyptian Red Sea are important for the endemic white-eyed gull and osprey, while two areas in Sudan (Mukawwar & Dungonab Bay and the Suakin Archipelago) are important for terns, crab plover, osprey and sooty falcon. In Saudi Arabia, Al Wajh Bank in the north of the Red Sea and the Farasan Archipelago in the south are important for their diversity and high numbers of breeding seabirds. The islets

associated with Moucha and Maskali Islands and Les Sept Frères should be given high priority for protection in Djibouti. The Yemeni islands in the Red Sea are very important areas for breeding seabirds and the threats seem more severe there. In Somalia in the Gulf of Aden, Mait and Aibat and Sa'adadin Islands need further investigation to assess the threats, while Socotra in Yemen requires greater efforts to increase protection. The priority ratings do not mean that other sites are unimportant. They may act as an aid for individual countries and PERSGA to start protecting sites that are most representative of the region. The classification of the sites according to the three criteria outlined can be seen in appendix 3.

Lack of Funds to Support Seabird Research and Conservation

As seabirds are not a priority for institutions in the region, funding of seabird surveys comes from outside, generally from non-national organisations. No effort has been made to attract financial sponsorship from wealthy organisations such as oil companies. At present, PERSGA is carrying out baseline habitat assessment studies in the region, but further funding is needed to establish long-term research, monitoring and conservation activities.

Figure 7: Priority Sites for Seabird Protection



1. Hurghada Archipelago (Egypt)
2. Tiran Island (Egypt/Saudi Arabia)
3. Al Wajh Bank (Saudi Arabia)
4. Mukkawar Island and Dunganab Bay (Sudan)
5. Suakin Archipelago (Sudan)
6. Farasan Archipelago (Saudi Arabia)
7. Kamaran and associated islands (Yemen)
8. Al Zubair islands (Yemen)
9. Az Zaqur islands (Yemen)
10. Isles des Sept Freres (Djibouti)
11. Musha, Maskali and associated islands (Djibouti)
12. Aibat and Sa'adadin islands (Somalia)
13. Mait islands (Somalia)
14. Socotra Islands Group (Yemen)



Lack of Institutional Capacity and Regional Expertise on Seabirds

In the region, experts are limited and the majority are expatriates. Even at the management level, there is capacity shortfall for the marine environment. There is a clear need to strengthen the skills of the manpower base to improve assessment, planning and management of coastal and marine environments. The development of manpower must be an integral component of all conservation activities.

Lack of Research on Seabird Conservation

Although there is an increase in the number of scientific institutions in the region, and specialists in the marine environment, no research programmes relating to seabird conservation are being carried out. This is due to the lack of understanding of the significance of seabird populations to the regional ecology, the small number of local experts and insufficient funding. Seabirds are known to be important as bio-indicators as they are at the top of the food chain. Sampling of eggs, feathers or tissues can allow monitoring of the levels of organochlorines and heavy metals in the marine environment. Seabird monitoring can be used to examine the levels of oil and plastic pollution. In addition, monitoring the seabirds' diet, breeding numbers and breeding success can indicate the health of the fisheries in the region. Thus, research institutions and conservation agencies should work together to develop research programmes to monitor seabird populations and to assess the threats facing them.

Lack of Awareness about the Importance of Seabird Conservation

Most of the factors affecting seabird populations are a result of human activities. Egg collection may have been a traditional activity for local fishermen in the region but, with the increase in well-equipped boats and foreign fishermen, these activities have become very damaging. Most of the fishermen probably do not know the laws and regulations regarding seabirds. It is essential

to start public awareness programmes for the conservation of the marine environment in general and for seabirds in particular. In addition, as tourism increases in the important seabird areas the level of threats to the seabirds also increases; tourists should be made aware of the sensitivity of certain areas.

7. RECOMMENDATIONS

Strengthen the Capacity for Seabird Conservation

- Train the managerial staff of the key national institutions in seabird monitoring techniques and in marine resource management.
- Train biological staff in the biology and ecology of birds in general and seabirds in particular.
- Improve the coordination between the institutions in charge of the marine environment.
- Strengthen the involvement of NGOs in seabird monitoring and management.

Strengthen the Protection of Breeding Seabird Areas

- Establish protected areas for breeding seabirds in the region.
- Increase the effectiveness of existing protected areas, by establishing a marine conservation force or ranger force.
- Include seabird areas in the coastal zone management plans for each country in the region.

Develop a Conservation Action Plan for Breeding Seabirds in the Region

Research and Monitoring

- Conduct complete surveys of seabirds in the region.
- Establish a monitoring programme for the RSGA countries.

- Encourage cooperation between scientific institutions to carry out applied research on all aspects of ecology on the seabirds in the region and to assess the threats facing the seabird populations.
- Develop a mechanism for funding seabird research and monitoring.
- Develop a method to monitor the threats affecting seabird populations.

Legislation

- Develop regional and national legislation for seabirds based on the relevant conservation conventions, such as RAMSAR and CMS.
- Develop laws and regulations protecting seabird populations.

- Develop management plans for each protected area.

Awareness

- Develop awareness programmes for fishermen living or operating around the important seabird areas in the region.
- Establish education centres near important seabird areas to promote environmental awareness among both locals and tourists.
- Produce pamphlets and posters presenting the importance of seabirds to the marine environment; distribute these to fishermen, schools, government offices and tourists in coastal cities in the region.

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Appendix 1. Number of breeding pairs of seabirds recorded in the PERSGA countries

Species	Estimated number in different PERSGA countries						
	Djibouti	Egypt	Jordan	Saudi Arabia	Somalia	Sudan	Yemen
Jouanin's Petrel	0	0	0	0	0	0	50+
Persian Shearwater	0	0	0	0	NK	0	10,000*
Red-billed Tropicbird	3-7	10	0	11-100	B	BA	520-700
Masked Booby	0	0	0	1	100-240	0	800-1,150
Brown Booby	100-150	85	0	2,000	B	B	13,230
Socotra Cormorant	0	0	0	0	NK	NB	B
Pink-backed Pelican	NK	0	0	>310	NK	BA	>100
Little Green Heron	B	40-60	0	ca. 1,000	B	B	B
Cattle Egret	0	0	0	1,900*	BA	BA	30
Western Reef Heron	20-40	130-200	0	ca. 1,000	B	B	B
Black-headed Heron	-	0	0	NK	NK	NK	NK
Purple Heron	B	0	0	10-20	NK	NK	NK
Goliath Heron	BA	<10	0	50-100	BA	BA	BA
Spoonbill	B	30-50	0	110-250	B	B	B
Osprey	10-20	150-200	0	340	<20	100	66+
Sooty Falcon	5-10	300+	0	260-380	NK	B	45+
Crab Plover	-	BA	0	1,100-1,500	1,000	333-500	1,060
Kentish Plover	NK	100+	0	B	NK	B	70+
Sooty Gull	B	100+	0	1,000-1,500	50-100	B	2,525+
White-eyed Gull	600-700	2,500	0	>1,500	1,200-2,200	300-1,000	3,900+
Caspian Tern	0	250-350	0	100-200	NK	BA	BA
Swift Tern	500-600	B	0	2,000	<1,000	B	B
Lesser Crested Tern	1,000 (1985)	1,500+/-	0	2,000-4,000	B	3,000-5,000	5,000
White-cheeked Tern	60-80	2,500+	0	7,500	BA	BA	8,910+
Bridled Tern	530	1,200+	0	60,000	100,000+	8,000	70,230
Saunders's Little Tern	0	0	0	B	NK	BA	B
Brown Noddy	5-10	0	0	7,500	10,000-20,000	B	3,940

B= breeding confirmed, BA= probable breeding, NK= not known, NB= not breeding, * counted as individuals

Appendix 2. Bird Species Distribution, Global and Regional Status, and Population Estimates

Species	Population Distribution	Global Status	Status in RSGA	RSGA Population Estimate (pairs)
Jouanin's Petrel	Endemic to the Northwest Indian Ocean	Near threatened	Threatened	3,000 **
Persian Shearwater	Endemic to the Indian Ocean and Gulf of Aden	Near threatened	Near threatened	10,000 **
Red-billed Tropicbird	Endemic subspecies to the Red Sea, Gulf of Aden and Arabian Sea	Not threatened	Uncertain	700
Masked Booby	Endemic subspecies to Western Indian Ocean	Threatened	Threatened	1,000
Brown Booby	The subspecies occur throughout the Indo-Pacific	Not threatened	Near threatened	15,000*
Socotra Cormorant	Endemic to the Arabian Gulf, Arabian Sea and Gulf of Aden	Threatened	Threatened	15,000***
Pink-backed Pelican	Widespread in the mainland in Africa and along the Islands in the Red Sea	Not threatened	Declining	-
Little Green Heron	Endemic subspecies (<i>B. s. brevipes</i>) to the Red Sea and Gulf of Aden	Not threatened	Stable	-
Cattle Egret	Widespread	Not threatened	Stable (declining in some areas due to insecticide)	-
Western Reef Heron	Widespread	Not threatened	Stable	-
Black-headed Heron	Widespread in Africa, with small population in Yemen	Not threatened	Small population occur	-
Purple Heron	Widespread in low number in the Red Sea and the Gulf of Aden	Not threatened	Data insufficient	-
Goliath Heron	Widespread	Not threatened	Data insufficient	-
Spoonbill	Endemic subspecies to the Red Sea and Gulf of Aden	Not threatened	Declining	-
Osprey	Widespread	Not threatened	Declining	-
Sooty Falcon	Important population in the Red Sea, Gulf of Aden and Arabian Gulf	Not threatened	Stable	-
Crab Plover	Breeds in the Northwest of the Indian Ocean	Not threatened	Uncertain	-
Kentish Plover	Widespread	Not threatened	Stable	-
Sooty Gull	Endemic to the Northwest of the Indian Ocean	Not threatened	Not threatened	4,000
White-eyed Gull	Endemic to the Red Sea and Gulf of Aden	Near threatened	Threatened	11,000*
Caspian Tern	Widespread	Not threatened	Vulnerable (the Northern population declining)	500*
Swift Tern	Endemic subspecies to the Red Sea, Arabian Gulf and Arabian Sea	Not threatened	Threatened	3,500*

Lesser Crested Tern	Widespread throughout North African coast, Arabian Sea and Indo-Pacific	Not threatened	Not threatened (Declining due to egg collecting)	14,000
White-cheeked Tern	Northwest Indian Ocean, high concentration in the Red Sea, Arabian Sea	Not threatened	Not threatened (Declining due to egg collecting)	27,000*
Sooty Tern	Tropical and subtropical zones of Pacific, Indian and Atlantic Ocean	Not threatened	Uncertain	7,000
Bridled Tern	Breeds in the Red Sea, Arabian Gulf, Arabian Sea, Indo-Pacific and Locally West Africa	Not threatened	Not threatened (Declining due to egg collecting)	240,000*
Saunders's Little Tern	Northwest Indian Ocean and east African and north-west Indian coasts	Not threatened	Uncertain	200*
Brown Noddy	Widespread in tropical and subtropical zones in Atlantic, Indian and Pacific Ocean	Not threatened	Uncertain	26,000*

* = Count of breeding birds from surveyed coasts and islands; ** = Estimated breeding population on Socotra Archipelago; *** = Estimated breeding population on Islands off Bir Ali and Socotra

Population data drawn from PERSGA surveys, DELANY & SCOTT 2002, SNOW & PERRINS 1998.

Appendix 3. Marine Protected Areas and Important Bird Areas in the Red Sea and the Gulf of Aden (from PERSGA, Fishpool & Evans 2001, Evans 1994)

Country	Site	Coordinate (N-E)	MPA name	IBA	Internationally important sites with > 1% of the bio-geographical pop.	Significant breeding seabird species - regional and national	Degree of overlap (Priority for protection)
Djibouti	Islets associated with Moucha and Maskali Islands	11° 43' - 43° 13' 11° 43' - 42° 10' 11° 43' - 43° 11' 11° 43' - 43° 11' 11° 43' - 43° 11'	Moucha Territorial Park		White-eyed gull Brown noddy	White-eyed gull Brown noddy	Same area (High)
	Les Sept Frères Islands (six islands involved)	12° 28' - 43° 23' 12° 28' - 43° 27' 12° 27' - 43° 26' 12° 28' - 43° 26' 12° 28' - 43° 25' 12° 28' - 43° 22'	Sept Frères Islands and Ras Siyyan	Kadda Guéini - Douméra,	White-eyed gull Sooty gull Brown booby Swift tern Lesser-crested tern	White-eyed gull Sooty gull Brown booby Osprey	The IBA is larger and includes most of the mangrove area to the south (High)
	Godoriya mangrove	12° 27' - 43° 17'		Kadda Guéini - Douméra	African reed warbler		Part of IBA (Medium)
Egypt	Ras Mohammed	27° 56' - 34° 33'	Ras Mohammed National Park (480 km ²)	Tiran island 27° 56' - 34° 33' (31km ²)	Imperial eagle Lesser kestrel Pallid harrier White-eyed gull White-cheeked tern Caspian tern Sooty falcon	White-eyed gull Imperial eagle	Both IBAs, (Medium)
	Nabq Protected Area	28° 03' - 28° 30' to 34° 17' - 34° 35'	Nabq Protected Area	Nabq Protected Area	Sooty falcon Spoonbill Reef heron	Spoonbill Osprey	(Low)
	Abu Galum Protected Area		Abu Galum Protected Area			Osprey	(Low)
	Gabel Elba National Park	Between 22° 00' - 23° 30' and 36° 00' - 36° 40'	Gabel Elba Protected Area 5000 km ²	Qulân Islands (24° 22' - 35° 23') 3 km ²	Sooty falcon White-eyed gull	White-eyed gull Osprey	Marine and terrestrial habitat
				Wadi Jimal Island 24° 40' - 35° 10' 2 km ²	White-eyed gull Sooty falcon	White-eyed gull	
				Zabargad Island 23° 37' - 36° 12' 4.5 km ²	Sooty falcon White-eyed gull	White-eyed gull	

Country	Site	Coordinate (N-E)	MPA name	IBA	Internationally important sites with > 1% of the bio-geographical pop.	Significant breeding seabird species - regional and national	Degree of overlap (Priority for protection)
				Siyal Islands 22° 47' - 36° 11'	White-eyed gull	White-eyed gull	
				Rawabel Islands 22° 25' - 36° 32' <1 km ²	White-eyed gull		
	Wadi El Jimal-Hamatah Protected Area						The marine part of Elba National Park, which includes Wadi El Jimal, Qulân Islands (High)
	Red Sea Island and Mangroves Protected Area			Hurghada Archipelago between 27° 05' - 27° 51' & 33° 32' - 34° 05' 1500 km ²	White-eyed gull White-cheeked tern Caspian tern Lesser crested tern Sooty falcon	White-eyed gull Sooty falcon	An extension of Elba National Park to include all the coastal areas and islands from the border of Sudan to Hurghada, including all the mangrove areas (High)
Jordan	Aqaba	29° 30' - 35° 00'	Aqaba Marine Park	Aqaba Mountains	Non breeding white-eyed gull Migrating levant sparrowhawk	Sooty falcon Lanner falcon Arabian warbler	Same area (Low)
Saudi Arabia	Farasan Islands	16° 45' - 42° 00'	Farasan Islands Protected Area	Farasan Islands	Brown booby White-eyed gull Sooty gull Red-billed tropicbird Saunders' tern Bridled tern	Egyptian vulture Sooty falcon Goliath heron	Same area (High)
	Umm al-Qamari Island	18° 59' - 41° 06'	Umm al-Qamari Protected Area	Umm al-Qamari Protected Area	Brown booby Swift tern	African collared dove Cattle egret	Same area (Low)
	Yanbu Royal Commission Protected Area	23° 56' - 38° 14'	Yanbu Royal Commission Protected Area 5 km ²	Madinat Yanbu al-Sinaiyah	Wintering Terek sandpiper	Goliath heron	

Country	Site	Coordinate (N-E)	MPA name	IBA	Internationally important sites with > 1% of the bio-geographical pop.	Significant breeding seabird species - regional and national	Degree of overlap (Priority for protection)
		25° 35' - 36° 45'		Al Wajh Bank	White-eyed gull Sooty gull White-cheeked tern	Sooty falcon	(High)
		18° 59' - 41° 06'		Qishran Bay		Goliath heron Sooty falcon White-collared kingfisher Crab plover	(Medium)
		17° 59' - 41° 42'		Kutambil Island	Eurasian spoonbill	Sooty falcon	(Medium)
		17° 48' - 41° 52'		Shuqaia mangrove		Mangrove reed warbler White-collared kingfisher	(Medium)
		16° 53' - 42° 32'		Jizan Bay	Crab plover Grey plover Lesser sand plover Whimbrel Redshank	Crab plover	(Medium)
		21° 26' - 39° 09'		Jeddah south cornice and port	Non-breeding Eurasian spoonbill Grey heron Slender-billed gull Western reef heron		(Medium)
		18° 26' - 41° 26'		Khawr 'Amiq		White-collared kingfisher	(Medium)
		16° 45' - 42° 40'		Khawr Wahlan		Crab plover	
Somalia	Aibat Sa'adadin and Saba Wanak	11° 28' - 43° 28'	Aibat, Sa'adadin and Saba Wanak	Jazirat Aibat and Jazirat Sa'adadin	White-eyed gull Bridled tern	White-eyed gull Crab plover	Same area (High)
	Maydh Island	11° 14' - 47° 15'	Mait Island	Jazirat Maydh	Brown noddy Masked booby		Same area (High)
		11° 06' - 47° 39'		Daalo			(Low)
		10° 44' - 43° 28'		Zeila			(Low)
Sudan	Sanganeb	19° 45' - 37° 26'	Sanganeb National Park 12 km ²				(Low)
	Mukawwar Islands and Dungonab Bay	20° 50' - 37° 17'	Mukawwar Islands and Dungonab Bay	Mukawwar Islands and Dungonab Bay	White-eyed gull Bridled tern Crab plover	White-eyed gull Sooty falcon	(High)

Country	Site	Coordinate (N-E)	MPA name	IBA	Internationally important sites with > 1% of the bio-geographical pop.	Significant breeding seabird species - regional and national	Degree of overlap (Priority for protection)
	Suakin Archipelago	18° 50' - 38° 00'	Suakin Archipelago Reserve	Suakin Archipelago	Bridled tern White-cheeked tern Crab plover	Sooty falcon Osprey	(High)
Yemen	Socotra Archipelago	12° 19' & 12° 42'E and 53° 22' & 54° 29'	Socotra Islands Protected Area It includes the islands to the east of Socotra :(Abd al-Kuri, Sabuniya and Ka'l Fir'awn and Al-Ikwan). (3625 km ²)	Several IBAs were identified in this protected area - Qalansiya lagoon - Jabal Ma'lih Escarpment - Ra's Hebaq - Airport Dunes - Muqadrihon Pass - Shidahah - Wadi Ayhaft - Rewgid and Regid Plateaus - Jebal Jef - Rookib Hills - Hamaderoh Plateau and scarp - Coast of Bindar Di-Sha'b - Hajhir mountains - Firjih - Di-Ishal foothills - Diksam - Ra's Momi and Fikhah - Firmihin near Jebal Keseslah - Noked plain	Socotra cormorant Sooty gull Jouanin's petrel Masked booby Persian shearwater	Socotra cormorant Jouanin's petrel Masked booby	(High)
		13° 50' - 48° 20'		Bir Ali Islands	Socotra cormorant Sooty gull	Socotra cormorant Sooty gull	(High)
		16° 21' - 52° 21'		Abdullah Gahrib lagoons	Sooty gull Swift tern Lesser black headed gull	Sooty gull	(Medium)
		15° 26' - 51° 45'		Qishn Beach	Socotra cormorant Sooty gull	Socotra cormorant Sooty gull	(Medium)

Country	Site	Coordinate (N-E)	MPA name	IBA	Internationally important sites with > 1% of the bio-geographical pop.	Significant breeding seabird species - regional and national	Degree of overlap (Priority for protection)
		15° 35' - 52° 10'		Ra's Fartak	Jouanin's petrel Persian shearwater Sooty gull	Jouanin's petrel Persian shearwater Sooty gull	(Medium)
		12° 45' - 44° 15'		Aden	White-eyed gull Imperial eagle Swift tern	White-eyed gull	
		16° 00' - 42° 50'		Midi-Al-Luhayyah	Western reef heron Lesser sand plover	White-eyed gull Pink-backed Pelican Crab plover White-cheeked tern	(High)
		15° 40' - 42° 30'		Islands north of Al Hodeidah	White-eyed gull Red-bill tropicbird Brown booby Lesser-crested tern	White-eyed gull Crab plover	(High)
		15° 20' - 42° 50'		Bahr Ibn Abas-Ra's Isa	White-eyed gull Caspian tern Goliath heron Sooty falcon	White-eyed gull Sooty falcon Pink-backed pelican Crab plover Sooty gull White-cheeked tern	(High)
		15° 05' - 42° 55'		Al-'Urj	Whimbrel Saunders tern	Crab plover	(Low)
		14° 30' - 43° 00'		Nukhaylah-Ghulayfiqah	White-eyed gull White-cheeked tern	Gabar goshawk	(Low)
		14° 08' - 43° 07'		Al-Fazzah	Kentish plover White-eyed gull	White-eyed gull	(Low)
		13° 52' - 42° 45'		Jaza'ir al-Hanish	White-eyed gull Brown booby	Persian shearwater Sooty gull White-eyed gull White-cheeked tern	(High)
		12° 50' - 43° 26'		Bab al-Mandab-Mawza	White-eyed gull	Persian shearwater Crab plover	(High)

Appendix 4. Status of International Treaties and Agreements (PERSGA/GEF 1998)

IMO Conventions as of June 1998 (PERSGA 1998)

indicates Signatory or Party

	Egypt	Jordan	Saudi Arabia	Sudan	Yemen	Djibouti	Somalia
IMO Convention 1948	✓	✓	✓	✓	✓	✓	✓
IMO amendments 1991	✓						
IMO amendments 1993	✓		✓				
SOLAS Conv. 1974	✓	✓	✓	✓	✓	✓	
SOLAS Proto. 1978	✓		✓				
SOLAS Proto. 1988	✓						
Stockholm Agreement 1996							
LOAD LINES Conv. 1966	✓		✓	✓	✓	✓	✓
LOAD LINES Proto.1988	✓						
TONNAGE Conv. 1969		✓	✓		✓		
COLREGs Conv. 1972	✓		✓		✓	✓	
CSC Conv. 1972			✓		✓		
CSC amendments 1993							
SFV Proto. 1993							
STCW Conv. 1978	✓		✓	✓			
STCW-F Conv. 1995							
SAR Conv. 1979							
STP Agree. 1971	✓		✓		✓		
STP Proto. 1973	✓		✓		✓		
INMARSAT Conv. 1976	✓		✓				
INMARSAT amendments 1994			✓				
INMARSAT OA 1976	✓		✓				
INMARSAT OA amendments '94			✓				
FACILITATION Conv. 1965	✓	✓			✓		
MARPOL 73/78 (Annex I/II)	✓					✓	
MARPOL 73/78 (Annex III)	✓						
MARPOL 73/78 (Annex IV)	✓						
MARPOL 73/78 (Annex V)	✓						
MARPOL Proto. 1997 (Annex VI)							
LC Conv. 1972	✓	✓					
LC Proto. 1996							
Intervention Conv. 1969	✓				✓	✓	
Intervention Proto. 1973	✓				✓		
CLC Conv. 1969	✓		✓		✓	✓	
CLC Proto. 1976	✓		✓		✓		
CLC Proto. 1992	✓						
Fund Conv. 1971						✓	
Fund Proto. 1976							
Fund Proto. 1992							
NUCLEAR Conv. 1971					✓		
PAL Conv. 1974	✓	✓			✓		
PAL Proto. 1976					✓		
PAL Proto. 1990	✓						
LLMC Conv. 1976	✓				✓		
LLMC Proto. 1996							
SUA Conv. 1988	✓						
SUA Proto. 1988	✓						
SALVAGE Conv. 1989	✓	✓	✓				
OPRC Conv. 1990	✓					✓	
HNS Conv. 1996							

Key

IMO Convention	International Convention to establish the IMO
SOLAS Convention	International Convention for the Safety of Life at Sea
Stockholm Agreement	UN Conference on the Human Environment (Stockholm 1972)
LOAD LINES Convention	International Convention on Load Lines
TONNAGE Convention	International Convention on Tonnage Measurements of Ships
COLREG Convention	International Regulations for Preventing Collisions at Sea
CSC Convention	International Convention for Safe Containers
SFV Protocol	The Torremolinos International Convention for the Safety of Fishing Vessels
STCW Convention	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
STCW-F Convention	International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel
SAR Convention	International Convention on Maritime Search and Rescue
STP Agreement	Special Trade Passenger Ships Agreement
INMARSAT Convention	Convention on the International Maritime Satellite Organization
FACILITATION Convention	Convention on Facilitation of International Maritime Traffic
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 relating thereto
LC Convention	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
Intervention Convention	International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties
Intervention Protocol	Protocol Related to Intervention on the High Seas in Cases of Pollution by Substances other than Oil, 1973, as amended
CLC Convention	International Convention on Civil Liability for Oil Pollution Damage
FUND Convention	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
NUCLEAR Convention	Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Materials
PAL Convention	Athens Convention relating to the Carriage of Passengers and their Luggage by Sea
LLMC Convention	Convention on the Limitation of Liability for Maritime Claims
SUA Convention	Convention for the Suppression of Unlawful Acts Against the Safety of Marine Navigation
SALVAGE Convention	International Convention on Salvage
OPRC Convention	International Convention on Oil Pollution Preparedness, Response and Cooperation
HNS Convention	International Convention on Liability and Compensation for Damage in connection with the Carriage of Hazardous and Noxious Substances by Sea

Other International Conventions

	Djibouti	Egypt	Jordan	Saudi Arabia	Somalia	Sudan	Yemen
African Conv. CNNR 1968	✓	✓				✓	
RAMSAR 1971	✓	✓	✓				
World Heritage Conv. 1972		✓	✓	✓		✓	✓
CITES 1973	✓	✓	✓	✓	✓	✓	✓
CMS (Bonn) 1979		✓	✓	✓	✓		
UNCLOS 1982	✓	✓	✓	✓	✓	✓	✓
PERSGA 1982	✓	✓	✓	✓	✓	✓	✓
Conv. for Prot. of M&CE EAR 1985					✓		
Vienna Convention 1985	✓	✓	✓	✓	✓	✓	✓
Montreal Protocol 1987	✓	✓	✓	✓	✓	✓	✓
Basel Convention 1989	✓	✓	✓	✓			✓
Bamako Convention 1991	✓	✓			✓	✓	
CBD 1992	✓	✓	✓	✓		✓	✓
UN FCCC 1992	✓	✓	✓	✓		✓	✓
UNCCD 1994	✓	✓	✓	✓	✓	✓	✓
AEWA 1995		✓	✓			✓	

✓ indicates either signature, ratification, accession, acceptance or approval

Key

African Conv. CNNR 1968	African Convention on the Conservation of Nature and Natural Resources (Algiers Convention) 1968
RAMSAR 1971	Convention on Wetlands of International Importance especially as Waterfowl Habitats 1971
World Heritage Conv. 1972	Convention concerning the Protection of World Cultural and Natural Heritage 1972
CITES 1973	Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973
CMS (Bonn) 1979	Convention on Conservation of Migratory Species of Wild Animals 1979
UNCLOS 1982	United Nations Convention on the Law of the Sea 1982
PERSGA 1982	Regional Convention of the Conservation of the Red Sea and Gulf of Aden Environment (and Protocol) [Jeddah Convention] 1982
Conv. for Prot. of M&CE EAR 1985	Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region 1985
Vienna Convention 1985	Vienna Convention for the Protection of the Ozone Layer 1985
Montreal Protocol 1987	Montreal Protocol on Substances that Deplete the Ozone Layer 1987
Basel Convention 1989	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1989
Bamako Convention 1991	Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa 1991
CBD 1992	The Convention on Biological Diversity 1992
UN FCCC 1992	United Nations Framework Convention on Climate Change 1992
UNCCD 1994	United Nations Convention to Combat Desertification 1994
AEWA 1995	Agreement on the Conservation of African Eurasian Migratory Waterbirds 1995

Appendix 5. Acronyms

ARA	Aqaba Regional Authority
CBD	Convention on Biological Diversity 1992
CMS	Convention on the Conservation of Migratory Species of Wild Animals 1979
DANIDA	Danish-Egyptian Development Cooperation in the Environment Sector
DG	Directorate General
EC	European Commission
EEAA	Egyptian Environment Affairs Agency
EGPC	Egyptian General Petroleum Corporation
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
EPC	Environment Protection Council
EPCCOM	Environment Protection Council Committee
FAO	Food and Agriculture Organization of the United Nations
FCCC	UN Framework Convention on Climate Change 1992
GCEP	General Corporation for Environmental Protection
GDP	Gross Domestic Product
GEF	Global Environment Facility
GTA	General Tourism Authority
HCEP	Higher Council for Environmental Protection
IBA	Important Bird Area
IMO	International Maritime Organization of the United Nations
IUCN	World Conservation Union
IWRB	International Waterfowl and Wetlands Research Bureau
JREDS	Jordan Royal Ecological Diving Society
MPA	Marine Protected Area
MEPA	Meteorology and Environmental Protection Administration (now PME)
MFW	Ministry of Fish Wealth
MSS	Aqaba Marine Science Station
NCICZM	National Committee for Integrated Coastal Zone Management
NCWCD	National Commission for Wildlife Conservation and Development
NGO	Non-Governmental Organisation
NIOF	National Institute of Oceanography and Fisheries
NWRC	National Wildlife Research Centre (NCWCD, Taif, Saudi Arabia)
OSME	Ornithological Society of the Middle East
PCMA	Public Corporation for Maritime Affairs
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
PME	Presidency of Meteorology and Environment (formerly MEPA)
RAMSAR	Convention on Wetlands of International Importance
RSCN	Royal Society for the Conservation of Nature
RSG	Red Sea Governorate
RSGA	Red Sea and Gulf of Aden
SAP	Strategic Action Programme for the Red Sea and Gulf of Aden
SSM	Standard Survey Methodology
UNCLOS	United Nations Convention on the Law of the Sea 1982
UNOPS	United Nations Office for Project Services
WAJ	Water Authority of Jordan
WWF	World-Wide Fund for Nature

ملخص موجز

يمثل البحر الأحمر وخليج عدن نظاماً إيكولوجياً بحرياً مدارياً يتسم بالتعقيد والتفرد. لقد تكون البحر الأحمر من الامتداد الشمالي لنظام الصدع الأفريقي، ويبلغ طوله 2.000 كيلو متر، بينما يمثل خليج عدن جزءاً من المحيط الهندي ويبلغ طوله 1.400 كيلو متر. وتحظى المنطقة بتنوع حيوي كبير ودرجة عالية من استيطان الأنواع، لا سيما الأسماك والشعاب.

هنالك محدودية في المعلومات المتاحة حول الطيور البحرية، إذ تم إجراء أغلب الدراسات قبل عقد أو عقدين من السنوات. وتشير التقارير إلى أن هنالك 17 نوعاً من الطيور البحرية الرئيسية إلى جانب 14 نوعاً من الطيور المائية الأخرى. ومن بين هذه الطيور، فإن طائر النؤ الجوانيني (Jouanin's petrel) والخرشنة الخطافية (Swift Tern) هما الأقل عدداً. أما النورس أبيض العين (White-eyed Gull)، والذي يستوطن فقط منطقة البحر الأحمر وخليج عدن، فهو يعيش في مجموعات ضخمة في الجزر المصرية بشمال البحر الأحمر، بينما يكثر النورس الأسحم وطائر أبو ملعقة في الجزء الجنوبي من البحر الأحمر فقط.

أما طيور الخرشنة وخاصة الخرشنة المتوجة الصغير والخرشنة المقنعة والخروشنة بيضاء الخد فهي الأكثر انتشاراً من بين كافة الطيور البحرية في المنطقة. أما الأطيش البني (brown booby) فقد وجد في كل الدول بالمنطقة، فيما تم تسجيل الأطيش المقنع (masked boobies) فقط في الجزر الواقعة بالجزء الجنوبي من البحر الأحمر، علماً بأن غالبيته توجد في خليج عدن. ومن الملاحظ أن بعض أنواع الطيور مثل العقاب النسارية والصقر الأسحم والبلشون الأخضر وبلشون الشعاب سجلت معششة في معظم دول الإقليم.

تشمل المخاطر التي تحرق بمجموعات الطيور البحرية كل من الأزعاج التي تحدث من قبل الإنسان، واستغلالها والأنواع المفترسة الداخلة إلى المنطقة وتدمير المواطن الطبيعية (وخاصة من جراء التوسع الحضري) والتلوث والصيد الجائر. وفي كل الأحوال، هنالك حاجة إلى القيام ببحث تفصيلي يتطرق إلى تأثيرات تلك المخاطر. وقد زادت أنشطة المحافظة البيئية في المنطقة بعد إنشاء الوكالات المختصة بالبيئة والمناطق المحمية. وعلى الرغم من ذلك لا تزال المحافظة على الطيور البحرية خارج نطاق أولويات المحافظة على البيئة البحرية في أغلب دول المنطقة.

وحتى يتسنى تطوير وتنفيذ خطة استراتيجية لحماية أعداد الطيور البحرية في المنطقة فإن النقاط التالية تستلزم الاهتمام الفوري: عدم وجود معلومات دقيقة؛ انعدام الفعالية المؤسسية في المحافظة؛ الافتقار إلى الاعتمادات المالية لدعم أبحاث الطيور البحرية والمحافظة عليها؛ عدم وجود خبرات اقليمية؛ عدم وجود بحوث حول المحافظة على الطيور البحرية وضعف الوعي العام بأهمية المحافظة عليها. و من الضروري، تحقيقاً لحماية أفضل للطيور البحرية، أن يتم تعزيز قدرات المحافظة عليها، وذلك لتحسين حماية مناطق تكاثر الطيور وتطوير خطة محافظة للطيور في المنطقة، على أن يشمل ذلك البحوث والمراقبة والتشريعات والتوعية العامة.

الهيئة الإقليمية للمحافظة على بيئة البحر الأحمر وخليج عدن، هي هيئة حكومية تهتم بالمحافظة على البيئات البحرية والساحلية في الإقليم.

تستمد الهيئة قاعدتها القانونية من الاتفاقية الإقليمية للمحافظة على بيئة البحر الأحمر وخليج عدن (1982). وقد تم إعلان إنشائها في القاهرة في سبتمبر 1995 حيث تتخذ من مدينة جدة مقراً لها. تضم الهيئة في عضويتها كل من الأردن ، جيبوتي ، السعودية ، السودان ، الصومال ، مصر واليمن.

عنوان الهيئة : ص ب 53662 جدة 21583 المملكة العربية السعودية

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تم إعداد وثيقة "الوضع الراهن للطيور المعششة في البحر الأحمر وخليج عدن" بواسطة الدكتور/ محمد شبراق (الهيئة الوطنية لحماية الحياة الفطرية وإنمائها – الطائف) ، الأستاذ/ عبد الله السحيباني (الهيئة الإقليمية للمحافظة على بيئة البحر الأحمر وخليج عدن) ، الدكتور/ عمر الصغير (الجمعية اليمنية لحماية الحياة الفطرية) . وقد جرى العمل لإعداد هذه الوثيقة ضمن أنشطة مكون صون المواطن الطبيعية والتنوع الحيوي في إطار تنفيذ برنامج العمل الاستراتيجي للبحر الأحمر وخليج عدن والذي يموله مرفق البيئة العالمي بشركائه الثلاثة: برنامج الأمم المتحدة الإنمائي و برنامج الأمم المتحدة للبيئة والبنك الدولي ، وبتمويل إضافي من البنك الإسلامي للتنمية.

إن الملاحظات التي تم إبدائها في هذه الوثيقة تمثل وجهة نظر المؤلف وتحت مسؤوليته الخاصة ولا تمثل بالضرورة وجهات نظر الهيئة ، أو الجهات التي ساعدت في تمويل إعداد هذا التقرير . وكذلك لا يعبر عن أي وصف أو تفاصيل إجمالية وردت في التقرير ، عن فكرة معينة تُنسب للهيئة أو لأي جهة مانحة ، فيما يتعلق بالحدود القانونية لأي دولة أو منطقة أو مدينة.

يمكن إعادة إنتاج هذا المنشور كلياً أو جزئياً بأي شكل من الأشكال بدون موافقة أصحاب حقوق الطبع ، وذلك لأغراض تعليمية وغير ربحية بشرط أن يتم التتويه عن مصدر المنشور . وسوف تكون الهيئة الإقليمية شاكراً ومقدرة لاستلام أي منشور يستفيد من هذا التقرير كمصدر من مصادر المعلومات.

لا يسمح بنسخ هذا المنشور أو توزيعه إلكترونياً أو بيعه مرة أخرى أو لأي أغراض تجارية أخرى بدون ترخيص مسبق ومكتوب من الهيئة الإقليمية.

الهيئة الإقليمية للمحافظة على بيئة البحر الأحمر وخليج عدن

الوضع الراهن للطيور المعششة
في البحر الأحمر وخليج عدن